3.1- COURSES IN ALL PROGRAMMES

(2015-16)

Index

I Year B.Tech. Biotechnology I - Semester

L	T	P	To	C
4	-	-	4	4

HS112 MATHEMATICS FOR BIOTECHNOLOGISTS - I

Course description and Objectives :

Without mathematics not a single day of an engineer will pass! Aim of this course is to introduce some elementary mathematics to non mathematical students. We study progressions, binomial theorem, partial fractions, trigonometry, plane geometry etc. We also introduce basic vector algebra. Later we introduce the differentiation and integration and later differential equations, which have many applications.

Course Outcomes:

1. This course will bridge the gap of biological students to cope up with mathematics during their Engineering programme.
2. This course will help them to learn progressions, binominal theorem, partial fractions, trigonometry, and plane geometry along with vector algebra.
3. The differentiation and integration will help them to use many applications effectively and efficiently in their engineering course.
4. All the above topics will be useful in their research work as well as projects.
5. First order first degree differential equations applications will be used in law of cooling, growth and decay problems.
6. The concept of maxima-minima has many real time applications.

UNIT I - Mathematical Preliminaries

Arithmetic & geometric progression, finding n^{th} term, sum of n terms, Binomial theorem, Partial fractions, Trigonometric ratios, Sum of angles, compound angles.

UNIT II - Straight line and Vector Algebra

Cartesian co-ordinates (in XY-plane), Straight lines different forms, Angle between straight lines, Point of intersection. Vector Algebra: Vector addition, Multiplication, Representation, Geometrical resultant Vectors, Orthogonal, Parallel vectors, Angle between vectors.

UNIT III - Differential Calculus

Concept of limit, continuity, differentiation, product rule, quotient rule, differentiation of trigonometric, logarithmic, exponential functions, Introduction to partial differentiation, Euler's theorem, maxima & minima.

UNIT IV - Integral Calculus

Introduction, Integration of different functions, methods of integration, integration by parts, Concept of definite integrals, application of definite integrals, problems on areas.

UNIT V - Ordinary Differential Equations

Formation of differential equation by eliminating arbitrary constants, first order and first degree – variable separables, exact, homogeneous, linear & Bernoulli's equation.

Applications of first order ordinary differential equations to growth and decay problems.

TEXT BOOKS :

1. *P. Seshagiri Rao*, "A Text book of Remedial Mathematics", 1st Edition, Parma Med Press, Hyderabad, 2008.
2. *T.K.V. Iyengar and others*, "Engineering Mathematics" Volume-I, 9th Edition, S. Chand & Company, 2010.

REFERENCE BOOKS :

1. *B.S.Grawal*, "Higher Engineering Mathematics", 40th Edition, Khanna Publishers, 2009.
2. *H.K. Dass*, "Advanced Engineering Mathematics", S.Chand & Co, 2002.

I Year B.Tech. Biotechnology I - Semester

L	T	P	To	C
4	-	-	4	4

HS 113 ENGINEERING PHYSICS

Course description and Objectives :

There is a symbiotic relation between physics and engineering. Broadly speaking, engineering is mainly applied physics. Recent technical developments have been the result of joint efforts of physicists and engineers. A proper study of physics is therefore indispensable for an engineering student to excel in his field. The purpose of this course is to present the principles and concepts of physics as relevant to an engineer.

Course Outcomes:

The students will be made to get acquainted to the following learning outcomes:

1. Concepts of Physical optics, devices and applications.
2. Ultrasonic waves, production, applications in NDT.
3. Introduction to Quantum mechanics in relevance to that of modern physics.
4. Exposure to latest inventions like lasers, fibers and applications
5. Insight into nano technology and applications, solar energy to combat energy crisis.

UNIT I - Physical Optics

Interference – Types - Interference in thin films (Reflection) – Newton's Rings – Michelson's Interferometer, Fabry-perot interferomenter – Applications.

Diffraction – Fraunhoffer Diffraction at single slit – Diffraction grating
Polarization – Production of plane polarized light – Nicol prism – Optical activity – photo elasticity.

UNIT II - Ultrasonics & NDT

Ultrasonics : Introduction – production of ultrasonic waves – piezoelectric method – Properties of ultrasonic waves – Types of ultrasonic waves – Determination of Velocity of ultrasonic waves in solids and liquids – Applications.

NDT : Introduction - Types – Theory and practice of Ultrasonic Testing – Ultrasonic Testing Systems – Ultrasonic Testing Methods – X-Ray Radiography.

UNIT - III Quantum Mechanics & Free electron theory of metals

Quantum Mechanics : Matter waves - Schroedinger's time independent wave equation - Physical significance of the wave function - Particle in one dimensional potential well – tunneling phenomenon.

Free electron theory of metals : Introduction – Classical free electron theory – Electrical conductivity of metal – Fermi - Dirac distribution function and its variation with temperature – Quantum free electron theory.

UNIT IV - Lasers & Fiber Optics:

Lasers: Characteristics of Laser light – Spontaneous and Stimulated emission of radiation – Low power and High power lasers, He-Ne Laser – CO_2 Laser – Nd-Yag laser - Applications of Lasers, Holography and Applications

Fiber Optics: Principle of optical fiber - materials – Numerical Aperture – Types of fibers – Dispersion and Attenuation in optical fibers – Optical sensors – Optical fiber communication system.

UNIT V - Solar Energy & NanoScience and Technology

Solar Energy : Solar radiation – Photovoltaic effect – solar cells – Efficiency of solar cell – Solar thermal energy conversion systems.

NanoScience & Technology : Introduction to nano meterials – Basic principles of nanoscience & Technology – Fabrication of nanomaterials – Physical & Chemical properties of nanomaterials – Applications of nanotechnology.

TEXT BOOKS :

1. M.R.Srinivasan, "Physics for Engineers" New Age International, 2002-2003.
2. M.N. Avadhanulu & P.G. Kshirasagar, "Engineering Physics", 1st edition, S. Chand & Company Ltd, 1992.

REFERENCE BOOKS :

1. Halliday, Resnic and Walker, "Fundamentals of Physics", 6th edition, John Willey publishers, 2003.
2. Grawfor F.S., Berkley Physics courses, "Waves and Oscillations", Volume III McGraw Hill, 1992.
3. V. Raghavan, "Materials Science and Engineering", 5th edition, Prentice-Hall India, 2004.
4. S.O.Pillai, "Solid State Physics", 6th edition, New Age International Publications, Revised, 2005.

I Year B.Tech. Biotechnology I - Semester	L	T	P	To	C
	4	-	-	4	4

ME 101 ENGINEERING MECHANICS

Course description and Objectives :

The course aims to impart the knowledge to understand the forces and their reactions on various static and dynamic conditions.

Course Outcomes:

1. Use scalar and vector analytical techniques for analyzing forces in statically determinate structures.
2. Solve the engineering problems in case of equilibrium conditions and to calculate the reaction forces of various supports of different structures.
3. Determine the centroid, centre of gravity and moment of inertia of various surfaces and solids.
4. Solve the problems involving dry friction.
5. Apply fundamental concepts of kinematics and kinetics of particles to the analysis of simple, practicalproblems.

UNIT I - Basic Concepts and Principles of Statics :

Introduction to Engineering Mechanics, Scalar and Vector quantities, Forces, Characteristics of a force, Definitions and examples of various types of force systems, Law of transmissibility, Definition of resultant, Composition and resolution of forces, Moment of a force, Principles of moments of force, Couples, characteristics of a couple, Transformations of a couple, Resultants of Force Systems, Possible resultants of different types of force systems, Resultant of a concurrent coplanar force system, Resultant of a non concurrent coplanar force system

UNIT II - Equilibrium of Rigid Bodies

Free body diagrams, Types of supports and their reactions, requirements of stable equilibrium, Equations of equilibrium of a concurrent coplanar force system, Equilibrium of Bodies acted on by two or three forces, Equilibrium of bodies acted on by non-concurrent coplanar force system

UNIT III - Properties of Surfaces and Solids :

Centroid and Center of Gravity: Centre of gravity of parallel forces in a plane, centroids and center of gravity of composite bodies, Distributed Loads on Beams.

Moments of Inertia: Definition, Parallel axis theorem and perpendicular axis theorem for areas, Polar Moment of inertia, Second moment of area by integration, Radius of gyration of areas, Moments of inertia of composite areas.

UNIT IV - Friction :

Nature of friction, Laws of friction, Coefficient of friction, Angle of friction, Cone of friction, Types of Friction - Sliding Friction, Rolling Friction, Belt Friction, Ladder Friction, Wedge friction.

UNIT V - Kinematics and Kinetics :

Absolute Motion: Introduction, Recapitulation of basic terminology of mechanics, Displacement, Velocity and acceleration their relationship, Rectilinear motion of a particle

Relative Motion: Introduction to kinematics of relative motion, Relative displacement, Relative velocity

Kinetics: Introduction to Kinetics, Force, Mass and Acceleration, Newton's Laws of motion, Equation of motion for a particle, D Alembert's principle, Rectilinear translation of a rigid body, Work done by a force, Work done by a force system, Energy, Potential energy, Kinetic energy, Principle of Work and kinetic energy, Conservation of energy, Linear impulse, Linear momentum, Principle of linear impulse and linear momentum, Conservation of linear momentum.

TEXT BOOKS :

1. J. L. Meriam, L. G. Kraige, "Engineering Mechanics: Dynamics", 7th ed., John wiley & sons, 2012

2. A. K. Tayal, "Engineering Mechanics", Umesh Publications, 2005.

REFERENCE BOOKS :

1. L. Singer - Harper, "Engineering Mechanics", 3rd ed., Fedinand . , Collins, 1975.

2. Timoshenko & Young, "Engineering Mechanics", 4th ed., Tata McGraw Hill, New Delhi, 2007.

3. S. S. Bhavakati & J. G. Rajasekharappa, "Engineering Mechanics", 3nd ed., New Age International Publications, New Delhi, 2008.

I Year B.Tech. Biotechnology I - Semester

L	T	P	To	C
3	2	-	5	5

HS 114 TECHNICAL ENGLISH COMMUNICATION

Course description and Objectives :

To introduce students to the specific use of language for the purposes of Technical Communication which would be an essential prerequisite for success in the areas of writing and speech. The teaching efforts in this course will be directed towards making students develop their technical and non-technical writing abilities using the fundamental principles that apply to the correct use of the English language free of grammatical and other related errors.

Course Outcomes:

Students shall achieve the ability to write and demonstrate college-level proficiency in the following:

1. Clear and effective communication of meaning in speaking and writing.
2. The ability to perform effectively the essential steps of the writing process (Note making, organizing, composing, revising, and editing).
3. The ability to explain, develop, and criticize ideas effectively.
4. Effective organization within the paragraph and the essay.
5. Accuracy, variety, and clarity of sentences.
6. Appropriate diction.
7. Control of conventional mechanics (e.g., punctuation, spelling)

UNIT - I

- Text : Environmental Consciousness (Climate Change – Green Cover – Pollution)
- Grammar : Articles – Prepositions – Sentence Types and Construction
- Vocabulary : Root – Prefixes - Suffixes
- Composition : Paragraph Writing (Descriptive & Narrative)

- Lab Practice : Introduction to Phonetics

  (Organs of Speech; Consonants, Vowels & Diphthongs; Syllable, Stress & Intonation)

UNIT - II

- Text : Emerging Technologies

  (Solar Power – Cloud Computing – Nanotechnology)
- Grammar : Time and Tense (Present-Past-Future; Helping Verbs; Modals)
- Vocabulary : Synonyms – Antonyms
- Composition : Note-making
- Lab Practice : Grammar Practice (Speaking of past, present & future)

UNIT - III

- Text : Energy

  (Renewable and Non-renewable Sources – Alternative Sources – Conservation – Nuclear Energy)
- Grammar : Subject-Verb Agreement - Sentence Construction

  (Characteristics of Technical Writing)
- Vocabulary : Idioms & Phrases
- Composition : Summarizing
- Lab Practice : Situational Conversations – Role-Plays

  (Introducing; Greeting; Enquiring; Informing; Requesting; Inviting)

UNIT - IV

- Text : Engineering Ethics

  (Challenger Disaster – Biotechnology – Genetic Engineering – Protection from Natural Calamities)
- Grammar : Sentence Transformation (Degrees, Voice, Speech & Synthesis)

- Vocabulary : Phrasal Verbs
- Composition : Letter Writing (Informal)
- Lab Practice : Situational Conversations – Role-Plays (Emotions; Directions; Descriptions; Agreements; Refusals; Suggestions)

UNIT - V

- Text : Travel and Tourism (Advantages and Disadvantages of Travel-Tourism – Atithi Devo bhava – Tourism in India)
- Grammar : Common Errors
- Vocabulary : One-word Substitutes
- Composition : Letter Writing (Formal)
- Lab Practice : Group Discussions

TEXT BOOK:

Mindscapes - English for Technologists and Engineers, Orient Black Swan, 2012.

REFERENCE BOOKS :

1. V. R. Narayana Swamy***, "Strengthen Your Writing",*** 1st edition, Orient Longman, 2003.
2. Thomas Elliott Berry***, "The Most Common Mistakes in English Usage",*** 1st edition, Tata McGraw Hill, 2004.
3. T. Balasubramanyam, ***A Textbook of English Phonetics for Indian Students***, Macmillan Ltd., 2000.
4. Sasikumar.V and P.V. Dhamija,. ***Spoken English: A Self-Learning Guide to Conversation Practice,*** 34th Reprint, Tata McGraw Hill, New Delhi, 1993.
5. Margaret M Maison, **"Examine your English",** 1st edition**,** Orient Longman, 1999.
6. Ashraf Rizwi, "***Technical English Communication***", Tata McGraw Hill, Latest Edition.i

I Year B.Tech. Biotechnology I - Semester

L	T	P	To	C
5	-	-	5	5

CS101 PROBLEM SOLVING AND COMPUTER PROGRAMMING

Course description and Objectives :

Aim of this course is to introduce the techniques of problem solving and concepts of programming language to the students. Because of its popularity and suitability to develop different types of applications, 'C' language has become the de-facto programming language to engineers. A comprehensive introduction of C language is offered through this course to enable the students to write diversified programs.

Course Outcomes:

On Completion of this course student should be able to

1. Able to understand the basic terminology used in computer programming and to write, compile and debug programs in C language.
2. Use different data types in a computer program and design programs involving decision structures, loops and functions.
3. Able to understand the allocation of dynamic memory using pointers
4. Use different data types to create/update basic data files.

UNIT I - Fundamentals of computers

Basic functional units and discrete components of a computer, computer networks, networking components, Binary representation of integers and real numbers, ASCII, EBCDIC, Unicode, Generations of computer languages.

UNIT II - Problem Solving Steps and Basic of C Language

Problem understanding, Formulating a mathematical model, Development of an algorithm, Representation of an algorithm, Flow chart and Pseudo code, Coding, Testing and Debugging, Comments, Processor statement, Function header statement, Variable declaration statement and Executable statement, C Character Set, constants, identifiers, operators, punctuations, keywords, Basic data types, modifiers, identifiers, variables, C scopes, type qualifiers, storage class specifiers, variable initializations, constants, reading and writing characters, formatted I/O.

UNIT III – Preliminaries of C

Assignment, arithmetic , relational, logical, bitwise, ternary, address, indirection, sizeof, dot, arrow, and parentheses operators, Expressions Precedence of operators and associatively, Category of Statements, Selection, Iteration, jump, label, expression and block, Function declaration, prototype, definition, calling by value and address, standard library functions and recursive functions.

UNIT IV - Arrays and Pointers

Declaration, initialization, reading, writing, accessing and passing as a parameter to functions, Multidimensional arrays and String functions, pointer expressions, pointer and arrays, multiple indirection, initializing pointers, pointer to functions, Dynamic memory allocation functions.

UNIT V - Structures and File Processing

Declaration, initialization and accessing, array of structures and passing structures to functions, structure pointers, arrays and structures within structures, unions, bit-fields, typedef and enumerations, I/O and processing operations on text and binary files. pre-processor directives.

TEXT BOOKS :

1. Reema Thareja, “Introduction to C Programming”, Oxford University Press, India, 2013

2. Herbert Schildt, C: “The Complete Reference”, 4th Edition, Tata McGraw-Hill, 2000.

REFERENCE BOOKS :

1. E. Balagurusamy, “ Programming in ANSI C”, 4TH Edition, Tata McGraw- Hill, 2008.

2. R Ravichandran and T Jeyapoovan, “ Computer Programming with C”, Soni Graphics, India, 2014.

I Year B.Tech. Biotechnology I - Semester	L	T	P	To	C
	2	-	-	2	-

CS 105 NETWORK SECURITY

Course description and Objectives :

This Course focuses towards the introduction of System, Information and Network security using various methodologies. It also focuses on the practical aspects that have been used to provide e_mail and web security.

Course Outcomes:

On Completion of this course student should be able to

1. understand the Importance of Information Security
2. Know the ways to protect the information
3. understand the Firewall importance
4. understand the need of Virtual Private Networks.

UNIT I - History of security :

History of security – Physical security, communications security, emissions security, computer security, network security and information security. Security process - Anti-virus software, access controls, firewalls, smart cards, biometrics, intrusion detection, policy management, vulnerability scanning, encryption, physical security mechanisms.

UNIT II - Access attacks

Snooping, eavesdropping, interception; Modification attacks - Changes, insertion and deletion; Denial of service attacks- Denial of access to information, applications, systems and communication; Repudiation attacks - Masquerading and denying an event. Hacking - Hacker motivation, historical hacking techniques, IP spoofing and malicious code.

UNIT - III

Confidentiality of files, information in transmission and traffic flow, integrity, availability and accountability; Integrity of files and information during transmission; Availability - backups, failover and disaster recovery; Accountability – identification and authentication, and audit.

UNIT - IV

Concepts of firewalls, Application layer and packet filtering firewalls; Virtual Private Networks.

UNIT - V

Basic encryption concepts, Private Key encryption standards-DES, triple DES and AES. Public key encryption – RSA. Concepts of digital signatures.

TEXT BOOKS :

1. Eric Maiwald, Fundamentals of Network security, Dreamtech Press, 2007.

REFERENCE BOOKS :

1. William Stallings, “Cryptography and Network security”, 4th edition, Pearson Education, 2010

I Year B.Tech. Biotechnology I - Semester

L	T	P	To	C
-	-	3	3	3

CS 107 COMPUTER PROGRAMMING LAB

Course description and Objectives :

To familiarize the students in preparation of documents and presentations with office automation tools. A comprehensive problem solving skills through C language is offered to enable the students to write diversified solutions using this language.

Course Outcomes:

1. Able to write, compile and debug programs in C language.
2. Able to formulate problems and implement algorithms in C.
3. Able to effectively choose programming components that efficiently solve computing problems in real-world

List of Experiments :

1. Write A Program to find simple Interest, compound interest
2. Write A Program to covert given temperature from C to F & F to C
3. Write A Program to check Entered number is positive or zero or Negative
4. Write A Program to print given year is Leap year or not
5. Write A Program to do arithmetic operations using switch
6. Write A Program to find biggest among 3 Numbers
7. Write A Program to print grade of a student for 5 sub avg>70(A), 60-70(B), 50-60(C),<50(F)
8. Write A Program to find Roots fo Quadratic Equation
9. Write A Program to find sum of individual digits of a given number
10. Write A Program to check whether the given number is PALINDRAM or not
11. Write A Program to check whether the given number is PERFECT or not
12. Write A Program to check whether the given number is PRIME or not
13. Write A Program to check whether the given number is ARMSTRONG or not
14. Write A Program to check whether the given number is STRONG or not
15. Write A Program to find sum of Natural Numbers

16. Write A Program to print the following triangle

```
      1
    2   3
  4   5   6
7   8   9   10 etc……….
```

17. C Progrm to find Factorial of Given number using Recursive and Non Recursive Functions.
18. Write A Program to print Fibonacci Series upto given limit using recursive, Non recursive
19. Write program in C for determining the minimum and maximum and sum of elements of an array of 'n' elements and searching for a given element.
20. C Program for computing range, mean and standard deviation of a given numeric dataset.
21. Write A Program in C for performing addition, subtraction, multiplication and transpose operations on matrices.
22. Write program to perform the following string operations on the given string. a) string length b) string copy c) string concatenation d) string comparison e) reverse string f) sub string
23. Write A Program to read student record (no, name, marks1, marks2, marks3, marks4, marks5, calculate average and Grade) and display the student record.
24. Write A Program to do arithmetic operations using pointers.
25. Write A Program to create two data files and copy the content of these two data files as a single file in another new file?

REFERENCE BOOKS :

1. Reema Thareja, "Introduction to C Programming", Oxford University Press, India, 2013
2. Herbert Schildt, C: "The Complete Reference", 4th Edition, Tata McGraw-Hill, 2000.
3. E. Balagurusamy, " Programming in ANSI C", 4TH Edition, Tata McGraw- Hill, 2008.
4. R Ravichandran and T Jeyapoovan, " Computer Programming with C", Soni Graphics, India, 2014.

I Year B.Tech. Biotechnology I - Semester

L	T	P	To	C
-	-	3	3	2

ME 105 WORKSHOP PRACTICE

Course description and Objectives :

To provide the hands on experience to the students on basic workshop skills.

Course Outcomes:

After completion of this course, students will be able to identify various tools connected to all the trades. They are also able to make various objects to the given dimension by using various types of tools.

Trades for exercises:

1. Carpentry:
2. Fitting
3. Tin Smithy & Black smithy
4. House wiring
5. Foundry & Welding (Demonstration)
6. Machine shop & CNC (Demonstration)
7. IT Workshop
8. Study of discrete components of computer and networking (1 session)
9. Demonstration of assembling a computer, disk partitioning and installation of system and application software. installation of modem etc. (2 sessions)

Note: In each trade, the students has to perform at least two jobs

TEXT BOOKS :

1. S.K. Hazra Choudhury, Elements of workshop Technology, 11th Edition, Media Promoters, 1997
2. Gopal, T.V., Kumar, T., and Murali, G., A first course on workshop practice – Theory, Practice and Work Book, Suma Publications, Chennai, 2005.
3. Venkatachalapathy, V. S., First year Engineering Workshop Practice, Ramalinga Publications, Madurai, 1999.

I Year B.Tech. Biotechnology I - Semester

L	T	P	To	C
-	-	3	3	2

HS 120 ENGINEERING PHYSICS LAB

Course description and Objectives :

This lab is intended to make the students realize the theoretical concepts of physics having hands on experience in conducting the following experiments. Students may have to take up any 10 experiments from each section.

Course Outcomes:

1. Students realize concept of resonance of sound conducting the experiment of Sonometer Melde's experiment and volume generator.
2. The students understand the concepts of light conducting the experiments of dispersion of light, diffraction of light, optical fibers and lasers.
3. The students acquire the knowledge of magnetic field theory, thermal energy and elastic properties by conducting the experiments of field along the axis of circular coil, Lee's experiment, Seebeck effect and Torsional pendulum.

PHYSICS LAB

1. Verification of laws of transverse vibrations in stretched string - Sonometer
2. Melde's Experiment - Transverse and Longitudinal modes.
3. Determination of Rigidity modulus of a material in the form of a wire - Torsional pendulum
4. Dispersive power of the material of a Prism - Spectrometer
5. Determination of wavelength of a monochromatic light source - Diffraction Grating.
6. Field along the axis of a circular coil – stewart Gee's apparatus.
7. Volume Resonator.
8. Band gap of semiconductor
9. Hall coefficient
10. Thermal conductivity of bad conductor Lee's method
11. Optical Fiber – Determination of numerical aperture
12. Solar Cell
13. Seebeck effect

REFERENCE BOOKS:

1. Vogel's Text book of qualitative Chemical Analysis J.Mendham, R.C Denney, J.D. Bares, M.Thomas & B. Siva Sankar, Pearson Publications – Volume I (2009).

I Year B.Tech. Biotechnology II - Semester

L	T	P	To	C
4	-	-	4	4

HS 116 MATHEMATICS FOR BIOTECHNOLOGISTS - II

Course description and Objectives :

Without mathematics not a single day of an engineer will pass! In this course we start with matrices, solving system of equations. Continue with higher order differential equations. We also study Laplace Transformations using which we can solve differential equations. When data is given at only a finite points, we use numerical methods for find the approximate values of functions, also to solve differential equations approximately etc.

Course Outcomes:

1. The students will be able to use Laplace transformations in solving differential equations.
2. Definite integrals can be evaluated using Laplace transforms.
3. They will analyze the data, when the data is given at only a finite point.
4. They will use numerical methods for finding the approximate values of functions and will solve differential equations.
5. Numerical integration can be applied in finding approximate areas.

UNIT I - Matrices :

Types of Matrices, determinants, Inverse of a square matrix, Rank of matrix, Echelon form, Solving of simultaneous equations by Cramer's method, Matrix inversion, Gauss Jordan methods, Solutions for linear equations, Eigen values & Eigen Vectors, Cayley-Hamilton theorem (without proof).

UNIT II - Higher Order O.D.E :

Non homogenous linear differential equations of second and higher order with constant coefficients with RHS term of the form e^{ax}, Sin ax, Cos ax, Polynomials in x.

UNIT III - Laplace Transforms :

Laplace transforms of some standard functions, linearity property, shifting theorems, change of scale properties, multiplication by powers of t, division by t, Inverse Laplace transforms, shifting properties, finding inverse Laplace transforms by partial fractions, multiplication by powers of s, division by Applications of L.T. for solving ordinary differential equations.

UNIT - IV : Numerical Methods – 1 : Bisection, Newton Raphson, Successive approximation methods.

Interpolation: Lagrange, Newton's forward & backward, Guass's forward & backward interpolation methods.

UNIT V - Numerical Methods – 2 :

Numerical integration by trapezoidal & Simpson's Rules.

Numerical solutions to differential equations : Euler, Runga Kutta Methods.

TEXT BOOKS :

1. *T.K.V.Iyengar, and others*, “Engineering Mathematics” Volume – I, 2009, S.Chand and Company.

2. *T.K.V. Iyengar, and others*, “Mathematical Methods, S.Chand and Company, 2009.

REFERENCE BOOKS :

1. *B.S.Grawel*, “Higher Engineering Mathematics”, Khanna Publishers.

2. *Peter V.O Neil*, “Advanced Engineering Mathematics”, Thomson Broocks/cole.

3. *Erwin Kreyszig*, “Advanced Engineering Mathematics”, 8th Edition, John Wiley & Sons (Asia) Pvt. Ltd. 2001.

I Year B.Tech. Biotechnology II - Semester

L	T	P	To	C
3	-	-	3	3

HS 118 ENVIRONMENTAL STUDIES

Course description and Objectives :

The objective of this course is to heighten on awareness of nature and its importance to students

and make them understand the need to make judicious use of all natural resources for long team sustenance of life on this planet.

Course Outcomes:

1. To provide Knowledge on importance of natural resources and integrate technical "field" knowledge with analytical skills to prevent natural resources depletion
2. To maintain healthy and Diverse Ecosystems ,
3. Work together to conserve the biodiversity
4. Take immediate measures to control the Pollution
5. Adopt Ecofriendly technology.
6. Maintenance of hygienic conditions

UNIT I - Environment and Natural Resources :

Environment: Definition, Scope and Importance – Need for Public Awareness

Natural Resources: Renewable and non-renewable resources – Natural resources and associated problems – Forest Resources: Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources: Use and over utilization of surface and ground water – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources - Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity–Energy resources: renewable and non-renewable energy sources, alternate energy sources. Land resources: Land as a resource, land degradation, Soil erosion – case studies - Role of an individual in conservation of natural resources.

UNIT II - Ecosystems and Biodiversity :

Ecosystem: Concept of an ecosystem. – Complete and incomplete ecosystem - Structure and functions of an ecosystem - Ecological succession. - Food chains, food webs -Structure and functional features of the following ecosystem: a. Forest ecosystem b. Grassland ecosystem c. Desert ecosystem, d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) **Biodiversity**: introduction of biodiversity, Bio-geographical classification of India - Value of biodiversity- Biodiversity at global, National and local levels - Hot-spots of biodiversity - Threats to biodiversity - Endangered and endemic species of India – Conservation of biodiversity

UNIT III - Environmental Pollution and Applications of Remote Sensing / GIS on Environment

Definition, Cause, effects and control measures of: Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution - Solid waste Management: Causes, effects and control measures of municipal and industrial wastes - Climate change, global warming, acid rain, ozone layer depletion -Case Studies - Role of an individual in prevention of pollution - Pollution case studies. – Green technology and its concept, role of green technology in controlling environmental problems.

UNIT IV - Social issues and EIA :

Sustainable development -water conservation: Cloud Seeding (Artificial rain making system), rainwater harvesting, watershed management - Disaster management: floods, earthquake, cyclone and landslides - Environment Protection Act. - Air (Prevention and Control of Pollution) Act. - Water (Prevention and control of Pollution) Act - Wildlife Protection Act - Forest Conservation Act

EIA: introduction to E.I.A.-definition of E.I.A and E.I.S – scope and objectives of E.I.A.- methods of E.I.A –CEIA, REIA, MOEF, CPCB, SPCB – Importance of E.I.A in proposed Projects / Industry /

Developmental activity - Remote sensing / GIS: Introduction of remote sensing / GIS, definition of remote sensing, applications of the remote sensing on environment (site selection, land use/land cover pattern, water/ air/soil quality models, a criteria of environmental information systems)

UNIT V - Environmental Sanitation :

Food sanitation: food and drugs Act, food preservations, food borne diseases-Milk sanitation: tests for milk, pasteurization of the milk - water borne diseases-air borne diseases-viral diseases (HIV/AIDS, SARS, bird-flu, anthrax)- maintenance of sanitary and hygienic conditions

Field Work/Environmental Visit: Visit to a local area to document environmental assets – river/ forest/ grassland / hill /mountain - Study of local environment - common plants, insects, birds - Study of simple ecosystems – pond, river, hill, slopes etc - Visits to industries, water treatment plants, effluent treatment plants

TEXT BOOKS :

1. Y. Anjaneyulu, “Introduction to Environmental Science”, B S Publications, 2008.
2. Dr. M. Chandrasekhar, “A Text book of Environmental Studies”, HI-TECH publications, 2006

REFERENCE BOOKS :

1. Dr. M. Anji Reddy, “A Text book of environmental science and Technology”, B S Publications, 2008
2. Dr. K. Mukkanti, “A Text book of Environmental Studies”, S.CHAND Company Ltd, 2009.
3. EHILRS and ST, “Text book of Municipal and Rural Sanitation”, M.S Hill, 1998.
4. C. S. Rao, Wiley Eastern Ltd, “Environmental Pollution Control Engineering”, New Age International Ltd, 2001
5. Dr. M. Anji Reddy, “Introduction to Remote Sensing”, B S Publications, 2004.
6. Kurian Joseph and R.Nagendram, “Essentials of environmental studies”, Pearson Education Pt Ltd, Delhi, 2007.
7. Sharma & Kour “Text book of Environmental pollution”.
8. H.C Perkins “Text book of Air Pollution”.

II Year B.Tech. Biotechnology II - Semester

L	T	P	To	C
4	-	-	4	4

EE 111 FUNDAMENTALS OF ELECTRICAL ENGINEERING

Course description and Objectives :

To understand the basic concepts, laws, techniques in analyzing various DC and AC circuits and concepts in coupled circuits. Study of construction details, working of various electrical machines and Semiconductor Devices and operation

Course Outcomes:

1. Able to explain the notation and components of electric circuits
2. Able to analyze DC and single phase and three phase AC circuits using different methods and theorems
3. Able to operate various electrical machines.
4. Able to explain the concepts of Semiconductor Devices and operation

UNIT I - Fundamentals Of DC Circuits

Circuit Concepts: Concepts of network, Active and passive elements, voltage and current sources, concept of linearity and linear network, unilateral and bilateral elements, R, L and C as linear elements. Ohm's Law – Kirchhoff's Laws –application to simple series, parallel circuits, mesh and nodal analysis of simple resistive circuits.(simple numerical problems).

UNIT II - Fundamentals of A.C. Circuits:

Generation of A.C. voltage - frequency, average value, R.M.S. value, form factor, peak factor for sinusoidal only - phasor representation of alternating quantities. Analysis of simple series and parallel A.C. circuits-(simple numerical problems)

Balanced Three phase systems – relation between phase and line quantities of voltages and currents in star and delta connected systems (Elementary treatment only)

UNIT III - Fundamentals of Electromagnetism and Transformers:

Concepts of Magneto motive force, reluctance, flux and flux density , concept of Self Inductance and Mutual Inductance, Coefficient of coupling-only elementary treatment. (simple numerical problems).

Transformers: Principle of operation of single phase transformer – constructional features – EMF equation (simple numerical problems)

UNIT IV - Electrical Machines:

DC Machines: Constructional details of a D.C. Machine.

D.C. Generator – Principle of operation – EMF equation – types of D.C. generators (simple numerical problems)

D.C. Motor – Principle of operation – Torque equation – types of D.C. motors (simple numerical problems)

A.C Machines: Principle of operation of three phase induction motors – slip ring and squirrel cage motors – Torque equation derivation, Constructional details of synchronous machines.

UNIT V - Semiconductor Devices:

Classification of solids based on energy band theory - Intrinsic semiconductors - Extrinsic semiconductors - P type and N type semiconductors - P-N junction diode and its characteristics –Half and Full wave rectifiers- Zener diode and its characteristics - Voltage regulator. Bipolar junction transistor – Operation-Types- Applications.

TEXT BOOKS:

1. Mittle, V.N., “Basic Electrical Engineering”, 2nd ed., TMH, New - Delhi, 1990.
2. V.K.Mehta,”Principles of Electrical Engineering and Electronics”, 3rd ed., S. Chand Publications, New Delhi, 2010.

REFERENCE BOOKS:

1. Millman & Halkias, “Integrated Electronics”, McGraw Hill, 1979.
2. A.K. Thereja & B.L. Thereja, “Electrical Technology”, Vol. – II, S.Chand Publications, 2007.
3. U.Bakshi & A.Bakshi, “Basic Electrical Engineering”, 1st ed., Technical Publications, Pune, 2005.
4. U.Bakshi & A.Bakshi, “Basic Electrical Engineering”, 1st ed., Technical Publications, Pune, 2005.

I Year B.Tech. Biotechnology II - Semester	L	T	P	To	C
	4	-	-	4	4

HS 117 ENGINEERING CHEMISTRY

Course description and Objectives :

Chemistry is the backbone in designing and understanding the nature and properties of various engineering materials. Currently, the electronics and computer engineers are waiting for suitable polymers for using miniature super computers. So this subject develops fundamental knowledge about new engineering materials and their significance in technical fields and industrial sectors. Water is an essential element for the existence of human, plant and animal lives, besides that it has greater industrial applications. The knowledge about water is the basic requirement for a professional student. Characterization of materials with instrumental techniques is essential for engineers.

Course Outcomes:

1. Differentiate between soft and hard water. Understand the disadvantages of using hard water domestically and industrially. Select and apply suitable softening methods (Soda-lime, zeolite, ion-exchange methods, etc.) to soften the hard water for industrial and domestic applications.
2. Acquaintance of primary and secondary cells, Hydrogen-Oxygen and Methanol fuel cells, dry and wet corrosions, corrosion controlling methods
3. Acquaintance of the properties and engineering applications of Ceramics, Refractories, Glasses, Cement, Abrasives, Lubricants
4. Acquaintance of Preparation, properties and applications of different polymers (Polyethylene, PVC, Tefflon, Bakelite,Urea-Formaldehyde, Silicones, Rubber – Vulcanization, Synthetic Rubbers-(Buna-S, Buna-N, Neoprene); treatment of membranes.
5. Acquaintance of various spectroscopic methods (UV-visible / IR), Beer-Lambert's Law, qualitative and quantitative analysis, block diagrams of UV and IR spectrophotometers.

UNIT I - Water Technology :

Introduction-Hardness of water-Determination of hardness by EDTA-Disadvantages of hard water-Scales & Sludges-Caustic embrittlement-Boiler corrosion-Priming & Foaming, WHO, BIS Standards of water-Softening Methods- Lime Soda process, Zeolite process, Ion Exchange process - Desalination of brackish water-Reverse osmosis, Electro dialysis.

UNIT II - Electrochemical cells and AND Corrosion:

Electrochemical cells: primary cell-(Dry or lecalanche cell), Secondary cell-(Lead-acid storage cell, Lithium ion battery), Hydrogen-Oxygen Fuel cell, Methanol fuel cell.

Corrosion: Introduction-Dry corrosion (chemical)-Wet corrosion (electrochemical)-Mechanism of wet corrosion-Bimetallic corrosion-Concentration cell corrosion-Factors influencing corrosion-Corrosion control methods- Cathodic protection and Electroplating.

UNIT III - Engineering Materials :

Properties and engineering applications of Ceramics, Refractories, Glasses, Cement,Abrasives, Lubricants.

UNIT IV - Polymers :

Introduction –Types of polymerization-Preparation, properties and applications of Polyethylene, PVC, Tefflon, Bakelite, UreaFormaldehyde, Silicones, Rubber – Vulcanization, Synthetic Rubbers - (Buna-S, Buna-N, Neoprene). Elementary treatment of Membranes

UNIT V - Instrumental Techniques :

Interaction of radiation with matter,UV-Visible Spectroscopy-Beer – Lambert's law ,Qualitative and Quantitative Analysis,Block diagram of UV-Visible Spectrophotometer.IRSpectroscopy-Types of Vibrations,Identification of functional groups,Block diagram of IR Spectrophotometer.

TEXT BOOKS :

1. P.C Jain and Monica Jain, "Engineering Chemistry", 15th edition, Dhanpat Rai Publications 2009.
2. Gurudeep Raj and Chatwal Anand, "Instrumental Methods of Analysis", 5th edition, Himalaya Publications, 2007.

REFERENCE BOOKS :

I Year B.Tech. Biotechnology II - Semester

L	T	P	To	C
4	-	-	4	4

BT 101 ELEMENTS OF BIOLOGY & BIOTECHNOLOGY

Course description and Objectives :

This course will provide fundamental aspects of Biology - Introduction and concepts abouts various biological systems, their functional metabolism and their significance in both industrial and management of natural resources (microorganisms, plants & animals) and their conservation. Biotechnology is one of the most precious and significant multidisiciplinary thrust area in the field of modern science and technology will provides the information about the concepts of developments in their -scope and importance in various fields like agriculture, health care, environment and industry, has already been visible and the efforts are now culminating into products and processes.

Course Outcomes:

The anticipated knowledge, skills and/or attitude to be developed by the student are: :

1. Be able to define the term "biotechnology" and appreciate its scope
2. Have an awareness of the global significance of biotechnology and its resultant industries, and a broad knowledge of which are represented nationally and locally
3. Be able to state the broad categories of biotechnological processes based on the products formed and/or the process or substrates used, and have detailed knowledge of examples of each of these
4. Have an understanding of the multidisciplinary nature of biotechnology and the associated role that has been played by enabling technologies in the development of biotechnology
5. Have an awareness of some of the current and future issues surrounding the relationship between biotechnology and government, investors, the environment and consumers and the impact of these on the development of future biotechnology enterprises.

UNIT I - Introduction to Biotechnology & Applications :

Biotechnology – definition, history, possible and thrust areas of biotechnology, Elements of Bio-Process Engineering, Various Biotech Industries, Basic concepts of GLP, GMP, FDA, Bioethics & IPR etc., Scope and Importance of Biotechnology and allied fields.

UNIT II - Introduction to Biological Systems :

Introduction -Diversity in biological systems,Cell biology and cell structure, Differences between Prokaryotes & Eukaryotes. Kingdom systems. Five-kingdom classification General characters, useful and harmful effects of Bacteria, Viruses, Algae, Fungi and Protozoans.

UNIT III - Plant Biology:

Classification of Plant Kingdom, Concepts of Growth, Meristems, development of different plant organs, Plant growth regulators; Photo synthesis: different types of photosynthesis, chlorophyll as trapper of solar energy, Photosynthetic reaction centers - PSI & PSII, differences in C3, C4 & CAM plants. Concepts of Plant Pathology: Brief account of Plant diseases, types, disease control measures & IPM (Integrated Pest Management) practices.

UNIT IV - Animal Biology:

Classification of Animal Kingdom, Functions, Morphology, Growth and Reproduction, Phylogeny of Invertebrata & Vertebrata Phyla & Economic importance of species. Brief account on Ecology, Concepts of Species & Ecosystem. Morphology, Nutrition, Locomotion and Reproduction. Protozoan Parasites – in man *(Plasmodium, Entamoeba histolytica),* Helminthes *(Fasciola sp., Taenia solium, Ascaris).*

UNIT V - Concepts of Human Biology :

Introduction of body as a whole, Cells and Tissue Organization, Electrolytes and Body fluids. Physiology of Blood, Digestive system, Respiratory system and Endocrine System, axons and neurons, Neuromuscular and synaptic junctions, Sensory systems - hearing, taste, smell and visual receptors.

TEXT BOOKS :

1. A.J. Lack, “An Instant notes on Plant Biology” , 1st ed., Viva Publications, 2003.
2. Richard D. Jurd “An Instant notes on Animal Biology”, VIVA Publications, 2003.

REFERENCE BOOKS :

1. John B Reece, et al., Compbell Biology, 9th Ed, Pub, Benjamin & Cummings, 2012.
2. H.K. Das, “Text Book of Biotechnology”, 3rd ed., Wiley India Publication, 2007.
3. F.B Salisbury & C.W. Ross, “Plant Physiology”, 4th ed., Thomson Wadsworth Pub., 2007.

I Year B.Tech. Biotechnology II - Semester	L	T	P	To	C
	2	-	-	2	-

HS 119 PROFESSIONAL ETHICS, VALUES AND HUMAN RIGHTS

Course description and Objectives :

To create an awareness on Engineering Ethics and Human Values. To instill Moral and Social Values and Loyalty . To appreciate the workplace rights of Others, responsibilities and Safety of others.

Course Outcomes:

The course will enable the students to attain the following:

1. an understanding of professional and ethical responsibility in workplace
2. the broad education necessary to understand the impact of engineering solutions in a global and societal context
3. a knowledge of contemporary issues related to human and professional interactions at workplace
4. an engineer's life-long commitment to serve the disadvantaged

UNIT I - Human Values :

Morals, Values and Ethics – Integrity – Work Ethic – Service Learning – Civic Virtue – Respect for Others – Living Peacefully – Caring – Sharing – Honesty – Courage – Valuing Time – Co-operation – Commitment – Empathy – Self-Confidence – Character – Spirituality.

UNIT II - Engineering Ethics & **Engineering as social experimentation :**

Engineering Ethics : Variety of moral issues – types of inquiry moral dilemmas – moral autonomy – The problems of Many Hands – Kohlburg's theory – Gilligan's theory Impediments to Responsible Action.

Engineering as social experimentation - Codes of ethics - a balanced outlook on law - the challenger case study.

UNIT III - Engineer's Responsibility for Safety :

Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis – Reducing Risk – The Government Regulator's Approach to Risk - Chernobyl Case Studies and Bhopal.

UNIT IV - Workplace Rights and Responsibilities & Work Environment :

Workplace Rights and Responsibilities : Engineers and Managers. Oganizational complaint procedures. Government agencies. Resolving Employee concerns. Limits on acceptable behaviour in large corporation.

Work Environment : Ethical and legal considerations, Organizational responses to offensive behaviour and harassment. Ethics in a Global Context.

UNIT V - Global Issues :

Multinational Corporations – Business Ethics - Environmental Ethics – Computer Ethics - Role in Technological Development – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Honesty – Moral Leadership – Sample Code of Conduct.

TEXT BOOKS :

1. Mike Martin and Roland Schinzinger, "Ethics in Engineering", McGraw Hill, New York, 2005.

REFERENCE BOOKS :

1. Prof. (Col) P S Bajaj and Dr. Raj Agrawal, "Business Ethics – An Indian Perspective", Biztantra, New Delhi, 2004
2. Charles E Harris, Michael S. Protchard and Michael J Rabins, "Engineering Ethics – Concepts and Cases", Wadsworth Thompson Learning, United States, 2000 (Indian Reprint now available)
3. Engineering Ethics-An industrial Perspective, Gail Dawn Baura
4. Charles E Harris, Michael S Pritchard and Michael J Rabins, "Engineering Ethics – Concepts and Cases", Thompson Learning, 2000.
5. Charles E Harris, Michael S Pritchard and Michael J Rabins, "Engineering Ethics – Concepts and Cases", Thompson Learning, 2000.
6. PSR Murthy, "Indian Culture Values and Professional Ethics", BS Publications
7. Edmund G Seebauer and Robert L Barry, "Fundamentals of Ethics for Scientists and Engineers", Oxford University Press, Oxford, 2001.

I Year B.Tech. Biotechnology II - Semester	**L**	**T**	**P**	**To**	**C**
	-	**-**	**3**	**3**	**2**

HS 121 ENGINEERING CHEMISTRY LAB

Course description and Objectives :

This lab is intended to make the students enlighten with the theoretical concepts of chemistry. Instrumental techniques are useful for characterization of materials for future engineers.

Students may have to take up any 10 experiments from the following experiments.

Course Outcomes:

1. To enable the students to analyse the hardness & chlorides in the potable water.
2. To help students to determine the Alkalinity in water used especially in industries.
3. To impart knowledge on polymers used as insulators.
4. To provide an idea about Advanced techniques in chemical analysis using conductometer and spectrophotometer.

Volumetric Analysis:

1. Determination of total Alkalinity of water
2. Determination of Percentage purity of Washing soda
3. Determination of Fe(II) by Dichrometry
4. Determination of Percentage of available chlorine in Bleaching powder
5. Determination of chlorides by Argentometry
6. Determination of Total hardness of water

Preparations:

7. Preparation of Bakelite
8. Preparation Of Urea- Formaldehyde Resin

Instrumental methods of Analysis:

9. Determination of Viscosity of a Lubricating oil
10. Determination of Strength of acid by conductometry
11. Determination of Mn^{+7} by Colorimetry
12. Demonstration of UV-Visible Spectrophotometer with Ferrothiocyanate

TEXT BOOKS:

1. Vogel's Text book of qualitative Chemical Analysis J.Mendham, R.C Denney, J.D. Bares, M.Thomas & B. Siva Sankar, Pearson Publications – Volume I (2009).
2. Experiments in Applied Chemistry by Dr.Sunita Rattan. S.K. Kataria & Sons publications,2008.

I Year B.Tech. Biotechnology II - Semester	L	T	P	To	C
	1	-	3	4	3

ME 103 ENGINEERING GRAPHICS

Course description and Objectives :

To familiarize students with the conventional concept of engineering drawing and application through AutoCAD.

Course Outcomes:

After completion of this course, student will be able to prepare plan and elevation of any pictorial view either conventional or through AutoCAD.

UNIT - I

Introduction to Engineering drawing: Introduction to Engineering Drawing – Types of lines, lettering, dimensioning Construction of polygon & Conics. (Ellipse, Parabola & Hyperbola by general method)

UNIT - II

Orthographic Projections: Principle of projection-Planes of projections.

Projections of points:

Projection of straight lines: Inclined to one plane and both the planes.

Projections of planes: Simple planes, Planes inclined to reference planes.

UNIT - III

Projections & Sections of solids – projections of prisms – cylinders – cones - pyramids – solid axis inclined to one plane, simple sections-prism, cylinder, pyramid and cone. AutoCAD Fundamentals.

UNIT - IV

Isometric projections: Isometric drawing of simple objects through AutoCAD **UNIT - V**

Orthographic projections: Conversion of Pictorial view into orthographic view using AUtoCAD and Conventional.

TEXT BOOKS :

1. N.D.Bhatt, “Engineering Drawing”, 49th ed., Charotar Publication, 2007.
2. K. Venugopal, “Engineering Drawing through Auto CAD”, 1st ed., New Age Publication, 2008.

REFERENCE BOOKS :

1. Jhole, “Engineering Drawing”, 2nd ed., Tata McGraw Hill, 2008.
2. K.L. Narayana, “Engineering drawing” 2nd ed., Scitech Publications, 2008

II Year B.Tech. Biotechnology II - Semester

L	T	P	To	C
-	-	3	3	2

EE 113 FUNDAMENTAL OF ELECTRICAL ENGG. LAB

Course description and Objectives :

To understand basic electrical elements, electrical energy its consumption and measurement. To develop practical knowledge on electrical machines, electronic devices and circuits

Out Comes :

1. Able to realize characteristics of electrical elements.
2. Able to analyze given simple ac and dc networks.
3. Able to work on different electrical machines.
4. Able to reflect the knowledge of electronic devices to verify experimentally.

List of Experiments

1. Familiarization with basic components such as Resistors, Capacitors, Diodes, Transistors
2. Familiarization with basic electrical measuring instruments
3. Verification of ohm's law
4. Verification of KVL and KCL
5. Calculation of power factor in simple RL and RC circuits
6. Magnetization characteristic of a D.C. self excited generator
7. Measurement of power and energy.
8. Measurement of transformation ratio of single phase transformer.
9. Measurement of Power, Power factor of 3-phase induction motor.
10. Characteristics of PN junction diode.
11. Characteristics of Zener diode.

VFSTR UNIVERSITY

II Year - B.Tech

SYLLABUS

I SEM & II SEM

II Year B.Tech. Biotechnology I - Semester

L	T	P	To	C
4	-	-	4	4

BT215 MICROBIOLOGY

Course Description & Objectives:

To familiarize the student to nderstand about classification, diversity and physiology of microorganisms. Also to acquaint about the methods of microbe cultivation and sterilization techniques as well as microbial diseases, host pathogen interactions and their control.

Course Outcomes:

1. Gives an insight on scope and historical developments in the field of microbiology
2. Acquaint the knowledge to identify and classify the newer microorganisms based on various characteristic features. This helps in designing a project for developing novel products from microorganisms.
3. Imparts knowledge on techniques used for identifying microorganisms.
4. Learn to cultivate the pure cultures by using specific media as well as enrichment.
5. Gain knowledge on how to control pathogenic microorganisms and maintain sterile conditions for doing experiments in biotechnology.

UNIT - I: Introduction to microbiology:

Discovery of microorganisms, Theory of spontaneous generation, Germ theory of diseases, Major contribution and events in the field of Microbiology. Scope and relevance of microbiology. Microscopic examination of microorganisms, Microscopy Types, Colony characteristics, Fixation, Principle dyes, Principles of different staining techniques: simple staining, differential staining, spore staining, flagellar straining, acid fast and capsular staining.

UNIT - II: **Major groups of Microorganisms:**

Microdiversity, Diversity classification of Woese et al. Three domains of life. Five - kingdom system of Whittaker. Classification systems - Phylogenetic, Phenetic, Genetic taxonomic ranks, Major characteristics used in Taxonomy, Molecular approaches to microbial taxonomy.

UNIT - III Nutrition, Cultivation and Growth kinetics:

Nutrition of microorganisms: Nutritional classes of microbes, Macro and micronutrients their sources and physiological functions of nutrients, growth factors and their functions in metabolism, aerobic and anaerobic metabolism.

Cultivation of microorganisms: Culture media-synthetic and complex media, solidifying agents, types of media -selective, differential and enrichment and enriched media, Pure culture methods - spread plate, pour plate and streak plate, special techniques for cultivation of anaerobes, growth of microorganisms, Growth curve, mathematics of growth, measurement of microbial growth (cell numbers, cell mass) and growth yields, Effect of env ironmental factors on growth, Continuous growth, chemostat, turbidostat, balanced and unbalanced growth.

UNIT - IV: **Microbial Diseases and Host Pathogen Interaction:**

Disease causing microorganisms, Classification of infectious diseases, Emerging infectious diseases, Molecular basis of pathogenicity and identification methods, Human diseases caused by viruses, bacteria and pathogenic fungi.

UNIT - V : Control of Microorganisms:

Control of microorganisms: Sterilization and disinfection-Physical (moist and dry heat, radiation and filtration). Chemical agents (disinfectants)- Characteristics & mode of action of antimicrobial agent. Classes of disinfectants - phenol and phenolics, alcohol, halogens (CI, Chloramines, Br, I, tinctures of iodine, iodophores), Surfactants (soaps and detergents), Alkylating agents (formaldehyde, glutaraldehyde, 3-propiolactone and ethylene oxide), Heavy metals. (Hg, Silver and copper containing compounds). Evaluation of effectiveness of antimicrobial agents.

TEXT BOOKS:

1. Prescott LM, Harley JP, Klein DA, “Microbiology”, 2ed., Mc Graw Hill, 2005.
2. Pelczar M.J. Chan ECS and Krieg NR. “Microbiology”, 5ed.,Tata McGraw Hill, 2006.

REFERENCE BOOKS:

1. Prescott and Dunn, “General Microbiology”, 1ed., Mc Graw Hill Publishers. 2004.
2. John. L. Ingraham, Catherine A Iingraham, “Introduction to Microbiology a case History approach” 3rd ed., Thomson Publications, 2004

II Year B.Tech. Biotechnology I - Semester	L	T	P	To	C
	4	-	-	4	4

BT217 BIOCHEMISTRY

Course Description & Objectives:

This course deals with the entire chemical processes associated with living cells at molecular level. This will offer them a clear-cut idea about various molecular and biochemical process governing the production of energy in the cells.

Course Outcomes:

1. Students will be able to understand structures, functions, and interactions between biological molecules.
2. Students will be able to understand various mechanism involved in the enzyme action.
3. They will acquire adequate knowledge in various pathways in intermediary metabolism and bioenergetics.
4. They will gain sufficient insights into redox biochemistry
5. They will be able to articulate, retain and apply specialized language and knowledge relevant to Biochemistry.

UNIT - I : Basic Concepts of Carbohydrates:

Structure and properties of Mono, Di, Oligo & polysaccharides, complex carbohydrates, Confirmation of pyranose & furanose ring, glycosidic bond, Glycogen, starch & dextran; as mobilizable stores of glucose. Cellulose, glycoproteins, glycosaminoglycans & lectins; structure and function.

UNIT - II : Bioenergetics & Metabolism of Carbohydrate:

Respiratory chain, Aerobic and anaerobic respiration. Glycolysis, Glucogenesis, Glycogenolysis, Gluconeogenesis, ED Pathway, Pentoses phosphate shunt & TCA cycle.

UNIT - III : Amino Acids and Enzymes:

Amino acids - Classifications, Physico – Chemical Properties, Protein structure, folding & function, Nitrogen Cycle, Nitrogen Balance, reductive amination & transamination & Urea cycle. Synthesis of amino acids - Glutamate pathway, Serine pathway, shikimate pathway for the production of aromatic amino acids. Introduction to Enzymes, Nomenclature, Functions, Mechanism of action and control, Michaelis – Menten Enzymes and Allosteric Enzymes.

UNIT - IV : Lipids and their Metabolism:

Classifications, Structures and roles of fatty acids, fatty acid breakdown, fatty acid synthesis, synthesis and metabolism of triglycerols, cholesterol structure and function, Lipoproteins – classification & function.

UNIT - V : Intermediatary Metabolism and Nucleic acids & their metabolism :

Interconnection of pathways & metabolic regulation Structure and Properties of purines, pyrimidines, nucleosides and nucleotides. Biosynthesis and degradation of nucleic acids.

TEXT BOOKS:

1. Lehninger A.L, Nelson O.'L, M.M. Cox, "Principles of Biochemistry " 3rd ed., CBS Publications, 2005.
2. J.L. Jain, "Fundamentals of Biochemistry ", 7thed., S.Chand Publishers, 2009.

REFERENCE BOOKS:

1. Voet D, Voet J. G, "Biochemistry", 3rd ed., John C Wiley and Sons,1994.
2. L. Stryer, J.M. Berg, JL Tymockzo, "Biochemistry" 5th ed., WH Freemen& Co., 2002.
3. K. Mathews, K.E. Van Holde, Kevin G Ahern, "Biochemistry", 3rd ed., Pearson education, 2005.

II Year B.Tech. Biotechnology I - Semester	**L**	**T**	**P**	**To**	**C**
	4	**-**	**-**	**4**	**4**

BT219 CELL BIOLOGY

Course Description & Objectives:

This course helps to know different cell components and their functions like transport of material, signaling etc. This course also imparts knowledge on cell division and cancer.

Course Outcomes:

1. Imparts knowledge on the importance of cell, its organelles and their functions.
2. Provides an understanding of the importance of selective permeability in biological systems.
3. Imparts knowledge on how cell division occurs in Unicellular and Multi cellular organisms.
4. Understand the role of macromolecules in cell signaling and the types involved in it.

UNIT - I : CHEMISTRY & STRUCTURE OF THE CELL :

Importance of carbon and water; Plasma membrane- structure and function; Cytoplasm; Cytoskeleton - Microtubules, microfilaments & interme- diate filaments, cell motility – cilia & flagella, Structure and functions of Nucleus, Endoplasmic Reticulum, Golgi Complex, Lysosomes, Peroxisomes, Chloroplast & Mitochondria.

UNIT - II :TRANSPORT ACROSS CELL MEMBRANES :

Passive & active transport, permeases, sodium potassium pump, Ca2+ ATPase pump, lysosomal and vacuolar membrane ATP dependent proton pumps, co transport, symport, antiport, trans-membrane potential coupled ATP generation, ion-selective gated channel against neuronal cell membrane, Transport into prokaryotic cells, endocytosis and exocytosis. Entry of virus and toxins into cells.

UNIT - III : CELL DIVISION & DIFFERENTIATION

Overview of the Cell Cycle, Interphase, Mitosis, Cytokinesis & Meiosis. Animal Cell & Yeast Cell Division, Cell Cycle Control & Checkpoints, general Characteristics of Cell Differentiation, Differentiation in Unicellular & Multi- cellular Organism, Cytoplasmic determinants, Nucleoplasmic Interactions, Embryonic and adult stem cells and its Biological Importance.

UNIT - IV : CELL SIGNALING - BASIC CONCEPTS:

Intracellular signaling, types of signal receptors - Cytosolic, Nuclear & Membrane bound receptors, Chemo receptors of Bacteria (Attractants & Repellents), Signal Transduction by hormones - Steroid / Peptide hormones, Concept of Secondary messengers, cAMP, cGMP, Protein Kinases, G Proteins, Receptors & No-receptors associated tyrosine kinases.

UNIT - V : RECEPTOR MEDIATED TRANSPORT :

Cytosolic, nuclear and membrane bound receptors, examples of receptors, autocrine, paracrine and endocrine models of action, quantitation and characterisation of receptors.

TEXT BOOKS:

1. De Robertis and De Robertis, “Cell and Molecular Biology” (Waverly), 8th ed., BI Publications Pvt. Ltd. 2005.
2. Cooper, The Cell, “ A Molecular Approach”, 3rd ed., Sinayer Publications, 2004.

REFERENCE BOOKS:

1. Gerald Karp, “Cell & Molecular Biology”, 5th ed., Wiley publishers 2008.
2. Becker, Reece, Poenie , “The World of the Cell”, 3rd ed., Benjamin Publishers. 2008.
3. Bruce Alberts, Alexander Johnson, Julian Lewis, Martin Raff, Keithroperts, Peferwalker, “Molecular Biology of the Cell”, 4th ed., Garland Science Publishers, 2002.
4. Ernst J.M.Helmreich. “The Biochemistry of Cell Signalling” 2nd ed., Oxford Press, 2007.

II Year B.Tech. Biotechnology I - Semester	L	T	P	To	C
	4	-	-	4	4

BT221 PROCESS ENGINEERING PRINCIPLES

Course Description & Objectives :

Introducing the basic principles, Unit operations of process engineering and develop familiarity with fluid flow. The course also introduces to various forms of measuring devices, transporting equipment used in industry.

Course Outcomes:

1. *Undertake basic mass, momentum and energy balances around individual processes and overall flow sheets*
2. *Use of numerical and analytical methods in process analysis calculations*
3. *Identify flow behavior and calculate pressure drops and frictional losses in fluid flow*
4. *Measuring of fluid flow using different types of flow measuring devices*
5. *Have an idea on size reduction equipment and calculation of particle size*

UNIT - I : Introduction :

Application of Engineering principles in biotech Industries-Introduction to unit \ operations and unit processes, Units and dimensions, basic quantities and derived units. Conversion of units. Concept of mass, force, density, pressure, moles, mole fraction. Chemical reactions, stoichiometry, conversion, yield. Newton's law of viscosity. Concept of Newtonian and non - Newtonian fluids- Different types of non-Newtonian fluids with examples in bioprocesses.

UNIT - II : Material & Energy Balance:

Analysis of degrees of freedom, Material and energy balances for physical and chemical processes, recylce, bypass, purge calculations, Combustion Analysis, Flue gas analysis, % excess air, theoretical oxygen requirement. Material and energy balances for multiple units.

UNIT - III : Fluid mechanics:

Properties of fluids, fluid statics, Bernoulli's equation and its application, calculation of power required for pumping fluids. Examples from bioprocesses systems. Flow through pipes, Laminar and turbulent flow characterization by Reynolds number, average velocity pressure drop due to skin friction and foam friction, friction factor chart, Hagen - Poiseuille equation. Definition of drag and drag coefficient. Introduction of the concept of packed beds. Friction in flow through beds of solids, derivation of friction factor equations and pressure drop expressions. Motion of particles through fluids, terminal velocity.

UNIT - IV : Flow past Immersed bodies :

Definition of drag and drag coefficient. Introduction of the concept of packed beds. Friction in flow through beds of solids, derivation of friction factor equations and pressure drop expressions. Motion of particles through fluids, terminal velocity.

UNIT - V : Fluid transportation machinery :

Different types of pumps, Calculation of pump horse power. Flow measuring devices- orifice meter, venture meter and rotameter. Size reduction unit operations, calculation of average particle size, efficiency of size reduction and screening. Different types of valves used in bioprocess industries.

TEXT BOOKS:

1. *Pauline M.Doran, "Bio-Process Engineering Principles", 1st ed., Academic Press, 2007.*
2. *McCabe, W.L,Smith J.C., and Harriot P. "Unit Operations of Chemical Engineering", 5th ed., Mc-Graw Hill, 1993.*

REFERENCE BOOKS:

1. *D.G.Rao, "Introduction to Biochemical Engineering", 1st ed., Tata Mc Graw Hill, 2005.*
2. *S. K. Ghosal, S. K. Sanyal and S. Dutta, "Introduction to Chemical Engineering", 1st ed., TMH Publications, 2007.*

II Year B.Tech. Biotechnology I - Semester

L	T	P	To	C
4	-	-	4	4

HS213 PROBABILITY & STATISTICS

Course Description & Objective:

The course aims to motivate students with an intrinsic interest in statistical thinking. It provides foundation and motivation for exposure to statistical ideas.

Course Outcomes:

1. Students will demonstrate the fundamental concepts in exploratory data analysis
2. They will be able to understand the basic concepts of probability and random variables.
3. They will understand the concept of the sampling distribution of a statistic, and in particular describe the behavior of the sample mean.
4. They will be able to perform multi-sample and nonparametric hypothesis testing.
5. They will be able to perform polynomial curve fitting.

UNIT - I : Descriptive Statistics

Basic Definitions, Frequencies, Graphical Representation, Histogram, Ogive curves, Measures of Central tendency, Arithmetic mean, Median, Mode, mean deviation, Standard deviation, Symmetry and Skewness, Karl Pearson's Coefficient of skewness.

UNIT - II : Curve Fitting and Correlation, Regression

Least squares method, curve fitting (straight line and parabola only) Covariance, Correlation, Types, Pearson's Coefficient of correlation, Rank correlation, Spearman's rank correlation. Regression, Regression lines, multiple regression.

UNIT - III : Probability

Introduction, Definition (Classical and Axiomatic approach), Addition theorem, Conditional probability, Multiplication theorem, Total probability, Bayes

Binomial distribution: Definition, Mean and Standard deviation, Recurrence relation, Applications, Fitting of binomial distribution. Poisson Distribution: Definition, Mean and Standard deviation, Recurrence relation, Poisson Distribution is an approximation of Binomial distribution, Applications, Fitting of Poisson distribution.

Geometric Distribution: Definition, Properties.

Normal Distribution: Definition, Normal curve, Mean and Standard deviation, Median, Mode, Normal Distribution applications, Normal Distribution is an approximation to Binomial distribution.

Exponential Distribution: Definition, Properties.

UNIT - IV : Distributions :

Random variables, Discrete and Continuous variables, Introduction to Distributions.

UNIT - V: Sampling Methods :

Population and Sampling, Parameters and Statistics, Types of sampling, Sampling Distributions, Central limit theorem, Standard Error of mean from infinite population, Standard deviation of variance. Test of hypothesis and test of significance, confidence limits, confidence interval, Test of significance of large samples, T-distribution, Chi square test.

TEXT BOOKS :

1. H. K. Dass and Er. Rajnish Verma, Higher Engineering Mathematics, S. Chand & Co., New Delhi, 2011.
2. Miller and Fruinds, Fundamentals of Probability and Statistics, PHI publication References :

REFERENCE BOOKS :

1. S.C. Gupta and V.K .Kapoor, “Fundamentals of Mathematical Statistics”, Sultan Chand & Co., New Delhi, 2005
2. B.V. Ramana, “Higher Engineering Mathematics”, 3rd Edition, Tata McGraw-Hill Publishing Co, 2008.

II Year B.Tech. Biotechnology I - Semester

L	T	P	To	C
-	-	1	1	1

SR002 SEMINAR

II Year B.Tech. Biotechnology I - Semester

L	T	P	To	C
-	-	3	3	2

BT209 MICROBIOLOGY LABORATORY

Course Description & Objectives:

To expose students to the basic science underlying our understanding of how cells, tissues and organs function and also to provide an integrated education, exposing students to projects that focus on molecular, cellular systems and whole animal levels.

CourseOutcomes:

I. Students will be introduced to the concepts of microscopes
II. They will be able to utilize microscopes to visualize cells
III. They will be able to perform various staining techniques
IV. They will understand the pricnciples of Gram staining

List of Experiments :

1. Study of typical prokaryotic and Eukaryotic cells with the help of a microscope
2. Preparation of culture media a) Simple media b) Complex media
3. Sterilization techniques
4. Methods of obtaining pure cultures of microorganisms-(Streak plate, Pour plate & Spread plate)
5. Identification of microorganisms (a) Staining techniques-Bacteria & Yeast (b) Biochemical tests
6. Microbiological examination of water.
7. Antibiotic test - Disc diffusion method, minimum inhibitory concentration.
8. Micrometry.
9. Factors affecting the growth & growth measurements

TEXT BOOKS :

1. P. Gunasekaran, “Laboratory Manual in Microbiology”, 1st ed., New Age International Publications, 1995.
2. Arti Nigam and Archana Ayyagari , “ Lab manual in Biochemistry, Immunology and Biotechnology”, 1st ed., TATA Mc Grahill, 2007.

II Year B.Tech. Biotechnology I - Semester

L	T	P	To	C
-	-	3	3	2

BT211 BIOCHEMISTRY LABORATORY

Course Description & Objectives:

The course aims at providing working knowledge of fundamental and advanced techniques of experimental biochemistry. It also provides insights into practical knowledge of qualitative and quantitative analysis of biological compounds including pH measurement and control along with application of chromatography and electrophoresis for separation and analysis of biological compounds.

Course Outcomes

I. Students will be able to perform qualitative analysis of carbohydrates
II. They will be able to estimate various bio-molecules using specific methods
III. They will perform various chromatography techniques for the separation of biomolecules.
IV. They will be able to evaluate michaelis menton parameters.
V. They will understand the basic principles of high performance liquid chromatography.

List of Experiments :

1. Preparation of buffers & pH Measurement
2. Qualitative tests for carbohydrates
3. Qualitative tests for Amino Acids.
4. Quantitative method for Amino Acids (Ninhydrin method)
5. Protein estimation by Biuret / Lowry / Bradford methods.
6. Separation of different macromolecules by Paper and Thin layer Chromatography.
7. Extraction of Lipids & Fats.
8. Analysis of Fats. (Saponification) & cholesterol.
9. Estimation of nucleic acids by DNS and Orcinol methods.

TEXT BOOKS:

1. J. Jayaraman, "Laboratory Manaual in Biochemistry", New Age International Publications. 2000.
2. K. Wilson & J. Walker,"Principles & Techniques of Practical Biochemistry", 5th ed., Cambridge University Press, 2000.

REFERENCE BOOKS:

1. I.D.Campbell and R.T.Dwek, "Biological Spectroscopy", Benjameer Cunmeib & Co., 1986.

II Year B.Tech. Biotechnology I - Semester

L	T	P	To	C
-	-	3	3	2

HS217 SOFT SKILLS LABORATORY

Course Description & Objectives:

The Soft Skills Laboratory course equips students with required skills such as interpersonal skills, communication skills, leadership skills etc. It aims at training undergraduate students on employability skills to win in the job interviews and building confidence to handle professional tasks.

Training Methodology:

The training methodology is designed to bring about changes in attitudes through experience-based learning. Activities in simulated environments such as role plays, group discussions, micro-presentations, audio-video clippings, case studies, psychometric tests etc., will provide students insights into their strengths and weaknesses.

Course Outcomes:

1. To help students to develop formal communication skills in a work place
2. To make them acquire team skill by working in group activities
3. To equip them with suitable language and speech patterns in a workplace
4. To enhance the ability of critical & lateral thinking while addressing the issues at any situation.
5. To enable them to present themselves confidently in job interviews

Course Contents:

Personality Development Skills :

a) Role of language in Personality – How language reflects, impacts personality – Using gender-neutral language in MNCs – being culturally sensitive.

Activity – Appraising each other – Worksheets related to the above

b) Career Planning- job vs. career- goal setting- SWOT analysis- planning and prioritization - four quadrant time management system - time management – self-management – stress-management.

Activity: Setting a SMART goal - SWOT analysis of the self – Writing a Statement of Purpose (SOP).

c) Effective Resume-Writing: structure and presentation - planning and defining the career objective - projecting one's strengths and skill-sets – summarizing - formats and styles - covering letter.

Activity: Resume preparation –writing a covering letter.

Language Skills :

A) Functional English - Formal/informal context – purpose - interpersonal dynamics - ideation –content organization - initiating a conversation – responding appropriately - right body language.

Activity - Role play in different situations, - self-introduction - social background (family, home town etc.,) - role model - my future - likes/ dislikes (movies, persons, places, food, music etc.,) - a mini project on functional English.

b) Vocabulary-Building: Etymology of words - word roots - prefixes & suffixes - synonyms & antonyms- collocations - one-word substitutes – analogies - idioms and phrases - contextual guessing of unfamiliar words – task-oriented learning (100 words).

Activity: Flash cards (200 words) – vocabulary exercises with hand-outs.

Communication Skills :

a) Group Discussion: Articulation and flow of oral presentation - dynamics of group discussion – intervention – summarizing - voice modulation – content generation – Key Word Approach (KWA) – Social, Political, Economic, Legal and Technical Approach (SPELT) – View Point of Affected Part (VAP) - language relevance - fluency and coherence.

Activity: Mock sessions on four types of GD topics.

b) Facing Interviews: Interview process - understanding employer expectations - pre-interview planning - opening strategies - answering strategies – stress-based interviews - tele-interviews, video interviews-frequently asked questions (FAQs).

Activity: Writing responses to FAQs - mock interviews.

Comprehensive skills :

a) Reading Comprehension: Reading as a skill- techniques for speed reading- skimming- scanning- appreciating stylistics - impediments for speed reading - eye fixation - sub-vocalisation - critical reading - reading based on purpose - reading for information - reading for inference - understanding tone.

Activity: Reading comprehension exercises with texts drawn from subject areas. (Hand-outs)

b) Listening Comprehension: Listening as skill - different types of listening - hidden data of communication - active listening - top-down approach - bottom-up approach.

Activity: Following different accents (Indian, British, American) listening comprehension exercises with audio and video excerpts.

Analytical Skills :

a) Data Commentary: Deductive & inductive reasoning - data interpretation - tables & charts - bar charts - pie charts - line graphs - ratios & proportions – percentages - coding and decoding - reasoning by analogy - artificial language etc.,

b) Analytical Thinking: Statement and Conclusion - Data Sufficiency - Statement and Argument - Statement and Assumption - Logical Deduction - Logical Problems.

Activity: Exercises with handouts.

TEST BOOKS:

1. *Edward Holffman, **Ace the Corporate Personality**, McGraw Hill,2001*

Adrian Furnham, ***Personality and Intelligence at Work***, Psychology Press, 2008.

2. John Adair Kegan Page, "***Leadership for Innovation"*** 1st edition, Kogan, 2007.

REFERENCE BOOKS:

1. M.Ashraf Rizvi, "***Effective Technical Communication",*** 1st edition, Tata McGraw Hill, 2005.
2. Krishna Mohan & NP Singh , "***Speaking English Effectively"*** 1st edition, Macmillan, 2008.

II Year B.Tech. Biotechnology II - Semester

L	T	P	To	C
4	-	-	4	4

CS218 DATA STRUCTURES

Course Description & Objectives :

The main objective of this course is to provide an introduction to basic data structures and manipulating them, by using C programming language. This course specifically has the following objectives pertaining to the fundamental design and implementation of basic data structures, the evaluation of the data structure needs of particular problems, the design and implementation of C programs by using basic data structures.

Course Learning Outcomes :

Having successfully completed this course, the student will be able to:

1. Apply advance C programming techniques such as pointers, dynamic memory allocation, structures to developing solutions for particular problems;
2. Design and implement abstract data types such as linked list, stack, queue and tree by using C as the programming language using static or dynamic implementations;
3. Evaluate and choose appropriate abstract data types to solve particular problems;
4. Design and implement C programs that apply abstract data types.

UNIT - I : Introduction

Data, Data type, Data Structures – Primitive and Non- prim itive, Storage structures – Sequential and linked storage representations, File structures, Abstract Data Type (ADT). Over view : Basic Structures-arrays, operations on arrays (retrieval of an element, search an element, insertion deletion of an element), manipulations on arrays such as finding the sum of elements of an array, adding two arrays, and reversing an array. Maximum sub sequence problem, Multi dimensional arrays.

UNIT - II : Linked Lists :

Linked List: Types of Linked Lists: Singly Linked List, Doubly Linked List, Circular Linked List. Operations on linked lists-insertion, deletion, traversing forward/reverse order. Multilists, Applications of Linked Lists.

UNIT III : Stacks :

ADT, Array and linked representations. Implementation and their applications. Queues – ADT, Array and linked representations. Implementation of linear, circular and doubly-ended queues, and their applications.

UNIT IV : Preliminaries :

Binary Tree – ADT, Array and linked representations, Binary tree properties, tree traversal Implementation, Expression trees. The Search Tree ADT – Binary Search Trees, Implementation. AVL Trees – Single Rotations, Double rotations.

UNIT V : Graphs :

ADT, definitions and properties, modeling problems as graphs, representation – adjacency matrix and adjacency list, basic graph traversals – breath first search and depth first search. Applications of graphs.

TEXT BOOKS :

1. Y. Langsam, M.J.Augeustein and A.M.Tenenbaum, “Data Structures Using C”, Pearson Education Asia.
2. Mark Allen Weiss, “Data Structures and Algorithm Analysis in C”, Second Edition, Pearson Education.

REFERENCE BOOKS :

1. Sartaj Sahni, Data Structures, Algorithms and Applications in C++, Universities Press, Second Edition, 2005
2. Jean Paul Tremblay and Paul G. Sorenson, An Introduction to Data Structures with Applications,Tata Mc-Graw Hill, Second Edition, 26th Reprint 2004
3. KRUSE, Data Structures and Programming Design-PHI

II Year B.Tech. Biotechnology II - Semester

L	T	P	To	C
4	-	-	4	4

BT214 GENETICS

Course Description & Objectives:

The course provides knowledge in genetics and equip students understand the genetic basis of diseases and prevention. It also enables students to understand molecular mechanisms through which genes cause diseases.

Course Outcomes:

1. Identification, packaging and organization of genetic material in prokaryotes and eukaryotes
2. Gene structure in prokaryotes and eukaryotes
3. Basic laws and factors of inheritance; extra chromosomal inheritance
4. Concept of linkage, crossing over and recombination
5. Concepts of human genetics; molecular basis of genetic diseases

UNIT - I : Physical Basis of Heredity:

Basic laws of inheritance mono-hybrid, di-hybrid and tri-hybrid ratios, Modification of Mendel's ratios due to gene interaction, Multiple alleles and lethality. Multiple factors of inheritance. The concept of linkage, crossing over and recombination. Two point and three point testcrosses and gene mapping. Mapping of genes by tetrad analysis by mitotic crossing over.

UNIT - II: Genetic material and its Organization:

Identification of the genetic materials - classical experiments- Hershey Chase, Avery McLeod etc, Packing and organization of genetic material in prokaryotes (with reference to *E.coli*), Eukaryotes. Chromosome morphology, classification, karyotyping. Special chromosomes.

UNIT - III: Bacterial genetics & Extra Chromosomal Inheritance:

Molecular mechanisms of conjugation, Transformation, Transduction. Phages and its life cycle-DNA, RNA and Retroviruses.Introduction to extra chromosomal inheritance, examples of extra chromosomal inheritance. Petite phenotypes in yeast. Uniparental inheritance in algae.

UNIT - IV: Mutation and Gene structure:

Spontaneous and induced mutations, Selection of mutants-Ames test, Chromosomal aberrations, Fine structure of genes in prokaryotes and Eukaryotes. Genetic control of development in Drosophila.

UNIT - V : Concepts of Human Genetics (Sex Determination, Linkage & Dominance):

Introduction – Population genetics, Eugenics& Euthenics. Mechanisms of sex determination, differentiation, Sex influenced dominance, Sex linked inheritance and Sex limited gene expression. Molecular basis of genetic diseases and applications.

TEXT BOOKS :

1. P.K. Gupta, "Genetics", 3rd ed., Rastogi Publications, 2005.
2. B.D Singh , "Fundamentals of Genetics", 4th ed., Kalyani Pub. 2007.

REFERENCE BOOKS :

1. Strickberger, Monroe. W. "Genetics", 3rd ed., Prentice - Hall of India Publications, 2006.
2. W illiam H Elliott and D.C.Ellioit, "Biochemistry & Molecular Biology", 3rd ed., Oxford University Press, 2007.
3. E. J. Gardner, M.J. Simmons & D. Peter Snustad, "Principles of Genetics", 8th ed., W illay India, 2007.

II Year B.Tech. Biotechnology II - Semester

L	T	P	To	C
3	1	-	4	4

BT216 INDUSTRIAL BIOTECHNOLOGY

Course Description & Objectives :

The objective of the course is to understand the production of commercially and therapeutically important metabolites and bioproducts like enzymes, recombinant proteins. The course also provides a fundamental knowledge of biological methods used in safeguarding the environment by waste treatment, energy production from waste and biological methods for minimum pollution formation.

Course Outcomes:

The course promotes the understanding of the following contents:

1. *Exploring the Potential and applications of traditional and modern biotechnology products such as cheese, vaccines, etc.*
2. *Streamlining of the process pertaining to production of primary and secondary metabolites.*
3. *Production of recombinant proteins*
4. *Production of monoclonal antibodies, vaccines and the pivotal role they play in treatment of various diseases.*

UNIT- I : Introduction to Industrial Bioprocess :

A historical overview of industrial fermentation process – traditional and modern biotechnology. A brief survey of organisms, processes, products relating to modern biotechnology. Process flow sheeting– block diagrams, pictorial representation.

UNIT- II : Production of Primary Metabolites :

Outline of processes for the production of some commercially important organic acids (e.g. citric acid, lactic acid, acetic acid etc.,); amino acids (glutamic acid, phenylalanine, aspartic acid etc.,) and alcohols (ethanol, butanol etc.,)

Unit- III: Production of Secondary Metabolites:

Study of production processes for various classes of secondary metabolites: antibiotics: beta-lactams (penicillin, cephalosporin etc.), aminoglycosides (streptomycin etc.,) macrolides (erythromycin), vitamins and steroids.

Unit -IV : Production of Enzymes and other Bioproducts:

Production of industrial enzymes such as proteases, amylases, lipases, cellulases etc., Production of biopesticides, biofertilisers, biopreservatives (Nisin), cheese, biopolymers (xanthan gum, PHB etc.,), single cell protein and its uses.

UNIT - V : Production of Modern Biotechnology Products:

Production of recombinant proteins having therapeutic and diagnostic applications, production of v accines. Production of monoclonal antibodies. Products of plant and animal cell culture.

TEXT BOOKS :

1. Casida Jr, L.E., *Industrial Microbiology,* 1st edition, New Age International (P) Ltd, 2007.
2. Presscott, Dunn, *IndustrialMicrobiology,* 1st edition, Agrobios (India), CBS Publication, 2004.

REFERENCE BOOKS :

1. Glazer,A.N and Nikaido,H.Microbial Biotechnology, W.H. Freeman & Company, NewYork.1995.
2. Wulf Cruger and Anneliese Crueger, *Biotechnology: A Textbook of Industrial Microbiology*, 2nd edition,Panima Publishing Corporation, 2004.
3. A.H. Patel, Industrial Microbiology, 1st edition, MacMillan Publication, 2008.

II Year B.Tech. Biotechnology II - Semester

L	T	P	To	C
3	1	-	4	4

BT218 HEAT AND MASS TRANSFER

Course Description & Objectives:

The course aims to develop familiarity with major heat transfer operations. It also enables students to develop familiarity with design of heat transfer equipment and optimize the cost of heat transfer operations.It imparts knowledge of different mass transfer operations used in industries and design of mass transfer equipments.

Course Outcomes:

1. Apply principles of heat & mass transfer to basic engineering systems.
2. Familiar with design of heat and mass transfer equipment by optimizing cost.
3. Know the design of condensers and evaporators.
4. Analyze diffusional processes and calculate flux in diffusion process

UNIT- I : Modes of Heat transfer :

Modes of Heat Transfer, Fourier's law, thermal conductivity, steady state conduction in plane wall & composite walls heat flow in cylinder and spheres, countercurrent and parallel current flows, energy balances, rate of heat transfer, overall heat transfer coefficient, logarithmic mean temperature difference, individual heat transfer coefficients, fouling factors

UNIT- II : Heat Transfer to Fluids without Phase change & with phase change:

Regimes of heat transfer in fluids, thermal boundary layer, heat transfer by forced convection in laminar flow, and turbulent flow, Natural convection to air from vertical and horizontal planes, Heat transfer from condensing vapors, heat transfer to boiling liquids

UNIT- III : Design of heat transfer equipments:

General design of heat ex change equipm ent, heat ex changers, condensers, boilers and calandrias. Types of evaporators, performance of tubular evaporators Enthalpy balances for single effect evaporator.

UNIT – IV : Diffusion and Mass Transfer:

Mass transfer operations, molecular diffusion in fluids, Binary solutions, Fick's Law, equation of continuity, Steady state equimolar counter current diffusion Stefan's diffusion estimation of diffusivity in gases and liquids, application of molecular diffusion, theories of mass transfer, diffusion in fluids, Concept of equilibrium, diffusion between phases, material balances in steady state, co – current and counter current stage processes.

UNIT – V: Mass Transfer Operations:

Introduction, Counter and co – current isothermal absorption and stripping of single component, operating lines, minimum flow rate, Determination of num ber of transfer units and height of continuous absorber, determination of no. of plates VLE for miscible liquids, immiscible liquids, steam distillation, VLE phase diagrams, tie lines, mixture rules, Flash vaporization and differential distillation for binary and multicomponent mixtures

TEXT BOOKS :

1. W.L. Mc Cabe and JC Smith - Unit Operations of Chemical Engineering, 5 th Edition, Mc Graw Hill, 1993.
2. R.E.Treybal, " Mass Transfer Operations" 3 rd Edition, Mc Graw Hill, 1981.

REFERENCE BOOKS :

1. Donald Q Kern - Process Heat Transfer, Mc Graw Hill, 1999.
2. C Judson King, " Separation Processes" 2 nd Edition, Mc Graw Hill, 1982.
3. P.M.Doran- Bioprocess Engineering Principles, Academic press-1995.
4. Alapati Suryanarayana, "Mass Transfer Operations", 1st Edition, New-age International, 2006

II Year B.Tech. Biotechnology II - Semester

L	T	P	To	C
4	-	-	4	4

BT220 INSTRUMENTAL METHODS OF ANALYSIS

Course Description & Objectives :

The course provides an indepth understanding of various scientific instruments used for analysis. The objective of this course is to understand the scope of application, advantages and limitations of the various modern analytical and separation techniques.

Course Outcomes:

The course promotes the understanding of the following contents:

1. Principles involved in functioning of various instruments and cause of uncertainities in instrumental measurements
2. To understand the advantages and limitations of various modern, analytical techniques.
3. To have in depth knowledge about separation techniques
4. To make use of instrumental methods for solving complex biological problems.

UNIT- I: Introduction to IMA & Microscopy

Types of Analytical Methods – Instruments for Analysis – Uncertainities in Instrumental measurements – Sensitivity and detection limit for instruments. Bright field, Dark field, Fluorescent, Phase contrast, confocal mi- croscopy, SEM & TEM Microscopy, Flow Cytometry.

UNIT-II : UV-VISIBLE & IR Spectroscopy

General principles – Radiation, energy and atomic structure- types of spec- tra and their biochemical usefulness–basic laws of light absorption. Elec- tromagnetic radiation & Spectrum, Beer–Lambert's Law and apparent deviations; UV - VIS Spectrophotometer, Infra Red Spectroscopy.

UNIT-III : NMR & X RAY Spectroscopy

NMR – Chemical shift-Spin-spin coupling - applications of proton NMR- quantitative analysis and qualitative analysis, application of NMR in biol- ogy and study of macromolecules. Principle, Mode of Operation and Applications of x-ray spectroscopy.

UNIT - IV : Centrifugation & Electrophoresis

General Principles, Ultra Centrifugation, Velocity Sedimentation & mea- surements, Equilibrium Ultracentrifugation – Density Gradient centrifugation. Electrophoresis – principles, types – disc, Isoelectric focussing, immuno-electrophoresis, isotachophoresis, supporting materials-paper, starch, agarose, polyacrylamide.

UNIT - V : Separation Equipments - Principles & Operations

HPLC, Gas chromatography, Ion – exchange Chromatography, Gel – filtration Chromatography, Affinity Chromatography, Membrane separations, Ultrafiltration , Reverse Osmosis.

TEXT BOOKS :

1. Hobert H Willard D. L. Merritt & J. R. J. A. Dean, “Instrumental Methods of Analysis”, CBS Publishers & Distributors, 1992
2. Chatwal and Anand, “Instrumental Methods of Chemical Analysis”, 5th ed., Him alaya Publications, 2006.

REFERENCE BOOKS:

1. Keith W ilson, Kenneth H. Goulding, “A Biologist Guide to Principles and Techniques of Practical Biochemistry”, 3rd ed., ELBS Series. 2006.
2. Douglas . A., Skoog & West, “Fundamentals of Analytical Chemistry”, 8th ed., Harcourt Publications, 2006.
3. F. Settle. “Hand Book of Instrumental Techniques for Analyti- cal Chemistry”, Prentice Hall Publications, 1997.

II Year B.Tech. Biotechnology II - Semester

L	T	P	To	C
-	-	1	1	1

SR003 SEMINAR

II Year B.Tech. Biotechnology II - Semester

L	T	P	To	C
-	-	3	3	2

(BT 222) INSTRUMENTAL METHODS OF ANALYSIS LABORATORY.

Course Description & Objectives:

The course provides practical knowledge of qualitative and quantitative analysis of biological compounds including pH measurement and control. It also enables to understand applications of chromatography and electrophoresis for separation and analysis of biological compounds.

Course Outcomes

1. Application of various scientific instruments to solve complex biological problems
2. Understanding the basis of principles in effective utilization of instruments
3. Effective design of scientific projects
4. Minimizing errors while using scientific equipments

LIST OF EXPERIMENTS :

1. Verification of Lambert – Beers Law by UV – VIS spectrophotometer, scanning.
2. Estimation of Reducing sugars (Benedict's method)
3. Estimation of proteins & nucleic acids by U.V. method.
4. Separation of different macromolecules by HPLC.
5. Estimation of Vitamin B by Turbidometry method.
6. Estimation of Turbidity by U.V. method.
7. Estimation of Chlorophyll by Colorimetric method.
8. Determination of Lambda max
9. Calibiration of pH meter

TEXT BOOKS:

1. J.Jayaraman, "Laboratory Manaual in Biochemistry", 1st ed., New Age International Publications, 2007.
2. K. Wilson & J. Walker, "Principles & Techniques of Practical Bio-chemistry", 6th ed., Cambridge University Press, 2007.

REFERENCE BOOKS:

1. I.D.Campbell and R.T.Dwek, "Biological Spectroscopy", 1st ed. Benjamin/ Cummings Publications, 1986.
2. F. Settle. "Handbook of Instrumental Techniques for Analytical Chemistry", 1st ed., Prence Hall Publishers, 1997.

II Year B.Tech. Biotechnology II - Semester

L	T	P	To	C
-	-	3	3	2

BT 224 HEAT, MASS & MOMENTUM TRANSFER LABORATORY

Course Description & Objectives:

The course aims to develop familiarity with major heat transfer operations. It also enables students to develop familiarity with design of heat transfer equipment and optimize the cost of heat transfer operations.It imparts knowledge of different mass transfer operations used in industries and design of mass transfer equipments.

Course Outcomes:

Students will be able to,

1) Identify the flow behavior based on Reynolds number
2) Measure the fluid flow rate using various flow measuring devices
3) Gain knowledge on various heat transfer mechanisms and also determine the rate of heat transfer
4) Determine the heat transfer coefficients for different modes of heat transfer
5) Measure the diffusivity of liquids and determine the mass transfer coefficients.

List of Experiments

1. Identification of Laminar and Turbulent Flows (Reynolds Apparatus).
2. Verification of Bernoulli's Equation.
3. Venturi Meter & Orifice Meter.
4. Pressure drop in packed bed & fluidized bed.
5. Characteristics of single stage centrifugal pump.
6. Heat Transfer through Metal Rod.

7. Natural & Forced Convection
8. Double Pipe Heat Exchanger.
9. Shell and Tube Heat Exchanger.
10. Liquid - Liquid Diffusivity.
11. Surface Evaporation.
12. Liquid – Liquid Extraction.
13. Simple Distillation.

TEXT BOOKS :

1. McCabe, W.L. Smith J.C., Harriot P., “Unit Operations of Chemical Engineering”, 5th ed., Mc-Graw Hill, 1993.
2. Robert E. Treybal, Mass Transfer Operations, III rd edition, Mc Graw Hill International.

II Year B.Tech. Biotechnology II - Semester	L	T	P	To	C
	-	-	3	3	2

(HS304) PROFESSIONAL COMMUNICATION LABORATORY

Course description and Objectives:

The Professional Communication exposes students to conventions of corporate communication and documentation procedures involved in the day-to-day functioning of the business world. The course is aimed at improving written communication skills of undergraduate students and preparing them to meet professional challenges in the work spheres. Writing and Personality are not two exclusive spheres of influence and this course will work on the relationship between professional writing and a personality that is able to meet the goals of an organization in creative and innovative ways.

Training Methodology:

The methodology is designed to give hands-on practice to students in formal and informal report writing, structure and format of letters as well as other organization related work.

Course outcomes:

1. To enable students to write logical sentences and paragraphs, use appropriate diction, grammar and punctuation.
2. To expose them to the world of business and business register
3. To make them compose clear and concise business messages
4. To produce business documents for mailing to external recipients or intra-organizational circulation
5. To enable them to speak business English for handling various business situations.

Mechanics of writing :

Elements of Technical Writing :

Sentence structure - reducing verbosity - arranging ideas logically – building coherence - paragraph level and document level - topic sentence - cohesive devices – transitionals – paraphrasing – précis - writing.

Mechanics of Writing :

Stylistic elements – the rapporteur- the purpose- the reader (audience) -elementary rules of grammar- choice of diction - elementary principles of composition - matters of form – punctuation - conventions of business communication -language and tone - weak links in business correspondence - ethical concerns in business writing.

Business Report Writing :

Parts of the Report: Writing an abstract - features of a good abstract – approach - compare and contrast - cause and effect.

Types of Technical Reports : Drafting a technical proposal - formal and informal proposals - factual reports, feasibility reports, survey reports – parts of a report - title page –declaration – acknowledgements – table of contents - abstract – introduction – conclusion – citations – references - appendices - oral reports and presentations

Business Letter Writing :

Letter-Writing - Formal and informal letters - structure of formal letters - expressions of salutations, introductory and concluding paragraphs - different types of letters - sales letter - complaint letter - adjustment letter - letter to the editor - covering letter - claim letter – letter of condolence.

Business E- writing:

E-mail – nature and scope - e-mail etiquette – Common Errors in composing e-mails – Quotations - Inviting quotations - sending quotations –placing orders.

Office Communication - agenda - notice - circular

Effective Resume-Writing : Structure and presentation - defining career objective - projecting one's strengths and skill-sets. Summarizing - formats and styles - covering letter.

Business visual presentations :

Business Proposals: Drafting business proposals - calculating profit and loss-averages - ratios and proportions – partnership - simple interest - compound interest - calculating volumes and areas. course of action - cause and effect- theme detection - making judgments -logical deductions - analyzing arguments – syllogisms - Venn diagrams - matching definitions -verbal reasoning - numerical reasoning - working out justifications.

Test Books :

1. Strunk , William, Jr.*The Elements of Style*, Fourth Edition,
2. Rozakis, Laurie, Ph.D, (2003). *English Grammar for the Utterly Confused*, McGraw-Hill

Reference Books :

1. Sharma. C. (1978) *Business Correspondence & Report Writing*, Tata McGraw-Hill
2. Kirkman, John. *Good Style: Writing for science & technology*, Routledge Study Guides, second edition.
3. Monippally, Matthukutty. M. 2001. *Business Communication Strategies*. 11th Reprint. Tata McGraw-Hill. New Delhi

VFSTR UNIVERSITY

III Year - B.Tech

SYLLABUS

I SEM & II SEM

III Year B.Tech. Biotechnology I - Semester

L	T	P	To	C
4	-	-	4	4

BT 301 MOLECULAR BIOLOGY

Course Description & Objective:

To acquaint the student about the structure, synthesis and processing of nucleic acids and protein synthesis in prokaryotes and eukaryotes. Also to make the students aware about the classification and types of mutations and how they effect the gene and its expression and how DNA will repair the damage.

Course Outcomes:

1. To provide an in-depth knowledge of the core principles of biological and/or medicinal processes to manipulate genes.
2. Imparts an understanding of biochemical synthesis and molecular processes that occur during cell growth.
3. Able to describe and explain processes that leads to the determination of characteristics of living organisms
4. Gives an insight into the most significant molecular and cell-based methods used in biotech industries.

UNIT I : Structure of DNA and RNA:

Detailed structure of DNA, variation from Watson & Crick model, Z - DNA, A & B DNA, Denaturation & melting curves, m-RNA, r-RNA, t-RNA structures.

UNIT II : DNA Replication:

Models of DNA replication: semi conservative model, Mitochondrial (D-loop), Viral DNA (Rolling circle), Single stranded- DNA phages (M13, ϕ174), Mechanism of DNA replication in E.coli (bi- directional), step by step process, Inhibitors of DNA Replication. Enzymes involved in replication, Eukaryotic telomeres and its replication.

UNIT III : RNA Biosynthesis and Post transcriptional processing:

Ribosomes,Transcription apparatus, Mechanism of transcription in prokaryotes and eukaryotes, RNA polymerases and proteins involved in transcription, Inhibitors of transcription, Post transcriptional processing of RNA 's t-RNA, r-RNA, m- RNA splicing..

UNIT IV: Protein Biosynthesis in Prokaryotes and Eukaryotes:

The genetic code and Wobble Hypothesis, Protein synthesis in Prokaryotes and Eukaryotes, Differences between prokaryotic and eukaryotic protein synthesis, Post translation modifications. Inhibitors of protein synthesis.

UNIT V : Mutagenesis:

Types of mutagens and their actions, Types of mutations- spontaneous, induced, lethal, characters of mutations and applications, Site - directed mutagenesis and reverse genetics. DNA damage and repair mechanisms.

TEXT BOOKS:

1. David Friefeldur - Molecular Biology, 2nd Ed., Norasa Publishing Home 1987.
2. Channarayappa - Molecular Biotechnology Principles and Practices, 1st Edition, 2006. University Press.

REFERENCE BOOKS:

1. Lodish & Baltimore, Molecular Cell Biology, 5th Ed., W.H. Freeman & Company, 2003.
2. Benjamin Lewin - Gene – VIII, 1 st Edition,2004.
3. Gerald Karp - Cell and Molecular Biology, Concepts and Experiments, 5th Edition, John Wiley and Sons Pvt. Ltd., 2008.

III Year B.Tech. Biotechnology I - Semester	L	T	P	To	C
	4	-	-	4	4

BT 303 BIOCHEMICAL REACTION ENGINEERING

Course Description & Objectives:

Develop familiarity with chemical reaction kinatics, D e v e l o p familiarity with types of reactions,Giving basic concepts of reactor design. Making familiarity with reactor operation.

Course Outcomes:

Students will be able to

1. Familiar with types of reactions & chemical reaction kinetics.
2. Familiar with reactor design.
3. Acquire skills with various modes of reactor operations.
4. Analyze concepts of elemental and electron balances, yield and maintenance coefficients.
5. Understand about the structured and unstructured models.
6. Learn growth and inhibition models.
7. Understand concepts of RTD & scale-up.

UNIT I : Fundamentals of reaction engineering:

Concept of order, molecularity of a reaction, searching a mechanism for a reaction, evaluation of rate constants, temperature using Arrhenius equation. Irreversible unimolecular type first order reactions, irreversible bimolecular type second order reactions, Interpretation of batch reactor data.

UNIT II : Microbial growth kinetics

Stoichiometry of cell growth and product formation - elemental and available electron balances, degrees of reduction, maintenance coefficient. Kinetics of microbial growth: Monods model, inhibitory growth kinetics- substrate inhibition models, product inhibiton models, Logistic models, Mixied growh kinetics, Product production kinetics.

UNIT III : Bioreactor Design & Analysis:

Definition of bioreactor, Concepts of reactors based on flow characteristics, design of ideal reactors using material and energy balance. Performace equation for batch, continuous (chemostat &

turbidostat) and fed batch bioreactor. Multiple stage chemostat, recycle flow in chemostat, Design of plug flow reactors, comparison of productivity in plug flow and single stage single flow chemostat.

UNIT IV: Multiple Reactions:

Parallel series, *series – parallel reactions,* calculation of yield and selectivity, role of thermodynamic parameters, Design principles-non isothermal reactions and pressure effects.

UNIT V: Non- Ideal Reactors & Reactor Applications:

Concepts of residence time distribution, micro mixing and macro mixing, Reasons for non-ideality, concept of macro using – RTD analysis (E-C-F functions), diagnosing the ills of non-ideal bioreactors. Design and analysis of fed-batch and airlift bioreactors. Application in animal cell culture. Basic concept of scale-up, non - dimensional analysis.

TEXT BOOKS:

1. Octave Levenspiel- Chemical Reaction Engineering, 3 rd Edition, John Wiley and sons, 1999.

2. P.M. Doran- Bioprocess Engineering Principles, Academic press-1995.

REFERENCE BOOKS:

1. D.G. Rao – Introduction to Biochemical Engineering, 1 st Edition, Mc Graw-Hill, 2005.
2. M. L.Shuler and F Kargi – Bioprocess Engineering, Prentice Hall of India, 1992.
3. James F Bailey- Biochemical Engineering Fundamentals, 2 nd Edition, David F. Ollis, 1986.
4. H.S Fogler – Elements of Chemical Reaction Engineering, 2 nd Edition, PHI, 1992.
5. J.M. Smith – Chemical Engineering Kinetics, 3 rd Edition, Mc Graw Hill, 1981.

III Year B.Tech. Biotechnology I - Semester

L	T	P	To	C
4	-	-	4	4

BT 305 GENETIC ENGINEERING

Course Description & Objectives:

The course is oriented at making the student understand about the process of gene expression and its regulation. Also to give awareness about different vectors used for gene transfer, enzymes, cloning methods, expression and detection of clones, molecular methods and markers and applications of r-DNA technology.

Course Outcomes:

Students gain knowledge on

1. Gene expression and regulation
2. Structure and organization of different vectors used in gene transfer
3. Enzymes used in gene manipulation
4. Cloning methods, expression and detection of clones
5. Molecular techniques, markers and applications of r-DNA technology

UNIT I : Gene Regulation in Prokaryotes and Eukaryotes:

Prokaryotes - Lactose, Arabinose and Tryptophan operons, Repressors and activators, Sigma switch in Bacillus subtilis., Eukaryotes - Gene regulation, Promoters, enhancer elements, Gene rearrangement , gene amplification.

UNIT II : Plasmids, Transposons / Vectors for Gene Transfers:

Plasmids: Definition, types, Identification, classification and purifications and transfer of Plasmids. Host restriction in transfer; Transposable elements: Definition, detection of transposition in bacteria, types of bacterial transposons, mechanisms of transposition and excision, applications of transposons, retrotransposons; enzymes involved in genetic engineering, different types of cloning vectors (Plasmid – pUC 19, l-phage, cosmid, M13, BAC,YAC & YEP).

UNIT III : Expression and Detection of clones :

Cloning strategies, sequencing, DNA fingerprinting; Blot analysis - Southern, Northern Western blot; dot and slot blot; PCR- Principles, designing of primers, methodology, Types of PCR, RT - PCR, multiplex PCR, identification of PCR product, application of PCR technology.

UNIT IV : Molecular Techniques :

Purification of genomic DNA from living cells, Manipulation of purified DNA; Introduction of DNA into living cells - methods of Gene transfer, DNA methylation, DNA hybridization, DNA sequencing, DNA fingerprinting; Blot analysis - Southern, Northern & Western blot; dot and slot blot; PCR- Principles, designing of primers, methodology, Types of PCR, RT - PCR, multiplex PCR, identification of PCR product, application of PCR technology.

UNIT V : Molecular Markers and Applications of r-DNA Technology:

Molecular markers: RFLP, RAPD, AFLP, Restriction mapping, 16s r-RNA typing, gene chip and microarray; applications in disease profile; Gene cloning in medicine (Insulin, Blood clotting factor VIII), High level expression of proteins in different host systems (E. coli, yeast, Insect, mammalian cells), Introduction to Gene therapy (Ex vivo & In vivo), case study of ADA as an example., Advantages and limitations of Gene therapy and novel technologies.

TEXT BOOKS :

1. T.A.Brown - Gene Cloning & DNA analysis, 5th Ed., Balckwell, 2006.

2. B.D. Singh,m Plant Biotechnology, 1st Edtion.Kalyani Publishers.

REFERENCE BOOK :

1. Primrose SB - Principles of Gene manipulation and Genomics, 5th edition, Blackwell Scientific Publications, 2006.
2. David Friefelder- Essentials of Molecular Biology, 4th ed., Noragam Publishing house, 1995.

III Year B.Tech. Biotechnology I - Semester

L	T	P	To	C
4	-	-	4	4

MS 310 MANAGERIAL ECONOMICS

Course description and Objectives:

To make the students familiar with Economic, Accounting & Financial concepts used to help the managers in taking Business Decisions.

Course Outcomes:

1. Student will be able to undesrastand the basic concepts of managerial economics
2. They will gain adequate knowledge in cost analysis
3. They will acquire sufficient skills to interpret pricing and profit management
4. They will be able to perform various ratio analyse

UNIT – I : Introduction to Managerial Economics :

Nature & Scope relation of Managerial Economics with the functional areas of business organization. Role of Managerial Economist

Demand Analysis: Types of Demand, Demand determination, Demand elasticities, Demand forecasting, Survey & Statistical methods.

UNIT – II : Production and Cost Analysis production function:

Marginal rate of technical substitution, iso-quants and iso-costs, production function with one/two variables, cobb-douglas production function, Factor productivities and returns to scale.

Cost Analysis: Cost concepts, cost determinants, cost output relationship in the short and long run.

UNIT – III : Pricing and Profit Management:

Features and types of different competitive situations – Perfect competition, monopoly, monopolistic and oligopoly, pricing methods in practice.

UNIT – IV : Profit Management:

Nature and theories of profit. Cost – Volume – Profit Analysis.

UNIT – V

Ratio Analysis – Introduction to ratios, Advantages and disadvantages of ratio analysis, Types of ratios – liquidity, solvency, turnover and profitability ratios.

TEXT BOOKS:

1. Gupta, "Managerial Economics" TMH, 1/e, 2005.
2. M.E. Thukaram, "Accounting for Managers" TMH, 2/e, 2006.

REFERENCE BOOKS:

1. Dominic Salvatore, "Managerial Economics", Thomson, 3/e, 2006.
2. Mote Paull, "Managerial Economics" TMH, 1/e, 2004.
3. S.N.Maheswari, "Financial Accounting" Thomson, 2/e, 2006.

III Year B.Tech. Biotechnology I - Semester

L	T	P	To	C
4	-	-	4	4

BT 307 PLANT BIOTECHNOLOGY (ELECTIVE - I)

Course Description & Objectives:

The Course is designed to provide concepts and industrial applications in the field of agricultural biotechnology. Production of high yielding,disease resistant crop varieties by using plant transformation technology. Concepts of Plant Molecular farming and production of plantibodies from Genetically modified organisms. To enable students to participate in R&D projects, develop laboratory and research skills.

Course Outcomes:

The students will develop fundamental knowledge in Plant Biotechnology and its application in laboratory and industry settings.

The students will:

1. Acquaint with principles, technical requirement, scientific and commercial applications in Plant Biotechnology,
2. Become familiar with sterile techniques, media preparation, DNA extraction methods, gene isolation and sequence analysis,
3. A knowledge of *Agrobacterium* and its development as a transformation vector & critically assess various plant genetic modification strategies
4. Knowledge of how plants can be transformed with respect to pest resistance, herbicide tolerance,
5. Support methodologies in plant tissue/cell culture to plant improvement, understanding how breeding strategies can be targeted to crops
6. Become motivated to set goals towards pursuing graduate school and higher level positions, such as lab manager and key scientist in plant biotechnological research institutes and industries.

UNIT I : INTRODUCTION TO TISSUE CULTURE & APPLICATIONS:

Introduction to cell and tissue culture; Tissue culture media (composition, preparation); Initiation and maintenance of callus and cell suspension culture, organogenesis; Protoplast isolation culture and fusion;Production of haploids, Somaclonal variations,Germplasm conservation (Cryopreservation); Hardening & Field transformation of cultured Plants; Bioreactors systems and models for mass cultivation of plant cells.

UNIT II: PLANT TRANSFORMATION TECHNOLOGY:

Agrobacterium mediated gene transfer; Agrobacterium based vectors, viral vectors and their application. Direct gene transfer methods; chemical methods, electroporation, microinjection, particle bombardment.

UNIT III:PLANT GENETIC ENGINEERING FOR PRODUCTIVITY AND PERFORMANCE (BIOTIC STRESS & ABIOTIC STRESS):

Herbicide resistance, Insect resistance, Disease resistance, virus resistance,. Abiotic stress tolerance ;(Drought, temperature, salt).

UNIT IVII MOLECULAR FARMING & INDUSTRIAL PRODUCTS:

Application of Plant biotechnology for the production of quality oil, Industrial enzymes, Therapeutic Proteins ,Antigens (edible vaccine) and plantibodies.

UNIT V: METABOLIC ENGINEERING:

Concepts of Production of secondary metabolites from plant; Metabolic engineering for plant primary metabolites and secondary metabolites.

TEXT BOOKS:

1. H.S. Chawla, A Text Book of “Plant Biotechnology”, 2nd ed., Oxford & IBH, New Delhi, 2002.
2. H.K.Das, Text Book of Biotechnology -Wiley India, (P) Ltd. New Delhi, 5th edition, 2007.

REFERENCEBOOKS:

1. Roberta Smith, Plant Tissue Culture: Techniques and Experiments. 2nd ed.Academic Press, 2000.
2. Freifelder D, Molecular Biology, Jones and Bartlett Publishers inc. 1987.
3. Bhojwani, S.S. and Rajdan, Plant Tissue Culture: Theory and Practice. 2004
4. R.C., Dubey, “A Text Book of Biotechnology” 4 th ed. S. Chand , Publishers,2006
5. Primrose, S B, Twyman, Richard M Old, R W, Principles of gene manipulation, Blackwell Scientific publishers, 2001

III Year B.Tech. Biotechnology	I - Semester	L	T	P	To	C
		4	-	-	4	4

BT 309 PLANT METABOLISM (ELECTIVE - I)

Course Description & Objectives:

The course is intended for students in the plant sciences. All topics are taught in the context of plant biology. Successful completion of this course will provide students with fundamental knowledge of biochemistry and specific knowledge of compounds and biochemical pathways that occur in plants.

Course Outcomes:

1. Students will learn the structure, function and biosynthetic pathways of essential biochemical molecules including their key chemical and physical properties.
2. Students will learn how membranes form and function and how the building blocks of membranes are made
3. Students will learn amino acid structures and relate their chemical properties to the synthesis and function of proteins, enzymes and other metabolites.
4. Students will learn about the rich diversity of secondary compounds and metabolism in plants and how such compounds contribute to human health.

Unit –I: Structure and biochemical aspects of specialized plant cell organelles Cell plate, primary and secondary cell walls, plasmodesmata, importance of vacuoles, characteristics of meristematic cells Cell division - Mitosis, Meiosis, extension, differentiation and their controls. Water relations of plants - role of water, absorption, adsorption, conduction and transpiration, guttation water balance and stress.

Unit-II Photosynthesis :

Structure of organelles involved in Photosynthesis of plants and bacteria. Electron transfer in chloroplasts of plants difference from mitochondria. photophosphorylation and reduction of CO_2; differences in C_3,C_4 & CAM Photosystems (PS I & PS II) light receptors and light harvesting ferrodoxin, Plastocyanin plasto quirone, carotenoids; Hill reaction, plants.Nitrogen assimilation and Biological nitrogen fixation.

Unit-III: Plant Hormones :

Growth regulating substances and their mode of action. Role of auxins, gibberelic acid, abscisic acid, cytokinins and brassinosteriods in the regulatory cell extension, germination, growth and development. Signal transduction and gene expression Secondary metabolism-Special features of secondary plant metabolism formation and functions of phenolic acids, tannins lignins, flavonoid pigments, surface waxes, cutin and suberin - the plant protective wats, terpenes Mineral metabolism - role of different minerals absorption and translocation of inorganic and organic substances.

Unit-IV: Photomorphogenesis :

Physiology of flowering & Vernalization Responding to light: Photomorphogenesis: Phytochrome, Phytochrome in dark grown seeding, Physiological effects of Phytochrome, Phytochrome in green plants, Phytochrome under natural conditions, mechanism of Phytochrome action. Temperature and Plant Development: Temperature in the Plant environment, Influence of temperature on growth and plant distribution, and development.

Unit-V: Photoperiodism and Rhythmic Phenomena :

Photoperodism; the Biological Clock,Genetic approaches to photoperiodism, and rhythms; Photoperiodism in nature. Biochemistry of fruit ripening, senescence and abscission; Seed Germination and Dormancy Defence system in plants (ethylene, Jasmonic acid and Salicylic acid), Pathogenesis Related (PR) Proteins.

Text Books:

1. Heldt, H. 2005. Plant Biochemistry (3rd Edn.) Indian Reprint, Elsevier, New Delhi.
2. Hopkins, W. G., Introduction to Plant Physiology. 3rdEdition. John Wiley & Sons, New York.2009.

Reference Books:

1. Dey, P. M. & Harborne, J. B. (Eds.) 1997. Plant Biochemistry, Academic Press, London
2. Salisbury, F.B., & C.W. Ross,"Plant Physiology", 4th ed., Thomson Wadsworth Pub., 2007. California.

III Year B.Tech. Biotechnology	I - Semester	L	T	P	To	C
		4	-	-	4	4

BT 311 PLANT PHYSIOLOGY (ELECTIVE - I)

Course Description & Objectives :

To make the student to understand about the uptake of water, absorption of minerals and different transport mechanisms in plants. To acquaint the student with biochemical processes like photosynthesis, respiration, nitrogen fixation; biosynthesis of secondary metabolites and strategies to improve their production. To gain knowledge on growth, differentiation, morphogenesis, development, mineral nutrition, plant movements and plant hormones; effect of different stresses on plant growth and development and responses of plants to stress.

Course Outcomes :

1. Absorption of water and minerals; transport mechanisms
2. Biochemical processes like photosynthesis, respiration, nitrogen fixation and biosynthesis of secondary metabolites
3. Growth, differentiation, morphogenesis, development, plant hormones, plant movements, photoperiodism
4. Effect of different types of stresses and response of plants to stresses.

Unit - I: Water Potential :

Plants and water, Diffusion, bulk flow, chemical and water potential; osmosis, transpiration, Ascent of Sap, mineral nutrition, absorption of mineral salts, nature of membranes, solute absorption, passive and active transport, ATPase pumps, proton pumps, carriers and channels, transport in phloem.

Unit - II: Plant Biochemistry :

Photosynthesis – chloroplasts, Emerson effect, Photosystem I and II, Electron transport, Calvin cycle,c4 pathway, photorespiration, CO_2 fixation, factors affecting photosynthesis; Respiration - Respiratory Quotient, glycolysis, fermentation, Krebs cycle, electron transport system and their energitics, Pentose phosphate pathway, factors affecting respiration; Nitrogen cycle, fixation, assimilation of nitrates and ammonium.

Unit-III : Plant secondary metabolites :

Definition of stress , stressful environments, water stress – drought, cold and salt; chilling injury, high temperature stress, oxidative stress, Mechanisms of plant response to water and related stresses, plant defense systems. Introduction; Classification, structure, function and biosynthesis of secondary metabolites ; important pathways of biosynthesis - phenyl propanoid pathway; Mevalonate pathway and acetate 6mevalonate pathway. Strategies and approaches for the over production of plant secondary metabolites – plant cell suspension cultures, hairy root cultures, metabolic engineering, bioreactors.

Unit-IV : Plant growth, Development and Regulation :

Growth, patterns of growth and development, growth kinetics, morphogenesis, principles of differentiation, dormancy, germination, flowering and senescence. Concepts of hormones and their action, Biosynthesis and physiological significance of auxins, cytokinins, gibberellins, abscisic acid, ethylene; Basic principles of plant movements-nastic movements, tropisms, photomorphogesis, photoperiodism

Unit- V : Stress Physiology :

Definition of stress , stressful environments, water stress – drought, cold and salt; chilling injury, high temperature stress, oxidative stress, Mechanisms of plant response to water and related stresses, plant defense systems.

TEXT BOOKS:

1. Plant Physiology , Frank B. Salisbury and Cleon W. Ross 2004, 4th Edition, Thomson Asia Pte Ltd., Singapour
2. Plant Biochemistry; P. M. Dey and J. B. Harborne, Academic Press (1997).

REFERENCE BOOKS

1. Plant Biochemistry, P.M. Dey & J.B. Harborne(2000) Hart Court Asia Pte Ltd.
2. Introduction to plant Biochemistry. Goodwin and Mercer, CBS Publisher (2000).
3. Biochemistry and Molecular Biology of Plants. Buchanan, Greussem and Jones, AAPS (2000).

II Year B.Tech. Biotechnology I - Semester

L	T	P	To	C
-	-	1	1	1

SR004 SEMINAR

III Year B.Tech. Biotechnology I - Semester

L	T	P	To	C
-	-	3	3	2

BT313 BIOCHEMICAL REACTION ENGINEERING LAB

Course Description & Objectives:

Provides practical knowledge of different chemical reactors used in chemical engineering industries.

Course Outcomes:

1. Able to determine the kinetics of a given reaction in different types of reactors
2. Would be familiar with the working models of various types of reactors
3. Able to Characterize lab reactors through residence time distributions (measured or model based).
4. Gain knowledge on effects combined reactors on kinetics of the reaction.

List of Experiments:

1. Kinetic Studies in C.S.T.R
2. Kinetic Studies in P.F.R
3. Kinetic Studies in Combined Reactor
4. Kinetic Studies in Batch Reactor
5. Adiabatic Batch Reactor
6. R.T.D Studies in C.S.T.R
7. R T D Studies in C.S.T.R's in Series
8. R.T.D Studies in Plug Flow Reactor
9. R.T.D Studies in Combined Reactor.

TEXT BOOKS:

1. Octave Levenspiel - Chemical Reaction Engineering , 3rd Ed. John Wiely & Sons,1999.
2. H.S. Fogler - Elements of Chemical Reaction Engineering, 2nd ed. PHI, 1992.

III Year B.Tech. Biotechnology I - Semester	**L**	**T**	**P**	**To**	**C**
	-	-	3	3	2

BT 329 CELL & TISSUE CULTURE LABORATORY

Course Description & Objectives:

To introduce the advanced laboratory skills that reinforce basic principles and techniques learned in introductory biology, chemistry of various cells and tissue systems. The enhancement of general and advanced laboratory experiences, facilitates that further for future independent research. To provide research outcomes that develops critical thinking and analytical skills. towards the changing trends in technology and the modern aspects of biochemical and molecular biology questions asked in plant biology and allied areas.

Course Outcomes:

1. The laboratory teaching of this course will provide students an opportunity to get hands on training with some of the most basic, yet widely utilized techniques in micropropagation etc.
2. Become familiar with sterile techniques, media preparation, methodologies in plant tissue/cell culture, effect of PGH on plant tissues etc.

List of Experiments:

1. Introduction to Cells, plant tissues
2. Observation of Algal & Fungal cultures,Mitotic & Meiotic Cells
3. Preparation of different Media for plant cell/tissue culture
4. Surface sterilization
5. Raising of Aseptic Seedlings
6. Callus induction
7. Organogenesis

8. Effect of Auxins on root induction

9. Effect of Cytokinins on shoot induction

10. Protoplast isolation & culture

11. Hardening & Field transformation of cultured Plants

12. Agrobacterium mediated gene transfer, selection of transformants, reporter gene (GUS) assays.

TEXT BOOKS:

1. C.C.Giri &ArchanaGiri, Plant Biotechnology Practical Manual, 2007.

2. Bhojwani, S.S. and Rajdan, Plant Tissue Culture: Theory and Practice.,Elsevier Publishers, Amsterdam, 2004.

REFERENCE BOOK:

1. Laboratory manual for Microbiology by P Gaunasekharan,Newage International Publishers. 2004.

III Year B.Tech. Biotechnology II - Semester

L	T	P	To	C
-	-	3	3	2

BT 331 BIOLOGICAL DATABASE LABORATORY

Course Description & Objectives:

The data pertaining to Biology is diverse and numerous. Hence a few data banks with details on genes, proteins, ligands, SNP etc.... are being maintained by Governmental and non-governmental agencies for the percolation of information. These data bases are to be practiced in the lab.

Course Outcomes:

1. Students will be able to retrieve data from online databases
2. They will understand the significance of biological databases
3. They will be able to submit annotated data to the databases
4. They will understand the importance of accession IDs
5. They will be able to utilize various tools in databases for research works in future.

Explaining and mining of the following Data Banks

a) NCBI
b) DDBJ
c) UCSC GENOME BROWSER
d) Biogrid (India)
e) Protein Data Bank
f) EMBL-EBI
g) HLA / IMGT data base
h) SNP database

TEXT BOOK :

1. Bioinformatics: Sequence and Genome Analysis, Second Edition, David Mount, 2004.

III Year B.Tech. Biotechnology II - Semester

L	T	P	To	C
4	-	-	4	4

BT 302 ANIMAL BIOTECHNOLOGY (ELECTIVE-II)

Course Description & Objectives:

The course provides an overview of current developments in different areas of animal biotechnology. It imparts in vitro reproductive techniques for sperm, ovum and embryo manipulation.It helps in ellucidating structural, functional and comparative genomics of farm animals and its application for livestock improvement.The course comprehends the application of immunological techniques in biotechnology and appreciates the principles of animal cell culture and its application.

Course Outcomes:

At the end the students will demonstrate the ability in / to

1. Development of primary cultures
2. Development of established cell culture.
3. Assess the effect of factors and their role in cell functions.
4. Develop awareness in interlinking of different fields for the development of biological organs.

UNIT- I: Animal cell culture techniques and media :

Cell culture techniques including primary and secondary culture, cell lines, suspension culture, organ culture etc. Different type of cell culture media, growth supplements, serum free media, balanced salt solution, culture of different tissues and its applications. Behavior of cells in culture conditions, division, growth pattern and metabolism, estimation of cell number and cell viability, MTT assay. Quantification of cells by trypan blue dye exclusion method.

UNIT-II: Development and maintenance of Cell Lines

Development of cell lines, characterization and maintenance of cell lines, stem cells, cryopreservation, common cell culture contaminants. Cryopreservation of primary cell cultures and cell lines. Effect of viruses on cultured mammalian cells. Cloning of domestic animals. Conservation of endangered species.

UNIT-III: Immunodiagnostics :

Somatic cell hybridization, hybridoma technology, commercial production of antibodies using monoclonal antibodies, screening of hybrids for production of monoclonal antibodies. Application of antibodies in chemiluminescence and fluorescence assay used, antibody based nucleic acid probes and their applications in ELISA.

UNIT-IV : Reproductive Technology

Assisted reproductive biotechnology in man and animal, introduction to embryo biotechnology, endocrine therapeutics. methodology of super ovulation, *in vitro* fertilization, embryo culture and micromanipulation, preparation of sperm for IVF. Different methods of gene transfer and their limitations, sperm mediated gene transfer, embryo splitting, production of transgenic livestock by nuclear transfer and its application, regulatory issues.

Unit-V : Animal Genomics

Characterization of animal genomes, SNP, STR, QTL, RFLP, RAPD, genetic basis for disease resistance, transgenic animal production and application in expression of therapeutic proteins. Nucleic acid based methods for identification of animal species, detection of meat adulteration using DNA based methods, identification of wild animal species using DNA based methods. Brief introduction on Software tools for molecular phylogeny.

TEXT BOOKS:

1. M M Ranga (2014) Animal Biotechnology, 2nd Ed. Riddhi International.
2. P C Trivedi (2014) Advances in Biotechnology, Riddhi International

REFERENCE BOOKS:

1. Gordon I. 2005. Reproductive Techniques in Farm Animals, CABI.
2. Kindt TJ, Goldsby RA & Osbrne BA. 2007. Kuby Immunology. WH Freeman.
3. Kun LY. 2006. Microbial Biotechnology, World Scientific.

III Year B.Tech. Biotechnology II - Semester

L	T	P	To	C
4	-	-	4	4

BT 304 THERMODYNAMICS FOR BIOTECHNOLOGISTS

Course Description & Objectives:

Develop familiarity with thermal energy concept..To estimate properties of chemical compounds and biomass.Develop familiarity with heat of reactions.Develop familiarity with phase and chemical equilibria.

Course Outcomes

1. Understand the terminology associated with engineering thermodynamics.
2. Reiterate the first and second laws of thermodynamics, and understand the practical implications of these laws in engineering design.
3. Understand the concepts of heat, work and energy conversion, and can calculate heat and work quantities for industrial processes.
4. Calculate the properties of ideal and real mixtures based on thermodynamic principles.
5. Explain the underlying principles of phase equilibrium in two-component and multi-component systems.
6. Apply mass, energy and entropy balances to flow processes.

UNIT - I : The first law and other basic concepts:

The scope of thermodynamics. The first law of thermodynamics, thermodynamic state and state functions, enthalpy, steady-state steady flow process, equilibrium, phase rule, reversible process, constant - V and constant - P processes, heat capacity. Calculation of Work, energy and property changes in reversible processes.

UNIT - II : Behavior of Fluids :

The PVT behavior of pure substances, virial equations, ideal gas, applications of the virial equations, second virial coefficients from potential functions. Thermodynamics of flow processes; principles of conservation of mass and energy for flow systems.

UNIT - III : Second Law of Thermodynamics :

Statements of the second law, thermodynamic temperature scales Entropy, Entropy changes of an ideal gas, third law of thermodynamics, entropy from the microscopic view point.

UNIT - IV : Thermodynamic Properties of Fluids & Solution Thermodynamics :

Estimation of thermodynamic properties using equations of state; Maxwell relationships and their applications; Calculation of flow processes based on actual property changes, Partial molar properties, concepts of chemical potential and fugacity, Ideal non ideal solutions, Gibbs Duhem equation; Excess properties of mixtures; Activity Coefficient.

UNIT - V : Phase Equilibria & Chemical Reaction Equilibria :

Criteria for phase equilibrium; Vapor-liquid equilibrium calculations for binary mixtures, Liquid – Liquid equilibrium and Solid-liquid equilibrium, Equilibrium criteria for homogeneous chemical reactions; Evaluation of equilibrium constant and effect of pressure and temperature on equilibrium constant; Calculation of equilibrium conversions and yields for single and multiple chemical reactions.

TEXT BOOKS:

1. J M.Smith,H.C.Van Ness and M.M. Abbott. “Introduction to Chemical Engineering Thermodynamics”, 5th ed., McGraw Hill, 2005.

2. Y.V. C.Rao, “Chemical Engineering Thermodynamics”, 1st ed., University Press, 2004.

REFERENCE BOOKS:

1. K. V. Narayanan, “A Text Book of Chemical Engineering Thermodynamics”, 1st ed., PHI Publications, 2001.
2. Y.V.C.Rao, “Engineering Thermodynamics”, 1st ed., University Publications, 2004.
3. M.D.Koretsky, “Engineering and Chemical Thermodynamics”, 1st ed., John Wiley and sons, 2004.

III Year B.Tech. Biotechnology	II - Semester	L	T	P	To	C
		4	-	-	4	4

BT 306 BIOPROCESS ENGINEERING

Course Description & Objectives:

This course helps to familiarize various aspects of bioreactors, to understand the media requirements and working conditions for profitable run of bioprocess industries.

Course Outcomes

1. The student understands about biological and kinetic concepts underlying bioprocesses engineering.
2. The student able to learn procedures for the design and control of industrial scale fermentation and biological waste treatment processes
3. The student will be able to apply different biotechnological methods used in the recombinant protein production, in fermentation processes and in protein purification.
4. The student will be able to analyze the research results and to present them both in written and oral form.
5. The student will be able to prepare a research plan for practical laboratory training research project in bioprocess field.

UNIT - I : Introduction to Bioprocesses & Media Design :

An overview of traditional and modern applications of biotechnology industry, outline of an integrated bioprocess and the various (upstream and down stream) unit operations involved in bioprocesses, generalized process flow sheets. Medium requirements for fermentation processes, carbon, nitrogen, minerals, vitamins and other complex nutrients, oxygen requirements, medium formulation for optimal growth and product formation, examples of simple and complex media, design and usage of various commercial media for industrial fermentations.

UNIT - II : Metabolic Stoichiometry & Energetics :

Stoichiometry of Cell growth and product formation, elemental balances, degrees of reduction of substrate and biomass, available electron balances, yield coefficients of biomass and product formation, maintenance coefficients. Energetic analysis of microbial growth and product formation, oxygen consumption and heat evolution in aerobic cultures, thermodynamic efficiency of growth.

UNIT - III : Kinetics of Microbial Growth & Product Formation :

Phases of cell growth in batch cultures, Simple unstructured kinetic models for microbial growth, Monod model, Growth of filamentous organisms. Growth associated (primary) and non - growth associated (secondary)

UNIT - IV :Transport process in bioreactors :

Mixing equipments, flow patters in agitated tanks, radial and axial flow impellers, mechansim of mixing, power requirement for ungassed and gassed mixing, scale-up of mixing system, improvement of mixing in fermenters and effect of shear in bioreactors. Oxygen transfer in fermenters, measuring dissolved oxygen concentratins, parameters affecting dissolved oxygen concentrations, measurement of $K_L a$ and scale up of oxygen transfer in larger bioreactors.

UNIT - V : Sterilization Kinetics :

Thermal death kinetics of microorganisms, batch and continuous heat sterilization of liquid media, filter sterilization of liquid media, air sterilization and design of depth filters, design of sterilization equipment - batch and continuous.

TEXT BOOKS :

1. M.L.Shuler and F. Kargi “Bioprocess Engineering”, 2nd ed., Prentice Hall of India, 2008.
2. P.M. Doran, “Biochemical Process Principles,1st ed., Elsivier Publications, 2009

REFERENCE BOOKS:

1. Harvey W. Blanch, Douglas S. Clark “Biochemical Engineering”, 1st ed., Marcel Dekker Publications, 2007.
2. Bailey Ollis, David F. Ollis, “Biochemical Engineering Fundamentals”, 2nd ed., McGraw-Hill Publications, 1986.

III Year B.Tech. Biotechnology II - Semester

L	T	P	To	C
4	-	-	4	4

BT 308 ENZYME TECHNOLOGY

Course Description & Objectives:

To acquaint the student with classification of enzymes, mechanism of action, isolation methods, kinetics and applications. Also about immobilization techniques and bioreactor designing.

Course Outcomes:

After completing this course, the student should be able to:

1. Describe various classes of enzymes, concept of active site and energetics of enzyme substrate complex.
2. Gain the knowledge on key structural and energetic factors which give rise to increased enzyme stability important for industrial application.
3. Summarize current processes involved in industrial enzyme production and purification from plants, animals and microorganisms.
4. Understand the selection and optimization of industrial enzymes using genetic and biochemical techniques,
5. Understand the different immobilization methods and analyze the bioconversions in immobilized reactors.

UNIT I: Introduction to Enzymes :

Classification of enzymes, Applications of Enzymes, Principles of catalysis – collision theory, transition state theory, role of entropy in catalysis, Comparison of chemical and enzyme catalysis. Stability, deactivation & catalytic activities. Mechanisms of enzyme action, Concept of active site and energetics of enzyme substrate complex formation, Specificity of enzyme reaction.

UNIT II: Isolation of Enzymes :

Extraction and Purification of Crude Enzyme extracts from plant, animal and microbial sources. Methods of characterization of enzymes and different characteristics, Development of enzymatic assays.

UNIT III: Kinetics of Enzyme Action :

Kinetics of single substrate reactions; Estimation of Michaelis – Menten parameters, Importance of K_M, Multisubstrate reaction mechanisms and kinetics, Turnover number. Types of Inhibition- kinetic models, Substrate and Product Inhibition, Allosteric regulation of enzymes, Deactivation kinetics.

UNIT IV : Enzyme Immobilization

Physical and Chemical techniques for enzyme Immobilization - adsorption. matrix entrapment, encapsulation, cross-linking, covalent binding – examples, Advantages and disadvantages of different Immobilization techniques, Overview of applications of immobilized enzyme systems.

UNIT V : Immobilized Enzyme Reactors

Design of Immobilized Enzyme Reactors-Packedbed, Fluidizedbed Membrane reactors, Bioconversion calculations in free-enzyme CSTRs and immobilized enzyme reactors. Stability, Deactivation & Catalytic activities.

TEXT BOOKS:

1. Trevor palmer - Enzymes, First edition, East west Press, 2004.
2. James E Bailey, David F., Ollis - Biochemical Engineering Fundamentals, 2nd edition. Mc Graw Hill Intl., 1986.

REFERENCE BOOKS:

1. James Lee - Biochemical Engineering , First edition, PHI, 1992.
2. Harvey W. Blanch, Douglas S. Clark - Biochemical Engineering, First Indian edition, Marcel Dekker, Inc. 2007.
3. Shuler, M.L. and Kargi,F. “ *Bioprocess Engineering - Basic concepts* Second Edition Prentice Hall of India Pvt. Ltd., 2005

III Year B.Tech. Biotechnology II - Semester

L	T	P	To	C
4	-	-	4	4

BT 310 BIOETHICS, SAFETY AND IPR

Course Description and Objectives:

This course helps to adhere to the ethical practices appropriate to the discipline at all times and to adopt safeworking practices relevant to the bioindustries & field of research :

Course outcomes:

1. Students will gain awareness about Intellectual Property Rights (IPRs) to take measure for the protecting their ideas
2. They will able to devise business strategies by taking account of IPRs
3. They will be able to assists in technology upgradation and enhancing competitiveness.
4. They will acquire adequate knowledge in the use of genetically modified organisms and its effect on human health
5. They will gain more insights into the regulatory affairs.

UNIT I: Engineering Ethics & Bioethics :

Senses of “Engineering Ethics”' - variety of moral issued - types of inquiry - moral dilemmas - moral autonomy - Kohlberg’s theory - Gilligan’s theory - consensus and controversy – Models of Professional Roles - theories about right action - Self-interest - customs and religion - uses of ethical theories. Introduction to Bioethics. Social and ethical issues in Biotechnology Definition of Biosafety. Biosafety for human health and environment. Social and ethical issues. Use of genetically modified organisms and their release in to the environment. Special procedures for r-DNA based products, Transgenic plants and Animals.

UNIT II : Regulatory Affairs :

Regulation, national and international guidelines of Biosafety, r-DNA guidelines, Regulatory requirements for drugs and Biologics GLP and GMP.

UNIT III : Intellectual Property Rights :

Intellectual property rights and protection, patents and methods of application of patents, Trade Secrets copyrights, Trade Marks, legal implications, farmer's rights, plant breeder's rights. International and National conventions on biotechnology and related areas, WTO guidelines.

UNIT IV : Safety, Responsibilities and Rights:

Safety and risk - assessment of safety and risk - risk benefit analysis and reducing risk – the three mile island and case studies. Collegiality and loyalty - respect for authority - collective bargaining - confidentiality - conflicts of interest - occupational crime - professional rights - employee rights.

UNIT V : Global Issues :

Multinational corporations - Environmental ethics - computer ethics - weapons development and bioterrorisms - engineers as managers-consulting engineers - engineers as expert witnesses and advisors - moral leadership-sample code of Ethics.

TEXT BOOKS:

1. Mike Martin and Roland Schinzinger, "Ethics in Engineering", McGraw-Hill, New York 1996.
2. Govindarajan M, Natarajan S, Senthil Kumar V. S, " Engineering Ethics", Prentice Hall of India, New Delhi, 2004.

REFERENCE BOOKS:

1. Sasson A, Biotechnologies and Development, UNESCO Publications, 1988.
2. Sasson A. Biotechnologies in developing countries present and future, UNESCO publishers, 1993. 7. John R Boatright, "Ethics and the Conduct of Business", Pearson Education, New
3. Edmund G Seebauer and Robert L Barry, "Fundamentals of Ethics for Scientists and Engineers", Oxford University Press, Oxford, 2001. 9. Singh K. "Intellectual Property Rights on Biotechnology", BCIL, New Delhi.

III Year B.Tech. Biotechnology	II - Semester	L	T	P	To	C
		4	-	-	4	4

BT 312 STEM CELL BIOLOGY(ELECTIVE - II)

Course Description & Objectives:

This course is an examination of the goals, practices, and accomplishments of contemporary stem cell biology. It impart in students an understanding about embryonic and adult stem cell culture; their role in drug discovery.

Course Outcomes:

At the end the students will demonstrate the ability

1. Establishment of embryonic & adult stem cells culture.
2. Assess the role of stem cells in drug discovery.
3. Develop awareness in interlinking of genetic engineering in the field of stem cell biology

UNIT I : STEM CELL BASICS :

Unique properties of stem cells – embryonic stem cells - adult stem cells – umbilical cord stem cells – similarities and differences between embryonic and adult stem cells. Properties of stem cells – pluripotency – totipotency.

UNIT II : EMBRYONIC STEMCELLS :

In vitro fertilization –culturing of embryos-isolation of human embryonic stem cells – blastocyst – inner cell mass – growing ES cells in lab – laboratory tests to identify ES cells – stimulation ES cells for differentiation – properties of ES cells.

UNIT III : ADULT STEM CELLS :

Somatic stem cells – test for identification of adult stem cells – adult stem cell differentiation – trans differentiation – plasticity – different types of adult stem cells.

UNIT IV : STEM CELL IN DRUG DISCOVERY AND TISSUE ENGIEERING :

Target identification – Manipulating differentiation pathways – stem cell therapy Vs cell protection - stem cell in cellular assays for screening – stem cell based drug discovery, drug screening and toxicology.

UNIT V: GENETIC ENGINEERING AND THERAPEUTIC APPLICATION OF STEM CELLS :

Gene therapy – genetically engineered stem cells – stem cells and Animal cloning – transgenic animals and stem cells – Therapeutic applications – Parkinson disease - Neurological disorder – limb amputation – heart disease - spinal cord injuries – diabetes –burns - HLA typing-Alzheimer's disease –tissue engineering application – production of complete organ - kidney – eyes - heart – brain.

TEXT BOOKS :

1. Embryonic Stem cells by Kursad and Turksen. 2002.Humana Press.
2. Stem cell and future of regenerative medicine . By committee on the Biological and Biomedical applications of Stem cell Research.2002.National Academic press

REFERENCE BOOKS:

1. Cell Growth and Division: A Practical Approach. Ed. R. Basega, IRL Press.
2. Cell Culture Lab Fax. Eds. M Butler & M. Dawson, Bios Scientific Publications Ltd..Oxford.
3. Animal Cell Culture Techniques. Ed. Martin Clynes, Springer.
4. Methods in Cell Biology, Vol. 57, Animal Cell Culture Methods. Ed. Jenni P Mather and David Barnes. Academic Press.

III Year B.Tech. Biotechnology	II - Semester	L	T	P	To	C
		4	-	-	4	4

BT 330 ANIMAL CELL SCIENCE & TECHNOLOGY (ELECTIVE - II)

Course Description & Objectives:

This course intends to impart in students an understanding of the primary cell culture and methods that convert them to long term established cultures. They will also be exposed to all the factors which could impact cell culture and equipment requirements for propagation. Awareness is generated about recent advances in the area of stem cell technology, organ culture, tissue engineering etc.,

Course Outcomes:

1. Students will demonstrate the ability to develop primary established cell culture.
2. They could assess the effect of factors and their role in cell functions.
3. They will develop awareness in interlinking of different fields for the development of biological organs.
4. They will have indepth knowlege on engineering of Animal Cells and their applications

UNIT-I BASICS OF ANIMAL CELL AND ITS CULTURING :

Structure and organization of an animal cell, Types of animal cell culture - cell culture, organ/tissue culture, organotypic culture and histotypic culture, Equipments and materials needed for animal cell culture technology.

UNIT-II ANIMAL CELL CULTURE MEDIUM AND ITS COMPONENTS AND THEIR SIGNIFICANCE:

Introduction to the balanced salt solutions and growth medium, Brief discussion on the chemical, physical and metabolic functions of different constituents of culture medium, Role of carbon-di-oxide and role of serum and its supplements in maintaining cells in culture medium, Serum and protein free defined media and their application.

UNIT-III BASIC TECHNIQUES OF MAMMALIAN CELL CULTURE *IN VITRO:*

Primary and established cell lines, Biology and characterization of the cultured cells, measuring parameters of growth. Maintenance of cell culture, Cell separation, Cell transformation, Cell synchronization, Measurement of viability and cytotoxicity, Apoptosis - characteristic features and molecular mechanisms, Measurement of cell death.

UNIT-IV ENGINEERING ANIMAL CELLS:

Somatic cell genetics, Cell culture based vaccines, Genetic engineering of mammalian cells in culture, Scaling up of animal cell culture, Stem cell cultures - embryonic and adult stem cells and their applications.

UNIT-V APPLICATIONS OF ANIMAL CELL CULTURE:

Three dimensional culture and tissue engineering, Applications of animal cell culture technology (heterologous, Primary culture/CEF culturing, Protein Expression).

TEXT BOOKS:

1. Culture of Animal Cells, Fl. Ian Froshney. Wiley-Liss.

2. Animal Cell Culture - Practical Approach, Ed. John R.W. Masters, OXFORD,

REFERENCE BOOKS:

1. Cell Growth and Division: A Practical Approach. Ed. R. Basega, IRL Press.

2. Animal Cell Culture Techniques. Ed. Martin Clynes, Springer. Methods in Cell Biology, Vol. 57, Animal Cell Culture Methods. Ed. Jenni P Mather and David Barnes. Academic Press

III Year B.Tech. Biotechnology I - Semester	L	T	P	To	C
	-	-	1	1	1

SR005 SEMINAR

III Year B.Tech. Biotechnology II - Semester	L	T	P	To	C
	-	-	3	3	2

BT 332 MOLECULAR BIOLOGY AND GENETIC ENGINEERING LABORATORY

Course Description & Objectives:

To familiarize students with Molecular Biology and Genetic Engineering Techniques like isolation of DNA agarose gel electrophoresis; PAGE, silver staining, blotting techniques, restriction enzyme digestion, ligation, restriction mapping, cloning of DNA & Transformation.

Course Outcomes:

The course is oriented at providing insights into

1. Isolation of genomic DNA from tissues
2. Amplifying DNA by PCR
3. Quantification of Nucleic acids by PCR
4. In-depth knowledge of various experiments to execute projects independently

List of Experiments:

1. Isolation of Plant, Bacterial Genomic DNA and Plasmid DNA.
2. Agarose Gel Electrophoresis.
3. Molecular Weight Determination DNA
4. Restriction digestion.
5. Restriction mapping and ligation.
6. Blotting Techniques – Northern/Western blots
7. Cloning of DNA into plasmid vector.
8. Expression of Beta – galactosidase assay.

TEXT BOOKS:

1. Ausubel etal, Current Protocols in Molecular Biology, Green Publishing associates, 1988.
2. Arati Nigam & Archana Ayyagari, Lab Manual in Biochemistry, Immunology and Biotechnology, 1 st ed., 2007.

III Year B.Tech. Biotechnology II - Semester

L	T	P	To	C
-	-	3	3	2

BT 334 BIOPROCESS ENGINEERING LABORATORY

Course Description & Objectives:

To learn - microbial process fundamentals, enzyme catalysis. Bioreactor design and analysis.

Course Outcomes :

1. The student understands about biological and kinetic concepts underlying bioprocesses engineering.
2. The student able to learn procedures for the design and control of industrial scale fermentation and biological waste treatment processes

LIST OF EXPERIMENTS:

1. Kinetics of growth in batch cultivation- estimation of Monod kinetic parameters
2. Temperature effect on growth-estimation of energy of activation and Arrhenius Constant for microorganisms.
3. Development of enzyme assays and quantification of enzyme activity and specific activity
4. Enzyme kinetics
5. Effect of pH and temperature on enzyme activity
6. Techniques of enzyme immobilization - matrix entrapment, ionic and cross linking.

TEXT BOOKS:

1. K.R. Aneja, “Experiments in Microbiology, Plant Pathology & Biotechnology” , 4th ed., New Age International Publishers. 2007.
2. P. Gunasekharan, “Laboratory Manual in Microbiology”, 1st ed., Newage International Publishers. 2005.

REFERENCE BOOKS:

1. J.Jayaraman , “Laboratory Manaual in Biochemistry”,1 st ed., New Age International Publications, 2007.
2. Eisenthal, R. & Danson N.J. (Eds) Enzyme Assays: “A Practical Approach”, 2nd ed., IRI Press, Oxford, UK, 1992.

III Year B.Tech. Biotechnology	II - Semester	L	T	P	To	C
		-	-	3	3	2

BT 336 MINI PROJECT

2.2 Meeting Documentation

- Notices
- Agenda
- Meetings
- Minutes
- Memorandum

UNIT - III The Job-Search (3 Sessions)

- Vacancy Announcements
- Application Letters
- Resume/Curriculum Vitae

UNIT- IV Report Writing (3 Sessions)

4.1 Nature and Structure of Reports
4.2 Planning and Preparation of Reports
4.3 Types of Reports

- Oral and Written
- Formal and Informal

UNIT-V Process of Report Writing (3 Sessions)

5.1 Technical Proposals
5.2 Types of Technical Proposals

- Formal
- Informal

5.3. Feasibility studies

READING LIST:

- Pfeiffer, W.S. (1997) Technical Writing: A Practical Approach. Prentice Hall
- Sharma. C. (1978) Business Correspondence & Report Writing.Tata McGraw-Hill
- Vesper, J. f. (1993) Contemporary Business Communication:From Thought to
- Expression. Harper Collins College Publishers
- Trimmer, J.F. (1995) Writing with Purpose. Houghton Mifflin
- Ashley, Rod et.al. (1993) Core Skills. Business Education Publishers
- King, F.W. (1962) English Business Letters. Longman
- Taylor, Shirley (2004) Model Business Letters, E-mails & Other Business Documents. Pearson Education

IV Year B.Tech. Biotechnology	VII - Semester	L	T	P	To	C
		3	1	-	4	4

(BT429) BIOINFORMATICS

Objectives of the Course :

To equip students with computational skills and to help them use computational methods to study, organise, analyse and interpret biological information at molecular, genetic and genomics levels.

UNIT I: Introduction to Bioinformatics:

Basics of Bioinformatics, Elementary commands and protocols, ftp, telnet, http,html. Scope of Bioinformatics.

UNIT II: Sequencing Alignment & Dynamic Programming:

Heuristic Alignment algorithms. Global sequence alignments-Neddleman-Wunsch Algorithm, Smith-Waterman Algorithm-Local sequence alignments (Amino acid substitution Matrices (PAM, BLOSUM).

UNIT III: Biological Databases & Their Use :

Introduction to Biological databases, Organization and management of databases. Searching and retrieval of information from the World Wide Web. Structure databases - PDB (Protein Data Bank), Molecular Modeling Databases (MMDB). Primary Databases NCBI,EMBL, DDBJ,Introduction to Secondary Databases Organization and management of databases Swissprot, PIR,KEGG,Introduction to BioChemical databases-organization and Management of databases. KEGG, EXPASY,BRENDA, WIT.

UNIT IV: Evolutionary Trees & Phylogeny:

Ultrasonic trees – parsimony – Ultrametric problem – Perfect phylogeny – Phylogenetic alignment – connection between multiple alignment and tree construction.

UNIT V: Applications of Bioinformatics:

DNA Mapping and sequencing –Map alignment – Large scale sequencing and alignment – Shotgun – DNA sequencing – Sequence assembly – Gene predictions – Molecular predictions with DNA strings.

TEXT BOOKS:

1. D. Baxivanis and Foulette - Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins, Wiely Indian Edition, 2001.

2. Mount. D. - Bioinformatics: Sequence and Genome Analysis, Indian Edition, Cold Spring Harbor Lab, 2001.

3. T K Attwood, D J parry-Smith, Introduction to Bioinformatics, Pearson Education, 1st Edition, 11th Reprint 2005.

REFERENCE BOOKS:

1. C S V Murthy - Bioinformatics, 1st Edition , Himalaya Publishing House, 2003.

2. Harshawardhan P. Bal - Bioinformatics – Principles and Applications, First Reprint, Tata McGraw-Hill, 2006.

IV Year B.Tech. Biotechnology	VII - Semester	L	T	P	To	C
		3	1	-	4	4

(BT431) IMMUNOLOGY

Objectives of the Course :

* *Acquire knowledge and understanding of theoretical concepts of Immunology.*

* *Acquire skills and competence in specialized immunological techniques in the diagnosis and management of health related disorders.*

* *Acquire knowledge and understanding of research methods employing immunological techniques for application in biomedical and clinical research.*

UNIT I: Immune system and immune responses:

Cells and organs of immune system; innate and acquired immunity, types of immune responses, theory of clonal selection.

Development, maturation, activation and differentiation of T-cells and B-cells; antigen presenting cells, major histocompatibility complex, antigen processing and presentation; regulation of T-cell and B-cell responses. TCR and its diversity.

UNIT II: Antigen and antibodies:

Antigens: chemical and molecular nature; haptens; adjuvants; Antibodies: structure and functions of antibodies; genetic control of Ab production. Isotype, allotypes, Idiotypes; antigen-antibody reactions and their significance in diagnosis; monoclonal and polyclonal antibody production: principles and applications, Immunotoxic chimeric antibodies and abzymes.

UNIT III: Infection and Immunity:

Injury and inflammation; immune responses to infections: immunity to viruses, bacteria, fungi and parasites, cytokines, complement; immunosuppression, tolerance, allergy and hypersensitivity, AIDS and Immunodeficiencies, resistance and immunization, vaccines.

UNIT IV: Transplantation and Tumor Immunology:

Transplantation: genetics of transplantation; laws of transplantation; Graft rejection evidence and mechanisms of graft rejection,prevention of graft rejection, tumor immunology. Autoimmunity, Autoimmune disorders and diagnosis.

UNIT V: Immuno-Techniques:

Immunoelectrophoresis, SDS-PAGE, HB electrophoresis, ELISA, RIA, non-isotopic methods for detection of antigens, chemiluminescence assay, immunohistochemistry, purification techniques of antigens and antibodies. Flowcytometer, PCR, RT-PCR, application of recombinant DNA technology for the study of the immune system, Immunotherapy with genetically engineered antibodies.

TEXT BOOKS:

1. Kuby - Immunology, 5th Edition . W H Freeman and Company. 2003.
2. Monica Gandhi and Paul Bawm, Microbiology and Immunology, 1st Edition, ANE Books, 2003.
3. Ashim K. Chakravarthy - Immunology, Tata McGraw-Hill, 1998.

REFERENCE BOOKS:

1. Tizard, Immunology., 4th Edition, Thamson Publication, Indian Print, 1995.
2. Roitt - Essential Immunology, 11th Edition, Blackwell Scientific Publications, Oxfordm, 2006.

IV Year B.Tech. Biotechnology	VII - Semester	L	T	P	To	C
		3	1	-	4	4

(BT433) NANO BIOTECHNOLOGY

Objectives of the Course :

This course combines physical laws, chemical procedures and biological principles on the nano-scale and enrich the students with important applications in a range of fields like medical diagnosis, drug delivery, detection of bio-macromolecules in complicated biochemical systems etc.

Unit I : Introduction:

Scope and Overview, Length scales , Importance of Nanoscale and Technology, History of Nanotechnology, Future of Nanotechnology: Nano Technology Revolution, Silicon based Technology, Benefits and challenges in Molecular manufacturing: The Molecular assembler concepts.

Unit II : Nano Particles :

Introduction, Types of Nanoparticles. Techniques to Synthesize Nanoparticles, Characterization of Nanoparticles, Applications, Toxic effects of Nanomaterials, Significance of Nanoparticles Nanofabrications- MEMS/NEMS, Atomic Force Microscopy, Self assembled monolayers/ Dip-pen Nanolithography, Soft Lithography, PDMS Molding, Nano wires and Nanotubes.

Unit III : Applications - I :

Nanobiosensor and Nanofluids. Nanocrystals in biological detection, Electrochemical DNA sensors and Integrated Nanoliter systems. Nano-Biodevices and Systems. Fabrication of Novel Biomaterials through molecular self assembly- Small scale systems for *in vivo* drug delivery- Future nanomachine.

Unit IV : Applications- II :

Clinical applications of nanodevices. Artificial neurons. Real-time nanosensors- Applications in cancer biology. Nanomedicine. Synthetic retinyl chips based on bacteriorhodopsins. High throughput DNA sequencing with nanocarbon tubules. Nanosurgical devices.

Unit V : Ethical Issues in Nanotechnology :

Introduction, Socioeconomic Challenges, Ethical Issues in Nanotechnology: With special Reference to Nanomedicine, Nanomedicine Applied in Nonmedical Contexts. Nanotechnology and Future Socio-economic Challenges.

TEXT BOOKS:

1. Christof M. Niemeyer, Chad A. Mirkin - Nanobiotechnology: Concepts, Applications and Perspectives. 1st Ed. Wiley-VCH, 2006.
2. Jian-Qin Liu, Katsunori Shimohara - Biomolecular Computation by Nanobiotechnology, 1st Ed., Artech House, 2007.

REFERENCE BOOKS:

1. Ralph S. Greco - Nanoscale Technology in Biological Systems. 1st Ed. CRC Press. 2005.
2. Hari Singh Nalwa - Handbook of Nanostructural Biomaterials and Their Applications in Nanobiotechnology. 1st Ed.American Scientific Publishers, 2005.
3. Viola Vogel - Nanotechnology: Volume 5: Nanomedicine and Nanotechnology. 1 st Ed. John Wiley & Sons Limited, 2008.

IV Year B.Tech. Biotechnology VII - Semester

L	T	P	To	C
3	1	-	4	4

(BT435) BIOETHICS, SAFETY AND INTELLECTUAL PROPERTY RIGHTS

Objectives of the Course :

*This course helps to adhere to the ethical practices appropriate to the discipline at all times and to adopt safe*working practices relevant to the bio industries & field of research. The course also enhances awareness about Intellectual Property.

Rights (IPRs) to take measure for the protecting their ideas and business strategies, and assist them in technology upgradation and enhancing competitiveness.

UNIT I: ENGINEERING ETHICS & BIOETHICS:

Senses of "Engineering Ethics"' - variety of moral issued - types of inquiry - moral dilemmas - moral autonomy - Kohlberg's theory - Gilligan's theory - consensus and controversy – Models of Professional Roles - theories about right action - Self-interest - customs and religion - uses of ethical theories. Introduction to Bioethics. Social and ethical issues in Biotechnology Definition of Biosafety. Biosafety for human health and environment. Social and ethical issues. Use of genetically modified organisms and their release in to the environment. Special procedures for r-DNA based products, Transgenic plants and Animals.

UNIT II : REGULATORY AFFAIRS:

Regulation, national and international guidelines of Biosafety, r-DNA guidelines, Regulatory requirements for drugs and Biologics GLP and GMP

UNIT III : INTELLECTUAL PROPERTY RIGHTS :

Intellectual property rights and protection, patents and methods of application of patents, Trade Secrets copyrights, Trade Marks, legal implications, farmer's rights, plant breeder's rights. International and National conventions on biotechnology and related areas, WTO guidelines.

UNIT IV : SAFETY, RESPONSIBILITIES AND RIGHTS:

Safety and risk - assessment of safety and risk - risk benefit analysis and reducing risk – the three mile island and case studies. Collegiality and loyalty - respect for authority - collective bargaining - confidentiality - conflicts of interest - occupational crime - professional rights - employee rights.

UNIT V : GLOBAL ISSUES:

Multinational corporations - Environmental ethics - computer ethics - weapons development and bioterrorisms - engineers as managers-consulting engineers-engineers as expert witnesses and advisors - moral leadership-sample code of Ethics.

TEXT BOOKS:

1. Mike Martin and Roland Schinzinger, "Ethics in Engineering", McGraw-Hill, New York 1996.
2. Govindarajan M, Natarajan S, Senthil Kumar V. S, " Engineering Ethics", Prentice Hall of India, New Delhi, 2004.
3. H.K.Das, Text Book of Biotechnology - Wiley India, (P) Ltd. New Delhi, 5th edition, 2007.

REFERENCE BOOKS:

1. Sasson A, Biotechnologies and Development, UNESCO Publications, 1988.
2. Sasson A. Biotechnologies in developing countries present and future, UNESCO publishers, 1993. 7. John R Boatright, "Ethics and the Conduct of Business", Pearson Education, New
3. Edmund G Seebauer and Robert L Barry, "Fundamentals of Ethics for Scientists and Engineers", Oxford University Press, Oxford, 2001. 9. Singh K. "Intellectual Property Rights on Biotechnology", BCIL, New Delhi.

IV Year B.Tech. Biotechnology	VII - Semester	L	T	P	To	C
		3	1	-	4	4

(BT437) CHEMICAL ENGINEERING PLANT DESIGN AND ECONOMICS

Objectives of the Course :

Perform economic evaluation of chemical processes and chemical projects, Become familiar with professional and forma for representing engineering results.

UNIT I : Process Design and Cash Flow:

Introduction – Process design development, design, Cost and asset accounting, Cash flow for industrial operations, Factors effecting investment, Production cost.

UNIT II : Capital Estimation and Interest:

Estimation of capital investments, Cost indices, Cost factors, Interest and investment cost, types of interest nominal and effective interest rates.

UNIT III : Annuities and Taxes:

Continuous interest, Present worth and discount annuities, Interest on investment, source of capital taxes and types of taxes, Insurance – Types of insurances, Self insurance.

UNIT IV : Depreciations:

Depreciation. Types of depreciation, Services life, Salvage value, Present Value, Methods for determining depreciation, group depreciation.

UNIT V : Profitability Analysis:

Profitability, Alternative investments and replacements, Profitability standards, discounted cash flow, Capitalized cost payout period, Alternative investments, Optimum design, Design strategy, Optimum condition, Optimum production rates, fluid dynamics.

TEXT BOOKS:

1. M.S. Peters and K.D.Timmerhaus - Plant Design and Economics, 4th Edition, McGraw - Hill, 1991.

REFERENCE BOOKS:

1. Coulson and Richardson. - Chemical Engineering Plant Design and Economics. Vol 6, 4th Edition, McGraw-Hill.

IV Year B.Tech. Biotechnology VII - Semester	L	T	P	To	C
	3	1	-	4	4

(BT439) PROTEOMICS AND GENOMICS

Objective of the Course :

To acquaint the student with genome organization, gene identification, expression and applications of genomics analysis. Also about proteomics, analysis and its applications.

UNIT I: Introduction to Genomics and Proteomics:

Introduction – Organization and structure of genomes, Genome size, Sequence complexity, Introns and Exons, Genome structure in viruses and prokaryotes, Isolation of Chromosomes, chromosome micro dissection, Retrofitting. Introduction to Proteomics – The Proteome, Mining proteomes, Bridging Genomics and Proteomics. Proteomics and the new biology.

UNIT II: Gene Identification and Expression:

Genome annotation, traditional routes of gene identification, detecting open-reading Frames, software programs for finding genes, Identifying the function of a new gene, gene ontology, overview of comparative genomics, Protein structural genomics, determining gene function by sequence comparison and through conserved protein structure Global expression profiling – Introduction, traditional approaches to expression profiling, Analysis of RNA expression, applications of genome analysis and genomics.

UNIT III: Analysis of Proteomes I:

Analysis of proteomes - Two-dimensional polyacrylamide gel electrophoresis, Sample Preparation, Solubilization, Reduction, Resolution, Reproducibility of 2-DE- Detecting proteins in polyacrylamide gels, Image analysis of 2-DE gels.

UNIT IV: Analysis of Proteomes II:

Mass spectrometry based methods for protein identification- De novo sequencing using mass spectrometric data- Correlative mass spectrometric based identification strategies, 2-DE gel electrophoresis coupled with mass spectrometry, Micro array techniques- Types of micorarrays, Designing a microarray experiment, Microarray Technology in Treating Disease.

UNIT V: Applications of Genomics and Proteomics Analysis:

Analysis of Genomes – Human, Mouse, *Plasmodium falsiparum, Saccharomyces cerevisiae, Mycobacterium tuberculosis*. Application of proteome analysis- drug development and toxicology, Pharmaceutical Applications, Proteomics in drug Discovery in human, phage antibodies as tools, Glycobiology and Proteomics in plant genetics and breeding.

TEXT BOOKS:

1. S. B. Primrose and R.M. Twyman - Principles of Genome Analysis and Genomics, 7th Edition, Blackwell Publishing, 2006.
2. S. Sahai - Genomics and Proteomics, Functional and Computational Aspects, Plenum Publication, 1999.

REFERENCE BOOKS:

1. Andrezej K Konopka and James C. Crabbe, Compact Hand Book - Computational Biology, Marcel Dekker, USA, 2004.
2. Pennington & Dunn - Proteomics from Protein Sequence to Function, 1st edition, Academic Press, San Diego, 1996.

IV Year B.Tech. Biotechnology	VII - Semester	L	T	P	To	C
		3	1	-	4	4

(BT441) CANCER BIOLOGY

Objectives of the Course :

To acquaint students with the biological principles of cancer as well as the human dimensions of the disease and its therapies.
To introduce the students to important and current concepts in Cancer Biology and Cancer Genetics and the lectures are organized into 4 broad thematic groups:

a. *Cell - Autonomous Mechanisms (e.g., tumor suppressor and oncogene function, DNA repair pathways, senescence, apoptosis),*
b. *Non Cell-Autonomous Mechanisms (e.g., tumor microenvironment, hypoxia, angiogenesis).*
c. *Organ Systems (e.g., pancreatic cancer, hematopoetic malignancies)*
d. *Therapeutic Approaches.*

UNIT I : Fundamentals of Cancer Biology :

Regulation of cell cycle, mutations that cause changes in signal molecules, effects on receptor, signal switches, tumour suppressor genes, modulation of cell cycle in cancer,different forms of cancers, diet and cancer.

UNIT II : Principles of Carcinogenesis :

Natural History of carcinogensis, Theory of carcinogenesis, Chemical carcinogenesis, targets of chemical carcinogenesis.metabolism of carcinogenesis.principles of physical carcinogenesis, x-ray radiation-mechanisms of radiation carcinogenesis.

UNIT III : Principles of Molecular Cell Biology of Cancer :

Signal targets and cancer, activation of kinases; Oncogenes, identification of oncogenes, retroviruses and oncogenes, detection of oncogenes. Oncogenes / proto oncogene activity. Growth Factor and Growth Factor receptors that are Oncogenes.Growth factors related to transformation.

UNIT IV : Principles of Cancer Metastasis :

Clinical significances of invasion, heterogeneity of metastatic phenotype, metastatic cascade,Basement membrane disruption three - step theory of invasion, proteinases and tumour cell invasion

UNIT V : Detection & Cancer Therapy :

Cancer screening, early and advanced detection, Detection using biochemical assays, tumor markers, molecular tools for early diagnosis of cancer.Different forms of therapy, chemotherapy, radiation therapy, Use of signal targets towards therapy of cancer; Gene therapy. Immuno therapy: advantages and limitations.

TEXT BOOKS:

1. Maly B.W.J -"Virology A Practical Approach", IRLI Press, Oxford, 1987.
2. Dunmock N.J And Primrose S.B. - "Introduction to Modern Virology", Blackwell Scientific Publications, Oxford, 1988.
3. Franks, L.M. & Teich, N.M, "An Introduction to Cell and Molecular Biology of Cancer", Oxford Medical Publications, First edition, 1991.

REFERENCE BOOKS:

1. Margaret A Knowlies, Peter J Selby - Introduction to the Cellular & Molecular Bioilogy of Cancer, Oxford, 4th Edition, 2005.
2. Raymond W. Ruddon - Cancer Biology, Wiley Publications, 4th Edition, 2007.
3. Robert T.A. Weinburg - The Biology of Cancer, Garland Science, First Edition, 2007.

IV Year B.Tech. Biotechnology VII - Semester

L	T	P	To	C
-	-	2	2	2

(BT443) PROJECT - I

Objective of the Course :

Student will be able to do project by learning project building and team work

B.Tech Project

B.Tech Project is offered as two units B.Tech Project-I and B.Tech Project-II in VII and VIII semesters respectively. These projects are supervised by a faculty member assigned to a student or a group of students. Student has to submit a project report in each semester and defend before a panel of examiners. The progress will be monitored periodically in each semester. In the interim presentations in VII and VIII semesters, a panel of examiners will be from the department only. In the final presentation in the VIII semester, an external expert will also be a member in the panel of examiners. The dates of submission of reports and presentations will be decided by the respective departments and will be displayed in notice boards in advance. The weightage for B.Tech Project -1 will be 50 marks and for B.Tech Project-II will be 250 marks.

	Weightage		
	Guide	**Panel**	**Total**
Project - IA (Start Date + 2 Months)	10	15	25
Project - IB (Start Date + 4 Months)	10	15	25
Totals	**20**	**30**	**50**
Project - IIA (Start Date + 2 Months)	35	35	70
Project - IIB (Start Date + 4 Months)	40	40	80
Project - IIB External	-	-	100
Total	**75**	**75**	**250**
Grand Total:			**300**

IV Year B.Tech. Biotechnology VII - Semester

L	T	P	To	C
-	-	2	2	2

(BT445) BIOINFORMATICS LAB

Objective of the Course :

To gain practical knowledge in retrieving biological information and analysing them & to use bioinformatics tools to solve biological problems.

List of Experiments:

1. To retrieve Nucleotide and protein sequences from Biological Databases like NCBI, SwissProt
2. To retrieve structure data for query protein from PDB
3. To retrieve Pathways from Pathway Databases (KEGG, BRENDA, METACYC, ECOCYC
4. To retrieve Biological Information from Pub Med of NCBI
5. To retrieve Open reading frame of given query nucleotide sequence by Gene prediction methods .
6. Analysis of protein sequence using Expasy.
7. Sequence similarity searching of nucleotide sequences
8. Sequence similarity searching of protein sequences
9. Docking Studies.

TEXT BOOKS:

1. Andreas D. Baxevanis, B.F. Francis Ouellette, Bioinformatics A Practical Guide to the analysis of Genes and Proteins, 3 rd edition, Wiley-Intersicence Publications, 2005.

IV Year B.Tech. Biotechnology VII - Semester

L	T	P	To	C
-	-	2	2	2

(BT447) MAT LAB & SIMULATION

1. Simulation of Initial Value Problem (Ex: Gravity Flow tank).
2. Simulation of Boundary Value Problem (Ex: Tubular Reactor with axial Diffusion)
3. Simulation of Three CSTRs in series – open and Closed loop
4. Simulation of Control system design for a Non isothermal CSTR
5. Simulation of Batch Reactor isothermal and Non isothermal – closed loop
6. Simulation of Interacting and Non interacting System- two tank liquid level
7. Simulation of Plug flow reactor
8. Non linear Regression: Fitting a catalytic rate model
9. Non Linear Regression using Genetic Algorithms
10. Constrained Optimization using Genetic Algorithms
11. Stability analysis using Bode diagrams for control systems
12. Steady state simulation using Aspen Plus.

IV Year B.Tech. Biotechnology VIII - Semester

L	T	P	To	C
3	1	-	4	4

(BT430) COMPUTATIONAL BIOLOGY

Objectives of the Course :

It helps the student to be familiar with the various Bioinformatics tools. Helps in Predicting the 3 Dimensional structure of proteins (without wet lab) giving information about function of protein and hence It gives knowledge about finding the function of gene and identifying disease causing genes by comparative genomics.

UNIT I : Introduction to Computational Biology:

Introduction, Biomolecular sequence analysis – Nucleic acid sequences, Motifs – localization and extraction, Protein sequence analysis and prediction of secondary structural features.

UNIT II : Discrete Models of Biopolymers:

Discretized structure models – Lattice proteins, contact graphs. Combinatorial considerations – secondary structure graphs. Random graph models of sequence structure maps, RNA secondary structures.

UNIT III : Protein Structure Folding & Prediction and DNA- Protein Interaction:

Overview of protein structure, Protein folding invitro and invivo, Theoretical models of folding, Insilico folding, Protein structure prediction - Alignment based methods. DNAProtein Interaction – Target prediction, sequence based methods, Structure based method, Ab inito method.

UNIT IV : Computational Genomics:

Sequences and contigs, Sequence data description, Advanced Sequence data description,Genome annotation- Eukaryotic and Prokaryotic genome annotation tools. Computer simulated functions.

VIGNAN UNIVERSITY

UNIT V : Computation in Comparative Genomics:

Introduction, Evolutionary basis, Tools for comparative genomics – data selection, Alignment, Visualization .

TEXT BOOKS:

1. Andrezej K Konopka and James C. Crabbe, Compact Handbook - Computational Biology, Marcel Dekker, USA, 2004.
2. Peter Clote, Rolf Backofen - Computational Molecular Biology An Introduction, John Wiley & Sons ltd.1997.
3. SC Rastogi,N.Mendiratta.P.Rastogi - Bioinformatics Methods and Applications:Genomics,Proteomics and Drug Discovery, Prentice Hall India Publications, 2005.

REFERENCE BOOKS:

1. David W. Mount - Sequence and Genome Analysis, Published by CSHL Press Science, 2004.
2. S. Salzberg, D. Searls,and S. Kasif - Computational Methods in Molecular Biology, Elsevier Science, 1998.
3. Joao Setubal and Joao Meidanis - Introduction to Computational Molecular Biology Publisher: PWS Publishing Company, Boston, 1997.

IV Year B.Tech. Biotechnology VIII - Semester

L	T	P	To	C
3	1	-	4	4

(CH448) INSTRUMENTATION & BIOPROCESS CONTROL

Objectives of the Course :

- *Choose the control strategy for a process*
- *Distinguish between feed forward and feedback control strategies*
- *Choose the appropriate control action (P,PI,PD,PID) for a particular process.*
- *Develop the Block diagram from process identification.*
- *Analyse the stability of a dynamic system*
- *To know the main types of Instruments and their working principle*
- *Understand the working principle of the different types of control loops.*

UNIT I: Process dynamics :

Introduction to process dynamics and control. Response of First Order Systems. Physical examples of first order systems. Response of first order systems in series, Higher order systems

UNIT II: Process controllers :

Block digram of chemical reactor control, Servo & Regulator operations. flow, level, temperature and pressure control, Basic control actions-characteristics of two position, two position control of single capacitance process, single speed floating control. P, P+D, P+I and P+I+D control modes.

UNIT III: Controller settings:

Optimum Controller Settings- Ziegler - Nichols tuning technique, Cohen -Coon settings, determination of optimum settings for mathematically described process using time response and frequency response. Evaluation criteria, 1/4th decay ratio, IAE. ISE, ITAE.

VIGNAN UNIVERSITY

UNIT IV: Multiloop Control System :

Feed forward control - Feed back control, Ratio control - Cascade control - Split range control -Multivariable control and examples from distillation column and Boiler system.

UNIT V: Bioprocess Instrumentation:

Introduction to process instrumentation, pH probes, DO probes, introduction to biosensors, online glucose sensors and biomass sensors. Pumps, pneumatic, hydraulic and electronic controllers. Pneumatic, electric and hydraulic actuators. control valves-characteristics of control valves-valve body-Globe, butterfly, diaphragm valves.

TEXT BOOKS:

1. D.R. Coughanowr - Process Systems Analysis and Control , 2nd ed. Mc Graw - Hill, 1991.
2. Harriott P. - Process control, Tata Mc Graw- Publishing Co., New Delhi, 1972.

REFERENCE BOOKS:

1. G. Stephanopolous - Chemical Process Control, PHI,1998.
2. Eckman D.P. - Automatic Process Control , Wiley Eastern Ltd.
3. Heinemann & Pollard A. - Process Control, Educational Books, London, 1971.

IV Year B.Tech. Biotechnology VIII - Semester

L	T	P	To	C
3	1	-	4	4

(BT432) FERMENTATION TECHNOLOGY

Objectives of the Course :

This course helps to familiarize important aspects of fermentation technology like media, process optimization, inoculum levels, solid state fermentation and bioprocess considerations for animal and plant cell cultivation

UNIT I : Fermentation Process:

General requirements of fermentation processes, Basic design and construction of fermentor and ancillaries, Main parameters to be monitored and controlled in fermentation processes; An overview of aerobic and anaerobic fermentation processes and their application in the biotechnology industry, solid-substrate, slurry fermentation and its applications, whole cell immobilization, behaviour of microbes in different reactors (air lift, fluidized, batch, continuous and fed batch condition).

Unit II: Fermentation inputs:

Nutrient requirement for fermentation process, carbon, nitrogen source, macro and micronutrients, renewable energy sources (carbon and nitrogen), C/N ratio, development of inocula for microbial, plant and animal cell cultivations, supply of air/nitrogen for aerobic and anaerobic process

UNIT III :Bioproces optimization:

Conventional optimization process (one variable at a time approach), need for statistical experimental desing, screening techniques-Plackett Burman design, response surface methodology-Box-Benken desing, central composite desing and self directing optimization

UNIT IV :Solid state fermentation:

Introduction to solid state fermentation (SSF), comparison of SSF with submerged fermentation, applications in industry, growth kinetics in SSF, Heat and Mass transfer problems in SSF, SSF bioreactors, Scale up of SSF.

UNIT V :Plant and animal cell cultivation

Plant and animal cells compared to microbial cultivation, Bioreactor considerations for plant cell-suspension culture, immobilazation culture and organized tissues. Methods used for cultivation of animal cells, Bioreactor conideration for animal cell culture-suspension culture, anchorage dependent cultivation. Imporant industrial products from plant and animal cell cultivation.

TEXT BOOKS:

1. Stanbury P.F, Stephen J. Hall and Whitaker A - Principles of Fermentation Technology, 2nd edition, Butter Worth - Heinemann, An imprint of Elsevier, India pvt. Ltd., 2005.
2. Shuler, M.L. and Kargi - F. " *Bioprocess Engineering - Basic concepts* – Second Edition, Prentice Hall of India Pvt. Ltd., 2005.

REFERENCE BOOKS:

1. Bailey and Ollis - " Biochemical Engineering Fundamentals", 2nd Edition, McGraw Hill , 1986.
2. Pauline M. Doran - Bioprocess Engineering Calculations, First edition, Blackwell Scientific Publications, 2005.
3. James M Lee - Biochemical Engineering, First edition, Prentice Hall, 1992.

IV Year B.Tech. Biotechnology VIII - Semester

L	T	P	To	C
3	1	-	4	4

(BT434) MOLECULAR MODELLING & DRUG DESIGN

Objectives of the Course :

The main goal of this course is to gain some knowledge on modern approaches used in molecular modeling. powerful computer-based technology used to identify and design molecules for new medications greatly shortening the discovery phase of drug development by powerful computer-based technology.

Unit I : Quantum mechanics & concepts in molecular modeling :

Introduction – coordinate systems – potential energy surfaces – introduction to quantum mechanics – postulates – Schrodinger wave equation – hydrogen molecule – Born-Oppenheimer approximation, introduction to computer hardware and software.

Unit II: Molecular mechanics and energy minimization:

Empirical force field models – Bond stretching – angle bending – torsional term – nonbonding interactions – thermodynamics properties using a forcefield – derived and non derived energy minimization method – simplex – sequential univariate method – steepest descent method – conjugate gradient method- Newton-Rapson method.

Unit III: Molecular Dynamics and Monte Carlo simulation :)

Introduction – Using single Model – time steps – Multiple steps – Setting up MD – energy conservation in MD Simulation Examples – Monte Carlo – Random number generation – Difference in MD & MC.

Unit IV: Homology modeling:

Comparative modeling of proteins – comparison of 3D structure – Homology – steps in homology modeling – tools – databases – side chain modeling – loop modeling.

Unit-V: Drug design:

General approach to discovery of new drugs - lead discovery – lead modification – physiochemical principles of drug action – drug stereo chemistry –drug action - 3D database search – computer aided drug design – docking - molecular modeling in drug design – structure based drug design – pharmacophores - QSAR.

TEXT BOOKS:

1. A. R.Leach - Molecular Modeling Principles and Application, 2nd edition, Longman Publications, 1996.
2. D. Baxivanis and Foulette - Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins, Wiely Indian Edition, 2001.

REFERENCE BOOK:

1. T K Attwood, D J parry-Smith, Introduction to Bioinformatics, Pearson Education, 1st Edition, 11th Reprint 2005.

IV Year B.Tech. Biotechnology VIII - Semester

L	T	P	To	C
3	1	-	4	4

(BT436) REGULATORY AFFAIRS & CLINICAL TRAILS

Objectives of the Course :

To make the student learn about rules, regulations and guidelines for clinical trails and how they are applicable in different countries. Also to acquaint with medical ethics, IVF, audit types, audit processing, and preparation, packaging, labeling and approval of investigational products and quality management.

UNIT I : Regulations of Clinical Research:

ICH-GCP guidelines, Licensing authorities -roles and responsibilities of FDA, EU Clinical Trial Directive, Data Protection Act , Declaration of Helsinki 2000 amendment and codes of practice, Regulations relating to electronic signatures, drug preparation and packaging, EMEA, European directives and MRECs,Ethics committees – history and structure

UNIT II : Medical Ethics and Auditing:

Ethics in all aspects of health care, Historical cases, Negligence, informed consent, mental competence Up – to – date cases: cloning, human embryos and IVF, Shared responsibilities for decisions and the understanding of risk: INDIAN / USA / EU Ethics approval system – Overview and Recent developments: Regulations in clinical research, The purpose of audits, Types of audits, Preparing for audits, In company, On site, The audit process, Typical audit finding.

UNIT III : Clinical Research and Clinical Trails:

History and purpose of GCP development, Roles and responsibilities in clinical research according to ICH GCP-Sponser Monitor Investigator Audit, IRB/IEC Investigational brochure Essential documentation. The INDIAN / USA / EU Directives on GCP in Clinical Trials - Purpose, How will the introduction affect clinical research, Extracts from the guidance documents; Possible sanctions for non-compliance - Legal and regulatory, Commercial and Professional.

UNIT IV: Regulatory Affairs and Product Approval:

History of regulatory affairs, Main concepts QSE, Sources of information, Regulatory affairs for studies in human subjects and required data. Current and future European ,US perspectives,requirements and procedures. Regulatory submissions for new products, Requirements for gaining approval, US perspective, Regulating control over marketing and sales of medical products, Regulations, Codes of practice, Promotional materials. Inputs of Indian guidelines & Indian perspectives.

UNIT V : Latest Developments and issues in Clinical Research:

Latest developments in ICH, Confidentiality issues, Medicines for human use (clinical trials) regulations 2003 and other relevant issues.

Related Web resources:

1. Code of Federal Regulation by USFDA - Download
2. ICH-GCP Guidelines – http//www.ich.org
3. Drugs and Cosmetics Act, 1940 or Download
4. WHO – http//www.who.in
5. http//www.oecd.org
6. http//www.unep.org
7. http//www.unido.org
8. http//www.fao.org
9. http//www.isaaa.org

TEXT BOOKS:

1. Good Clinical Practices, Central Drugs Standard Control Organisation, Govt. of India
2. Dominique P.Brunier and Gerhardt Nahler - International Clinical Trial, Volume 1 & 2 Interpharm Press, Denver, Colorado.

REFERENCE BOOK:

1. Biosafety issues related to genetically modified organism , Biotech Consortium India Limited, New Delhi.

IV Year B.Tech. Biotechnology VIII - Semester

L	T	P	To	C
-	-	10	10	10

(BT438) PROJECT - II

Objective of the Course :

Student will be able to do project by learning project building and team work

B.Tech Project

B.Tech Project is offered as two units B.Tech Project-I and B.Tech Project-II in VII and VIII semesters respectively. These projects are supervised by a faculty member assigned to a student or a group of students. Student has to submit a project report in each semester and defend before a panel of examiners. The progress will be monitored periodically in each semester. In the interim presentations in VII and VIII semesters, a panel of examiners will be from the department only. In the final presentation in the VIII semester, an external expert will also be a member in the panel of examiners. The dates of submission of reports and presentations will be decided by the respective departments and will be displayed in notice boards in advance. The weightage for B.Tech Project -1 will be 50 marks and for B.Tech Project-II will be 250 marks.

	Weightage		
	Guide	Panel	Total
Project - IA (Start Date + 2 Months)	10	15	25
Project - IB (Start Date + 4 Months)	10	15	25
Totals	**20**	**30**	**50**
Project - IIA (Start Date + 2 Months)	35	35	70
Project - IIB (Start Date + 4 Months)	40	40	80
Project - IIB External	-	-	100
Total	**75**	**75**	**250**
Grand Total:			**300**

VIGNAN UNIVERSITY

MINOR DEGREE STREAMS

A. Management

B. Humanities & Sciences

C. Information Technology (IT)

D. Electronics & Communication Engineering (ECE)

HS 111 ENGINEERING MATHEMATICS - I

L	T	P	To	C
3	1	-	4	4

Course Description & Objectives :

Without mathematics not a single day of an engineer will pass! All the topics of this course are relevant to all branches of engineering. Differential equations are used in various places. Laplace transformations are used, for example, for conversion of domains, from time domain to frequency domain. These are also used to solve ordinary differential equations. When data is given at only a finite points, we use numerical methods for find the approximate values of functions, also to solve differential equations approximately etc. Maxima, minima of a function has got many applications.

Course Outcomes:

1. *Students will understand that Mathematics which they learn can be used at different levels in their Engineering course irrespective of their branches.*
2. *This course will help to sketch the graph of a differential equation and its direction mixing fields*
3. *Laplace transform used to compute solutions of equations involving impulse functions*
4. *They will be able to use Laplace transformations for conversion of domains from time domain to frequency domain.*
5. *Differential Equations help them to find approximate values of function.*
6. *They will be able to analyze and use them in different applications.*
7. *Eigen values and Eigen vectors play a prominent role in the study of ordinary differential equations and in many applications of physical sciences.*

UNIT I - Ordinary Differential Equations & Differential Equations of Second Order :

Differential Equations of First Order : Definiton, Order and degree of a differential equation, Formation of differential equations, Solution of a differential equation, Differential equations of first order and first degree : variables separable, Homogenous equations, Linear equations, Exact differential equations.

Differential Equations of Second Order : Linear differential equations of second order with constant coefficients, Methods for finding the complementary functions and particular integral, General method of finding the particular integral of any function.

UNIT II - Applications of Differential Equations and Laplace Transformations

Applications of Differential Equations : Newton’s law of cooling, Natural law of growth, Orthogonal trajectiories**.**

Laplace transformations : Definition, Properties, Convolution theorem, Inverse Laplace transformation, Solving differential equations using Laplace Transformation.

UNIT III - Numerical Methods

Taylor’s Method, Picard Method, Euler Method, Modified Euler Method, Runga-Kutta Methods.

Interpolation by Lagrange and Newton methods.

UNIT IV - Matrices

Rank of a matrix, finding rank of a matrix using Echelon form, Normal form, triangular form, PAQ form, inverse of a matrixEigen values, Eigen vectors, properties, Cayley-Hamilton theorem (without proofs), Diagonalisation of a matrix.

Solving System of equations (Gauss-Siedal method only)

UNIT V - Maxima and Minima & Jacobians

Maxima and Minima : Review of partial differentiation: Partial derivatives, Partial derivatives of higher order, Homogeneous function, Euler’s theorem, Total differential coefficient,

Maxima and Minima of a function of two variables, Conditions for extreme values, Lagrange method of undetermined multipliers.

Jacobians : Definition, Properties, Jacobian of implicit functions, Partial derivaties of Implicit functions using Jacobian.

TEXT BOOKS :

1. H. K. Dass and Er. Rajnish Verma, Higher Engineering Mathematics, S. Chand & Co., New Delhi, 2011.
2. B.S. Grewal, “Higher Engineering Mathematics”, 40th edition, Khanna Publishers, 2009.

REFERENCES:

1. B.V. Ramana, “Higher Engineering Mathematics”, 3rd Edition, Tata McGraw-Hill Publishing Co, 2008.
2. R K Jain, S R K Iyengar, “Advanced Engineering Mathematics”, 2nd Edition, Narosa Publishing House.
3. Erwin Kreyszig, “Advanced Engineering Mathematics”, 8th Edition, John Wiley & Sons (Asia) Pvt. Ltd. 2001.

HS 113 ENGINEERING PHYSICS

L	T	P	To	C
3	1	-	4	4

Course Description & Objectives :

There is a symbiotic relation between physics and engineering. Broadly speaking, engineering is mainly applied physics. Recent technical developments have been the result of joint efforts of physicists and engineers. A proper study of physics is therefore indispensable for an engineering student to excel in his field. The purpose of this course is to present the principles and concepts of physics as relevant to an engineer.

Course Outcomes:

The students will be made to get acquainted to the following learning outcomes:

1. *Concepts of Physical optics, devices and applications.*
2. *Ultrasonic waves, production, applications in NDT.*
3. *Introduction to Quantum mechanics in relevance to that of modern physics.*
4 *Exposure to latest inventions like lasers, fibers and applications*
5. *Insight into nano technology and applications, solar energy to combat energy crisis.*

UNIT I - Physical Optics

Interference – Types - Interference in thin films (Reflection) – Newton's Rings – Michelson's Interferometer, Fabry-perot interferomenter – Applications.

Diffraction – Fraunhoffer Diffraction at single slit – Diffraction grating

Polarization – Production of plane polarized light – Nicol prism – Optical activity – photo elasticity.

UNIT II - Ultrasonics & NDT

Ultrasonics : Introduction – production of ultrasonic waves – piezoelectric method – Properties of ultrasonic waves – Types of ultrasonic waves – Determination of Velocity of ultrasonic waves in solids and liquids – Applications.

NDT : Introduction - Types – Theory and practice of Ultrasonic Testing – Ultrasonic Testing Systems – Ultrasonic Testing Methods – X-Ray Radiography.

UNIT - III Quantum Mechanics & Free electron theory of metals

Quantum Mechanics : Matter waves - Schroedinger's time independent wave equation - Physical significance of the wave function - Particle in one dimensional potential well – tunneling phenomenon.

Free electron theory of metals : Introduction – Classical free electron theory – Electrical conductivity of metal – Fermi - Dirac distribution function and its variation with temperature – Quantum free electron theory.

UNIT IV - Lasers & Fiber Optics:

Lasers: Characteristics of Laser light – Spontaneous and Stimulated emission of radiation – Low power and High power lasers, He-Ne Laser – CO_2 Laser – Nd-Yag laser - Applications of Lasers, Holography and Applications

Fiber Optics: Principle of optical fiber - materials – Numerical Aperture – Types of fibers – Dispersion and Attenuation in optical fibers – Optical sensors – Optical fiber communication system.

UNIT V - Solar Energy & NanoScience and Technology

Solar Energy : Solar radiation – Photovoltaic effect – solar cells – Efficiency of solar cell – Solar thermal energy conversion systems.

NanoScience & Technology : Introduction to nano meterials – Basic principles of nanoscience & Technology – Fabrication of nanomaterials – Physical & Chemical properties of nanomaterials – Applications of nanotechnology.

TEXT BOOKS :

1. M.R.Srinivasan, "Physics for Engineers" New Age International, 2002-2003.
2. M.N. Avadhanulu & P.G. Kshirasagar, "Engineering Physics", 1st edition, S. Chand & Company Ltd, 1992.

REFERENCES:

1. Halliday, Resnic and Walker, "Fundamentals of Physics", 6th edition, John Willey publishers, 2003.
2. Grawfor F.S., Berkley Physics courses, "Waves and Oscillations", Volume III McGraw Hill, 1992.
3. V. Raghavan, "Materials Science and Engineering", 5th edition, Prentice-Hall India, 2004.
4. S.O.Pillai, "Solid State Physics", 6th edition, New Age International Publications, Revised, 2005.
5. V.Rajendran, "Engineering Physics", 1st edition, TMH Publications, 2010.

EE 111 FUNDAMENTALS OF ELECTRICAL ENGINEERING

L	T	P	To	C
4	0	-	4	4

Course Description & Objectives :

To understand the basic concepts, laws, techniques in analyzing various DC and AC circuits and concepts in coupled circuits. Study of construction details, working of various electrical machines and Semiconductor Devices and operation

Course Outcomes:

1. *Able to explain the notation and components of electric circuits*
2. *Able to analyze DC and single phase and three phase AC circuits using different methods and theorems*
3. *Able to operate various electrical machines.*
4. *Able to explain the concepts of Semiconductor Devices and operation*

UNIT I - Fundamentals Of DC Circuits

Circuit Concepts: Concepts of network, Active and passive elements, voltage and current sources, concept of linearity and linear network, unilateral and bilateral elements, R, L and C as linear elements. Ohm's Law – Kirchhoff's Laws –application to simple series, parallel circuits, mesh and nodal analysis of simple resistive circuits.(simple numerical problems).

UNIT II - Fundamentals of A.C. Circuits:

Generation of A.C. voltage - frequency, average value, R.M.S. value, form factor, peak factor for sinusoidal only - phasor representation of alternating quantities. Analysis of simple series and parallel A.C. circuits-(simple numerical problems)

Balanced Three phase systems – relation between phase and line quantities of voltages and currents in star and delta connected systems (Elementary treatment only)

UNIT III - Fundamentals of Electromagnetism and Transformers:

Concepts of Magneto motive force, reluctance, flux and flux density , concept of Self Inductance and Mutual Inductance, Coefficient of coupling-only elementary treatment. (simple numerical problems).

Transformers: Principle of operation of single phase transformer – constructional features – EMF equation (simple numerical problems)

UNIT IV - Electrical Machines:

DC Machines: Constructional details of a D.C. Machine.

D.C. Generator – Principle of operation – EMF equation – types of D.C. generators (simple numerical problems)

D.C. Motor – Principle of operation – Torque equation – types of D.C. motors (simple numerical problems)

A.C Machines: Principle of operation of three phase induction motors – slip ring and squirrel cage motors – Torque equation derivation, Constructional details of synchronous machines.

UNIT V - Semiconductor Devices:

Classification of solids based on energy band theory - Intrinsic semiconductors - Extrinsic semiconductors - P type and N type semiconductors - P-N junction diode and its characteristics –Half and Full wave rectifiers- Zener diode and its characteristics - Voltage regulator. Bipolar junction transistor – Operation- Types- Applications.

TEXT BOOKS:

1. Mittle, V.N., “Basic Electrical Engineering”, 2nd ed., TMH, New - Delhi, 1990.
2. V.K.Mehta,”Principles of Electrical Engineering and Electronics”, 3rd ed., S. Chand Publications, New Delhi, 2010.

REFERENCES:

1. Millman & Halkias, “Integrated Electronics”, McGraw Hill, 1979.
2. A.K. Thereja & B.L. Thereja, “Electrical Technology”, Vol. – II, S.Chand Publications, 2007.
3.. U.Bakshi & A.Bakshi, “Basic Electrical Engineering”, 1st ed., Technical Publications, Pune, 2005.
4. U.Bakshi & A.Bakshi, “Basic Electrical Engineering”, 1st ed., Technical Publications, Pune, 2005.

HS 114 TECHNICAL ENGLISH COMMUNICATION

L	T	P	To	C
3	2	-	5	5

Course Description & Objectives :

To introduce students to the specific use of language for the purposes of Technical Communication which would be an essential prerequisite for success in the areas of writing and speech. The teaching efforts in this course will be directed towards making students develop their technical and non-technical writing abilities using the fundamental principles that apply to the correct use of the English language free of grammatical and other related errors.

Course Outcomes:

Students shall achieve the ability to write and demonstrate college-level proficiency in the following:

1. *Clear and effective communication of meaning in speaking and writing.*
2. *The ability to perform effectively the essential steps of the writing process (Note making, organizing, composing, revising, and editing).*
3. *The ability to explain, develop, and criticize ideas effectively.*
4. *Effective organization within the paragraph and the essay.*
5. *Accuracy, variety, and clarity of sentences.*
6. *Appropriate diction.*
7. *Control of conventional mechanics (e.g., punctuation, spelling)*

UNIT - I

- Text : Environmental Consciousness (Climate Change – Green Cover – Pollution)
- Grammar : Articles – Prepositions – Sentence Types and Construction
- Vocabulary : Root – Prefixes - Suffixes
- Composition : Paragraph Writing (Descriptive & Narrative)
- Lab Practice : Introduction to Phonetics (Organs of Speech; Consonants, Vowels & Diphthongs; Syllable, Stress & Intonation)

UNIT - II

- Text : Emerging Technologies
  (Solar Power – Cloud Computing – Nanotechnology)
- Grammar : Time and Tense (Present-Past-Future; Helping Verbs; Modals)
- Vocabulary : Synonyms – Antonyms
- Composition : Note-making
- Lab Practice : Grammar Practice (Speaking of past, present & future)

UNIT - III

- Text : Energy
  (Renewable and Non-renewable Sources – Alternative Sources – Conservation – Nuclear Energy)
- Grammar : Subject-Verb Agreement - Sentence Construction
  (Characteristics of Technical Writing)
- Vocabulary : Idioms & Phrases
- Composition : Summarizing
- Lab Practice : Situational Conversations – Role-Plays
  (Introducing; Greeting; Enquiring; Informing; Requesting; Inviting)

UNIT - IV

- Text : Engineering Ethics
  (Challenger Disaster – Biotechnology – Genetic Engineering – Protection from Natural Calamities)
- Grammar : Sentence Transformation (Degrees, Voice, Speech & Synthesis)
- Vocabulary : Phrasal Verbs
- Composition : Letter Writing (Informal)
- Lab Practice : Situational Conversations – Role-Plays
  (Emotions; Directions; Descriptions; Agreements; Refusals; Suggestions)

UNIT - V

- Text : Travel and Tourism
  (Advantages and Disadvantages of Travel-Tourism – Atithi Devo bhava – Tourism in India)
- Grammar : Common Errors
- Vocabulary : One-word Substitutes
- Composition : Letter Writing (Formal)
- Lab Practice : Group Discussions

TEXT BOOKS :

Mindscapes - English for Technologists and Engineers, Orient Black Swan, 2012.

REFERENCES:

1. V. R. Narayana Swamy***, "Strengthen Your Writing",*** 1st edition, Orient Longman, 2003.
2. Thomas Elliott Berry***, "The Most Common Mistakes in English Usage",*** 1st edition, Tata McGraw Hill, 2004.
3. T. Balasubramanyam, ***A Textbook of English Phonetics for Indian Students***, Macmillan Ltd., 2000.
4. Sasikumar.V and P.V. Dhamija,. ***Spoken English: A Self-Learning Guide to Conversation Practice,*** 34th Reprint, Tata McGraw Hill, New Delhi, 1993.
5. Margaret M Maison, **"Examine your English",** 1st edition**,** Orient Longman, 1999.
6. Ashraf Rizwi, "***Technical English Communication***", Tata McGraw Hill, Latest Edition.

CS 101 PROBLEM SOLVING AND COMPUTER PROGRAMMING

L	T	P	To	C
4	1	-	5	5

Course Description & Objectives :

Aim of this course is to introduce the techniques of problem solving and concepts of programming language to the students. Because of its popularity and suitability to develop different types of applications, 'C' language has become the de-facto programming language to engineers. A comprehensive introduction of C language is offered through this course to enable the students to write diversified programs.

Course Outcomes:

On Completion of this course student should be able to

1. *Able to understand the basic terminology used in computer programming and to write, compile and debug programs in C language.*
2. *Use different data types in a computer program and design programs involving decision structures, loops and functions.*
3. *Able to understand the allocation of dynamic memory using pointers*
4. *Use different data types to create/update basic data files.*

UNIT I - Fundamentals of computers

Basic functional units and discrete components of a computer, computer networks, networking components, Binary representation of integers and real numbers, ASCII, EBCDIC, Unicode, Generations of computer languages.

UNIT II - Problem Solving Steps and Basic of C Language

Problem understanding, Formulating a mathematical model, Development of an algorithm, Representation of an algorithm, Flow chart and Pseudo code, Coding, Testing and Debugging, Comments, Processor statement, Function header statement, Variable declaration statement and Executable statement, C Character Set, constants, identifiers, operators, punctuations, keywords, Basic data types, modifiers, identifiers, variables, C scopes, type qualifiers, storage class specifiers, variable initializations, constants, reading and writing characters, formatted I/O.

UNIT III – Preliminaries of C

Assignment, arithmetic , relational, logical, bitwise, ternary, address, indirection, sizeof, dot, arrow, and parentheses operators, Expressions Precedence of operators

and associatively, Category of Statements, Selection, Iteration, jump, label, expression and block, Function declaration, prototype, definition, calling by value and address, standard library functions and recursive functions.

UNIT IV - Arrays and Pointers

Declaration, initialization, reading, writing, accessing and passing as a parameter to functions, Multidimensional arrays and String functions, pointer expressions, pointer and arrays, multiple indirection, initializing pointers, pointer to functions, Dynamic memory allocation functions.

UNIT V - Structures and File Processing

declaration, initialization and accessing, array of structures and passing structures to functions, structure pointers, arrays and structures within structures, unions, bit-fields, typedef and enumerations, I/O and processing operations on text and binary files. pre-processor directives.

TEXT BOOKS :

1. Reema Thareja, “Introduction to C Programming”, Oxford University Press, India, 2013
2. Herbert Schildt, C: “The Complete Reference”, 4th Edition, Tata McGraw-Hill, 2000.

REFERENCES:

1. E. Balagurusamy, “ Programming in ANSI C”, 4TH Edition, Tata McGraw- Hill, 2008.
2. R Ravichandran and T Jeyapoovan, “ Computer Programming with C”, Soni Graphics, India, 2014.

HS 115 ENGINEERING MATHEMATICS - II

L	T	P	To	C
3	1	-	4	4

Course Description & Objectives :

Without mathematics not a single day of an engineer will pass! All the topics of this course are relevant to all branches of engineering. In real life, many quantities are dependent on more than one quantity. Hence study of functions of several variables is crucial. In this course, we study partial differentiation, partial differential equations, multiple integrals all involving functions of two variables. We also study Fourier series and Z-transformations and difference equations.

Course Outcomes:

1. *The students will understand that many quantities are dependent on more than one quantity so they learn functions of several variables.*
2. *They will be able to solve Partial Differential Equations, multiple integrals which are involving functions of two variables.*
3. *They can apply Z – transforms to solve difference equations.*
4. *They will be able to calculate areas and volumes.*
5. *The student will enable to locate the maxima and minima of a function is an important task which arises often in applications of mathematics to problems in engineering and science.*
6. *Vector differentiation and integration used to find the arc lengths and curvatures of space curves*

UNIT I - Partial Differential Equations :

Formation of Partial Differential Equations, Linear (Lagrange) Equations, Method of multipliers, Non-linear partial differential equations (Types), Charpit's method.

Second order linear equations, classifications, Solution by method of separation of variables.

UNIT II - Fourier Series :

Periodic functions, Fourier series, Dirichlet's conditions, Determination of Fourier coefficients, Discontinuous functions, even and odd functions, Half-range series, Functions having arbitrary period.

UNIT III - Z-transformations & Applications :

Z-transformations : Sequences, Z-transformation, Properties, Inverse Z-transformation, Multiplication and division by k, Initial and final value theorems,

Convolution, Determination of inverse Z-transformation.

Applications : Solutions of difference equations using Z-transformations.

UNIT IV - Multiple Integrals :

Double integrals, Evaluation, Evaluation in Polar coordinates, Change of order of integration, Change of variables, Applications to Area in Cartesian coordinates and polar coordinates.

Triple integrals, Fundamentals, Evaluation of triple integrals.

UNIT V - Vector Differentiation and Integration

Vector Function, Differentiation, Scalor and Vector point function, Gradient, Normal, Divergence, Directional Derivate, Curl, Vector identities.

Line Integral, Surface Integral, Volume integral, Green's theorem, Stoke's theorem, Gauss theorem of divergence (without proofs).

TEXT BOOKS :

1. H. K. Dass and Er. Rajnish Verma, Higher Engineering Mathematics, S. Chand & Co., New Delhi, 2011.
2. B.S. Grewal, "Higher Engineering Mathematics", 40th edition, Khanna Publishers, 2009.

REFERENCES:

1. B.V. Ramana, "Higher Engineering Mathematics", 3rd Edition, Tata McGraw-Hill Publishing Co, 2008.
2. R K Jain, S R K Iyengar, "Advanced Engineering Mathematics", 2nd Edition, Narosa Publishing House.
3. Erwin Kreyszig, "Advanced Engineering Mathematics", 8th Edition, John Wiley & Sons (Asia) Pvt. Ltd. 2001.

HS 117 ENGINEERING CHEMISTRY

L	T	P	To	C
4	0	-	4	4

Course Description & Objectives :

Chemistry is the backbone in designing and understanding the nature and properties of various engineering materials. Currently, the electronics and computer engineers are waiting for suitable polymers for using miniature super computers. So this subject develops fundamental knowledge about new engineering materials and their significance in technical fields and industrial sectors. Water is an essential element for the existence of human, plant and animal lives, besides that it has greater industrial applications. The knowledge about water is the basic requirement for a professional student. Characterization of materials with instrumental techniques is essential for engineers.

Course Outcomes:

1. *Differentiate between soft and hard water. Understand the disadvantages of using hard water domestically and industrially. Select and apply suitable softening methods (Soda-lime, zeolite, ion-exchange methods, etc.) to soften the hard water for industrial and domestic applications.*
2. *Acquaintance of primary and secondary cells, Hydrogen-Oxygen and Methanol fuel cells, dry and wet corrosions, corrosion controlling methods*
3. *Acquaintance of the properties and engineering applications of Ceramics, Refractories, Glasses, Cement, Abrasives, Lubricants*
4. *Acquaintance of Preparation, properties and applications of different polymers (Polyethylene, PVC, Tefflon, Bakelite,Urea-Formaldehyde, Silicones, Rubber – Vulcanization, Synthetic Rubbers-(Buna-S, Buna-N, Neoprene); treatment of membranes.*
5. *Acquaintance of various spectroscopic methods (UV-visible / IR), Beer-Lambert's Law, qualitative and quantitative analysis, block diagrams of UV and IR spectrophotometers*.

UNIT I - Water Technology :

Introduction-Hardness of water-Determination of hardness by EDTA-Disadvantages of hard water-Scales & Sludges-Caustic embrittlement-Boiler corrosion-Priming & Foaming, WHO, BIS Standards of water-Softening Methods- Lime Soda process, Zeolite process, Ion Exchange process - Desalination of brackish water-Reverse osmosis, Electro dialysis.

UNIT II - Electrochemical cells and AND Corrosion:

Electrochemical cells: primary cell-(Dry or lecalanche cell), Secondary cell-(Lead-acid storage cell, Lithium ion battery), Hydrogen-Oxygen Fuel cell, Methanol fuel cell.

Corrosion: Introduction-Dry corrosion (chemical)-Wet corrosion (electrochemical)-Mechanism of wet corrosion-Bimetallic corrosion-Concentration cell corrosion-Factors influencing corrosion-Corrosion control methods- Cathodic protection and Electroplating.

UNIT III - Engineering Materials :

Properties and engineering applications of Ceramics, Refractories, Glasses, Cement,Abrasives, Lubricants.

UNIT IV - Polymers :

Introduction –Types of polymerization-Preparation, properties and applications of Polyethylene, PVC, Tefflon, Bakelite, UreaFormaldehyde, Silicones, Rubber – Vulcanization, Synthetic Rubbers - (Buna-S, Buna-N, Neoprene). Elementary treatment of Membranes

UNIT V - Instrumental Techniques :

Interaction of radiation with matter,UV-Visible Spectroscopy-Beer –Lambert's law ,Qualitative and Quantitative Analysis,Block diagram of UV-Visible Spectrophotometer.IRSpectroscopy-Types of Vibrations,Identification of functional groups,Block diagram of IR Spectrophotometer**.**

TEXT BOOKS :

1. P.C Jain and Monica Jain, "Engineering Chemistry", 15th edition, Dhanpat Rai Publications 2009.
2. Gurudeep Raj and Chatwal Anand, "Instrumental Methods of Analysis", 5th edition, Himalaya Publications, 2007.

REFERENCES:

1. S.S.Dara, "Text book of Engineering Chemistry" 1st edition, S. Chand Publications, 2009.
2. C.V. Agarwal, C.P. Murthy, A.Naidu, "Chemistry of Engineering materials", 9th edition, BSP Publications, 2008.
3. M.R. Senapati, "Advanced Engineering Chemistry" 2nd edition, Lakshmi Publications, 2006
4. H.W. Wilard and Demerit, "Instrumental methods of Analysis", 7th edition, CBS Publications, 1986.

HS 122 ENGINEERING MATERIALS

L	T	P	To	C
4	-	-	4	4

Course Description & Objectives :

The course will help students to learn about the elementary relationships between structure and properties of materials how materials can be classified. It also reveals the engineering applications of metals, alloys, semi conductors and magnetic materials and relation between properties and engineering applications.

Course Outcomes:

The students will be made to get acquainted to the following learning outcomes:

1. *The bonding in solids. Crystal systems and their structural features*
2. *Fundamentals related to phase equilibria and relevance in Materials Science*
3. *Mechanical properties of solids, factors affecting such properties in order to gain materials information.*
4. *Classification of solids based on band theory, sources of resistivity in metals, semi conductors transport mechanism and applications.*
5. *Classification of magnetic materials, hysteresis, ferrites and applications*
6. *Super conductors, classification and their applications. Dielectric materials, types of polarization and new engineering materials and their usefulness.*

UNIT I - Bonding in Solids & Crystallography:

Bonding in Solids: Inter atomic forces – Types of bonds – Primary & Secondary bonded materials and their properties – Cohesive energy.

Crystallography: Introduction – classification of Crystal systems – SC, BCC & FCC structures –Miller indices of planes & directions – Separation between successive planes – X-ray diffraction – Bragg's Law – Powder method – Crystal imperfection – Point and line imperfections – Grain boundaries

UNIT II - Phase Equilibria & Mechanical Properties :

Phase Equilibria: Gibb's phase rule & terms involved – Reduced phase rule - Two component systems–invariant reactions – Eutectic system & Iron – Carbon system - Lever rule.

Mechanical Properties : Introduction – mechanical properties of materials – Stress-Strain relations of various solids – Elastic moduli- deformations in solids- Fracture – Creep- Fatigue – Factors affecting mechanical properties of materials.

UNIT III - Conducting Materials & Semiconductors :

Conducting Materials: Introduction – Classification of solids based on the band models - Relaxation time and electrical conductivity of a metal – Collision time & mean free path – Sources of resistivity of metals.

Semiconductors: Introduction – Generation & recombination – Intrinsic semiconductors – Extrinsic semiconductors – Drift and diffusion (Qualitative treatment) – Einstein relation – Hall effect – Direct and Indirect band gap.

UNIT IV - Magnetic Properties & Superconductivity

Magnetic Properties: Introduction – Origin of magnetic moment – Classification of magnetic materials – Domain theory of ferromagnetism – Hysteresis curve - Soft and hard magnetic materials – Ferrites and their applications.

Superconductivity – Introduction - Meissner Effect – Types of superconductors – High Temperature superconductors – Applications.

UNIT V - Dielectrics & Functional materials

Dielectrics : Introduction – Dielectric polarization – Internal electric field – Clausius – Mossotti relation – Ferro and Piezo electricity - Electrets – Applications.

Functional materials: Introduction – Metallic glasses – Biomaterials – Composites – Metal matrix composites - Fiber reinforced plastics – Conducting polymers - shape memory alloys – smart materials.

TEXT BOOKS :

1. V. Raghavan, “Materials Science and Engineering”, 3 rd ed., PHI, 1996.
2. Lawrence H. Van Vlack, “Element s of Materials Science and Engineering”, 6th ed., Wesley Publication, 1989.

REFERENCES:

1. Arumugam. M “Material Science” Anuradha Technical Book Publishers, Kumbakonam.K, 1997.
2. Manas Chandra, “Science of Engineering Materials”, Vol 1-3, Mc - Millian Company of India, Delhi.
3. Pillai, S.O, “Solid State Physics”, New Age International, 1998.
4. William F. Smith, “Principles of Materials Science and Engineering”, MGH, Publishers, 1988.
5. Structure and Properties of Materials – John Wulff – Wiley Eastern Ltd.

ME 101 ENGINEERING MECHANICS

L	T	P	To	C
3	1	-	4	4

Course Description & Objectives :

The course aims to impart the knowledge to understand the forces and their reactions on various static and dynamic conditions.

Course Outcomes:

1. *Use scalar and vector analytical techniques for analyzing forces in statically determinate structures.*
2. *Solve the engineering problems in case of equilibrium conditions and to calculate the reaction forces of various supports of different structures.*
3. *Determine the centroid, centre of gravity and moment of inertia of various surfaces and solids.*
4. *Solve the problems involving dry friction.*
5. *Apply fundamental concepts of kinematics and kinetics of particles to the analysis of simple, practicalproblems.*

UNIT I - Basic Concepts and Principles of Statics :

Introduction to Engineering Mechanics, Scalar and Vector quantities, Forces, Characteristics of a force, Definitions and examples of various types of force systems, Law of transmissibility, Definition of resultant, Composition and resolution of forces, Moment of a force, Principles of moments of force, Couples, characteristics of a couple, Transformations of a couple, Resultants of Force Systems, Possible resultants of different types of force systems, Resultant of a concurrent coplanar force system, Resultant of a non concurrent coplanar force system

UNIT II - Equilibrium of Rigid Bodies

Free body diagrams, Types of supports and their reactions, requirements of stable equilibrium, Equations of equilibrium of a concurrent coplanar force system, Equilibrium of Bodies acted on by two or three forces, Equilibrium of bodies acted on by non-concurrent coplanar force system

UNIT III - Properties of Surfaces and Solids :

Centroid and Center of Gravity: Centre of gravity of parallel forces in a plane, centroids and center of gravity of composite bodies, Distributed Loads on Beams.

Moments of Inertia: Definition, Parallel axis theorem and perpendicular axis theorem for areas, Polar Moment of inertia, Second moment of area by

integration, Radius of gyration of areas, Moments of inertia of composite areas.

UNIT IV - Friction :

Nature of friction, Laws of friction, Coefficient of friction, Angle of friction, Cone of friction, Types of Friction - Sliding Friction, Rolling Friction, Belt Friction, Ladder Friction, Wedge friction.

UNIT V - Kinematics and Kinetics :

Absolute Motion: Introduction, Recapitulation of basic terminology of mechanics, Displacement, Velocity and acceleration their relationship, Rectilinear motion of a particle

Relative Motion: Introduction to kinematics of relative motion, Relative displacement, Relative velocity

Kinetics: Introduction to Kinetics, Force, Mass and Acceleration, Newton's Laws of motion, Equation of motion for a particle, D Alembert's principle, Rectilinear translation of a rigid body, Work done by a force, Work done by a force system, Energy, Potential energy, Kinetic energy, Principle of Work and kinetic energy, Conservation of energy, Linear impulse, Linear momentum, Principle of linear impulse and linear momentum, Conservation of linear momentum.

TEXT BOOKS :

1. J. L. Meriam, L. G. Kraige, "Engineering Mechanics: Dynamics", 7th ed., John wiley & sons, 2012

2. A. K. Tayal, "Engineering Mechanics", Umesh Publications, 2005.

REFERENCES:

1. L. Singer - Harper, "Engineering Mechanics", 3rd ed., Fedinand . , Collins, 1975.

2. Timoshenko & Young, "Engineering Mechanics", 4th ed., Tata McGraw Hill, New Delhi, 2007.

3. S. S. Bhavakati & J. G. Rajasekharappa, "Engineering Mechanics", 3nd ed., New Age International Publications, New Delhi, 2008.

HS 118 ENVIRONMENTAL STUDIES

L	T	P	To	C
3	0	-	3	3

Course description and Objectives :

The objective of this course is to heighten on awareness of nature and its importance to students

and make them understand the need to make judicious use of all natural resources for long team sustenance of life on this planet.

Course Outcomes:

1. *To provide Knowledge on importance of natural resources and integrate technical "field" knowledge with analytical skills to prevent natural resources depletion*
2. *To maintain healthy and Diverse Ecosystems ,*
3. *Work together to conserve the biodiversity*
4. *Take immediate measures to control the Pollution*
5. *Adopt Ecofriendly technology.*
6. *Maintenance of hygienic conditions*

UNIT I - Environment and Natural Resources :

Environment: Definition, Scope and Importance – Need for Public Awareness

Natural Resources: Renewable and non-renewable resources – Natural resources and associated problems – Forest Resources: Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources: Use and over utilization of surface and ground water – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources - Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity–Energy resources: renewable and non-renewable energy sources, alternate energy sources. Land resources: Land as a resource, land degradation, Soil erosion – case studies - Role of an individual in conservation of natural resources.

UNIT II - Ecosystems and Biodiversity :

Ecosystem: Concept of an ecosystem. – Complete and incomplete ecosystem - Structure and functions of an ecosystem - Ecological succession. - Food chains, food webs -Structure and functional features of the following ecosystem: a. Forest ecosystem b. Grassland ecosystem c. Desert ecosystem, d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) **Biodiversity**: introduction of biodiversity, Bio-geographical classification of India - Value of biodiversity- Biodiversity at global, National and local levels - Hot-spots of biodiversity - Threats to biodiversity - Endangered and endemic species of India – Conservation of biodiversity

UNIT III - Environmental Pollution and Applications of Remote Sensing / GIS on Environment

Definition, Cause, effects and control measures of: Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution - Solid waste Management: Causes, effects and control measures of municipal and industrial wastes - Climate change, global warming, acid rain, ozone layer depletion -Case Studies - Role of an individual in prevention of pollution - Pollution case studies. – Green technology and its concept, role of green technology in controlling environmental problems.

UNIT IV - Social issues and EIA :

Sustainable development -water conservation: Cloud Seeding (Artificial rain making system), rainwater harvesting, watershed management - Disaster management: floods, earthquake, cyclone and landslides - Environment Protection Act. - Air (Prevention and Control of Pollution) Act. - Water (Prevention and control of Pollution) Act - Wildlife Protection Act - Forest Conservation Act

EIA: introduction to E.I.A.-definition of E.I.A and E.I.S – scope and objectives of E.I.A.- methods of E.I.A –CEIA, REIA, MOEF, CPCB, SPCB – Importance of E.I.A in proposed Projects / Industry /

Developmental activity - Remote sensing / GIS: Introduction of remote sensing / GIS, definition of remote sensing, applications of the remote sensing on environment (site selection, land use/land cover pattern, water/air/soil quality models, a criteria of environmental information systems)

UNIT V - Environmental Sanitation :

Food sanitation: food and drugs Act, food preservations, food borne diseases- Milk sanitation: tests for milk, pasteurization of the milk - water borne diseases-

air borne diseases-viral diseases (HIV/AIDS, SARS, bird-flu, anthrax)-maintenance of sanitary and hygienic conditions

Field Work/Environmental Visit: Visit to a local area to document environmental assets – river/ forest/ grassland / hill /mountain - Study of local environment - common plants, insects, birds - Study of simple ecosystems – pond, river, hill, slopes etc - Visits to industries, water treatment plants, effluent treatment plants

TEXT BOOKS :

1. Y. Anjaneyulu, "Introduction to Environmental Science", B S Publications, 2008.
2. Dr. M. Chandrasekhar, "A Text book of Environmental Studies", HI-TECH publications, 2006

REFERENCES:

1. Dr. M. Anji Reddy, "A Text book of environmental science and Technology", B S Publications, 2008
2. Dr. K. Mukkanti, "A Text book of Environmental Studies", S.CHAND Company Ltd, 2009.
3. EHILRS and ST, "Text book of Municipal and Rural Sanitation", M.S Hill, 1998.
4. C. S. Rao, Wiley Eastern Ltd, "Environmental Pollution Control Engineering", New Age International Ltd, 2001
5. Dr. M. Anji Reddy, "Introduction to Remote Sensing", B S Publications, 2004.
6. Kurian Joseph and R.Nagendram, "Essentials of environmental studies", Pearson Education Pt Ltd, Delhi, 2007.
7. Sharma & Kour "Text book of Environmental pollution".
8. H.C Perkins "Text book of Air Pollution".

CS 105 NETWORK SECURITY

L	T	P	To	C
2	-	-	2	-

Course description and Objectives :

This Course focuses towards the introduction of System, Information and Network security using various methodologies. It also focuses on the practical aspects that have been used to provide e_mail and web security.

Course Outcomes:

On Completion of this course student should be able to

1. *understand the Importance of Information Security*
2. *Know the ways to protect the information*
3. *understand the Firewall importance*
4. *understand the need of Virtual Private Networks.*

UNIT I - History of security :

History of security – Physical security, communications security, emissions security, computer security, network security and information security. Security process - Anti-virus software, access controls, firewalls, smart cards, biometrics, intrusion detection, policy management, vulnerability scanning, encryption, physical security mechanisms.

UNIT II - Access attacks

Snooping, eavesdropping, interception; Modification attacks - Changes, insertion and deletion; Denial of service attacks- Denial of access to information, applications, systems and communication; Repudiation attacks - Masquerading and denying an event. Hacking - Hacker motivation, historical hacking techniques, IP spoofing and malicious code.

UNIT - III

Confidentiality of files, information in transmission and traffic flow, integrity, availability and accountability; Integrity of files and information during transmission; Availability - backups, failover and disaster recovery; Accountability – identification and authentication, and audit.

UNIT - IV

Concepts of firewalls, Application layer and packet filtering firewalls; Virtual Private Networks.

UNIT - V

Basic encryption concepts, Private Key encryption standards-DES, triple DES and AES. Public key encryption – RSA. Concepts of digital signatures.

TEXT BOOKS :

1. Eric Maiwald, Fundamentals of Network security, Dreamtech Press, 2007.

REFERENCES:

1. William Stallings, “Cryptography and Network security”, 4th edition, Pearson Education, 2010.

HS 119 PROFESSIONAL ETHICS, VALUES AND HUMAN RIGHTS

L	T	P	To	C
2	-	-	2	-

Course description and Objectives :

• To create an awareness on Engineering Ethics and Human Values.

• To instill Moral and Social Values and Loyalty

• To appreciate the workplace rights of Others, responsibilities and Safety of others.

Course Outcomes:

The course will enable the students to attain the following:

1. *an understanding of professional and ethical responsibility in workplace*
2. *the broad education necessary to understand the impact of engineering solutions in a global and societal context*
3. *a knowledge of contemporary issues related to human and professional interactions at workplace*
4. *an engineer's life-long commitment to serve the disadvantaged*

UNIT I - Human Values :

Morals, Values and Ethics – Integrity – Work Ethic – Service Learning – Civic Virtue – Respect for Others – Living Peacefully – Caring – Sharing – Honesty – Courage – Valuing Time – Co-operation – Commitment – Empathy – Self-Confidence – Character – Spirituality.

UNIT II - Engineering Ethics & **Engineering as social experimentation :**

Engineering Ethics : Variety of moral issues – types of inquiry moral dilemmas – moral autonomy – The problems of Many Hands – Kohlburg's theory – Gilligan's theory Impediments to Responsible Action.

Engineering as social experimentation - Codes of ethics - a balanced outlook on law - the challenger case study.

UNIT III - Engineer's Responsibility for Safety :

Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis – Reducing Risk – The Government Regulator's Approach to Risk - Chernobyl

Case Studies and Bhopal.

UNIT IV - Workplace Rights and Responsibilities & Work Environment :

Workplace Rights and Responsibilities : Engineers and Managers. Oganizational complaint procedures. Government agencies. Resolving Employee concerns. Limits on acceptable behaviour in large corporation.

Work Environment : Ethical and legal considerations, Organizational responses to offensive behaviour and harassment. Ethics in a Global Context.

UNIT V - Global Issues :

Multinational Corporations – Business Ethics - Environmental Ethics – Computer Ethics - Role in Technological Development – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Honesty – Moral Leadership – Sample Code of Conduct.

TEXT BOOKS :

1. Mike Martin and Roland Schinzinger, "Ethics in Engineering", McGraw Hill, New York, 2005.

REFERENCES:

1. Prof. (Col) P S Bajaj and Dr. Raj Agrawal, "Business Ethics – An Indian Perspective", Biztantra, New Delhi, 2004
2. Charles E Harris, Michael S. Protchard and Michael J Rabins, "Engineering Ethics – Concepts and Cases", Wadsworth Thompson Learning, United States, 2000 (Indian Reprint now available)
3. Engineering Ethics-An industrial Perspective, Gail Dawn Baura
4. Charles E Harris, Michael S Pritchard and Michael J Rabins, "Engineering Ethics – Concepts and Cases", Thompson Learning, 2000.
5. Charles E Harris, Michael S Pritchard and Michael J Rabins, "Engineering Ethics – Concepts and Cases", Thompson Learning, 2000.
6. PSR Murthy, "Indian Culture Values and Professional Ethics", BS Publications
7. Edmund G Seebauer and Robert L Barry, "Fundamentals of Ethics for Scientists and Engineers", Oxford University Press, Oxford, 2001.

HS 120 ENGINEERING PHYSICS LAB

L	T	P	To	C
-	-	3	3	2

Course description and Objectives :

This lab is intended to make the students realize the theoretical concepts of physics having hands on experience in conducting the following experiments. Students may have to take up any 10 experiments from each section.

Course Outcomes:

1. *Students realize concept of resonance of sound conducting the experiment of Sonometer Melde's experiment and volume generator.*
2. *The students understand the concepts of light conducting the experiments of dispersion of light, diffraction of light, optical fibers and lasers.*
3. *The students acquire the knowledge of magnetic field theory, thermal energy and elastic properties by conducting the experiments of field along the axis of circular coil, Lee's experiment, Seebeck effect and Torsional pendulum.*

PHYSICS LAB

1. Verification of laws of transverse vibrations in stretched string - Sonometer
2. Melde's Experiment - Transverse and Longitudinal modes.
3. Determination of Rigidity modulus of a material in the form of a wire - Torsional pendulum
4. Dispersive power of the material of a Prism - Spectrometer
5. Determination of wavelength of a monochromatic light source - Diffraction Grating.
6. Field along the axis of a circular coil – stewart Gee's apparatus.
7. Volume Resonator.
8. Band gap of semiconductor
9. Hall coefficient
10. Thermal conductivity of bad conductor Lee's method
11. Optical Fiber – Determination of numerical aperture
12. Solar Cell
13. Seebeck effect

REFERENCES:

1. Vogel's Text book of qualitative Chemical Analysis J.Mendham, R.C Denney, J.D. Bares, M.Thomas & B. Siva Sankar, Pearson Publications – Volume I (2009).

EE 113 FUNDAMENTAL OF ELECTRICAL ENGG. LAB

L	T	P	To	C
-	-	3	3	2

Course description and Objectives :

To understand basic electrical elements, electrical energy its consumption and measurement. To develop practical knowledge on electrical machines, electronic devices and circuits

Out Comes :

1. *Able to realize characteristics of electrical elements.*
2. *Able to analyze given simple ac and dc networks.*
3. *Able to work on different electrical machines.*
4. *Able to reflect the knowledge of electronic devices to verify experimentally.*

List of Experiments

1. Familiarization with basic components such as Resistors, Capacitors, Diodes, Transistors
2. Familiarization with basic electrical measuring instruments
3. Verification of ohm's law
4. Verification of KVL and KCL
5. Calculation of power factor in simple RL and RC circuits
6. Magnetization characteristic of a D.C. self excited generator
7. Measurement of power and energy.
8. Measurement of transformation ratio of single phase transformer.
9. Measurement of Power, Power factor of 3-phase induction motor.
10. Characteristics of PN junction diode.
11. Characteristics of Zener diode.
12. Operation of Full wave Rectifier
13. Operation of half wave Rectifier
14. Study and Working of fluorescent lamp
15. Measurement of armature and field resistances of d c machine using voltmeter-ammeter method.

Note : Any 10 of above experiments are to be conducted.

CS 107 COMPUTER PROGRAMMING LAB

L	T	P	To	C
-	-	3	3	2

Course description and Objectives :

To familiarize the students in preparation of documents and presentations with office automation tools. A comprehensive problem solving skills through C language is offered to enable the students to write diversified solutions using this language.

Course Outcomes:

1. *Able to write, compile and debug programs in C language.*
2. *Able to formulate problems and implement algorithms in C.*
3. *Able to effectively choose programming components that efficiently solve computing problems in real-world*

List of Experiments:

1. Write A Program to find simple Interest, compound interest
2. Write A Program to covert given temperature from C to F & F to C
3. Write A Program to check Entered number is positive or zero or Negative
4. Write A Program to print given year is Leap year or not
5. Write A Program to do arithmetic operations using switch
6. Write A Program to find biggest among 3 Numbers
7. Write A Program to print grade of a student for 5 sub avg>70(A), 60-70(B), 50-60(C),<50(F)
8. Write A Program to find Roots fo Quadratic Equation
9. Write A Program to find sum of individual digits of a given number
10. Write A Program to check whether the given number is PALINDRAM or not
11. Write A Program to check whether the given number is PERFECT or not
12. Write A Program to check whether the given number is PRIME or not
13. Write A Program to check whether the given number is ARMSTRONG or not
14. Write A Program to check whether the given number is STRONG or not
15. Write A Program to find sum of Natural Numbers

16. Write A Program to print the following triangle

```
      1
    2   3
  4   5   6
7   8   9   10 etc……….
```

17. C Progrm to find Factorial of Given number using Recursive and Non Recursive Functions.
18. Write A Program to print Fibonacci Series upto given limit using recursive, Non recursive
19. Write program in C for determining the minimum and maximum and sum of elements of an array of ‘n’ elements and searching for a given element.
20. C Program for computing range, mean and standard deviation of a given numeric dataset.
21. Write A Program in C for performing addition, subtraction, multiplication and transpose operations on matrices.
22. Write program to perform the following string operations on the given string. a) string length b) string copy c) string concatenation d) string comparison e) reverse string f) sub string
23. Write A Program to read student record (no, name, marks1, marks2, marks3, marks4, marks5, calculate average and Grade) and display the student record.
24. Write A Program to do arithmetic operations using pointers.
25. Write A Program to create two data files and copy the content of these two data files as a single file in another new file?

HS 121 ENGINEERING CHEMISTRY LAB

L	T	P	To	C
-	-	3	3	2

Course description and Objectives :

This lab is intended to make the students enlighten with the theoretical concepts of chemistry. Instrumental techniques are useful for characterization of materials for future engineers.

Students may have to take up any 10 experiments from the following experiments.

Course Outcomes:

1. *To enable the students to analyse the hardness & chlorides in the potable water.*
2. *To help students to determine the Alkalinity in water used especially in industries.*
3. *To impart knowledge on polymers used as insulators.*
4. *To provide an idea about Advanced techniques in chemical analysis using conductometer and spectrophotometer.*

Volumetric Analysis:

1. Determination of total Alkalinity of water
2. Determination of Percentage purity of Washing soda
3. Determination of Fe(II) by Dichrometry
4. Determination of Percentage of available chlorine in Bleaching powder
5. Determination of chlorides by Argentometry
6. Determination of Total hardness of water

Preparations:

7. Preparation of Bakelite
8. Preparation Of Urea- Formaldehyde Resin

Instrumental methods of Analysis:

9. Determination of Viscosity of a Lubricating oil
10. Determination of Strength of acid by conductometry
11. Determination of Mn^{+7} by Colorimetry
12. Demonstration of UV-Visible Spectrophotometer with Ferrothiocyanate

REFERENCE BOOKS:

1. Vogel's Text book of qualitative Chemical Analysis J.Mendham, R.C Denney, J.D. Bares, M.Thomas & B. Siva Sankar, Pearson Publications – Volume I (2009).
2. Experiments in Applied Chemistry by Dr.Sunita Rattan. S.K. Kataria & Sons publications,2008.

ME 103 ENGINEERING GRAPHICS

L	T	P	To	C
1	-	2	3	3

Course description and Objectives :

To familiarize students with the conventional concept of engineering drawing and application through AutoCAD.

Course Outcomes:

After completion of this course, student will be able to prepare plan and elevation of any pictorial view either conventional or through AutoCAD.

UNIT - I

Introduction to Engineering drawing: Introduction to Engineering Drawing – Types of lines, lettering, dimensioning Construction of polygon & Conics. (Ellipse, Parabola & Hyperbola by general method)

UNIT - II

Orthographic Projections: Principle of projection-Planes of projections.

Projections of points:

Projection of straight lines: Inclined to one plane and both the planes.

Projections of planes: Simple planes, Planes inclined to reference planes.

UNIT - III

Projections & Sections of solids – projections of prisms – cylinders – cones - pyramids – solid axis inclined to one plane, simple sections- prism, cylinder, pyramid and cone. AutoCAD Fundamentals.

UNIT - IV

Isometric projections: Isometric drawing of simple objects through AutoCAD

UNIT - V

Orthographic projections: Conversion of Pictorial view into orthographic view using AUtoCAD and Conventional.

TEXT BOOKS :

1. N.D.Bhatt, "Engineering Drawing", 49th ed., Charotar Publication, 2007.
2. K. Venugopal, "Engineering Drawing through Auto CAD", 1st ed., New Age Publication, 2008.

REFERENCES::

1. Jhole, "Engineering Drawing", 2nd ed., Tata McGraw Hill, 2008.
2. K.L. Narayana, "Engineering drawing" 2nd ed., Scitech Publications, 2008.

VFSTR UNIVERSITY

II Year - B.Tech

SYLLABUS

I SEM & II SEM

II Year B.Tech. Chemical Engg. - I-Semester

L	T	P	To	C
4	0	-	4	4

HS 213 PROBABILITY & STATISTICS

Course Description & Objectives:

This course is to impart knowledge to the students concerned with the laws governing random events. The collection, analysis, interpretation, and display of numerical data and its applications in Food Science and Technology.

Course Outcomes:

Students who successfully complete this course should be able to demonstrate understanding of:

1. *Basic probability axioms and rules and the moments of discrete and continuous random variables as well as be familiar with common named discrete and continuous random variables.*
2. *How to derive the probability density function of transformations of random variables and use these techniques to generate data from various distributions.*
3. *How to calculate probabilities, and derive the marginal and conditional distributions of bivariate random variables.*
4. *Discrete time Markov chains and methods of finding the equilibrium probability distributions.*
5. *How to calculate probabilities of absorption and expected hitting times for discrete time Markov chains with absorbing states.*

UNIT I - Descriptive Statistics

Basic Definitions, Frequencies, Graphical Representation, Histogram, Ogive curves, Measures of Central tendency, Arithmetic mean, Median, Mode, mean deviation, standard deviation, Symmetry and Skewness, Karl Pearson's Coefficient of skewness.

UNIT II - Curve Fitting and Correlation, Regression

Least squares method, curve fitting (straight line and parabola only)

Covariance, Correlation, Types, Pearson's Coefficient of correlation, Rank correlation, Spearman's rank correlation. Regression, Regression lines, multiple regression.

UNIT III - Probability

Introduction, Definition (Classical and Axiomatic approach), Addition theorem, Conditional probability, Multiplication theorem, Total probability, Bayes theorem.

UNIT IV - Distributions

Random variables, Discrete and Continuous variables, Introduction to Distributions.

Binomial distribution : Definition, Mean and Standard deviation, Recurrence relation, Applications, Fitting of binomial distribution.

Poisson Distribution : Definition, Mean and Standard deviation, Recurrence relation, Poisson Distribution is an approximation of Binomial distribution, Applications, Fitting of Poisson distribution.

Geometric Distribution : Definition, Properties.

Normal Distribution : Definition, Normal curve, Mean and Standard deviation, Median, Mode, Normal Distribution applications, Normal Distribution is an approximation to Binomial distribution.

Exponential Distribution : Definition, Properties.

UNIT V - Sampling Methods

Population and Sampling, Parameters and Statistics, Types of sampling, Sampling Distributions, Central limit theorem, Standard Error of mean from infinite population, Standard deviation of variance.Test of hypothesis and test of significance, confidence limits, confidence interval, Test of significance of Large samples, T-distribution, Chi square test.

TEXT BOOKS :

1. *H. K. Dass* and *Er. Rajnish Verma*, Higher Engineering Mathematics, S. Chand & Co., New Delhi, 2011.
2. *Miller and Fruinds*, Fundamentals of Probability and Statistics, PHI publication.

REFERENCE BOOKS :

1. *S.C. Gupta* and *V.K .Kapoor*, "Fundamentals of Mathematical Statistics", Sultan Chand & Co., New Delhi, 2005.
2. *B.V. Ramana*, "Higher Engineering Mathematics", 3rd Edition, Tata McGraw-Hill Publishing Co, 2008.
3. *R K Jain, S R K Iyengar*, "Advanced Engineering Mathematics", 2nd Edition, Narosa Publishing House.
4. *Erwin Kreyszig*, "Advanced Engineering Mathematics", 8th Edition, John Wiley & Sons (Asia) Pvt. Ltd. 2001.

II Year B.Tech. Chemical Engg. - I-Semester

L	T	P	To	C
4	0	-	4	4

HS 223 PHYSICAL & ANALYTICAL CHEMISTRY

Course Description and Objectives:

This is an introductory course covering basic concepts in general chemistry. Identify types of chemical reactions. Understand the energetic and kinetics of chemical reactions. Characterize the differences in the states of matter and the unique properties associated with each.

Course Outcomes:

1. *Chemical Engineering is mostly based on applications of concepts of Physical and Analytical Chemistry.*
2. *This course will impart a sound understanding of concepts that are relevant to chemical engineering.*

UNIT I - Distribution Law

Nernst Distribution law, Distribution coefficient – explanation and limitations of distribution law – modified distribution law – applications of distribution law, critical solution temperature and its determination for phenol water system. Colligative properties: Calculation of molecular weights by using colligative properties.

UNIT II - Catalysis

Types of catalysis, characteristics of catalytic reactions, Theories of catalysis, Enzyme catalysis, characteristics of Enzyme catalysis. Adsorption: Types of adsorption, adsorption Isotherm, Freundlich Adsorption isotherm, Langmuir Adsorption isotherms, Adsorption of solutes from solutions, applications of adsorption, Ion exchange adsorption, applications of ion exchange adsorption

UNIT III – Phase Rule

Phase Rule: Explanation of terms in phase rule, derivation of phase rule, one component systems, eg: water, sulphur systems, two component system, the silver lead system. Chemical Kinetics: Rate of reaction, order of reaction (1st, 2nd, 3rd order of reaction), factors influencing rate of a reaction, molecularity.

UNIT IV - Electro Analytical Methods

Voltametry: Principle of micro electrolysis, polarization, DME, Polarograph, half wave potential, ilkovic equation.

UNIT V - Chromatography

Theory and types of chromatography.

Paper chromatography – Principle, Migration parameters, Types of paper chromatography, Applications.

Thin layer chromatography – Principles, preparation of thin layers, Applications.

Gas Chromatography – Instrumentation, Detectors and Applications.

HPLC – Principles, Instrumentation, Pumps, Detectors, Applications.

TEXT BOOKS :

1. A. Bahl, B.S.Bahl and G.D. Tuli, “Essential of Physical Chemistry”, 1st ed., S. Chand, 2009.
2. Gurudeep Raj and Chatwal Sham Anand, “Instrumental Methods of Chemical Analysis”, 1st ed., Himalaya Publications, 2007.

REFERENCE BOOKS :

1. S. Glasstone and Lewis, “Physical Chemistry”, 2nd ed., Mac Million Publications, 1998.
2. P.W.Atkins, “Physical Chemistry”, 8th edition, Oxford up Publications, 2007.
3. D.A. Skoog and P.M. West, “Fundamentals of Analytical Chemistry”, 8thed., Harcourt Publications, 2006.
4. H.W. Willard and Demerit, “Instrumental Methods of Analysis”, 1st ed., CBS Pulications, 1986.
5. B.R. Puri and L.R.Sharma, “Principles of Physical Chemistry”, 1st ed., Shobanlan Nagin Chand & Co., 2006.
6. R.A.Day and A.L.Underwood, “Quantitative Analysis”, 6th ed., Prentice Hall.Publications, 2009.

II Year B.Tech. Chemical Engg. - I-Semester	L	T	P	To	C
	4	0	-	4	4

CH 215 MOMENTUM TRANSFER

Course Description & Objectives:

To understand basic concept of fluid flow and its application to chemical process industries including pipe flow, fluid machinery and agitation and mixing. This course covers fluid statics, fluid dynamics, basic equations, compressible and incompressible fluids, fluidization, transportation and metering of fluids.

Course Outcomes:

1. *Knowledge of basic principles of fluid mechanics*
2. *Ability to analyze fluid flow problems with the application of the momentum and energy equations*

Capability to analyze pipe flows as well as fluid machinery

UNIT I - Fluid Statics & Fluid Phenomena

Definitions & Principles: Unit operations, Unit systems, Dimensional analysis, Basic concepts.

Fluid Statics: Nature of fluids, Hydrostatic equilibrium, Manometers, Decanters.

Fluid Flow Phenomena**:** Laminar flow, Shear stress, Viscosity, Turbulence, Eddy Viscosity, Flow in boundary layers.

UNIT II - Flow of Incompressible Fluids

Basic Equations of Fluid Flow: Mass balance, Mass velocity, Momentum balance, Bernoulli equation, Mechanical energy balance equation, Correction factors, Pump work.

Flow of Incompressible Fluids: Shear stress distribution in pipes, Relation between skin friction parameters, Laminar flow in pipes, Hagen-poiseuille equation, Friction factor chart, Friction factor in flow through channels of noncircular cross section, Friction from changes in velocity or direction, Effect of fittings and valves.

UNIT III - Flow of Compressible Fluids

Mach number, Basic equations, Stagnation temperature, Process of compressible flow, Equations for isentropic flow, Adiabatic frictional flow, Isothermal frictional flow.

UNIT IV - Flow Past Immersed Bodies

Drag, Drag Coefficient, Stagnation point, Friction in flow through beds of solids, Motion of particles through fluids, Terminal velocity, Motion of spherical particles.

Fluidization: Conditions for fluidization, Minimum fluidization velocity, Types of fluidization, Applications of fluidization

UNIT V - Transportation and Metering of Fluids

Pipes, Fittings, Valves, Joints, Pumps, Developed head & Power requirement in pumps, Suction lift and cavitation, Positive displacement pumps, Centrifugal pumps, Fans, Blowers, Compressors. Measurement of Flowing Fluids: Classification of measuring devices, Venturi meter, Orifice meter, Rotameter, Insertion meters.

TEXT BOOKS

1. W.L.McCabe, J.C.Smith & Peter Harriot, "Unit Operations of Chemical Engineering", 6th ed., McGraw-Hill, 2001.
2. Chattopadhyay P, "Unit Operations of Chemical Engineering", Vol -1, Khanna Publishers, 2003.

REFERENCE BOOKS

1. Christie J Geankoplis, "Transport Processes and Unit Operations", 3rd ed., PHI Pvt Ltd, 1993.
2. Foust, Alan S., "Principles of Unit Operations", 2nd ed., John Wiley and Sons, 1980.
3. J.M. Coulson, J.F. Richardson, "Chemical Engineering", Vol-I, Oxford,Pergamon Press, 1968.

II Year B.Tech. Chemical Engg. - I-Semester	L	T	P	To	C
	4	0	-	4	4

CH 217 CHEMICAL PROCESS CALCULATIONS

Course Description & Objectives:

The course continues to develop concepts and provides a more extensive treatment of energy balances. Students develop a fundamental understanding of the basic principles of chemical engineering processes and calculations. (memory, comprehension). Students can examine and select pertinent data, and solve material and energy balance problems. (application, analysis, synthesis).

Course Outcomes:

1. *The student does material & energy balances, either over a single processing unit or and / or over the entire plant.*
2. *The input, output data (material or energy) calculated through this subject can be used to further problem for individual design or collective appraisal.*

3. *A material – energy audit is hinted at several stages in this subject, which is later used to design the equipment – like dryers, absorbers, distillation columns, crystallization etc.*

UNIT I - Stoichiometric Relations

Basis of calculations, Methods of expressing composition of mixtures and solutions, Mole fraction and mole percent density and specific gravity, Baume and 'API' gravity scales.

Behaviour of ideal gases: Kinetic theory of gases, application of ideal gas law, gaseous mixtures gases in chemical reactions. Gas densities and specific gravities.

UNIT II - Vapour Pressure

Liquefaction and liquid state, vaporization, boiling point, effect of temp on vapor pressure, Antonie equation, vapor pressure plots, vapor pressure of immiscible liquids and ideal solutions, Raoult's law, non volatile solutes.

UNIT III - Material Balances

Tie substance, yield and conversion, processes involving chemical reactions material balance calculation involving drying, dissolution and crystallization, Process involving recycles bypass and purge.

UNIT IV - Thermo Physics

Energy, Energy balances, heat capacity of gases, liquid and mixture solutions, Kopp's rule, latent heats, heat of fusion and heat of vaporization, trouton's rule, kistyakowski equation for non polar liquids, enthalpy and its evaluations.

UNIT V - Thermo Chemistry

Calculation and applications of heat of reaction, combustion, formation and neutralization, Kirchoff's equation, enthalpy concentration change, Calculation of theoretical and actual flame temperatures.

TEXT BOOKS

1. Hougen O.A Watson K.M and Ragatz .R.A, "Chemical Process Principles" Part – I: Material and Energy Balance ,John Wiley sons, 2nd ed., CBS Publishers & Distributors, 1965.
2. V. Venkataramani & N.Anantharaman,"Process Calculations", 1st ed., PHI Publications, 2003.

REFERENCE BOOKS

1. B.I.Bhatt and S.M.Vora, "Stoichiometry", 4th ed., Tata McGraw Hill, New Delhi 2004.
2. D.H.Himmelblau, "Basic Principles and Calculations in Chemical Engineers", 5th ed., Prentice Hall, 1989.

II Year B.Tech. Chemical Engg. - I-Semester	L	T	P	To	C
	4	0	-	4	4

HS 221 ORGANIC CHEMISTRY

Course Description & Objective:

The designing and preparation of most organic compounds and pharmaceuticals is based on the reaction mechanism involved in the reaction. This course is aimed at making the student familiar with reaction mechanism and stereo chemical aspects.

Course Outcomes:

The designing and preparation of most organic compounds and pharmaceuticals is based on the reaction mechanism involved in the reaction.

1) This course is aimed at making the student familiar with reaction mechanism.

2) It allows student to understand the role of catalysts and reagents in a reactions.

3) It gives the familiarity about stereo chemical aspects.

4) Comprehensive understanding for synthesis of heterocycles.

UNIT I - Reaction Intermediates

a) Reaction Intermediates: Bond fissions, carbanions, carbonium ions, Free radicals, Nucleophiles and electrophiles.

b) Polar Effects: Inductive effect, Resonance, Hyper conjugation, Electromeric effect.

UNIT II - Types of Organic Reactions

a) Types of Organic Reactions: Electrophilic reactions: Friedal - Craft's reactions, Reimer - Tiemann reaction, Beckmann rearrangement. Nucleophilic reactions: Aldol condensation, Perkin reaction, Benzoin condensation.

b) **Free Radical Reactions:** Halogenation of alkane, Addition of HBr to alkene in presence of peroxide.

c) **Allylic Halogenation:** NBS and thermal halogenation.

UNIT – III

a) Characteristic properties of Alcohols, Phenols, Carboxylic acids, Aldehydes, Ketones, Amines.

b) Organic Named Reactions: Wolf – Kishner reduction, Hoffmann rearrangement, Sandmaeyer reaction, Diels – Alder reaction.

UNIT IV - Stereo Chemistry

a) Stereo Chemistry**:** Stereo isomerism, Optical isomerism, Symmetry, Chirality, Lactic acid, Tartaric acid, Enantiomers, Diastereomers, R and S nomenclature, Racemic mixture and resolution methods.

b) Geometrical Isomerism, E and Z nomenclature

c) Conformational isomerism in cyclohexane.

UNIT V - Heterocyclic compounds

Heterocyclic compounds, nomenclature, preparation properties and uses of

1) Furan 2) Thiophene 3) Pyrrole 4) Pyridine

5) Quinoline 6) ISO – quinoline

TEXT BOOKS:

1. Arun Bahl and B.S. Bahl, "Text Book to Organic Chemistry", 8th ed., S.Chand, 2009.

REFERENCE BOOKS:

1. I.L.Finar, "Organic Chemistry", Vol – I, 6th edition, Longman Scientific Publications, 2006.

2. Somendra Nadh Sanyal, “Named Reactions, Rearrangements and Reagents”, Bharathi Bhavan Publications, 2003.

3. O.P.Agarwal, “Reactions and Reagents”, 46th edition, Goel Publications, 2005.

4. R.T.Morrison and R.M.Boyd, “Organic Chemistry”, 6th edition, Pearson Publications, 2008

II Year B.Tech. Chemical Engg. - I-Semester

L	T	P	To	C
-	-	3	3	2

HS 205 PHYSICAL & ANALYTICAL CHEMISTRY LAB

Course Description & Objectives:

The course continues to develop Basic laboratory techniques, methods of separation, types of chemical reactions, solution preparation, titrations, and household chemicals Student able to Observe laboratory techniques and understand their usefulness in providing data for problem solving. Record measurements from scientific instruments with correct precision. Perform calculations and solve problems using data collected from laboratory measurements.

Course Outcomes:

This lab will provide a firsthand knowledge of various analytical techniques of Chemistry by laying special emphasis on real time spectrometers.

PHYSICAL CHEMISTRY LAB

1. Determination of rate constant for 1st order reaction i.e., hydrolysis of methyl acetate.
2. Determination of partition coefficient of iodine in between water and CCl4.
3. Determination of partition coefficient of benzoic acid between water and benzene.
4. Determination of surface tension by stalagmometer.
5. Adsorption of solution on activated charcoal.

6. Determination of critical solution temperature for phenol water system.

ANALYTICAL CHEMISTRY LAB

1. Chromatography – Paper Chromatography / TLC.
2. Conductiometric Titration – Mixture of acids.
3. Potentiomtric Titration – Estimation of iron (II).
4. P^H Metric Titration – Strength of acid.
5. Clorimetry – Simultaeneous determination of 2 components (Cr^{+6} & Mn^{+7}).
6. Ion exchange Method – Determination of concentration of a salt.

TEXT BOOKS:

1. Vogel's Textbook of Quantitative Chemical Analysis J.Maedham, R.C.Denney, J.D.Barnes, M.Thomas & B.Siva Sankar, "Pearson Publications" – Volume – 1, 6th edition, 2009.
2. B.Viswanathan, P.S.Raghavan, "Practical Physical Chemistry", 1st edition, Viva Books Pvt., 2005.

II Year B.Tech. Chemical Engg. - I-Semester	L	T	P	To	C
	-	-	3	3	2

CH 205 MOMENTUM TRANSFER LAB

Course Description & Objectives:

To understand various flows, application of basic equations, transportation and metering of fluids.This course covers identification of flows, measurement of fluids, pressure drop calculations, performance of fluid flow machinery.

Course Outcomes:

1. *Identify, name, and characterize flow patterns and regimes.*
2. *Utilize basic measurement techniques of fluid mechanics.*
3. *Measure fluid pressure and relate it to flow velocity.*
4. *Demonstrate practical understanding of friction losses in flows.*

List of Experiments

1. Identification of Laminar and Turbulent Flows (Reynolds Apparatus).
2. Verification of Bernoulli's Equation
3 Measurement of flowing fluid using Venturi Meter
4. Measurement of flowing fluid using Orifice Meter
5. Measurement of flowing fluid using Pitot Tube
6. Measurement of flowing fluid using Rotameter
7. Determination of Friction loss in fluid flow through pipes
8. Determination of Pressure drop in packed bed
9. Determination of Pressure drop in fluidized bed
10. Characteristics of single stage centrifugal pump
11. Characteristics of multistage centrifugal pump
12. Characteristics of Reciprocating pump
13. Coefficient of discharge in V – notch

II Year B.Tech. Chemical Engg. - I-Semester

L	T	P	To	C
-	-	3	3	2

HS 217 SOFT SKILLS LAB

Course Description & Objectives:

The Soft Skills Laboratory course is aimed at training undergraduate students and enabling them to acquire employability skills. Designed to impart work related skills, the course will help trainees develop interpersonal communication, leadership and team skills. It will give them the required competence and confidence to handle professional tasks.

Training Methodology:

The training methodology is designed to bring about changes in attitudes through experience-based learning. Activities in simulated environments such as role plays, group discussions, micro-presentations, audio-video clippings, case studies, psychometric tests etc., will provide students insights into their strengths and weaknesses.

Learning Outcomes:

1. *To help students to develop formal communication skills in a work place*
2. *To make them acquire team skill by working in group activities*
3. *To equip them with suitable language and speech patterns in a workplace*
4. *To enhance the ability of critical & lateral thinking while addressing the issues at any situation*
5. *To enable them to present themselves confidently in job interviews*

UNIT I - Personality Development Skills

a) Role of language in Personality – How language reflects, impacts personality – Using gender-neutral language in MNCs – being culturally sensitive.

Activity – Appraising each other – Worksheets related to the above

b) Career Planning- job vs. career- goal setting- SWOT analysis- planning and prioritization - four quadrant time management system - time management – self-management – stress-management.

Activity: Setting a SMART goal - SWOT analysis of the self – Writing a Statement of Purpose (SOP).

c) Effective Resume-Writing: structure and presentation - planning and defining the career objective - projecting one's strengths and skill-sets – summarizing - formats and styles - covering letter.

Activity: Resume preparation –writing a covering letter.

UNIT II - Language Skills

a) Functional English - Formal/informal context – purpose - interpersonal dynamics - ideation –content organization - initiating a conversation – responding appropriately - right body language.

Activity - Role play in different situations, - self-introduction - social background (family, home town etc.,) - role model - my future - likes/dislikes (movies, persons, places, food, music etc.,) - a mini project on functional English.

b) Vocabulary-Building - Etymology of words - word roots - prefixes & suffixes - synonyms & antonyms- collocations - one-word substitutes – analogies - idioms and phrases - contextual guessing of unfamiliar words – task-oriented learning (100 words).

Activity: Flash cards (200 words) – vocabulary exercises with hand-outs.

UNIT III - Communication Skills

a) Group Discussion: Articulation and flow of oral presentation - dynamics of group discussion – intervention – summarizing - voice modulation – content generation – Key Word Approach (KWA) – Social, Political, Economic, Legal and Technical Approach (SPELT) – View Point of Affected Part (VAP) - language relevance - fluency and coherence.

Activity: Mock sessions on four types of GD topics.

b) Facing Interviews: Interview process - understanding employer expectations - pre-interview planning - opening strategies - answering strategies – stress-based interviews - tele-interviews, video interviews- frequently asked questions (FAQs).

Activity: Writing responses to FAQs - mock interviews.

UNIT IV - Comprehensive Skills

a) Reading Comprehension: Reading as a skill- techniques for speed reading- skimming- scanning- appreciating stylistics - impediments for speed reading - eye fixation - sub-vocalisation - critical reading - reading based on purpose - reading for information - reading for inference -understanding tone.

Activity: Reading comprehension exercises with texts drawn from subject areas. (Hand-outs)

b) Listening Comprehension: Listening as skill - different types of listening - hidden data of communication - active listening - top-down approach - bottom-up approach.

Activity: Following different accents (Indian, British, American) listening comprehension exercises with audio and video excerpts.

UNIT V - Analytical Skills

a) Data Commentary: Deductive & inductive reasoning - data interpretation - tables & charts - bar charts - pie charts - line graphs - ratios & proportions – percentages - coding and decoding - reasoning by analogy - artificial language etc.,

b) Analytical Thinking: Statement and Conclusion - Data Sufficiency - Statement and Argument - Statement and Assumption - Logical Deduction - Logical Problems.

Activity: Exercises with handouts.

REFERENCE BOOKS :

1. *Edward Holffman, **Ace the Corporate Personality**, McGraw Hill,2001*
2. Adrian Furnham, ***Personality and Intelligence at Work***, Psychology Press, 2008.
3. John Adair Kegan Page, "***Leadership for Innovation"*** 1st edition, Kogan, 2007.
4. M.Ashraf Rizvi, "***Effective Technical Communication",*** 1st edition, Tata McGraw Hill, 2005.
5. Krishna Mohan & NP Singh , "***Speaking English Effectively"*** 1st edition, Macmillan, 2008.
6. ***Soft Skills Material*** of **Infosys** Under the Academic Initiative of Campus Connect
7. K.R. Lakshminarayana & T. Murugavel***, "Managing Soft Skills",*** Scitech Publications. 2009

II Year B.Tech. Chemical Engg. - II-Semester

L	T	P	To	C
4	0	-	4	4

CH216 PROCESS INSTRUMENTATION

Course Description & Objectives:

This course covers the fundamentals of instrumentation used in industry.

Emphasis is on electric, electronic, and other instruments.

The course will give an idea about different instruments that are used to calculate flow rate, Temperature etc, used in all types of chemical process industries

Course Outcomes:

1. *Explain, discuss and describe the principles and theories related to basic process control instrumentation.*
2. *Read and analyze instrumentation diagrams.*
3. *Design a simple instrumentation system*

UNIT I - Qualities of Measurement

Elements of Instruments, Static and dynamic characteristics, Response of first order instruments, Bimetallic thermometer, pressure spring thermometer, Industrial thermo couples, Thermo Couple wires, Thermo Wells.

UNIT II - Resistance Thermometers

Thermal coefficients of resistance, Industrial resistance thermometer bulbs and circuits, Radiation, Photoelectric and Optical Pyrometers, Spectroscopic analysis, Colour measurement spectrometers.

UNIT III - Measurement of Pressure And Vacuum

Liquid column manometers, Gauge pressure and vacuum measurement, Indicating elements for pressure gauges, measurement of absolute pressure, Corrosive liquids, static accuracy and response of pressure gauge.

UNIT IV - Measurement of Head and Level

Head, density and specific gravity measurement, direct measurement of liquid level, Pressure measurement in open vessels measurement of interface level, Density measurement.

UNIT V - Flow Metering

Head flow and area flow meters, Open channel meters, Viscosity measurements, quantity meters, Flow of dry materials. Recording, Indicating and signaling Instruments.

TEXT BOOKS

1. Donald P Eckman, "Industrial Instrumentation", 1st ed., Wiley eastern, 1950.

2. Patranabis, "Principles of Industrial Instrumentation", 1st ed., Tata McGraw Hill, 1976.

REFERENCE BOOKS

1. D.M.Considine, "Hand Book of Instrumentation", 2nd ed., Mc Graw Hill, 1957.

2. Norman Anderson, "Instrumentation for Process Measurement and Control", 3rd ed., CRC Press, 1997.

II Year B.Tech. Chemical Engg. - II-Semester	L	T	P	To	C
	4	0	-	4	4

CS218 DATA STRUCTURES

Course Description & Objectives:

The main objective of this course is to provide an introduction to basic data structures and manipulating them, by using C programming language.

The fundamental design and implementation of basic data structures. The evaluation of the data structure needs of particular problems & The design and implementation of C programs by using basic data structures.

Course Outcomes:

Having successfully completed this course, the student will be able to:

(1) Apply advance C programming techniques such as pointers, dynamic memory allocation, structures to developing solutions for particular problems;

(2) Design and implement abstract data types such as linked list, stack, queue and tree by using C as the programming language using static or dynamic implementations;

(3) Evaluate and choose appropriate abstract data types to solve particular problems;

(4) Design and implement C programs that apply abstract data types.

UNIT I - Data Types

Introduction – Data, Data type, Data Structures – Primitive and Non-primitive, Storage structures – Sequential and linked storage representations, File structures, Abstract Data Type (ADT). Overview of Structures-arrays, operations on arrays(retrieval of an element, search an element, insertion deletion of an element), manipulations on arrays such as finding the sum of elements of an array, adding two arrays, and reversing an array. Maximum sub sequence problem, Multi dimensional arrays.

UNIT II - Linked Lists

Linked Lists : Types of Linked Lists Singly Linked List, Doubly Linked List, Circular Linked List. Operations on linked lists-insertion, deletion, traversing forward/reverse order. Multi lists, Applications of Linked Lists.

UNIT III - Stacks

Stacks – ADT, array and linked representations, Implementation and their applications. Queues – ADT, array and linked representations, Implementation of linear, circular and doubly-ended queues, and their applications.

UNIT IV - Types of Trees

Preliminaries – Binary Tree – ADT, array and linked representations, Binary tree properties, tree traversal, Implementation, Expression trees. The Search Tree ADT – Binary Search Trees, Implementation. AVL Trees – Single Rotations, Double rotations.

UNIT V - Graphs

Graphs – ADT, definitions and properties, modeling problems as graphs, representation – adjacency matrix and adjacency list, basic graph traversals – breath first search and depth first search. Applications of graphs.

TEXT BOOKS :

1. Richard F.Gilberg, Behrouz A. Forouzan, Data Structures - A Pseudo code Approach with C, Second Edition, Cengage Learning.
2. Y. Langsam, M.J.Augeustein and A.M.Tenenbaum, “Data Structures Using C”, Pearson Education Asia.

REFERENCE BOOKS :

1. Mark Allen Weiss, “Data Structures and Algorithm Analysis in C”, Second Edition, Pearson Education.
2. Sartaj Sahni, Data Structures, Algorithms and Applications in C++ , Universities Press, Second Edition, 2005
3. Jean Paul Tremblay and Paul G. Sorenson, An Introduction to Data Structures with Applications,Tata Mc-Graw Hill, Second Edition, 26th Reprint 2004
4. KRUSE, Data Structures and Programming Design-PHI

II Year B.Tech. Chemical Engg. - II-Semester	L	T	P	To	C
	4	0	-	4	4

CH218 CHEMICAL ENGINEERING THERMODYNAMICS - I

Course Description & Objectives:

This course covers first, second and third law of thermodynamics, volumetric properties, refrigeration and liquefaction processes.

To understand the theory and applications of classical thermodynamics, thermodynamic properties, equations of state, methods used to describe and predict phase equilibria.

Course Outcomes:

1. *Ability to apply fundamental concepts of thermodynamics to engineering applications.*
2. *Ability to estimate thermodynamic properties of substances in gas and liquid states.*
3. *Capability to determine thermodynamic efficiency of various energy related processes.*

UNIT I - Basic Concepts

The scope of thermodynamics, dimensions and units, Measures of amount or size, force, temperature, pressure, work, energy, heat, zeroth law.

UNIT II - First Law of Thermodynamics

Joule's experiment, internal energy, statement of first law, energy balance for closed system, thermodynamic state and state functions, equilibrium, phase rule, reversible processes, constant-v and constant-p processes, enthalpy, heat capacity, mass and energy balances for open systems.

UNIT III - Volumetric Properties of Pure Fluids

PVT behaviour of pure substances, virial equations of state, Ideal gas, applications of the virial equations, Cubic equations of state, generalized correlations for gases.

UNIT IV - The Second Law of Thermodynamics

Statements of the second law, heat engines, thermodynamic temperature scales, entropy, entropy changes of an ideal gas, Mathematical statement of the Second law, Third law of thermodynamics (Statement).

UNIT V - Refrigeration and Liquefaction

The carnot refrigerator, the vapor compression cycle, the choice of refrigerant, Absorption refrigeration, liquefaction processes.

TEXT BOOKS :

1. J.M.Smith, H.C,Vanness, M.M.Abbot, "Introduction to Chemical Engineering Thermodynamics", 6th ed., Tata McGraw Hill – 2003.

2. Y.V.C.Rao, "Chemical Engineering Thermodynamics", 1st ed., University Publication, 1997.

REFERENCE BOOKS :

1. Dodge B.F. "Chemical Engineering Thermodynamics". 1st ed., Mc Graw Hill, 1960.

2. Kyle B.G. "Chemical and Process Thermodynamics", 1st ed., PHI,1990.

II Year B.Tech. Chemical Engg. - II-Semester	**L**	**T**	**P**	**To**	**C**
	4	0	-	4	4

CH220 MECHANICAL UNIT OPERATIONS

Course Description & Objectives:

This course introduces the student to the principles and practices involved in contacting, conveying, separating and storing of solids, as well as Unit operations such as filtration, sedimentation, centrifugation, and separation techniques such as gravity settling, Centrifugal settling, Sink and Float method, flotation, are also studied.

Course Outcomes:

The student will be able to

1. *Understand and apply the basic methods of characterization of particles and bulk solids.*
2. *How to crush and grind a solid material and separate ground material in to various sizes.*
3. *Explain application of unit operations and can describe their operational principles.*
4. *Describe the operation of filtration processes and types of filters used to perform solid-liquid separations.*

UNIT I - Properties of Solids

Properties, handling and mixing of particulate solids, Properties of particulate masses, Storage and mixing of solids, Mixers for cohesive and non-cohesive solids.

UNIT II - Conveyors

Transportation of solid particulate mass. Belt, screw, apron conveyers, bucket elevators, Pneumatic conveying.

UNIT III - Principle of Comminution

Size reduction, Principle of comminution, milling operations, Crushers, Grinders, Ultrafine Grinders, Cutting machines. Screening, Industrial screens.

UNIT IV - Filtration

Filtration, Cake filters, Centrifugal filters, Principles of cake filtration, Clarifying filters, Liquid clarification, cross flow filtration, Types of membranes, Permeate flux, concentration polarization, Micro filtration..

UNIT V - Separation Techniques

Separations based on motion of particles through fluids, gravity settling, Centrifugal settling, Sink and Float method, flotation, flotation agents. Agitation and mixing of liquids, blending of liquids, crystallization, nucleation, crystal growth.

TEXT BOOKS :

1. W.L.Mc Cabe, J.C.Smith & P.Harriott, “Unit Operations of Chemical Engineering”, 5th ed.,McGraw-Hill, Inc, 1993.
2. Foust et.al, “Principles of Unit Operations” 2nd ed.,wiley, New York, 1980.

REFERENCE BOOKS :

1. W.L.Badger and J.T.Banchero, “Introduction to Chemical Engineering”, 1st ed., TMH, 1997.
2. Perry J.H , “Chemical Engineer’s Hand book”, 6th ed., McGraw-Hill New York, 1984.

II Year B.Tech. Chemical Engg. - II-Semester

L	T	P	To	C
4	0	-	4	4

CH222 CHEMICAL TECHNOLOGY

Course Description & Objectives:

This course lends an appreciation of the business decisions made by the chemical industry that funds research and development.

The course is essential to understanding of the different Industrial Processes employed in the manufacture of various types of "Chemicals".

Course Outcomes:

1. *Ability to understand the manufacturing of various inorganic and organic chemicals.*
2. *Ability to understand the process flow diagram and various process parameters.*
3. *Ability to identify and solve engineering problems during production.*

UNIT I - Chlor - Alkali Industries

Manufacture of soda ash, Caustic soda, Chlorine. Manufacture of special glass, manufacture of carbon dioxide, Hydrogen, oxygen, Water gas, Producer gas, Manufacture of ammonia, Urea, and complex fertilizers.

UNIT II - Sulfuric Acid, Hydrochloric Acid and Inorganic Chemicals

Manufacture of sulphuric acid, Hydrochloric acid and other chemicals, Manufacture of Aluminum sulphate and alum, barium salts and rate earth compounds.

UNIT III - Cement and Rubber Industries

Manufacture of cement, Portland cement, Miscellaneous calcium compounds, Magnesium compounds, Phenols formal dehyde, Vinyl chloride and acetate, Manufacture of PVC & SBR.

UNIT IV - Soaps and Detergents

Production and extraction of vegetable oils, Hydrogenation of oils, refining of oils, continuous process of production of fatty acids, glycerin and soap, Production of detergents.

UNIT V - Pulp and Paper Industries

Methods of pulping, Production of sulphate and sulphite pulp, Production of paper – wet process, ceramics.

TEXT BOOKS :

1. M.Gopal Rao and M. Sittig "Dryden's outlines of chemical technology", 2nd ed., East west press, 1973.
2. Shreve's "Chemical Process Industries", 5th ed., Mc Graw Hill, 1984.

REFERENCE BOOKS :

1. Industrial Chemistry by B.K. Sharma.
2. Krishna Prakashan Media (P) Ltd., 1st ed.,1985

II Year B.Tech. Chemical Engg. - II-Semester	L	T	P	To	C
	-	-	3	3	2

CH224 MECANICAL UNIT OPERATIONS LAB

Course Description & Objectives:

The objective of the laboratory is to enable the student to handle various unit operations and to understand separation, size reduction techniques and average particle size calculation of the given material.

Course Outcomes:

The student will be able to

1. *Design and conduct experiments, as well as to analyze and interpret data*
2. *Formulate hypotheses, design experiments*

3. Investigate the procedures to conduct experiments.

4. Analyze and interpret data obtained from unit operation experiments

List of Experiments

1. Screen Analysis
2. Screen Effectiveness
3. Jaw Crusher
4. Ball Mill
5. Roll Crusher
6. Sedimentation
7. Press and Frame Filter
8. Froth Flotation
9. ICI Sedimentation
10. Cyclone Separator
11. Vibrating Screens
12. Centrifugal Filter
13. Sieve Shaker
14. Leaf Filter

II Year B.Tech. Chemical Engg. - II-Semester	L	T	P	To	C
	-	-	3	3	2

CH226 CHEMICAL ANALYSIS LAB

Course Description & Objectives:

This course covers practical knowledge on identification of different organic compounds, analysis and detection of extra elements in functional groups.

To check purity of chemical compounds, identification of unknown substance and preparation of chemicals.

Course Outcomes:

1. *Predict the outcome of several common organic reaction types through a basic understanding of starting materials, functional groups, mechanism, and typical reaction conditions.*

I. Criteria of purity of solid and liquid compounds

a. Determination of Melting point
b. Determination of Boiling point

II. Detection of extra elements in organic compounds

c. Nitrogen
d. Sulphur
e. Halogens

III. Identification of an unknown substance from the following organic compounds

f. Acids
g. Alcohols
h. Aldehydes
i. Amides
j. Amines
k. Carbohydrates
l. Esters
m. Ketones
n. Nitro Group
o. Phenols

IV. Preparations

a. Asprin
b. M-dinitro benzene

REFERENCE BOOK :

1. A.I Vogel Pearson, "Elementary Practical Organic Chemistry", Publications, 2000.

II Year B.Tech. Chemical Engg. - II-Semester

L	T	P	To	C
-	-	3	3	2

HS304 PROFESSIONAL COMMUNICATION LAB

Course Description & Objectives:

The Professional Communication exposes students to conventions of corporate communication and documentation procedures involved in the day-to-day functioning of the business world. The course is aimed at improving written communication skills of undergraduate students and preparing them to meet professional challenges in the work spheres. Writing and Personality are not two exclusive spheres of influence and this course will work on the relationship between professional writing and a personality that is able to meet the goals of an organization in creative and innovative ways.

Course Outcomes:

1. *To enable students to write logical sentences and paragraphs, use appropriate diction, grammar and punctuation.*
2. *To expose them to the world of business and business register*
3. *To make them compose clear and concise business messages*
4. *To produce business documents for mailing to external recipients or intra-organizational circulation*
5. *To enable them to speak business English for handling various business situations*

UNIT I - Writing

- Elements of Technical Writing : Sentence structure - reducing verbosity - arranging ideas logically – building coherence - paragraph level and document level - topic sentence - cohesive devices – transitionals – paraphrasing – précis-writing.
- Mechanics of Writing: Stylistic elements – the rapporteur- the purpose- the reader (audience) - elementary rules of grammar- choice of diction - elementary principles of composition - matters of form – punctuation - conventions of business communication - language and tone - weak links in business correspondence - ethical concerns in business writing.

UNIT II - Reports

- Parts of the Report: Writing an abstract - features of a good abstract – approach - compare and contrast - cause and effect.
- Types of Technical Reports : Drafting a technical proposal - formal and informal proposals - factual reports, feasibility reports, survey reports – parts of a report - title page –declaration – acknowledgements – table of contents - abstract – introduction – conclusion – citations – references - appendices - oral reports and presentations

UNIT III - Letter Writing

- Letter-Writing - Formal and informal letters - structure of formal letters - expressions of salutations, introductory and concluding paragraphs - different types of letters - sales letter - complaint letter - adjustment letter - letter to the editor - covering letter - claim letter – letter of condolence.

UNIT IV - Correspondence

- **Business Correspondence :** E-mail – nature and scope - e-mail etiquette - Common Errors in composing e-mails – Quotations - Inviting quotations - sending quotations – placing orders - Office Communication - agenda - notice - circular
- **Effective Resume-Writing:** Structure and presentation - defining career objective - projecting one's strengths and skill-sets
- Summarizing - formats and styles - covering letter.

UNIT V - Drafting

- Business Proposals: Drafting business proposals - calculating profit and loss-averages - ratios and proportions – partnership - simple interest - compound interest - calculating volumes and areas
- course of action - cause and effect- theme detection - making judgments - logical deductions - analyzing arguments – syllogisms - Venn diagrams - matching definitions -verbal reasoning - numerical reasoning - working out justifications.

REFERENCE BOOKS :

1. Strunk , William, Jr.*The Elements of Style*, Fourth Edition
2. Rozakis, Laurie, Ph.D, (2003). *English Grammar for the Utterly Confused*, McGraw-Hill.

VFSTR UNIVERSITY

III Year - B.Tech

SYLLABUS

I SEM & II SEM

III Year B.Tech. Chemical Engg. - I -Semester

L	T	P	To	C
4	0	-	4	4

CH 301 PROCESS HEAT TRANSFER

Course Description & Objectives:

Study about heat transfer mechanisms conduction, convection, radiation and various equipments used in chemical industries

To understand the fundamentals of heat transfer mechanisms and their applications in various heat transfer equipment in process industries.

Course Outcomes:

1. *Understand and use empirical equations to solve forced and natural convection heat-transfer problems;*
2. *Analyze the heat transfer processes involved in boiling and condensation;*
3. *Perform basic calculations of common heat exchangers to determine relevant design parameters.*

UNIT I – Heat Transfer and its Applications

Heat Transfer and Its Applications: Nature of heat flow, Conduction, Convection, Radiation, Heat Transfer by Conduction: Fourier’s law of conduction, Thermal conductivity, Steady state conduction, Compound resistances in series, Heat flow through cylinder, Unsteady state conduction, Semi-infinite solid.

Principles of heat flow in fluids: Heat exchange equipment, Counter current & parallel current flows, Energy balances, Rate of heat transfer, LMTD, Individual heat transfer coefficients, Over all heat transfer coefficient, Fouling factors, Effective coefficients for unsteady state heat transfer.

UNIT II - Heat Transfer to Fluids Without Phase Change

Regimes of heat transfer, Thermal boundary layer, Heat transfer by forced convection in laminar flow, Heat transfer by forced convection in turbulent flow, Analogy between transfer of momentum and heat, Reynolds analogy, Colburn analogy, Heat transfer in transition region, Transfer to liquid metals, Interpretation of dimensionless groups. Natural Convection: Dimensional analysis, Natural convection to vertical shapes and horizontal planes.

UNIT III - Heat Transfer to Fluids With Phase Change

Drop wise and film type condensation, Coefficients for film type condensation, Practical use of nusselt equations, Condensation of super heated vapors, Effect of non condensable gases on rate of condensation, Heat transfer to boiling liquids, Pool boiling of saturated liquid, Maximum Flux and critical temperature drop, Minimum flux and film boiling.

UNIT IV - Radiation Heat Transfer

Fundamental facts concerning radiation, Emission of radiation, Black body radiation, Laws of black body radiation, Absorption of radiation by opaque solids, Radiation between surfaces, Non black surfaces, Radiation to semitransparent materials, Combined heat transfer by conduction-convection and radiation.

UNIT V - Heat Exchange Equipment

General design of heat exchange equipment, Heat exchangers, Condensers, Boilers, Calandrias, Extended surface equipment.

Evaporation: Liquid characteristics, Types of evaporators, Performance of tubular evaporators, Enthalpy balances for single effect evaporator, Multiple effect evaporators.

TEXT BOOKS

1. W.L.McCabe, J.C.Smith & P.Harriott,"Unit Operations of Chemical Engineering", 6th ed., McGraw-Hill, Inc., 2001.
2. D.Q.Kern, "Process Heat Transfer", 1st ed., Tata McGraw Hill, 2002.

REFERENCE BOOKS

1. J.P.Holman, "Heat Transfer", 8th ed., McGraw Hill, New York, 1997.
2. Y.V.C.Rao, "Heat Transfer", 1st ed., University Press, 2001.
3. Donald Pitts, Leighton E, Sissom, "Schaum's Outline of Heat Transfer", 2nd ed., McGraw Hill publications, 1998.
4. J.M. Coulson. J.F.Richardson, "Chemical Engineering", Vol-1, Oxford, Pergamon Press, 1968.

III Year B.Tech. Chemical Engg. - I -Semester

L	T	P	To	C
4	0	-	4	4

CH 303 MASS TRANSFER OPERATIONS-I

Course Description & Objectives:

The course deals about various mass transfer operations like Absorption, Stripping, Humidification, etc.

It includes the design of various equipments like Absorber, Humidifier, etc.

Course Outcomes:

The student will be able to recognize the various modes of mass transfer like Determination of mass transfer rates using

1. *Fick's Law*
2. *Estimation of diffusion coefficients*
3. *Solving of unsteady state diffusion problems*

UNIT I - Diffusion and Mass Transfer

Mass transfer operations, molecular diffusion in fluids, Binary solutions, Fick's Law, equation of continuity, Steady state equimolar counter current diffusion; Stefan's diffusion estimation of diffusivity n gases and liquids, application of molecular diffusion, theories of mass ransfer, diffusion in fluids, Reynolds analogy, heat and mass transfer coefficients in laminar and turbulent flow, diffusion through solids.

UNIT II - Interphase Mass Transfer

Concept of equilibrium, diffusion between phases, material balances in steady state, co – current and counter current stage processes, Sparged vessels mechanically agitated vessels for liquid gas (single phase), Venturi scrubbers, Sieve tray design for absorption tray tower vs. packed tower, Stage efficiencies and point efficiencies.

UNIT III - Absorption and Stripping

Introduction, Counter and co – current isothermal absorption and stripping of single component, operating lines, minimum flow rate, Determination of number of transfer units and height of continuous absorber, determination of no. of plates, absorption factor, Kremser - Brown equations.

UNIT IV - Humidification

Introduction, Vapor – pressure curve, definitions, psychometric charts, Enthalpy of vapor – gas mixtures, humidification and de humidification, operating lines and design of packed humidifiers, cooling towers, spray chambers.

UNIT V - Drying

Introduction, Definitions of various moisture contents, drying conditions, Rate of Batch drying under constant drying conditions, mechanism of batch drying, Drying time, through circulation drying, batch and continuous drying, equipment design of continuous counter current dryer.

TEXT BOOKS

1. R.E.Treybal "Mass Transfer Operations" 3rd ed., Mc-Graw Hill, 1981.
2. Binay. K.Dutta, "Principles of Mass Transfer and Separation Processes",Prentice Hall of India, New Delhi, 2007.

REFERENCE BOOKS

1. C. Judson King, "Separation Processes", 2nd ed., McGraw Hill, 1982.
2. Seader. J. D, E. J. Henley & D.Keith Roper, "Separation ProcessesPrinciples", John Wiley & sons, New York, 2010.
3. Alapati Suryanarayana "Mass Transfer Operations", 1st ed., New - Age, International, 2006.

III Year B.Tech. Chemical Engg. I - Semester

L	T	P	To	C
4	0	-	4	4

CH305 CHEMICAL REACTION ENGINEERING - I

Course Description & Objectives:

Chemical Reaction Engineering is the heart of a Chemical Process Industry, especially the kinetics i.e. the rate at which chemical reactions occur. This subject enables the students to learn about the different types of reactions underlying a chemical process and thereby design chemical reactors.

Course Outcomes:

1. *On having completed the course, the student will be in a position to design reactor, with some additional inputs.*

2. *The homogeneous reactions & hence the reactors are fairly easy to design. But, with increasing complexity like in multiple rxns & heterogeneous rxno.*
3. *The student has to exercise some caution in designing the reactors.*
4. *The reactor history coupled with personal experience and sound judgment are necessary.*

UNIT I - Reaction Kinetics

Rate equation, Elementary, Non Elementary Reactions and their mechanisms, Theories of reaction rate and temperature dependency, Searching for mechanism.

UNIT II - Interpretation of Batch Reactor Data

Constant volume batch reactor, varying volume batch reactor, analysis of batch reactor, temperature and reaction rate the search for a rate equation.

UNIT III - Ideal Reactors

Ideal batch reactors, steady state mixed flow reactors, steady state plug flow reactors. Size comparison of single reactors, Case studies & problems.

UNIT IV - Multiple Reactions

Parallel reactions, Series reactions, Series – parallel reactions, Maximizing the productivity of desired reactant. An alternative approach to using fractional conversion; Net reaction rates and stoichiometry.

UNIT V - Temperature and Pressure Effects

Single reactions, Heat of reactions from thermodynamics, Heat of reaction and temperature, equilibrium constant from thermodynamics, Conversion, Graphical Design procedure.

TEXT BOOK

1. Octave Levenspiel, "Chemical Reaction Engineering", 3rd ed., WEE, 1999.

REFERENCE BOOKS

1. H.S.Fogler, "Elements of Chemical Reaction Engineering", 3rd ed., PHS, 1992.
2. J.M.Smith, "Chemical Engineering Kinetics", 3rd ed., MGH, 1981.

III Year B.Tech. Chemical Engg. I - Semester

L	T	P	To	C
4	0	-	4	4

CH325 PROCESS DYNAMICS & CONTROL

Course Description & Objectives:

Study of dynamic behavior of chemical processes and techniques of conventional process control, Mathematical modeling and analysis of open loop and closed loop process, frequency domain analysis and stability Provide a conceptual and methodological framework for describing a process and its control system.

Course Outcomes:

. 1. Develop mathematical models of chemical processes by writing unsteady-state mass and energy balances.

2. Ability to design controllers.

UNIT I - First Order System

Introduction to process dynamics and control, Response of first order systems, Physical examples of first order systems, Response of first order systems in series, Higher order systems, Second order systems and transportation lag.

UNIT II - Control System

Controllers and final control elements, Block diagram of a chemical reactor, Control Systems, Closed loop transfer functions, Transient response of simple control systems.

UNIT III - Stability Criteria

Stability, Routh array Root locus, Application of Root locus to control systems.

UNIT IV - Frequency Response Analysis

Introduction to frequency response, control systems design by frequency response, Bode diagrams.

UNIT V - Advanced Control Strategies

Advanced control strategies, Cascade control, Feed Forward control ratio control, Smith predictor, Dead time compensation, Internal mode control. Controller tuning, Process Identification, Different types of control valves like linear, on – off etc.

TEXT BOOKS

1. Donald R Coughanowr, "Process System Analysis and Control" 2nd ed., Mc Graw Hill, 1993.
2. G.Stephanepolous, "Chemical Process Control", 1st ed., Prentice Hall, 1998.

REFERENCE BOOK

1. Peter Harriott, "Process Control", Tata McGraw Hill, 2008.
2. R.W.Gaikwad,S.A.Misal "Process Dynamics and Control",1st ed.,Central Techno publications,2004.

III Year B.Tech. Chemical Engg. I - Semester

L	T	P	To	C
4	0	-	4	4

CH327 ENERGY ENGINEERING (ELECTIVE - I)

Course Description & Objectives:

The course programme focuses on understanding the sources of energy and their contributions to the energy and power needs of the nation and the world.

Course Outcomes:

The student will be able to

1. Understand the present and future enery demands of the energy resources,

2. Know about various energy auditing and energy conservation methods.

3. Obtain in detail knowledge about the stem distribution and utilization.

4. Know about various renewable energy resources.

UNIT I - Sources of Energy and Types of Fuels

Energy resources present and future, Energy demands with reference to India. Coal: - Origin, occurrence reserves, petrography, rank, classification, analysis, testing, storage, carbonization liquefaction, gasification.

UNIT II - Liquid Fuels: Petroleum

Origin, occurrence, Reserves, Composition, classification, fractionation, reforming cracking, petroleum products, specification for petroleum natural gas, coke oven gas, producer gas, water gas, LPG.

UNIT III - Energy Auditing

Short term, medium term, long term schemes, energy conversion energy index, energy cost, representation of energy consumption, Energy auditing.

UNIT IV - Steam Plant

Run time cycle, boiler plant, steam cost, steam distribution and utilization, combined heat and power cycles. Energy from biomass, gas purification solar energy, wind energy, energy storage, waste heat recovery.

UNIT V- Energy Conservation:

Energy conservation methods in process industries, practical applications and theoretical analysis.

TEXT BOOKS

1. O.P.Gupta, "Elements of Fuels, Furnaces & Refractories", 3rd ed., Khanna Publications, 1996
2. Sami Sarkar, "Combustion", 2nd ed., Orient Longman, 1998.

REFERENCE BOOKS

1. Conventional Energy Technology, Fuel and Chemical Energy, Tata Mc Graw Hill, 1987.
2. G.D.Rai, "Non – Convectional Energy Sources", 4th ed., Khanna Publications, 1997.

III Year B.Tech. Chemical Engg. I - Semester

L	T	P	To	C
4	0	-	4	4

CH329 INDUSTRIAL SAFETY & HAZARD MANAGEMENT (ELECTIVE - I)

Course Description & Objectives:

To provide comprehensive knowledge of safety and hazards aspects in industries and the management of hazards. To build in safety competency of the participants in the Quantifying risk, Design for Safety, Investigating accident.

Course Outcomes:

1. *This course will enable the student to identify and understand safety hazards in a business or industrial setting.*

2. *The principles learned in this course will allow the student to use current safety theory and guidelines in making the workplace safer for workers.*

3. *The intention is for the student to be able to: Identify basic safety hazards.*

4. *Demonstrate the ability to document and record incidents and accidents in the workplace, Identify basic methods of hazard control.*

UNIT I - Safety

Safety programs, engineering ethics, accident and loss statistics, acceptable risk, public perception.

UNIT II - Toxicology

How Toxicants enter biological organisms & are eliminated from biological organisms, government regulations, Industrial Hygiene: identification, evaluation, control.

UNIT III - Fires and Explosions

The fire triangle, distinction between fires and explosions, Definitions, flammability characteristics of liquids and vapors, ignition energy, auto ignition, auto oxidation, adiabatic compression, explosions.

UNIT IV - Introduction to Relief's

Relief concepts, definitions, location of relief's, relief types, relief systems, conventional spring operated reliefs in liquid service and vapor or gas service, rupture disc relief's in liquid service and vapor or gas service.

UNIT V - Hazard's Identification

Process hazards checklists, hazards and operability studies, safety reviews.

TEXT BOOKS

1. DA.Crowl & J.F.Louvar, "Chemical Process Safety", Vol. 2, Prentice Hall, 1980.
2. H.H.Fawcett and W.S.Wood, "Safety & Accident Prevention in Chemical Operations", 2nd ed., John Wiley and Sons, New York, 1982.

REFERENCE BOOKS

1. R.K.Sinnoot, "Coulson and Richardson's - Chemical Engineering", Vol 6, Butterworth - Heinmann Limited, 1996.
2. Roye Sanders, "Chemical Process Safety", 1st ed., Elsevier, 2007.

III Year B.Tech. Chemical Engg. I - Semester

L	T	P	To	C
4	0	-	4	4

CH331 DESIGN OF ANALYSIS & EXPERIMENTS (ELECTIVE - I)

Course Description & Objectives:

Understand the important role of experimentation in new product design, manufacturing process development, process improvement and analyze the results from such investigations to obtain conclusions

Course Outcomes:

1. *Describe how to design experiments, carry them out, and analyze the data they yield.*

2. *Understand the process of designing an experiment including factorial and fractional factorial designs.*

3. *Examine how a factorial design allows cost reduction, increases efficiency of experimentation, and reveals the essential nature of a process.*

UNIT I - Introduction

Modeling and study of systems in Chemical Engineering leading to systems of algebraic, ordinary differential and partial equations (both linear and non-linear systems). Methods of solution of systems of linear algebraic equations, linear homogeneous ordinary differential equations and linear non-homogeneous ordinary differential equations observed in systems of interest to chemical engineers.

UNIT II - Differential Equations

Methods of solution of linear and non-linear finite difference equations, solution of differential – difference equations, numerical solution to partial differential equations by relaxation method, finite – difference method, introduction to finite element method and application to problems of interest in chemical engineering.

UNIT III - Basic Statistical Concepts

Probability distributions, sampling and sampling distributions; Inferences about the differences in Means.

Randomized Designs**:** Hypothesis Testing – t-test, use of P-values; Confidence intervals, Inferences about the difference in means, paired comparison designs, inferences about the variances of normal distributions F-test.

UNIT IV - Analysis of Variance

One-way and two way Analysis. Analysis of fixed effects model – Decomposition of the total sum of squares, statistical analysis.

Factorial Experiments: Definitions, Interpretation of main effects and interactions, design with factors at two levels – Calculation of effects and Analysis of variance – Model adequacy testing, Estimating model parameters Analysis of 2K factional design in detail.

UNIT V - Regression Models

Linear Regression Models, Estimation of parameters, Multiple regression, Hypothesis Testing in multiple regression, confidence intervals in multiple regression.

Response Surface Methodology: Introduction, Method of Steepest Ascent, Analysis of a second order response. Experimental designs for fitting response surfaces Composite Designs. Introduction to other experimental design: Mixture experiments, Evolutionary Operation, Robust Design (Taguchi Methods).

TEXT BOOKS

1. S. Pushpavanam, "Mathematical Methods in Chemical Engineering", 1st ed., Prentice Hall of India, New Delhi, 2005.
2. Douglas C. Montgomery, "Design and Analysis of Experiments", 5th ed., John Wiley and Sons INC, 2007.

REFERENCE BOOKS

1. W.L. Hines and D.C. Montgomery, "Probability and Statistics in Engineering and Management", John Wiley and Sons, 1980.
2. Ed. Oven L. Davies Longman Group, "Design and Analysis of Industrial Experiments", 2nd ed., 1978.
3. Jenson and Jeffereys, "Mathematical Methods in Chemical Engineering", Academic Press, 1963.
4. C.F. Jeff Wu & Michael Hamada 2009, Experiments-Panning, Analysis, and Parameter Design Optimization, 2nd edn, John Wiley & Sons. Inc.

III Year B.Tech. Chemical Engg. I - Semester

L	T	P	To	C
-	-	3	3	2

CH333 PROCESS HEAT TRANSFER LAB

Course Description & Objectives:

To understand the fundamentals of heat transfer mechanisms and their applications in various heat transfer equipment in process industries.

Course Outcomes:

The course will provide a sound practical knowledge of the three main heat transfer phenomena namely conduction, convection and radiation.

List of Experiments

1. Determination of heat transfer coefficient by Natural Convection.
2. Determination of overall resistance in Composite Wall.
3. Determination of heat transfer coefficient through Pin Fin.
4. Emissivity Measurement.
5. Determination of heat transfer coefficient of Shell and Tube Heat Exchanger.
6. Determination of Thermal Conductivity of Metal Rod.
7. Determination of heat transfer coefficient of Vertical Condenser.
8. Determination of heat transfer coefficients of Agitated Vessel.
9. Determination of heat transfer coefficients of Double Pipe Heat Exchanger.
10. Determination of Thermal Conductivity of Liquids.
11. Determination of performance of Single Effect Evaporator.
12. Determination of heat transfer coefficient of Horizontal tube lossing heat by Forced Convection.
13. Determination of Stefan Boltzmann Constant.
14. Determination of Critical Heat Flux points of Nichrome Wire.

III Year B.Tech. Chemical Engg. I - Semester

L	T	P	To	C
-	-	3	3	2

CH335 CHEMICAL TECHNOLOGY LAB

Course Description & Objectives:

To study process technologies of various organic and inorganic process industries.

This course covers manufacture of various chemicals, cement, rubber, soaps, detergent, paper and ceramics.

Course Outcomes:

1. Ability to understand the manufacturing of various inorganic and organic chemicals
2. Ability to estimate melting / boiling points, preparation, analysis of different chemical compounds.

List of Experiments

1. Estimation of Glucose
2. Estimation of Sucrose
3. Iodine value of oil
4. Saponification value of oil
5. Acid value of oil
6. Preparation of Acetanilide
7. Preparation of Aspirin (Acetyl Salicylic acid)
8. Preparation of Azodye (Phenyl Azo – 2 – Naphthol)
9. Preparation of Nitrobenzene from benzene
10. Preparation of M – Dinitro Benzene from Nitro Benzene
11. Preparation of Urea formaldehyde resin
12. Preparation of Phenol formaldehyde resin
13. Determination of Alkalinity of water
14. Determination of Percentage purity of lime stone

III Year B.Tech. Chemical Engg. I - Semester

L	T	P	To	C
-	-	3	3	2

CH337 PROCESS DYNAMICS & CONTROL LAB

Course Description & Objectives:

Study of dynamic behavior of chemical processes, various controllers and techniques of conventional process control.

Course Outcomes:

To provides a sound practical knowledge of different control systems, controllers, and control valves that are used in industries.

List of Experiments:

1. Dynamics of 1st Order Systems [Thermometer].
2. Dynamics of Interacting System for Step Input.
3. Dynamics of Non Interacting System for Step Input
4. Response of Interacting System for Pulse Input.
5. Response of Non-Interacting System for Pulse Input.
6. Response of Single Tank for Step Input
7. Response of Single Tank for Pulse Input
8. Response of Manometer (2nd Order System)
9. Response of Control Values
10. Response of 1st Order System using Mat Lab
11. Response of 2nd Order System using Mat Lab
12. Temperature Control Trainer
13. Cascade Control Trainer
14. Response of "P" Controller using Mat Lab.

III Year B.Tech. Chemical Engg. II - Semester

L	T	P	To	C
4	0	-	4	4

MS310 MANAGERIAL ECONOMICS

Course Description & Objectives:

This course provides students with the knowledge, tools and techniques to make effective economic decisions under conditions of risk and uncertainly.

Course Outcomes:

Students will be able to:

1. *Apply the economic way of thinking to individual decisions and business decisions*
2. *Understand how prices get determined in markets, how market participants benefit in the form of consumer surplus and producer surplus, and what are the consequences of government intervention*
3. *Understand the roles of managers in firms*
4. *Understand the internal and external decisions to be made by managers*
5. *Design competition strategies, including pricing, product differentiation, research & development, and marketing, according to the natures of products and the structures of the markets*
6. *Analyse real-world business problems with a systematic theoretical framework.*

UNIT I - Nature & Scope of Managerial Economics

Basic tools and techniques of Business Economics, Macro Economic Environment and Managerial decisions.

UNIT II – Demand Analysis

Demand Analysis: Types of Demand, Demand determination Concept of Elasticity and measurement, Demand forecasting, Survey & Statistical methods.

UNIT III – Theory of Production

Production function, Marginal rate of technical substitution, Iso-quants and Iso-costs, production function with one/two variable factors,Law of Variable Proportions, and Returns to Scale, internal and external economies.

UNIT IV – Cost Analysis

Cost concepts, cost determinants, cost output relationship in the short and long run, Break-Even analysis.

UNIT V - Features and types of different competitive situations

Perfect competition, Monopoly, Monopolistic competition and Oligopoly, pricing methods in practice.

Text Books:

1. Gupta: Managerial Economics, 1/e TMH, 2005
2. A.R.Arya Sri, Managerial Economics and Financial Analysis, TMH, 2/e, 2010

Reference Books:

1. Dominic Salvatore, Managerial Economics, Thomson, 2/e, 2006
2. Mote Paull, Managerial Economics, 1/e, TMH, 2004

III Year B.Tech. Chemical Engg.   II - Semester

L	T	P	To	C
4	0	-	4	4

CH302 MASS TRANSFER OPERATIONS-II

Course Description & Objectives:

The Course deals about various separation techniques and mass transfer operations like Distillation, Extraction, adsorption, etc.

It includes the design of various equipments like Distillation, adsorber, extractor etc.

Course Outcomes:

The student will be able to recognize the various Principles like design of operating line equation, design of Distillation units, Tower sizing, design of single and multi stage cross current, co-current, counter current extractors, design of adsorption and leaching equipments.

UNIT I - Distillation

Introduction, Fields of application, VLE for miscible liquids, immiscible liquids, steam distillation, VLE phase diagrams, tie lines, mixture rules, Flash vaporization and differential distillation for binary and multicomponent mixtures, Batch distillation with reflux.

UNIT II - Mc – Cabe and Ponchon - Savarit Methods

Continuous fractionation of binary mixtures, Mc – Cabe Thiele method, Ponchon – Savarit method determination of no of ideal plates for binary mixtures, optimum reflux ratio, plate efficiencies, condenser and reboiler duties, principles of
azeotropic and extractive distillation, open steam system.

UNIT III – Liquid-Liquid Extraction

Fields of application of ternary liquid systems, triangular and solvent free coordinate systems, Choice of solvent and selectivity, extraction with insoluble and partially soluble systems,Single and multi stage cross and counter current extraction with reflux, continuous contact extraction (packed beds) equipment for liquid – liquid extraction.

UNIT IV - Leaching

Introduction, Fields of application, Preparation of solid for leaching, types of leaching, Leaching equilibria, Constant under flow conditions, Single and multistage leaching calculations, equipment for leaching operation.

UNIT V - Adsorption and Ion – Exchange

Principles and applications, types of adsorption, use of adsorbents, Adsorption equilibria, adsorption isotherms for vapor and dilute solutions, Design of steady state moving bed adsorber for one component, Un steady state adsorption, Break through curve, fixed bed adsorber and ion exchange.

TEXT BOOKS

1. R.E.Treybal, "Mass Transfer Operations", 3rd ed., Mc-Graw Hill, 1981.
2. Binay. K.Dutta, "Principles of Mass Transfer and Separation Processes",Prentice Hall of India, New Delhi, 2007.

REFERENCE BOOKS

1. C. Judson King, "Separation Processes", 2nd ed., McGraw Hill, 1982.
2. Alapati Suryanarayana, "Mass Transfer Operations", 1st ed., New - Age, International, 2006.

III Year B.Tech. Chemical Engg. II - Semester

L	T	P	To	C
4	0	-	4	4

CH304 CHEMICAL REACTIONS ENGINEERING – II

Course Description & Objectives:

This covers the degree of nonideality contribution in reactors, which affects the conversion levels. Also, here hetroganeous systems to an extent are taken into account coupled with catalysis.

Course Outcomes:

1. *On having completed the course, the student will be in a position to design reactor, with some additional inputs.*
2. *The homogeneous reactions & hence the reactors are fairly easy to design. But, with increasing complexity like in multiple rxns, & heterogeneous rxno.*
3. *The student has to exercise some caution in designing the reactors.*
4. *The reactor history coupled with personal experience and sound judgment are necessary.*

UNIT I - Non Ideal Flow

E curve, the age distribution of fluid, the RTD studies, conversion in non ideal flow reactors, dispersion model Axial dispersion, correlations of axial dispersion, problems.

UNIT II - Tanks in Series Model

Pulse response experiments and the RTD, Chemical conversion, Convertion model in laminar flow reactors, Earliness of mixing, Segregation and RTD: Self mixing of a single fluid.

UNIT III - Fluid - Particle Reactions: Kinetics - The Rate Equation

Fluid particle reactions: Kinetics - selection of a model, shrinking core model for spherical particles of unchanging size, rate of reaction for shrinking spherical particles, determination of rate controlling step.

UNIT IV - Heterogeneous Reactions

Introduction**:** Solid catalyzed reactions - pore diffusion resistance combined with surface kinetics, porous catalyst particles, performance equations for reactors containing porous catalyst particles.

UNIT V - Deactivating Catalysts

Mechanism of catalyst deactivation, the rate and performance equations.

TEXT BOOKS:

1. Octave Levenspiel,"Chemical Reaction Engineering", 3rd ed., WEE, 1999.
2. H.S.Fogler, "Elementary Chemical Reaction Engineering", 3rd ed., PHS, 1981.

III Year B.Tech. Chemical Engg. II - Semester

L	T	P	To	C
4	0	-	4	4

CH306 CHEMICAL ENGINEERING THERMODYNAMICS – II

Course Description & Objectives:

To understand the theory and applications of classical thermodynamics, thermodynamic properties, equations of state, methods used to describe and predict phase equilibria, vapor-Liquid equilibria, Chemical reaction equilibria.

Course Outcomes:

1. *State the thermodynamic equations and explain them for solving actual thermodynamic problems.*

2. *Apply the thermodynamic principles for the chemical process design as well as industrial application.*

3. *Analyse and calculate thermodynamic properties for a given system or process at specified conditions using appropriate thermodynamic approaches.*

4. *Use the Vapor Liquid Equilibrium relations to solve the process separation problems.*

5. *Evaluate the chemical reaction equilibria for the equilibrium conversion/composition calculations.*

UNIT I - Heat Effects

Sensible heat effects, Latent heats of pure substances, standard heat of Reaction, standard heat of formation, standard heat of combustion, Temperature dependence of ÄH^0.

UNIT II - Solution Thermodynamics -Theory

Fundamental property relation, The chemical potential and phase equilibria, Partial properties, Ideal gas mixtures, fugacity and fugacity coefficient: pure species, fugacity and fugacity coefficient: species in solution .

UNIT III - Vapor / Liquid Equilibrium

The nature of equilibrium, Phase rule, Duhem's theorem, VLE: Qualitative behaviour, Simple models for VLE, VLE by modified raoult's law.

UNIT IV - Phase Equilibria

Equilibrium and stability, Liquid – Liquid equilibrium, Vapor liquid liquid equilibrium, solid – liquid equilibrium, Solid Vapor equilibrium, equilibrium adsorption of gases on solids.

UNIT V - Chemical Reaction Equilibria

The reaction coordinate, Application of equilibrium criteria to chemical reactions, the Standard Gibbs- energy change and the equilibrium constant, effect of temperature on equilibrium constant, Evaluation of equilibrium constants, Relation of equilibrium constants to composition.

TEXT BOOKS

1. J.M.Smith, H.C.Vanness, “Introduction to Chemical Engineering Thermodynamics”, 6th ed., TMH, 2003.
2. Kyle.B.G. “Chemical and Process Thermodynamics”, 2nd ed., PHI, 1990.

REFERENCE BOOKS

1. Dodge B.F “Chemical Engineering Thermodynamics”, 1st ed., MGH, 1960.
2. Sandler, S.I “Chemical and Engineering Thermodynamics”, 2nd ed., Wiley, 1989.

III Year B.Tech. Chemical Engg. II - Semester

L	T	P	To	C
4	0	-	4	4

CH308 MEMBRANE TECHNOLOGY (ELECTIVE – II)

Course Description & Objectives:

The course will describe in details membrane separation technology and wide range of applications including water treatment and desalination.

The objective of the course is to give the students the technical background on membrane technology and to provide wide level of understanding that will allow them to design, using appropriate combinations of unit processes and water treatment plant. The practical component will provide the students with a range of laboratory skills together with an understanding of the need for rigorous experimental design of membrane modules for water treatment plant.

Course Outcomes:

Students will be able to

1. *Apply various transport models for the calculation of membrane fluxes and the extent of separation for various membrane systems.*
2. *Identify the types of experimental data needed for the calculation of membrane parameters.*

3. *Select a membrane process and design components to carry out a specific separation.*
4. *Be familiar with the relevant literature.*
5. *Have an introduction to advancement of membrane techniques to solve environmental problems.*

UNIT I – Introduction to Membrane Processes

Separation process, Introduction to membrane processes, definition of a membrane, classification of membrane processes.

Preparation of Synthetic Membranes: Types of Membrane materials, preparation of Synthetic membranes, phase inversion membranes, preparation technique for immersion precipitation, preparation technique for composite membranes.

UNIT II - Characterization of Membranes

Introduction, membrane characterization, characterization of porous membranes, characterization of non-porous membranes.

Transport in Membranes: introduction, driving forces, non equilibrium thermodynamics, transport through porous, non-porous, and ion exchange membranes.

UNIT III - Membrane Processes

Pressure driven membrane processes: Introduction, microfiltration, membranes for microfiltration, industrial applications, ultrafiltration, membranes for ultrafiltration, industrial applications, reverse Osmosis and nanofiltration: membranes for reverse osmosis and nanofiltration, industrial applications, Electrically Driven Processes: Introduction, electrodialysis, Process parameters, membranes for electrodialysis, applications, Membrane electrolysis, Bioploar membranes, Fuel Cells.

UNIT IV- Concentration Driven Membrane Processes

Gas separation, gas separation in porous and non porous membranes, membranes for gas separation, applications, pervaporation, membranes for pervaporation, applications, dialysis: membranes for dialysis, applications, liquid membranes: aspects, liquid membrane development, choice of the organic solvent and carrier, applications, introduction to membrane reactors.

UNIT V - Polarization Phenomenon and Fouling

Introduction to concentration polarization, turbulence promoters, pressure drop, gel layer model, osmotic pressure model, boundary layer resistance model, concentration

polarization in diffusive membrane separations and electro dialysis, membrane fouling, methods to reduce fouling, compaction.

Module and Process Design: Introduction, plate and frame module, spiral wound module, tubular module, capillary module, hollow fiber module, comparison of module configurations.

TEXT BOOKS

1. M.H.V.Mulder, “Membrane Separations”, Springer Publications, 2007.
2. R.Philip C.Wanket, “Rate-Controlled Separations”, 1st ed., Springer, 2005.

REFERENCE BOOKS

1. S.P.Nunes, K.V.Peinemann, “Membrane Technology in the Chemical Industry”, Wiley-VCH, 2nd ed., 2006.
2. Rautanbach and R. Albrecht, “Membrane Process”, John Wiley & Sons, 1st ed., 1986.
3. J.G.Crespo, K.W.Bodekes, “Membrane Processes in Separation and Purification”, Kluwer Academic Publications, 1st ed., 1994.
4. C .J. Geankoplis, “Transport Processes and Unit Operations”, 3rd ed., PHI, 2003.

III Year B.Tech. Chemical Engg. II - Semester

L	T	P	To	C
4	0	-	4	4

CH310 MATHEMATICAL METHODS FOR CHEMICAL ENGINEERING (ELECTIVE – II)

Course Description & Objectives:

The course deals about various mathematical differential equations. It discuss about the vector analysis and heat transfer with various bodies.

Course Outcomes:

Mathematical tools are indispensable to process modeling, analysis, engineering design and research. The theme of the course is to introduce a spectrum of widely used mathematical methods in chemical engineering useful to solve problems commonly encountered.

UNIT I - Introduction

Mathematical formulations of the physical problem, formulation of differential equations, application of the law of conservation of mass and energy, flow systems, rate equations.

UNIT II - Partial Differential Equations

Formulation of partial differential equations, differentiation formulae change from Cartesian to cylindrical and spherical , differentiation of implicit functions, directional derivatives, maxima and minima, one dimensional heat conduction problems.

UNIT III - Vector Analysis

Vectors, scalars, vector field, vector differential operators, line integral, mass transfer in binary gas mixture, equation of motion.

UNIT IV - Heat Transfer in Finite and Infinite Slab Thicknesses

Solutions of PDEs heat transfer in a flowing fluid, heat conduction in a slab, temperature distribution in rectangular parallel pipe, heat conduction in a slab of infinite thickness.

UNIT V - Steady State and Unsteady State Heat Transfer

Solutions of PDEs by Laplace transforms, one dimensional un steady state heat conduction, Un steady state operations of packed bed.

TEXT BOOKS

1. T.S.Sherwood & C. Reed, "Applied Mathematics in Chemical Engineering", 2nd ed., Tata McGraw Hill Publishers, 1998.
2. V.G.Jenson & G.V.Jeffreys, "Mathematical Methods in Chemical Engineering", 2nd ed., Academic Press, London, 2000.

REFERENCE BOOKS

1. Steve Chopra, " Numerical Methods for Chemical Engineering" 5th ed., Tata McGraw Hill Publishers, 2009.
2. Pushpavanam ,Kondaswamy, "Numerical Methods for Chemical Engineering" 1st ed., PHI Publishers, 2005.

III Year B.Tech. Chemical Engg. II - Semester

L	T	P	To	C
4	0	-	4	4

CH312 BIOCHEMICAL ENGINEERING (ELECTIVE – II)

Course Description & Objectives:

This course focuses on the interaction of Chemical engineering, biochemistry, microbiology.

To enhance skills in the areas of biochemical processes, to provide the fundamental background of biological systems.

Course Outcomes:

1. *The course will help the students to understand and apply the principles of biochemical engineering in the analysis and design of industrial biochemical processes.*
2. *Understanding of biological basics and bio processing.*
3. *Understanding the difference between bioprocesses and chemical processes.*

4. *Students will be able to understand the kinetics of growth, depth& metabolism.*

UNIT I - Introduction to Microbiology

Introduction to Microbiology: Bio physics, and cell doctrine, the structure of cell, Important Cell Types RNA, DNA building blocks.

UNIT II - Kinetics of Enzyme Catalyzed Reactions

Kinetics of enzyme catalyzed reactions, The enzyme substrate complex, Enzyme action, Kinetics with one and two substrates, Michaelis – Menten equation, Estimation of MM parameters. Line weavers burk plot.

UNIT III - Enzyme Immobilization

Enzyme inhibitions, immobilized enzyme technology, Utilization of co – factors, biosynthesis, transport across cell membrane, Introduction to metabolic path way and end products of metabolism.

UNIT IV- Microbial Growth Kinetics

Microbial growth, Monod growth kinetics, Substrate and product inhibition, yield coefficients for bio mass and products, continuous culture for stirred tank fermenter design and analysis of biological reactors.

UNIT V- Fermentation Technology

Production of antibiotics, pencilin, citric acid, bakers yeast, ethanol, Anaerobic fermentation production of biogas, aeration and agitation in bio reactors.

TEXT BOOK

1. J.E.Bailey & David F. Ollis, “Bio Chemical Engineering Fundamentals”, 2nd ed., McGraw Hill Publishers, 1986.

2. Michael L. Shuler & Fikret Kargi, “Bioprocess Engineering”, 1st ed., Pearson Education International Series, 2002.

REFERENCE BOOKS

1. James – Lee , “BioChemical Engineering”, 1st ed., Prentice Hall Publishers, 1992.
2. Pauline M. Doran, “Bioprocess engineering principles” Elsevier Publishers, 1995.

III Year B.Tech. Chemical Engg. II - Semester

L	T	P	To	C
-	-	3	3	2

CH314 CHEMICAL REACTION ENGINEERING LAB

Course Description & Objectives:

Here, a bimoelcular, second order homogeneous reaction is considered for which rate constant k is found through various systems. Also, the degree of Non-Ideality is studied by finding the R.T.D's.

Course Outcomes:

Provides a practical knowledge to students of the different chemical reactors used in chemical engineering industries.

List of Experiments:

1. Kinetic Studies in C.S.T.R
2. Kinetic Studies in P.F.R
3. Kinetic Studies in Combined Reactor
4. Kinetic Studies in MFR's in Series
5. Kinetic Studies in Batch Reactor Equimolar Feed
6. Kinetic Studies in Batch Reactor Non - Equimolar Feed
7. Isothermal Batch Reactor
8. Adiabatic Batch Reactor
9. R.T.D Studies in C.S.T.R
10. R T D Studies in C.S.T.R's in Series
11. R.T.D Studies in Plug Flow Reactor
12. R.T.D Studies in Combined Reactor
13. R.T.D Studies in Fluidized Bed Reactor
14. R.T.D Studies in Packed Bed Reactor

III Year B.Tech. Chemical Engg. II - Semester

L	T	P	To	C
-	-	3	3	2

CH334 MASS TRANSFER OPERATIONS LAB

Course Description & Objectives:

The Course discuss about the various experiments like Distillation, Extraction, Diffusion, etc

It includes the estimation of various parameters like Temperature, Pressure and concentration.

Course Outcomes:

1. *Provides to students the knowledge of various mass transfer operations used in industries.*
2. *Provides to students able to design equipments.*

List of experiments:

1. Verification of Rayleigh's equation using batch distillation
2. Determination of steam distillation temperature and vaporisation efficiency
3. Gas Diffusivity
4. Liquid-Liquid Diffusivity
5. Tray Drier
6. Surface Evaporation
7. Determination of solubility characteristics of given ternary system
8. Estimation of Liquid - Liquid extraction and determination of plait point
9. Estimation of solid liquid extraction and leaching efficiency
10. Determination of VLE data for a binary mixture
11. Adsorption Stuidies of ternary mixture
12. HETP (Hight Equivalent to Theoretical Plate)

2.2 Meeting Documentation

- Notices
- Agenda
- Meetings
- Minutes
- Memorandum

UNIT - III: The Job-Search **(3 Sessions)**

- Vacancy Announcements
- Application Letters
- Resume/Curriculum Vitae

UNIT- IV: Report Writing **(3 Sessions)**

4.1 Nature and Structure of Reports

4.2 Planning and Preparation of Reports

4.3 Types of Reports

- Oral and Written
- Formal and Informal

UNIT-V: Process of Report Writing **(3 Sessions)**

5.1 Technical Proposals

5.2 Types of Technical Proposals

- Formal
- Informal

5.3. Feasibility Studies

Text Books:

1. Pfeiffer, W.S., “Technical Writing: A Practical Approach”,Prentice Hall, 1997.
2. Sharma. C., “Business Correspondence & Report Writing”,Tata McGraw-Hill, 1978.
3. Vesper, J. f., “Contemporary Business Communication: From Thought to”, 1993.
4. Harper Collins, “Expression”, College Publishers.
5. Trimmer, J.F., “Writing with Purpose”, Houghton Mifflin, 1995.
6. Ashley, Rod et.al., “Core Skills”, Business Education Publishers, 1993.
7. King, F.W., “English Business Letters”, Longman, 1962.

VIGNAN UNIVERSITY

IV Year B.Tech. Chemical Engg. I - Semester	L	T	P	To	C
	3	1	-	4	4

(CH425) TRANSPORT PHENOMENA

Objective of the Course :

This course will enable students to make shell balances for conservation of momentum, energy, and mass, understanding and applying flux laws in balances and also teach how to apply interphase transport relationships.

UNIT - I

Introduction

Transport Properties, Estimation of transport properties, pressure, Temperature, Concentration dependence, Newton’s Law of viscosity.

UNIT - II

Momentum Balance

Boundary conditions, Flow problems flat plate, Circular pipe, Annulus, Creeping flow.

UNIT - III

Energy Balance

Boundary conditions, Fourier’s law of conduction, Composite wall, Extended Fin surface, Viscous heat source, Chemical heat source, Electric heat source.

UNIT - IV

Mass Balance

Boundary conditions, diffusion through a stagnant gas film, homogeneous, heterogeneous reactions, falling liquid film, chemical reaction inside a porous catalyst.

UNIT - V

Flow Problems

Equation of change for isothermal, Non isothermal systems, use of equation of change to solve flow problems, introduction to turbulent flow.

Text Book:

1. R.B.Bird, W.E. Stewart, "Transport Phenomena", 1st ed., McGraw Hill, 2003.

Reference Books :

1. James. R. Welty,Robert. E.E.Wilson, "Fundamentals of Momentum, Heat and Mass Transfer", 2nd ed., John Wiley & sons, 2002.
2. L. Theodore, "Transport Phenomena", 2nd ed., John Wiley & Sons, 2002.
3. J. Geankoplis, "Transport Processes & Unit Operations", 3rd ed., Prentice Hall of India, 2003.

IV Year B.Tech. Chemical Engg.	I - Semester	L	T	P	To	C
		3	1	-	4	4

(CH427) PROCESS MODELING AND SIMULATION

Objective of the Course :

To establish to students the basis of chemical process design by taking into account technical elements as well as economic aspects. Students will appreciate how process modeling has been playing a key role in the design, planning and operation of chemical and related processes.

UNIT-I

Fundamentals: Mathematical models for chemical engineering systems, fundamentals, introduction to fundamental laws, examples of mathematical models of chemical engineering systems, constant volume CSTRS, two heated tanks.

UNIT-II

Examples: Gas phase pressurized CSTR, non-isothermal CSTR, single component vaporizer, batch reactor, reactor with mass transfer, ideal binary distillation column, batch distillation with holdup.

UNIT-III

Iterative Methods: Bisection, false position, Newton –Raphson, successive approximation method, comparison of iterative methods, **Solution of Linear Simultaneous Algebraic Equations:** Computation of Eigen values and Eigen vectors, Gauss elimination method, Gauss-Jordan and Gauss-Seidel's method.

UNIT-IV

Numerical Integration: Trapezoidal and Simpson's rules.
Numerical Solution of Differential Equations: Euler method, Runge-Kutta fourth order method, Milne predictor corrector method.
Interpolation: Lagrange interpolation, forward difference, backward difference and central difference interpolation methods, least square approximation of functions.

UNIT-V

Computer Simulation Examples: Gravity flow tank, three CSTRs in series, binary distillation column, batch reactor, Non-isothermal CSTR, VLE dew point, bubble point calculations, countercurrent heat exchanger.

Text books:

1. William L. Luyben, “Process Modeling, Simulation and Control for Chemical Engineers”, McGraw - Hill International Editions, 2nd ed.,1990.
2. Santosh.K. Gupta, “Numerical Methods in Engineering”, New Age International (P) Ltd., 2003.

Reference Book :

1. K.Balu and K.Padmanabhan, “Modeling and Analysis of Chemical Engineering Processes”, IK International Private Limited, 2007.

IV Year B.Tech. Chemical Engg.	I - Semester	L	T	P	To	C
		3	1	-	4	4

(CH429) CHEMICAL PROCESS EQUIPMENT DESIGN

Objective of the Course :

To study systematic techniques for the design of chemical processes, there by learn methods for process synthesis and energy recovery.

UNIT - I

Design of Shell and Tube Heat Exchangers: 1-2 heat exchanger, arrangements for increased heat recovery, and calculations for process conditions.Design calculations of a double-pipe heat exchanger: Double pipe exchangers in series-parallel arrangement.

UNIT - II

Design of Pressure Vessels:

stresses in thin and thick pressure vessels, theory of failure.

UNIT - III

Design of Dryers: Design of rotary dryer, tray dryer and spray dryer.

Design of Packed Towers for Absorption: Flow of liquid over packings, limiting gas velocities, Pressure-drop calculations, design of packed towers using absorption coefficients, design of packed tower using transfer-unit method.

UNIT- IV

Design of Sieve Tray Tower for Distillation: Introduction, sieve tray, tower diameter, plate spacing, entrainment, flooding, weepage, tray layout, hydraulic parameters.

UNIT- V

Cooling Tower Practice: Mechanism, types, rating duty and physical size of cooling towers, Cooling tower components, construction material, practical aspects of tower selection

Cooling Tower Design Calculations: Heat transfer calculations, selection of tower size for a given duty, corrections for altitude, use of charts for calculation of cooling tower duties.

Text Books:

1. D.Q. Kern, “Process Heat Transfer”, Tata McGraw Hill, 2001.
2. S. D. Dawande, “Process Equipment Design”, Vol 1 & 2.
3. Coulson & Richardson Series, “Chemical Engineering”, Volume 6, Pergaman Press, 1983.

Reference Books :

1. Robert E. Treybal, “Mass Transfer Operations”, McGraw Hill, 1982.
2. Morris and Jackson, “Absorption Towers”,Butter Worth’s Scientific Publications, 1985.
3. Pring and Osborn Butter Worth,“Cooling Tower Principles and Practice”, Heinemann - Hill, 1986.

IV Year B.Tech. Chemical Engg.	I - Semester	L	T	P	To	C
		3	1	-	4	4

(CH431) CHEMICAL ENGINEERING PLANT DESIGN AND ECONOMICS

Objective of the Course :

The course is aimed at training the students to perform economic evaluation of chemical processes and chemical projects & gain familiarity of the professional conventions and formats for representing engineering results.

UNIT - I

Introduction to Process Design

Introduction – Process design development, design confederations, Cost and asset accounting, Cash flow for industrial operations, Factors effecting investment.

UNIT - II

Estimation of Capital Investment

Estimation of capital investments, Cost indices, Cost factors, Interest and investment cost, types of interest nominal and effective interest rates.

UNIT - III

Interest and Investment Costs

Continuous interest, Present worth and discount annuities, Interest on investment, source of capital taxes and types of taxes.

UNIT - IV

Insurance

nsurance – Types of insurances, Self insurance, Depreciation Types of depreciation, Services life, Salvage value, Present Value, Methods for determining depreciation, group depreciation.

UNIT - V

Profitability & Optimum Design

Profitability, Alternative investments and replacements, Profitability standards, discounted cash flow, Capitalized cost payout period, Alternative investments, Optimum design, Design strategy, Optimum condition, Optimum production rates fluid dynamics.

Text Book:

1. K.D. Timmerhaus & M.S. Peters, “Plant Design and Economics for Chemical Engineering”, 3rd ed., McGraw Hill, 1981.

IV Year B.Tech. Chemical Engg. I - Semester

L	T	P	To	C
3	1	-	4	4

(CH433) MEMBRANE TECHNOLOGY

Objective of the Course :

Membrane Technology is one of the unit processes in chemical industries. Through study of this subject students will get a thorough acquaintance of the separation process widely used in reverse osmosis, dialysis etc.

UNIT-I

Introduction: Separation process, Introduction to membrane processes, definition of a membrane, classification of membrane processes.
Preparation of Syntheic Membranes: Types of Membrane materials, preparation of Syntheic membranes, phase inversion membranes, preparation technique for immersion precipitation, preparation technique for composite membranes.

UNIT-II

Characterization of Membranes: Introduction, membrane characterization, characterization of porous membranes, characterization of non-porous membranes.
Transport in Membranes: introduction, driving forces, non equilibrium thermodynamics, transport through porous, non-porous, and ion exchange membranes.

UNIT-III

Membrane Processes: Introduction, osmosis, pressure driven membrane processes: Introduction, microfiltration, membranes for microfiltration, industrial applications, ultrafiltration, membranes for ultrafiltration, industrial applications, reverse Osmosis and nanofiltration: membranes for reverse osmosis and nanofiltration, industrial applications, Electrically Driven Processes: Introduction, electrodialysis, Process parameters, membranes for electrodialysis, applications, Membrane electrolysis, Biploar membranes, Fuel Cells.

UNIT-IV

Concentration Driven Membrane Processes: Gas separation, gas separation in porous and non porous membranes, membranes for gas separation, applications, pervaporation, membranes for pervaporation, applications, dialysis: membranes for dialysis, applications, liquid membranes: aspects, liquid membrane development, choice of the organic solvent and carrier, applications, introduction to membrane reactors,

UNIT-V

Polarization Phenomenon and Fouling: Introduction to concentration polarization, turbulence promoters, pressure drop, gel layer model, osmotic pressure model, boundary layer resistance model, concentration polarization in diffusive membrane separations and electro dialysis, membrane fouling, methods to reduce fouling, compaction.
Module and Process Design: Introduction, plate and frame module, spiral wound module, tubular module, capillary module, hollow fiber module, comparison of module configurations.

Text Books:

1. M.H.V.Mulder, “Membrane Separations”, Springer Publications, 2007.
2. R.Philip C.Wanket, “Rate- Controlled Separations”, Springer, 1994.

Reference Books :

1. S.P.Nunes, K.V.Peinemann, “Membrane Technology in the Chemical Industry”, Wiley-VCH, 2nd ed., 2006.
2. Rautanbach and R. Albrecht, “Membrane Process”, John Wiley & Sons, 1st ed., 1986.
3. J.G.Crespo, K.W.Bodekes, “Membrane Processes in Separation and Purification”, Kluwer Academic Publications, 1st ed., 1994.
4. C.J. Geankoplis, “Transport Processes and Unit Operations”, 3rd ed., PHI, 2003.

IV Year B.Tech. Chemical Engg. I - Semester

L	T	P	To	C
3	1	-	4	4

(CH435) ENERGY ENGINEERING

Objective of the Course :

The course will offer students a good knowledge about convectional and non convectional sources of energy used in various industries.

UNIT - I

Sources of Energy and Types of Fuels

Calorific value, gross value, net value, fuel calorific value calculations experimental determination, Energy resources present and future, Energy demands with reference to India. Coal: - Origin, occurrence reserves, petrography, rank, classification, analysis, testing, storage, carbonization liquefaction, gasification, Pulverization, burning of coal.

UNIT - II

Liquid Fuels: Petroleum

Origin, occurrence, Reserves, Composition, classification, fractionation, reforming cracking, petroleum products, specification for petroleum natural gas, coke oven gas, producer gas, water gas, LPG, burning of gaseous fuels, hydrogen from water, as future fuel, fuel cells, flue gas.

UNIT - III

Energy Auditing

Short term, medium term, long term schemes, energy conversion energy index, energy cost, representation of energy consumption, Energy auditing.

UNIT - IV

Steam Plant

Run time cycle, boiler plant, steam cost, steam distribution and utilization, combined heat and power cycles. Energy from biomass, gas purification solar energy, wind energy, energy storage, waste heat recovery, various types of heat recovery, regenerators, waste heat boilers.

UNIT - V

Energy Conservation

Energy conservation methods in process industries practical applications theoretical analysis.

Text Books:

1. O.P.Gupta, “Elements of Fuels, Furnaces and Refractories”, 3rd ed., Khanna Publications, 1996.
2. Sami Sarkar, “Combustion”, 2nd ed., Orient Longman, 1998.

Reference Books :

1. “Conventional Energy Technology, Fuel and Chemical Energy”, Tata – McGraw Hill, 1987.
2. G.D.Rai, “Non – Convectional Energy Sources”, 4th ed., Khanna Publications, 1997.
3. Barker and Back Hurst, “Fuel Science”, Academic Press London, 1981.

IV Year B.Tech. Chemical Engg. I - Semester

L	T	P	To	C
3	1	-	4	4

(CH437) INDUSTRIAL SAFETY AND HAZARD MANAGEMENT

Objective of the Course :

The course will aim to demonstrate how the safety function is integrated (distributed) across the functional entities of the whole organization. On completion of this course, the successful student will be equipped with knowledge of the fundamentals by which thorough safety is ensuring in the given organization.

UNIT - I

Introduction

Introduction,safety programe,engineering ethics,accident and loss statistics,acceptable risk,publicperception.

UNIT - II

Toxicology

Toxicants,biological organisms,elimination of toxicants,government regulations,identification,evaluation,control.

UNIT - III

Fires and Explosions

Fire triangle,distinction between fir e and explosions,flammability characteristics,ignition energy,auto ignition,auto oxidation,adiabatic compression,explosions.

UNIT - IV

Introduction to Relief's

Relief concepts,definitions,location of relief's, relief types, relief systems,conventional spring operated reliefs,rupture disc relief's in liquid,vapour or gas.

UNIT - V

Hazard's Identification

Hazard identification,process hazard checklists,hazard surveys,Hazop safety reviews.

Text Books:

1. DA.Crowl & J.F.Louvar, "Chemical Process Safety", Vol. 2, Prentice Hall, 1980.
2. H.H.Fawcett and W.S.Wood, "Safety & Accident Prevention in Chemical Operations", 2nd ed., John Wiley and Sons, New York, 1982.

Reference Books :

1. R.K.Sinnoot, "Coulson and Richardson's - Chemical Engineering", Vol 6, Butterworth - Heinmann Limited, 1996.
2. Roye Sanders, "Chemical Process Safety", 1st ed., Elsevier, 2007.

IV Year B.Tech. Chemical Engg. I - Semester

L	T	P	To	C
3	1	-	4	4

(CH439) MATHEMATICAL METHODS FOR CHEMICAL ENGINEERS

Objective of the Course :

Mathematical tools are indispensable to process modeling, analysis, engineering design and research. The objective of the course is to introduce a spectrum of widely used mathematical methods in chemical engineering useful to solve problems commonly encountered.

UNIT - I

Introduction

Mathematical formulations of the physical problem, formulation of differential equations, application of the law of conservation of mass and energy, flow systems, rate equations.

UNIT - II

Partial Differential Equations

Formulation of partial differential equations, differentiation formulae change from Cartesian to cylindrical and spherical , differentiation of implicit functions, directional derivatives, maxima and minima, one dimensional heat conduction problems.

UNIT - III

Vector Analysis

Vectors, scalars, vector field, vector differential operators, line integral, mass transfer in binary gas mixture, equation of motion.

UNIT - IV

Heat Transfer in Finite and Infinite Slab Thicknesses

Solutions of PDEs heat transfer in a flowing fluid, heat conduction in a slab, temperature distribution in rectangular parallel pipe, heat conduction in a slab of infinite thickness.

UNIT - V

Steady State and Unsteady State Heat Transfer

Solutions of PDEs by laplace transforms, one dimensional un steady state heat conduction, Un steady state operations of packed bed.

Text Books:

1. T.S.Sherwood & C. Reed, "Applied Mathematics in Chemical Engineering", 2nd ed., Tata McGraw Hill Publishers, 1998.
2. V.G.Jenson & G.V.Jeffreys, "Mathematical Methods in Chemical Engineering", 2nd ed., Academic Press, London, 2000.

Reference Books :

1. Steve Chopra, " Numerical Methods for Chemical Engineering" 5th ed., Tata McGraw Hill Publishers, 2009.
2. Pushpavanam ,Kondaswamy, "Numerical Methods for Chemical Engineering" 1st ed., PHI Publishers, 2005.

IV Year B.Tech. Chemical Engg. I - Semester

L	T	P	To	C
-	-	3	3	2

(CH443) CHEMICAL PROCESS SIMULATION LAB

Objective of the Course :

The course provides a sound practical knowledge about chemical process modeling, simulation & design of various chemical engineering equipments and gaining experience in simulation packages.

1. Simulation of gravity flow tank system
2. Simulation of three constant holdup CSTRs in series
3. Simulation of three variable holdup CSTRs in series
4. Bubble point calculations
5. Dew point calculations
6. Simulation of double pipe heat exchanger
7. Simulation of interacting two tank liquid level system
8. Simulation of non – interacting two tank liquid level system
9. Simulation of non isothermal CSTR
10. Simulation of binary distillation column
11. Simulation of isothermal batch reactor
12. Simulation of cone shaped tank

IV Year B.Tech. Chemical Engg. I - Semester

L	T	P	To	C
-	-	3	3	2

(CH445) CHEMICAL PROCESS EQUIPMENT DESIGN LAB

Objective of the Course :

The course will offer students a broad based understanding of the chemical process equipment design & drawing which is the starting point to establish a new chemical industry.

1. Drawing of Flow Sheets Symbols
2. Drawing of Instrumentation Symbols
3. Drawing of Instrumentation Diagrams
4. Mechanical Aspects of Chemical equipment design and drawing of double pipe heat exchanger.
5. Mechanical Aspects of Chemical equipment design and drawing of 1-2 shell and tube heat exchanger.
6. Mechanical Aspects of Chemical equipment design and drawing of 2-4 shell and tube heat exchanger.
7. Mechanical Aspects of Chemical equipment design and drawing of Feed forward evaporator.
8. Drawing of distillation column by using Mc - Cabe Thiele method
9. Drawing of distillation column by using Ponchon - Savarit method
10. Design of Adsorption Column
11. Design of Absorption Tower
12. Design of Batch Reactor
13. Design of CSTR.

IV Year B.Tech. Chemical Engg. II - Semester

L	T	P	To	C
3	1	-	4	4

(CH434) ENVIRONMENTAL ENGINEERING

Objective of the Course :

The course will provide knowledge of the various pollutants, the regulatory standards, cleaning up technologies & the removal methods of various pollutants from industries.

UNIT - I
Introduction

Types of emissions from chemical industries and effects of environment, environment legislation, Types of pollution, Sources of waster water, effluent guidelines and standards, characterization of effluent streams, BOD, COD, TOC, oxygen sag curve, self purification of running streams.

UNIT - II
Gaseous Effluent Treatment

General methods of control and removal of Sulfur dioxide, Oxides of nitrogen and organic vapors from gaseous effluent, Treatment of liquid and gaseous effluents from fertilizer industry.

UNIT - III
Air Pollution Sampling and Measurement

Types of pollutant and sampling, Measurement collection of gaseous air pollutant, collection of air pollutants.
Stack sampling: Sampling system, Particulate sampling and gaseous sampling analysis of air pollutants like so_2, carbon monoxide, Particular matter, hydrocarbons.

UNIT - IV
Air Pollution Control Methods and Equipments

Raw material changes, Process changes and equipment modification, Cleaning of gaseous equipments, Control equipment like gravitational Settling chambers, Cyclone separators, Wet scrubbers spray towers centrifugal scrubbers Packed beds, plate columns and their design aspects.

VIGNAN UNIVERSITY

UNIT - V
Waste Water Treatment

Introduction to waster water treatment biological waste water, bacterial and bacterial growth curve aerobic processes, suspended growth processes, activated growth processes, trickling fillers, rotary drum filters, anaerobic processes screening sedimentation, flotation, neutralization.

Text Books:

1. C.S.Rao, “Environmental Pollution Control Engineering”, Wiley Eastern Ltd, 1993.
2. S.P.Mahajan,“Pollution Control in Process Industries”, Tata Mc Graw Hill, 1985.

Reference Books :

1. M.N.Rao and A.K.Dutta, “Waste Water Treatment”, Oxford and I.B.H. Publishers, New Delhi, 1952.
2. P.Pratap Mouli & N.V.Subbayya, “Air Pollution Control” Divya Jyothi Publishers, Jodhpur.

IV Year B.Tech. Chemical Engg. II - Semester

L	T	P	To	C
3	1	-	4	4

(CH436) OPTIMIZATION TECHNIQUES

Objective of the Course :

To establish to students the basis of chemical process design by taking into account technical elements as well as economic aspects. Students will appreciate how process modeling has been playing a key role in the design, planning and operation of chemical and related processes.

UNIT-I:

Nature and Organization of Optimization Problems:

what optimization is all about, Why optimize, scope and hierarchy of optimization, examples of applications of optimization, the essential features of optimization problems, general procedure for solving optimization problems, obstacles to optimization.

Fitting Models to Data: Classification of models, how to build a model, fitting functions to empirical data, the method of least squares, factorial experimental designs, fitting a model to data subject to constraints.

UNIT-II:

Basic Concepts of Optimization: Continuity of functions, unimodal versus multimodel functions. Convex and Concave functions, Convex region, Necessary and sufficient conditions for an extremum of an unconstrained function, interpretation of the objective function in terms of its quadratic approximation.

Optimization of Unconstrained Functions One-Dimensional Search: Numerical methods for optimizing a function of one variable, scanning and bracketing procedures, Newton's, Quasi-Newton's and Secant methods of uni-dimensional search, Region elimination methods, polynomial approximation methods.

UNIT-III:

Unconstrained Multivariable Optimization:

Direct methods: Random search, grid search, uni-variate search, simplex method, conjugate search directions,Powell's method, indirect methods-first order: gradient method, conjugate method, indirect methods second order: Newton's method forcing the Hessain matrix to be positive definite,

movement in the search direction, termination, summary of Newton's method, relation between conjugate gradient methods and Quasi-Newton method.

UNIT– IV:

Linear Programming and Applications:

Basic concepts in linear programming, Degenerate LP's – graphical solution, natural occurrence of linear constraints, the simplex method of solving linear programming problems, standard LP form, obtaining a first feasible solution, the revised simplex method, sensitivity analysis, duality in linear programming, the Karmarkar algorithm, LP applications.

UNIT-V:

Optimization of Unit Operations: Recovery of waste heat, shell & tube heat exchangers, evaporator design, liquid liquid extraction process, optimal design of staged distillation column, Optimal pipe diameter, optimal residence time for maximum yield in an ideal isothermal batch reactor, chemostat, optimization of thermal cracker using liner programming.

Text Book:

1. T.F.Edgar and Himmelblau DM, "Optimization of Chemical Processes", McGraw Hill, 2001.

Reference Book:

1. Kalyan Moy Deb, "Optimization for Engineering Design",PHI, 2000.

IV Year B.Tech. Chemical Engg. II - Semester

L	T	P	To	C
3	1	-	4	4

(CH438) COLLOIDAL AND INTERFACIAL SCIENCE

Objective of the Course :

Mathematical tools are indispensable to process modeling, analysis, engineering design and research. The objective of the course is to introduce a spectrum of widely used mathematical methods in chemical engineering useful to solve problems commonly encountered.

UNIT - I

Basic Concepts of Colloids and Interfaces: Introduction, Examples of Interfacial Phenomena, Solid-Fluid Interfaces, Colloids.

Properties of Colloid Dispersions: Introduction, Sedimentation under Gravity, Sedimentation in a Centrifugal Field, Brownian Motion, Osmotic pressure, Optical properties, Electrical Properties, Rheological Properties of Colloid Dispersions.

UNIT - II

Surfactants and their Properties: Introduction, Surfactants and their Properties, Emulsions and Microemulsions, foams.

Surface and Interfacial Tension: Introduction, Surface tension, Interfacial Tension, Contact Angle and Wetting, Shape of the Surfaces and interfaces.

UNIT - III

Surface and Interfacial Tension:

Measurement of Surface and Interfacial Tension, Measurement of Contact Angle; Intermolecular and Surface Forces: Introduction, Vanderwalls Forces. Intermolecular and Surface Forces: Electrostatic double layer force, The DLVO theory, Non-DLVO forces.

UNIT - IV

Adsorption at Interfaces: Introduction, The Gibbs Dividing surface, Gibbs Adsorption Equation, Langmuir and Frumkin Adsorption Isotherms, Surface Equation of state(EOS), Effect of Salt on Adsorption of Surfactants.

VIGNAN UNIVERSITY

UNIT - V

Adsorption at Interfaces:

Adsorption Isotherms incorporating the Electrostatic Effects, Calculation of Free energy of Adsorption, Adsorption of inorganic salts at interfaces, Dynamics of Adsorption of Surfactants at the interfaces, Adsorption at Solid-Fluid interfaces.

Text Books:

1. Pallab Ghosh, “Colloid and Interface Science”, PHI, New Delhi, 2009.
2. R. J. Hunter, “Foundations of Colloid Science”, 2nd ed., Oxford University Press, USA, 2001.

Reference Books :

1. Paul C. Hiemenz and Raj Rajagopalan, “Principles of Colloid and Surface Chemistry”, 3rd ed., Revised and Expanded, 1997.
2. A. Adamson, “Physical Chemistry of Sciences”, 6th ed.,1997.
3. G.Barnes, I.Gentle, “Interfacial Science: An Introduction”, Oxford University Press, USA, 2006.

IV Year B.Tech. Chemical Engg. II - Semester

L	T	P	To	C
3	1	-	4	4

(CH440) COMPUTER APPLICATIONS IN CHEMICAL ENGINEERING

Objective of the Course :

Through the course the students will learn computer applications, to solve chemical engineering problems, will learn to write computer Programmes with the aid of computers, knowledge of basic numerical methods that are used in engineering.

UNIT - I

Introduction

Review on programming languages, basic, FORTRAN, Review on operation system Commands, Numerical solution of first order differential equations with initial conditions, Euler's Method, Runge kutta method.

UNIT - II

Spread Sheets

Application in density, molecular weight, mole and percentage compositions, empirical and molecular formula calculations, heat of mixing, gas laws, vapor pressure, chemical kinetics calculations.

UNIT - III

Spread Sheets (Data Analysis)

Application in data processing, statistical analysis of data, regression analysis of variance, interpolations, graphical representations, design and development of single data bases on chemical and physical properties of substances.

UNIT - IV

Numerical Methods

Roots of algebraic and transcendental equations, iterations methods, regulafalsi method, Newton – raphson method, roots of simultaneous and solution set of transcendental and algebraic equations, development of equations for heat transfer, fluid mechanics and reaction Engineering problems.

UNIT - V

Mathematical Programming

Linear programming, transportation, assignment, dynamic programming in chemical engineering, formulation and solution through PC based programmes.

Text Books:

1. Leon Lapidas, "Digital Computation for Chemical Engineering", 2nd ed., MGH, 1962.
2. Jerry, O. Breneman GL., "Spread Sheet Chemistry", PH, Englewood Cliffs,1991.

Reference Books :

1. Hanna OT Scandell O.C, "Computational Methods in Chemical Engineering", PH, 1995.
2. Taxali R. K. T. K, " D Base IV Made Simple", 1st ed.,TMH, 1991.

IV Year B.Tech. Chemical Engg. II - Semester

L	T	P	To	C
3	1	-	4	4

(CH442) DESIGN AND ANALYSIS OF EXPERIMENTS

Objective of the Course :

- Describe how to design experiments, carry them out, and analyze the data they yield.
- Understand the process of designing an experiment including factorial and fractional factorial designs.
- Examine how a factorial design allows cost reduction, increases efficiency of experimentation, and reveals the essential nature of a process.

UNIT-I

Introduction: Modeling and study of systems in Chemical Engineering leading to systems of algebraic, ordinary differential and partial equations (both linear and non-linear systems). Methods of solution of systems of linear algebraic equations, linear homogeneous ordinary differential equations and linear non-homogeneous ordinary differential equations observed in systems of interest to chemical engineers.

UNIT-II

Differential Equations: Methods of solution of linear and non-linear finite difference equations, solution of differential – difference equations, numerical solution to partial differential equations by relaxation method, finite – difference method, introduction to finite element method and application to problems of interest in chemical engineering.

UNIT-III

Basic Statistical Concepts: Probability distributions, sampling and sampling distributions; Inferences about the differences in Means. **Randomized Designs:** Hypothesis Testing – t-test, use of P-values; Confidence intervals, Inferences about the difference in means, paired comparison designs, inferences about the variances of normal distributions F-test.

Unit-IV

Analysis of Variance: one-way and two way Analysis. Analysis of fixed effects model – Decomposition of the total sum of squares, statistical analysis.

Factorial Experiments: Definitions, Interpretation of main effects and interactions, design with factors at two levels – Calculation of effects and Analysis of variance – Model adequacy testing, Estimating model parameters Analysis of 2^K factional design in detail.

Unit-V

Regression Models: Linear Regression Models, Estimation of parameters,Multiple regression, Hypothesis Testing in multiple regression, confidence intervals in multiple regression.

Response Surface Methodology: Introduction, Method of Steepest Ascent, Analysis of a second order response. Experimental designs for fitting response surfaces Composite Designs. Introduction to other experimental design: Mixture experiments, Evolutionary Operation, Robust Design (Taguchi Methods).

Text Books:

1. S. Pushpavanam, "Mathematical Methods in Chemical Engineering", Prentice Hall of India, New Delhi, 2004.
2. Jenson and Jeffereys, "Mathematical Methods in Chemical Engineering", Academic Press, 1963.

Reference Books :

1. W.L. Hines and D.C. Montgomery, "Probability and Statistics in Engineering and Management", John Wiley and Sons, 1980.
2. Ed. Oven L. Davies Longman Group, "Design and Analysis of Industrial Experiments", 2nd ed., 1978.
3. Douglas C. Montgomery, "Design and Analysis of Experiments", 5th ed., John Wiley and Sons INC, 2007.

IV Year B.Tech. Chemical Engg. II - Semester

L	T	P	To	C
3	1	-	4	4

(CH444) OPERATIONS RESEARCH

Objective of the Course :

To make students aware of the solutions to the problems of management encountered in planning for efficient utilization and optimum allocation of resources.

UNIT - I

Introduction: History and development of OR, Applications, modeling in operation research, O.R. models and their applications

Linear Programming Problems: Formulation of problem, Graphical solution, Simplex procedure for maximization and minimization, Duality concept.

UNIT - II

Integer Programming: Introduction, Gomory's cutting plane method for solving integer programming problems.

Assignment Model: Mathematical statement, Methods to solve balanced and unbalanced assignment problems, Maximization problems, Assignment with restrictions, Traveling salesman problem.

Transportation Model: Mathematical formulation, methods to obtain initial basic feasible solution (IBFS), NWCR and VAM, conditions for testing optimality, MODI method for testing optimality solution of balanced and unbalanced problems, Degeneracy and its resolution.

UNIT - III

Dynamic Programming: Introduction, Bellman's Principle of optimality, shortest route (stage coach) problem, maximization problem (Cargo LOADING problem).

Introduction to Nonlinear Programming: Introduction, Lagrangean method, Kuhn Tucker conditions for solutions of non linear programming problems.

UNIT - IV

Queuing Model: Introduction, Queuing system, Kendall's notation ,classification of queuing models, Model I (M/ M/ 1) : (µ/FCFS) .

Replacement Model: Replacement problem Replacement model for items whose maintenance cost increases with time (money value constant) and with change in money value, Selection of best machine, group replacement policy.

UNIT - V

Network Techniques: Introduction, shortest path model – Systematic methods, Dijikstra's algorithm Floyds algorithm, Maximal flow problem, Minimum spanning tree problem- PRIM algorithm.

Text Books:

1. Hamdy Taha, "Operations Research – An Introduction", 7th ed., PHI, 2003.
2. S. D. Sharma, "Operation Research", Kedarnath and Rannalt Publications, 1995

Reference Books :

1. R. Panneerselvam, "Operations Research", PHI, 2002.
2. Susy Philipose, "Operations Research", T.M.H, New Delhi, 1986.
3. P.K.Gupta and D.S.Hira, "Operation Research", S. Chand and Company Ltd.,2008.
4. Manohar Mahajan, "Operations Research", Dhanpat Rai & Co.

HS111 ENGINEERING MATHEMATICS - I

(For all branches except Biotechnology)

L	T	P	To	C
4	-	-	4	4

Course description and Objectives :

Without mathematics not a single day of an engineer will pass! All the topics of this course are relevant to all branches of engineering. Differential equations are used in various places. Laplace transformations are used, for example, for conversion of domains, from time domain to frequency domain. These are also used to solve ordinary differential equations. When data is given at only a finite points, we use numerical methods for find the approximate values of functions, also to solve differential equations approximately etc. Maxima, minima of a function has got many applications.

Course Outcomes:

- Students will understand that Mathematics which they learn can be used at different levels in their Engineering course irrespective of their branches.
- This course will help to sketch the graph of a differential equation and its direction mixing fields
- Laplace transform used to compute solutions of equations involving impulse functions
- They will be able to use Laplace transformations for conversion of domains from time domain to frequency domain.
- Differential Equations help them to find approximate values of function.
- They will be able to analyze and use them in different applications.
- Eigen values and Eigen vectors play a prominent role in the study of ordinary differential equations and in many applications of physical sciences.

UNIT I - Ordinary Differential Equations & Differential Equations of Second Order :

Differential Equations of First Order : Definiton, Order and degree of a differential equation, Formation of differential equations, Solution of a differential equation, Differential equations of first order and first degree : variables separable, Homogenous equations, Linear equations, Exact differential equations.

Differential Equations of Second Order : Linear differential equations of second order with constant coefficients, Methods for finding the complementary functions and particular integral, General method of finding the particular integral of any function.

UNIT II - Applications of Differential Equations and Laplace Transformations

Applications of Differential Equations : Newton's law of cooling, Natural law of growth, Orthogonal trajectiories**.**

Laplace transformations : Definition, Properties, Convolution theorem, Inverse Laplace transformation, Solving differential equations using Laplace Transformation.

UNIT III - Numerical Methods

Taylor's Method, Picard Method, Euler Method, Modified Euler Method, Runga-Kutta Methods.

Interpolation by Lagrange and Newton methods.

UNIT IV - Matrices

Rank of a matrix, finding rank of a matrix using Echelon form, Normal form, triangular form, PAQ form, inverse of a matrixEigen values, Eigen vectors, properties, Cayley-Hamilton theorem (without proofs), Diagonalisation of a matrix.

Solving System of equations (Gauss-Siedal method only)

UNIT V - Maxima and Minima & Jacobians

Maxima and Minima : Review of partial differentiation: Partial derivatives, Partial derivatives of higher order, Homogeneous function, Euler's theorem, Total differential coefficient,

Maxima and Minima of a function of two variables, Conditions for extreme values, Lagrange method of undetermined multipliers.

Jacobians : Definition, Properties, Jacobian of implicit functions, Partial derivaties of Implicit functions using Jacobian.

TEXT BOOKS :

1. *H. K. Dass* and *Er. Rajnish Verma*, Higher Engineering Mathematics, S. Chand & Co., New Delhi, 2011.
2. *B.S. Grewal*, "Higher Engineering Mathematics", 40th edition, Khanna Publishers, 2009.

REFERENCE BOOKS :

1. *B.V. Ramana*, "Higher Engineering Mathematics", 3rd Edition, Tata McGraw-Hill Publishing Co, 2008.
2. *R K Jain, S R K Iyengar*, "Advanced Engineering Mathematics", 2nd Edition, Narosa Publishing House.
3. *Erwin Kreyszig*, "Advanced Engineering Mathematics", 8th Edition, John Wiley & Sons (Asia) Pvt. Ltd. 2001.

HS113 ENGINEERING PHYSICS

L	T	P	To	C
4	-	-	4	4

Course description and Objectives :

There is a symbiotic relation between physics and engineering. Broadly speaking, engineering is mainly applied physics. Recent technical developments have been the result of joint efforts of physicists and engineers. A proper study of physics is therefore indispensable for an engineering student to excel in his field. The purpose of this course is to present the principles and concepts of physics as relevant to an engineer.

Course Outcomes:

The students will be made to get acquainted to the following learning outcomes:

- Concepts of Physical optics, devices and applications.
- Ultrasonic waves, production, applications in NDT.
- Introduction to Quantum mechanics in relevance to that of modern physics.
- Exposure to latest inventions like lasers, fibers and applications
- Insight into nano technology and applications, solar energy to combat energy crisis.

UNIT I - Physical Optics

Interference – Types - Interference in thin films (Reflection) – Newton’s Rings – Michelson’s Interferometer, Fabry-perot interferomenter – Applications.

Diffraction – Fraunhoffer Diffraction at single slit – Diffraction grating

Polarization – Production of plane polarized light – Nicol prism – Optical activity – photo elasticity.

UNIT II - Ultrasonics & NDT

Ultrasonics : Introduction – production of ultrasonic waves – piezoelectric method – Properties of ultrasonic waves – Types of ultrasonic waves – Determination of Velocity of ultrasonic waves in solids and liquids – Applications.

NDT : Introduction - Types – Theory and practice of Ultrasonic Testing – Ultrasonic Testing Systems – Ultrasonic Testing Methods – X-Ray Radiography.

UNIT - III Quantum Mechanics & Free electron theory of metals

Quantum Mechanics : Matter waves - Schroedinger's time independent wave equation - Physical significance of the wave function - Particle in one dimensional potential well – tunneling phenomenon.

Free electron theory of metals : Introduction – Classical free electron theory – Electrical conductivity of metal – Fermi - Dirac distribution function and its variation with temperature – Quantum free electron theory.

UNIT IV - Lasers & Fiber Optics:

Lasers: Characteristics of Laser light – Spontaneous and Stimulated emission of radiation – Low power and High power lasers, He-Ne Laser – CO_2 Laser – Nd-Yag laser - Applications of Lasers, Holography and Applications

Fiber Optics: Principle of optical fiber - materials – Numerical Aperture – Types of fibers – Dispersion and Attenuation in optical fibers – Optical sensors – Optical fiber communication system.

UNIT V - Solar Energy & NanoScience and Technology

Solar Energy : Solar radiation – Photovoltaic effect – solar cells – Efficiency of solar cell – Solar thermal energy conversion systems.

NanoScience & Technology : Introduction to nano meterials – Basic principles of nanoscience & Technology – Fabrication of nanomaterials – Physical & Chemical properties of nanomaterials – Applications of nanotechnology.

TEXT BOOKS :

1. M.R.Srinivasan, "Physics for Engineers" New Age International, 2002-2003.
2. M.N. Avadhanulu & P.G. Kshirasagar, "Engineering Physics", 1st edition, S. Chand & Company Ltd, 1992.

REFERENCE BOOKS :

1. Halliday, Resnic and Walker, "Fundamentals of Physics", 6th edition, John Willey publishers, 2003.
2. Grawfor F.S., Berkley Physics courses, "Waves and Oscillations", Volume III McGraw Hill, 1992.
3. V. Raghavan, "Materials Science and Engineering", 5^{th} edition, Prentice-Hall India, 2004.
4. S.O.Pillai, "Solid State Physics", 6^{th} edition, New Age International Publications, Revised, 2005.
5. V.Rajendran, "Engineering Physics", 1^{st} edition, TMH Publications, 2010.

EE111 FUNDAMENTALS OF ELECTRICAL ENGINEERING

(For all branches except EEE)

L	T	P	To	C
4	-	-	4	4

Course description and Objectives :

To understand the basic concepts, laws, techniques in analyzing various DC and AC circuits and concepts in coupled circuits. Study of construction details, working of various electrical machines and Semiconductor Devices and operation

Course Outcomes:

- Able to explain the notation and components of electric circuits
- Able to analyze DC and single phase and three phase AC circuits using different methods and theorems
- Able to operate various electrical machines.
- Able to explain the concepts of Semiconductor Devices and operation

UNIT I - Fundamentals Of DC Circuits

Circuit Concepts: Concepts of network, Active and passive elements, voltage and current sources, concept of linearity and linear network, unilateral and bilateral elements, R, L and C as linear elements. Ohm's Law – Kirchhoff's Laws –application to simple series, parallel circuits, mesh and nodal analysis of simple resistive circuits.(simple numerical problems).

UNIT II - Fundamentals of A.C. Circuits:

Generation of A.C. voltage - frequency, average value, R.M.S. value, form factor, peak factor for sinusoidal only - phasor representation of alternating quantities. Analysis of simple series and parallel A.C. circuits-(simple numerical problems)

Balanced Three phase systems – relation between phase and line quantities of voltages and currents in star and delta connected systems (Elementary treatment only)

UNIT III - Fundamentals of Electromagnetism and Transformers:

Concepts of Magneto motive force, reluctance, flux and flux density , concept of Self Inductance and Mutual Inductance, Coefficient of coupling-only elementary treatment. (simple numerical problems).

Transformers: Principle of operation of single phase transformer – constructional features – EMF equation (simple numerical problems)

UNIT IV - Electrical Machines:

DC Machines: Constructional details of a D.C. Machine.

D.C. Generator – Principle of operation – EMF equation – types of D.C. generators (simple numerical problems)

D.C. Motor – Principle of operation – Torque equation – types of D.C. motors (simple numerical problems)

A.C Machines: Principle of operation of three phase induction motors – slip ring and squirrel cage motors – Torque equation derivation, Constructional details of synchronous machines.

UNIT V - Semiconductor Devices:

Classification of solids based on energy band theory - Intrinsic semiconductors - Extrinsic semiconductors - P type and N type semiconductors - P-N junction diode and its characteristics –Half and Full wave rectifiers- Zener diode and its characteristics - Voltage regulator. Bipolar junction transistor – Operation-Types- Applications.

TEXT BOOKS:

1. Mittle, V.N., “Basic Electrical Engineering”, 2nd ed., TMH, New - Delhi, 1990.
2. V.K.Mehta,”Principles of Electrical Engineering and Electronics”, 3rd ed., S. Chand Publications, New Delhi, 2010.

REFERENCE BOOKS:

1. Millman & Halkias, “Integrated Electronics”, McGraw Hill, 1979.
2. A.K. Thereja & B.L. Thereja, “Electrical Technology”, Vol. – II, S.Chand Publications, 2007.
3.. U.Bakshi & A.Bakshi, “Basic Electrical Engineering”, 1st ed., Technical Publications, Pune, 2005.
4. U.Bakshi & A.Bakshi, “Basic Electrical Engineering”, 1st ed., Technical Publications, Pune, 2005.

HS114 TECHNICAL ENGLISH COMMUNICATION

L	T	P	To	C
3	2	-	5	5

Course description and Objectives :

To introduce students to the specific use of language for the purposes of Technical Communication which would be an essential prerequisite for success in the areas of writing and speech. The teaching efforts in this course will be directed towards making students develop their technical and non-technical writing abilities using the fundamental principles that apply to the correct use of the English language free of grammatical and other related errors.

Course Outcomes:

Students shall achieve the ability to write and demonstrate college-level proficiency in the following:

- Clear and effective communication of meaning in speaking and writing.
- The ability to perform effectively the essential steps of the writing process (Note making, organizing, composing, revising, and editing).
- The ability to explain, develop, and criticize ideas effectively.
- Effective organization within the paragraph and the essay.
- Accuracy, variety, and clarity of sentences.
- Appropriate diction.
- Control of conventional mechanics (e.g., punctuation, spelling)

UNIT - I

- Text : Environmental Consciousness (Climate Change – Green Cover – Pollution)
- Grammar : Articles – Prepositions – Sentence Types and Construction
- Vocabulary : Root – Prefixes - Suffixes
- Composition : Paragraph Writing (Descriptive & Narrative)
- Lab Practice : Introduction to Phonetics (Organs of Speech; Consonants, Vowels & Diphthongs; Syllable, Stress & Intonation)

UNIT - II

- Text : Emerging Technologies
  (Solar Power – Cloud Computing – Nanotechnology)
- Grammar : Time and Tense (Present-Past-Future; Helping Verbs; Modals)
- Vocabulary : Synonyms – Antonyms
- Composition : Note-making
- Lab Practice : Grammar Practice (Speaking of past, present & future)

UNIT - III

- Text : Energy
  (Renewable and Non-renewable Sources – Alternative Sources – Conservation – Nuclear Energy)
- Grammar : Subject-Verb Agreement - Sentence Construction (Characteristics of Technical Writing)
- Vocabulary : Idioms & Phrases
- Composition : Summarizing
- Lab Practice : Situational Conversations – Role-Plays (Introducing; Greeting; Enquiring; Informing; Requesting; Inviting)

UNIT - IV

- Text : Engineering Ethics
  (Challenger Disaster – Biotechnology – Genetic Engineering – Protection from Natural Calamities)
- Grammar : Sentence Transformation (Degrees, Voice, Speech & Synthesis)
- Vocabulary : Phrasal Verbs
- Composition : Letter Writing (Informal)
- Lab Practice : Situational Conversations – Role-Plays (Emotions; Directions; Descriptions; Agreements; Refusals; Suggestions)

UNIT - V

- Text : Travel and Tourism
  (Advantages and Disadvantages of Travel-Tourism – Atithi Devo bhava – Tourism in India)
- Grammar : Common Errors
- Vocabulary : One-word Substitutes
- Composition : Letter Writing (Formal)
- Lab Practice : Group Discussions

TEXT BOOKS :

Mindscapes - English for Technologists and Engineers, Orient Black Swan, 2012.

REFERENCE BOOKS :

1. V. R. Narayana Swamy***, "Strengthen Your Writing",*** 1st edition, Orient Longman, 2003.
2. Thomas Elliott Berry***, "The Most Common Mistakes in English Usage",*** 1st edition, Tata McGraw Hill, 2004.
3. T. Balasubramanyam, ***A Textbook of English Phonetics for Indian Students***, Macmillan Ltd., 2000.
4. Sasikumar.V and P.V. Dhamija,. ***Spoken English: A Self-Learning Guide to Conversation Practice,*** 34th Reprint, Tata McGraw Hill, New Delhi, 1993.
5. Margaret M Maison, **"Examine your English",** 1st edition**,** Orient Longman, 1999.
6. Ashraf Rizwi, "***Technical English Communication***", Tata McGraw Hill, Latest Edition.

CS101 PROBLEM SOLVING AND COMPUTER PROGRAMMING

L	T	P	To	C
4	-	-	4	4

Course description and Objectives :

Aim of this course is to introduce the techniques of problem solving and concepts of programming language to the students. Because of its popularity and suitability to develop different types of applications, 'C' language has become the de-facto programming language to engineers. A comprehensive introduction of C language is offered through this course to enable the students to write diversified programs.

Course Outcomes:

On Completion of this course student should be able to

- Able to understand the basic terminology used in computer programming and to write, compile and debug programs in C language.
- Use different data types in a computer program and design programs involving decision structures, loops and functions.
- Able to understand the allocation of dynamic memory using pointers
- Use different data types to create/update basic data files.

UNIT I - Fundamentals of computers

Basic functional units and discrete components of a computer, computer networks, networking components, Binary representation of integers and real numbers, ASCII, EBCDIC, Unicode, Generations of computer languages.

UNIT II - Problem Solving Steps and Basic of C Language

Problem understanding, Formulating a mathematical model, Development of an algorithm, Representation of an algorithm, Flow chart and Pseudo code, Coding, Testing and Debugging, Comments, Processor statement, Function header statement, Variable declaration statement and Executable statement, C Character Set, constants, identifiers, operators, punctuations, keywords, Basic data types, modifiers, identifiers, variables, C scopes, type qualifiers, storage class specifiers, variable initializations, constants, reading and writing characters, formatted I/O.

UNIT III – Preliminaries of C

Assignment, arithmetic , relational, logical, bitwise, ternary, address, indirection, sizeof, dot, arrow, and parentheses operators, Expressions Precedence of operators and associatively, Category of Statements, Selection, Iteration, jump, label, expression and block, Function declaration, prototype, definition, calling by value and address, standard library functions and recursive functions.

UNIT IV - Arrays and Pointers

Declaration, initialization, reading, writing, accessing and passing as a parameter to functions, Multidimensional arrays and String functions, pointer expressions, pointer and arrays, multiple indirection, initializing pointers, pointer to functions, Dynamic memory allocation functions.

UNIT V - Structures and File Processing

declaration, initialization and accessing, array of structures and passing structures to functions, structure pointers, arrays and structures within structures, unions, bit-fields, typedef and enumerations, I/O and processing operations on text and binary files. pre-processor directives.

TEXT BOOKS :

1. Reema Thareja, “Introduction to C Programming”, Oxford University Press, India, 2013
2. Herbert Schildt, C: “The Complete Reference”, 4th Edition, Tata McGraw-Hill, 2000.

REFERENCE BOOKS :

1. E. Balagurusamy, “ Programming in ANSI C”, 4TH Edition, Tata McGraw- Hill, 2008.
2. R Ravichandran and T Jeyapoovan, “ Computer Programming with C”, Soni Graphics, India, 2014.

HS115 ENGINEERING MATHEMATICS - II

(For all branches except Biotechnology)

L	T	P	To	C
4	-	-	4	4

Course description and Objectives :

Without mathematics not a single day of an engineer will pass! All the topics of this course are relevant to all branches of engineering. In real life, many quantities are dependent on more than one quantity. Hence study of functions of several variables is crucial. In this course, we study partial differentiation, partial differential equations, multiple integrals all involving functions of two variables. We also study Fourier series and Z-transformations and difference equations.

Course Outcomes:

- The students will understand that many quantities are dependent on more than one quantity so they learn functions of several variables.
- They will be able to solve Partial Differential Equations, multiple integrals which are involving functions of two variables.
- They can apply Z – transforms to solve difference equations.
- They will be able to calculate areas and volumes.
- The student will enable to locate the maxima and minima of a function is an important task which arises often in applications of mathematics to problems in engineering and science.
- Vector differentiation and integration used to find the arc lengths and curvatures of space curves

UNIT I - Partial Differential Equations :

Formation of Partial Differential Equations, Linear (Lagrange) Equations, Method of multipliers, Non-linear partial differential equations (Types), Charpit's method.

Second order linear equations, classifications, Solution by method of separation of variables.

UNIT II - Fourier Series :

Periodic functions, Fourier series, Dirichlet's conditions, Determination of Fourier coefficients, Discontinuous functions, even and odd functions, Half-range series, Functions having arbitrary period.

UNIT III - Z-transformations & Applications :

Z-transformations : Sequences, Z-transformation, Properties, Inverse Z-transformation, Multiplication and division by k, Initial and final value theorems, Convolution, Determination of inverse Z-transformation.

Applications : Solutions of difference equations using Z-transformations.

UNIT IV - Multiple Integrals :

Double integrals, Evaluation, Evaluation in Polar coordinates, Change of order of integration, Change of variables, Applications to Area in Cartesian coordinates and polar coordinates.

Triple integrals, Fundamentals, Evaluation of triple integrals.

UNIT V - Vector Differentiation and Integration

Vector Function, Differentiation, Scalor and Vector point function, Gradient, Normal, Divergence, Directional Derivate, Curl, Vector identities.

Line Integral, Surface Integral, Volume integral, Green's theorem, Stoke's theorem, Gauss theorem of divergence (without proofs).

TEXT BOOKS :

1. *H. K. Dass* and *Er. Rajnish Verma*, Higher Engineering Mathematics, S. Chand & Co., New Delhi, 2011.
2. *B.S. Grewal*, "Higher Engineering Mathematics", 40th edition, Khanna Publishers, 2009.

REFERENCE BOOKS :

1. *B.V. Ramana*, "Higher Engineering Mathematics", 3rd Edition, Tata McGraw-Hill Publishing Co, 2008.
2. *R K Jain, S R K Iyengar*, "Advanced Engineering Mathematics", 2nd Edition, Narosa Publishing House.
3. *Erwin Kreyszig*, "Advanced Engineering Mathematics", 8th Edition, John Wiley & Sons (Asia) Pvt. Ltd. 2001.

HS117 ENGINEERING CHEMISTRY

L	T	P	To	C
4	-	-	4	4

Course description and Objectives :

Chemistry is the backbone in designing and understanding the nature and properties of various engineering materials. Currently, the electronics and computer engineers are waiting for suitable polymers for using miniature super computers. So this subject develops fundamental knowledge about new engineering materials and their significance in technical fields and industrial sectors. Water is an essential element for the existence of human, plant and animal lives, besides that it has greater industrial applications. The knowledge about water is the basic requirement for a professional student. Characterization of materials with instrumental techniques is essential for engineers.

Course Outcomes:

- Differentiate between soft and hard water. Understand the disadvantages of using hard water domestically and industrially. Select and apply suitable softening methods (Soda-lime, zeolite, ion-exchange methods, etc.) to soften the hard water for industrial and domestic applications.
- Acquaintance of primary and secondary cells, Hydrogen-Oxygen and Methanol fuel cells, dry and wet corrosions, corrosion controlling methods
- Acquaintance of the properties and engineering applications of Ceramics, Refractories, Glasses, Cement, Abrasives, Lubricants
- Acquaintance of Preparation, properties and applications of different polymers (Polyethylene, PVC, Tefflon, Bakelite,Urea-Formaldehyde, Silicones, Rubber – Vulcanization, Synthetic Rubbers-(Buna-S, Buna-N, Neoprene); treatment of membranes.
- Acquaintance of various spectroscopic methods (UV-visible / IR), Beer-Lambert's Law, qualitative and quantitative analysis, block diagrams of UV and IR spectrophotometers.

UNIT I - Water Technology :

Introduction-Hardness of water-Determination of hardness by EDTA-Disadvantages of hard water-Scales & Sludges-Caustic embrittlement-Boiler corrosion-Priming & Foaming, WHO, BIS Standards of water-Softening Methods- Lime Soda process, Zeolite process, Ion Exchange process - Desalination of brackish water-Reverse osmosis, Electro dialysis.

UNIT II - **Electrochemical cells and AND Corrosion:**

Electrochemical cells: primary cell-(Dry or lecalanche cell), Secondary cell-(Lead-acid storage cell, Lithium ion battery), Hydrogen-Oxygen Fuel cell, Methanol fuel cell.

Corrosion: Introduction-Dry corrosion (chemical)-Wet corrosion (electrochemical)-Mechanism of wet corrosion-Bimetallic corrosion-Concentration cell corrosion-Factors influencing corrosion-Corrosion control methods- Cathodic protection and Electroplating.

UNIT III - Engineering Materials :

Properties and engineering applications of Ceramics, Refractories, Glasses, Cement,Abrasives, Lubricants.

UNIT IV - Polymers :

Introduction –Types of polymerization-Preparation, properties and applications of Polyethylene, PVC, Tefflon, Bakelite, UreaFormaldehyde, Silicones, Rubber – Vulcanization, Synthetic Rubbers - (Buna-S, Buna-N, Neoprene). Elementary treatment of Membranes

UNIT V - Instrumental Techniques :

Interaction of radiation with matter,UV-Visible Spectroscopy-Beer –Lambert's law ,Qualitative and Quantitative Analysis,Block diagram of UV-Visible Spectrophotometer.IRSpectroscopy-Types of Vibrations,Identification of functional groups,Block diagram of IR Spectrophotometer**.**

TEXT BOOKS :

1. P.C Jain and Monica Jain, "Engineering Chemistry", 15th edition, Dhanpat Rai Publications 2009.
2. Gurudeep Raj and Chatwal Anand, "Instrumental Methods of Analysis", 5th edition, Himalaya Publications, 2007.

REFERENCE BOOKS :

1. S.S.Dara, "Text book of Engineering Chemistry" 1st edition, S. Chand Publications, 2009.
2. C.V. Agarwal, C.P. Murthy, A.Naidu, "Chemistry of Engineering materials", 9th edition, BSP Publications, 2008.
3. M.R. Senapati, "Advanced Engineering Chemistry" 2nd edition, Lakshmi Publications, 2006
4. H.W. Wilard and Demerit, "Instrumental methods of Analysis", 7th edition, CBS Publications, 1986.

CS103 DATA STRUCTURES

(For CSE, IT & ECM)

L	T	P	To	C
4	-	-	4	4

Course description and Objectives :

In this course, students will learn the basic skills and knowledge of the general-purpose data structures to solve computational problems. The main objective of this course is to provide an introduction to basic data structures and manipulating them, by using C programming language and the evaluation of the data structure needs of particular problems.

Course Outcomes:

Having successfully completed this course, the student will be able to:

- Apply advance C programming techniques such as pointers, dynamic memory allocation, structures to developing solutions for particular problems;
- Design and implement abstract data types such as linked list, stack, queue and tree by using C as the programming language using static or dynamic implementations;
- Evaluate and choose appropriate abstract data types to solve particular problems;
- Design and implement C programs that apply abstract data types.

UNIT I - LINEAR DATA STRUCTURES-ARRAYS

Introduction – Data, Data type, Data Structures – Primitive and Non-primitive, Storage structures – Sequential and linked storage representations, File structures, Abstract Data Type (ADT). Overview of Structures-arrays, operations on arrays(retrieval of an element, search an element, insertion deletion of an element), manipulations on arrays such as finding the sum of elements of an array, adding two arrays, and reversing an array. Maximum sub sequence problem, Multi dimensional arrays.

UNIT II - LINKED LISTS

Types of Linked Lists Singly Linked List, Doubly Linked List, Circular Linked List. Operations on linked lists-insertion, deletion, traversing forward/reverse order. Multi lists, Applications of Linked Lists.

UNIT III - STACKS AND QUEUES

Stacks – ADT, Array and Linked representations, Implementation and their applications. Queues – ADT, array and linked representations, Implementation of linear, circular and doubly-ended queues, and their applications.

UNIT IV - NON-LINEAR DATA STRUCTURES-TREES

Preliminaries –Binary Tree – ADT, array and linked representations, Binary tree properties, tree traversal, Implementation, Expression trees. The Search Tree ADT –Binary Search Trees, Implementation. AVL Trees – Single Rotations, Double rotations.

UNIT V - GRAPHS

Graphs – ADT, definitions and properties, modeling problems as graphs, representation – adjacency matrix and adjacency list, basic graph traversals – breath first search and depth first search. Applications of graphs.

TEXT BOOKS:

1. Richard F.Gilberg, Behrouz A. Forouzan, “Data Structures –A Pseudocode Approach with C”, 2nd Edition, Cengage Learning.

2. Y.Langsam, M.J.Augeustein and A.M.Tenenbaum, “Data Structures Using C”, Pearson Education Asia.

REFERENCE BOOKS:

1. Mark Allen Weiss, “Data Structures and Algorithm Analysis in C”, Second Edition, Pearson Education,1997
2. Sartaj Sahni, Data Structures, Algorithms and Applications in C++ , Universities Press, Second Edition, 2005
3. Jean Paul Tremblay and Paul G. Sorenson, An Introduction to Data Structures with Applications,Tata Mc-Graw Hill, Second Edition, 26th Reprint 2004
4. KRUSE, Data Structures and Programming Design-PHI

ME101 ENGINEERING MECHANICS

L	T	P	To	C
4	-	-	4	4

Course description and Objectives :

The course aims to impart the knowledge to understand the forces and their reactions on various static and dynamic conditions.

Course Outcomes:

- Use scalar and vector analytical techniques for analyzing forces in statically determinate structures.
- Solve the engineering problems in case of equilibrium conditions and to calculate the reaction forces of various supports of different structures.
- Determine the centroid, centre of gravity and moment of inertia of various surfaces and solids.
- Solve the problems involving dry friction.
- Apply fundamental concepts of kinematics and kinetics of particles to the analysis of simple, practicalproblems.

UNIT I - Basic Concepts and Principles of Statics :

Introduction to Engineering Mechanics, Scalar and Vector quantities, Forces, Characteristics of a force, Definitions and examples of various types of force systems, Law of transmissibility, Definition of resultant, Composition and resolution of forces, Moment of a force, Principles of moments of force, Couples, characteristics of a couple, Transformations of a couple, Resultants of Force Systems, Possible resultants of different types of force systems, Resultant of a concurrent coplanar force system, Resultant of a non concurrent coplanar force system

UNIT II - Equilibrium of Rigid Bodies

Free body diagrams, Types of supports and their reactions, requirements of stable equilibrium, Equations of equilibrium of a concurrent coplanar force system, Equilibrium of Bodies acted on by two or three forces, Equilibrium of bodies acted on by non-concurrent coplanar force system

UNIT III - Properties of Surfaces and Solids :

Centroid and Center of Gravity: Centre of gravity of parallel forces in a plane, centroids and center of gravity of composite bodies, Distributed Loads on Beams.

Moments of Inertia: Definition, Parallel axis theorem and perpendicular axis theorem for areas, Polar Moment of inertia, Second moment of area by

integration, Radius of gyration of areas, Moments of inertia of composite areas.

UNIT IV - Friction :

Nature of friction, Laws of friction, Coefficient of friction, Angle of friction, Cone of friction, Types of Friction - Sliding Friction, Rolling Friction, Belt Friction, Ladder Friction, Wedge friction.

UNIT V - Kinematics and Kinetics :

Absolute Motion: Introduction, Recapitulation of basic terminology of mechanics, Displacement, Velocity and acceleration their relationship, Rectilinear motion of a particle

Relative Motion: Introduction to kinematics of relative motion, Relative displacement, Relative velocity

Kinetics: Introduction to Kinetics, Force, Mass and Acceleration, Newton's Laws of motion, Equation of motion for a particle, D Alembert's principle, Rectilinear translation of a rigid body, Work done by a force, Work done by a force system, Energy, Potential energy, Kinetic energy, Principle of Work and kinetic energy, Conservation of energy, Linear impulse, Linear momentum, Principle of linear impulse and linear momentum, Conservation of linear momentum.

TEXT BOOKS :

1. J. L. Meriam, L. G. Kraige, "Engineering Mechanics: Dynamics", 7th ed., John wiley & sons, 2012
2. A. K. Tayal, "Engineering Mechanics", Umesh Publications, 2005.

REFERENCE BOOKS :

1. L. Singer - Harper, "Engineering Mechanics", 3rd ed., Fedinand . , Collins, 1975.
2. Timoshenko & Young, "Engineering Mechanics", 4th ed., Tata McGraw Hill, New Delhi, 2007.
3. S. S. Bhavakati & J. G. Rajasekharappa, "Engineering Mechanics", 3nd ed., New Age International Publications, New Delhi, 2008.

HS118 ENVIRONMENTAL STUDIES

L	T	P	To	C
4	-	-	4	4

Course description and Objectives :

The objective of this course is to heighten on awareness of nature and its importance to students

and make them understand the need to make judicious use of all natural resources for long team sustenance of life on this planet.

Course Outcomes:

- To provide Knowledge on importance of natural resources and integrate technical "field" knowledge with analytical skills to prevent natural resources depletion
- To maintain healthy and Diverse Ecosystems ,
- Work together to conserve the biodiversity
- Take immediate measures to control the Pollution
- Adopt Ecofriendly technology.
- Maintenance of hygienic conditions

UNIT I - Environment and Natural Resources :

Environment: Definition, Scope and Importance – Need for Public Awareness

Natural Resources: Renewable and non-renewable resources – Natural resources and associated problems – Forest Resources: Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources: Use and over utilization of surface and ground water – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources - Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity–Energy resources: renewable and non-renewable energy sources, alternate energy sources. Land resources: Land as a resource, land degradation, Soil erosion – case studies - Role of an individual in conservation of natural resources.

UNIT II - Ecosystems and Biodiversity :

Ecosystem: Concept of an ecosystem. – Complete and incomplete ecosystem - Structure and functions of an ecosystem - Ecological succession. - Food chains, food webs -Structure and functional features of the following ecosystem: a. Forest ecosystem b. Grassland ecosystem c. Desert ecosystem, d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) **Biodiversity**: introduction of biodiversity, Bio-geographical classification of India - Value of biodiversity- Biodiversity at global, National and local levels - Hot-spots of biodiversity - Threats to biodiversity - Endangered and endemic species of India – Conservation of biodiversity

UNIT III - Environmental Pollution and Applications of Remote Sensing / GIS on Environment

Definition, Cause, effects and control measures of: Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution - Solid waste Management: Causes, effects and control measures of municipal and industrial wastes - Climate change, global warming, acid rain, ozone layer depletion -Case Studies - Role of an individual in prevention of pollution - Pollution case studies. – Green technology and its concept, role of green technology in controlling environmental problems.

UNIT IV - Social issues and EIA :

Sustainable development -water conservation: Cloud Seeding (Artificial rain making system), rainwater harvesting, watershed management - Disaster management: floods, earthquake, cyclone and landslides - Environment Protection Act. - Air (Prevention and Control of Pollution) Act. - Water (Prevention and control of Pollution) Act - Wildlife Protection Act - Forest Conservation Act

EIA: introduction to E.I.A.-definition of E.I.A and E.I.S – scope and objectives of E.I.A.- methods of E.I.A –CEIA, REIA, MOEF, CPCB, SPCB – Importance of E.I.A in proposed Projects / Industry /

Developmental activity - Remote sensing / GIS: Introduction of remote sensing / GIS, definition of remote sensing, applications of the remote sensing on environment (site selection, land use/land cover pattern, water/air/soil quality models, a criteria of environmental information systems)

UNIT V - Environmental Sanitation :

Food sanitation: food and drugs Act, food preservations, food borne diseases-Milk sanitation: tests for milk, pasteurization of the milk - water borne diseases-

air borne diseases-viral diseases (HIV/AIDS, SARS, bird-flu, anthrax)-maintenance of sanitary and hygienic conditions

Field Work/Environmental Visit: Visit to a local area to document environmental assets – river/ forest/ grassland / hill /mountain - Study of local environment - common plants, insects, birds - Study of simple ecosystems – pond, river, hill, slopes etc - Visits to industries, water treatment plants, effluent treatment plants

TEXT BOOKS :

1. Y. Anjaneyulu, “Introduction to Environmental Science”, B S Publications, 2008.
2. Dr. M. Chandrasekhar, “A Text book of Environmental Studies”, HI-TECH publications, 2006

REFERENCE BOOKS :

1. Dr. M. Anji Reddy, “A Text book of environmental science and Technology”, B S Publications, 2008
2. Dr. K. Mukkanti, “A Text book of Environmental Studies”, S.CHAND Company Ltd, 2009.
3. EHILRS and ST, “Text book of Municipal and Rural Sanitation”, M.S Hill, 1998.
4. C. S. Rao, Wiley Eastern Ltd, “Environmental Pollution Control Engineering”, New Age International Ltd, 2001
5. Dr. M. Anji Reddy, “Introduction to Remote Sensing”, B S Publications, 2004.
6. Kurian Joseph and R.Nagendram, “Essentials of environmental studies”, Pearson Education Pt Ltd, Delhi, 2007.
7. Sharma & Kour “Text book of Environmental pollution”.
8. H.C Perkins “Text book of Air Pollution”.

CS105 NETWORK SECURITY

L	T	P	To	C
2	-	-	2	-

Course description and Objectives :

This Course focuses towards the introduction of System, Information and Network security using various methodologies. It also focuses on the practical aspects that have been used to provide e_mail and web security.

Course Outcomes:

On Completion of this course student should be able to

- understand the Importance of Information Security
- Know the ways to protect the information
- understand the Firewall importance
- understand the need of Virtual Private Networks.

UNIT I - History of security :

History of security – Physical security, communications security, emissions security, computer security, network security and information security. Security process - Anti-virus software, access controls, firewalls, smart cards, biometrics, intrusion detection, policy management, vulnerability scanning, encryption, physical security mechanisms.

UNIT II - Access attacks

Snooping, eavesdropping, interception; Modification attacks - Changes, insertion and deletion; Denial of service attacks- Denial of access to information, applications, systems and communication; Repudiation attacks - Masquerading and denying an event. Hacking - Hacker motivation, historical hacking techniques, IP spoofing and malicious code.

UNIT - III

Confidentiality of files, information in transmission and traffic flow, integrity, availability and accountability; Integrity of files and information during transmission; Availability - backups, failover and disaster recovery; Accountability – identification and authentication, and audit.

UNIT - IV

Concepts of firewalls, Application layer and packet filtering firewalls; Virtual Private Networks.

UNIT - V

Basic encryption concepts, Private Key encryption standards-DES, triple DES and AES. Public key encryption – RSA. Concepts of digital signatures.

TEXT BOOKS :

1. Eric Maiwald, Fundamentals of Network security, Dreamtech Press, 2007.

REFERENCE BOOKS :

1. William Stallings, “Cryptography and Network security”, 4th edition, Pearson Education, 2010.

HS119 PROFESSIONAL ETHICS, VALUES AND HUMAN RIGHTS

L	T	P	To	C
2	-	-	2	-

Course description and Objectives :

• *To create an awareness on Engineering Ethics and Human Values.*

• *To instill Moral and Social Values and Loyalty*

• *To appreciate the workplace rights of Others, responsibilities and Safety of others.*

Course Outcomes:

The course will enable the students to attain the following:

- an understanding of professional and ethical responsibility in workplace
- the broad education necessary to understand the impact of engineering solutions in a global and societal context
- a knowledge of contemporary issues related to human and professional interactions at workplace
- an engineer's life-long commitment to serve the disadvantaged

UNIT I - Human Values :

Morals, Values and Ethics – Integrity – Work Ethic – Service Learning – Civic Virtue – Respect for Others – Living Peacefully – Caring – Sharing – Honesty – Courage – Valuing Time – Co-operation – Commitment – Empathy – Self-Confidence – Character – Spirituality.

UNIT II - Engineering Ethics & **Engineering as social experimentation :**

Engineering Ethics : Variety of moral issues – types of inquiry moral dilemmas – moral autonomy – The problems of Many Hands – Kohlburg's theory – Gilligan's theory Impediments to Responsible Action.

Engineering as social experimentation - Codes of ethics - a balanced outlook on law - the challenger case study.

UNIT III - Engineer's Responsibility for Safety :

Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis – Reducing Risk – The Government Regulator's Approach to Risk - Chernobyl Case Studies and Bhopal.

UNIT IV - Workplace Rights and Responsibilities & Work Environment :

Workplace Rights and Responsibilities : Engineers and Managers. Oganizational complaint procedures. Government agencies. Resolving Employee concerns. Limits on acceptable behaviour in large corporation.

Work Environment : Ethical and legal considerations, Organizational responses to offensive behaviour and harassment. Ethics in a Global Context.

UNIT V - Global Issues :

Multinational Corporations – Business Ethics - Environmental Ethics – Computer Ethics - Role in Technological Development – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Honesty – Moral Leadership – Sample Code of Conduct.

TEXT BOOKS :

1. Mike Martin and Roland Schinzinger, "Ethics in Engineering", McGraw Hill, New York, 2005.

REFERENCE BOOKS :

1. Prof. (Col) P S Bajaj and Dr. Raj Agrawal, "Business Ethics – An Indian Perspective", Biztantra, New Delhi, 2004
2. Charles E Harris, Michael S. Protchard and Michael J Rabins, "Engineering Ethics – Concepts and Cases", Wadsworth Thompson Learning, United States, 2000 (Indian Reprint now available)
3. Engineering Ethics-An industrial Perspective, Gail Dawn Baura
4. Charles E Harris, Michael S Pritchard and Michael J Rabins, "Engineering Ethics – Concepts and Cases", Thompson Learning, 2000.
5. Charles E Harris, Michael S Pritchard and Michael J Rabins, "Engineering Ethics – Concepts and Cases", Thompson Learning, 2000.
6. PSR Murthy, "Indian Culture Values and Professional Ethics", BS Publications
7. Edmund G Seebauer and Robert L Barry, "Fundamentals of Ethics for Scientists and Engineers", Oxford University Press, Oxford, 2001.

HS120 ENGINEERING PHYSICS LAB

L	T	P	To	C
-	-	3	3	2

Course description and Objectives :

This lab is intended to make the students realize the theoretical concepts of physics having hands on experience in conducting the following experiments. Students may have to take up any 10 experiments from each section.

Course Outcomes:

- Students realize concept of resonance of sound conducting the experiment of Sonometer Melde's experiment and volume generator.
- The students understand the concepts of light conducting the experiments of dispersion of light, diffraction of light, optical fibers and lasers.
- The students acquire the knowledge of magnetic field theory, thermal energy and elastic properties by conducting the experiments of field along the axis of circular coil, Lee's experiment, Seebeck effect and Torsional pendulum.

PHYSICS LAB

1. Verification of laws of transverse vibrations in stretched string - Sonometer
2. Melde's Experiment - Transverse and Longitudinal modes.
3. Determination of Rigidity modulus of a material in the form of a wire - Torsional pendulum
4. Dispersive power of the material of a Prism - Spectrometer
5. Determination of wavelength of a monochromatic light source - Diffraction Grating.
6. Field along the axis of a circular coil – stewart Gee's apparatus.
7. Volume Resonator.
8. Band gap of semiconductor
9. Hall coefficient
10. Thermal conductivity of bad conductor Lee's method
11. Optical Fiber – Determination of numerical aperture
12. Solar Cell
13. Seebeck effect

REFERENCE BOOKS:

1. Vogel's Text book of qualitative Chemical Analysis J.Mendham, R.C Denney, J.D. Bares, M.Thomas & B. Siva Sankar, Pearson Publications – Volume I (2009).

EE113 FUNDAMENTALS OF ELECTRICAL ENGG. LAB

(For all branches except EEE)

L	T	P	To	C
-	-	3	3	2

Course description and Objectives :

To understand basic electrical elements, electrical energy its consumption and measurement. To develop practical knowledge on electrical machines, electronic devices and circuits

Out Comes :

- Able to realize characteristics of electrical elements.
- Able to analyze given simple ac and dc networks.
- Able to work on different electrical machines.
- Able to reflect the knowledge of electronic devices to verify experimentally.

List of Experiments

1. Familiarization with basic components such as Resistors, Capacitors, Diodes, Transistors
2. Familiarization with basic electrical measuring instruments
3. Verification of ohm's law
4. Verification of KVL and KCL
5. Calculation of power factor in simple RL and RC circuits
6. Magnetization characteristic of a D.C. self excited generator
7. Measurement of power and energy.
8. Measurement of transformation ratio of single phase transformer.
9. Measurement of Power, Power factor of 3-phase induction motor.
10. Characteristics of PN junction diode.
11. Characteristics of Zener diode.
12. Operation of Full wave Rectifier
13. Operation of half wave Rectifier
14. Study and Working of fluorescent lamp
15. Measurement of armature and field resistances of d c machine using voltmeter-ammeter method.

Note : Any 10 of above experiments are to be conducted.

CS107 COMPUTER PROGRAMMING LAB

L	T	P	To	C
-	-	3	3	2

Course description and Objectives :

To familiarize the students in preparation of documents and presentations with office automation tools. A comprehensive problem solving skills through C language is offered to enable the students to write diversified solutions using this language.

Course Outcomes:

- Able to write, compile and debug programs in C language.
- Able to formulate problems and implement algorithms in C.
- Able to effectively choose programming components that efficiently solve computing problems in real-world

1. Write A Program to find simple Interest, compound interest
2. Write A Program to covert given temperature from C to F & F to C
3. Write A Program to check Entered number is positive or zero or Negative
4. Write A Program to print given year is Leap year or not
5. Write A Program to do arithmetic operations using switch
6. Write A Program to find biggest among 3 Numbers
7. Write A Program to print grade of a student for 5 sub avg>70(A), 60-70(B), 50-60(C),<50(F)
8. Write A Program to find Roots fo Quadratic Equation
9. Write A Program to find sum of individual digits of a given number
10. Write A Program to check whether the given number is PALINDRAM or not
11. Write A Program to check whether the given number is PERFECT or not
12. Write A Program to check whether the given number is PRIME or not
13. Write A Program to check whether the given number is ARMSTRONG or not
14. Write A Program to check whether the given number is STRONG or not
15. Write A Program to find sum of Natural Numbers

16. Write A Program to print the following triangle

```
      1
    2   3
  4   5   6
7   8   9   10 etc……….
```

17. C Progrm to find Factorial of Given number using Recursive and Non Recursive Functions.
18. Write A Program to print Fibonacci Series upto given limit using recursive, Non recursive
19. Write program in C for determining the minimum and maximum and sum of elements of an array of 'n' elements and searching for a given element.
20. C Program for computing range, mean and standard deviation of a given numeric dataset.
21. Write A Program in C for performing addition, subtraction, multiplication and transpose operations on matrices.
22. Write program to perform the following string operations on the given string. a) string length b) string copy c) string concatenation d) string comparison e) reverse string f) sub string
23. Write A Program to read student record (no, name, marks1, marks2, marks3, marks4, marks5, calculate average and Grade) and display the student record.
24. Write A Program to do arithmetic operations using pointers.
25. Write A Program to create two data files and copy the content of these two data files as a single file in another new file?

CS108 DATA STRUCTURES LAB

(For CSE, IT & ECM)

L	T	P	To	C
-	-	3	3	2

Course Description & Objectives

In this course, students will learn the basic skills and knowledge of the general-purpose data structures to solve computational problems. The main objective of this course is to provide an introduction to basic data structures and manipulating them, by using C programming language

Course Outcomes

- Able to understand the importance of structure and abstract data type, and their basic usability in different applications through different programming languages.
- Able to understand the linked implementation, and its uses both in linear and non-linear data structure.
- Able to understand various data structure such as stacks, queues, trees, graphs, etc. to solve various computing problems.
- Able to decide a suitable data structure to solve a real world problem.

Programs

1. Code the following list ADT operations using array.
   (a) void is_emptyList(List 1)
   (b) List makeNullList(size n)
   (c) Position firstPost(List 1)
   (d) Position endPost(List 1)
   (e) Position nextPost(List 1, Position p)
   (f) Position prevPos(List 1, position p)
   (g) Position find(List 1, Element x)
   (h) Position findKth(List 1, int k)
2. Code the following list ADT operations using array
   (i) void insert(List 1, Position p)
   (j) void delete(List 1, Position p)
   (k) void append(List 1, Element x)
   (l) int cmp(List 1, Position p1, Position p2)
   (m) int cmp2(List11, List12, Position p1, Position p2)
   (n) void swap(List 1, Position p1, Position p2)
   (o) Element retrieve Element(List 1, Position p)
   (p) void print element(List 1, Position p)

3. Implement singly linked list
   i. Create list
   ii. Insert a new node into linked list at front, middle, end
   iii. Delete an existing node from list.
   iv. Traverse the list in forward direction
4. Write a program that reads two lists of elements, prints them, reverses them, prints the reverse list, merges the list, prints merge list.
5. Implement a polynomial ADT and write a program to read two polynomials and print them, adds the polynomials, prints the sum, multiply the polynomials and print the product.
6. write a program that reads an infix arithmetic expression of variables, constants, operators (+, -, *, /) and converts it into the corresponding postfix form. Using Stack data structure.
7. Implement Circular Queue ADT .
8. Implement Binary search Tree ADT and write a program that interactively allows

   (a) Insertion (b) Deletion (c) Find_min (d) Find_max (e) Find operations (f) Height of tree.
9. Implement Binary Tree Traversals recursion/non recursion.
10. WAP for AVL Tree to implement following operations: (For nodes as integers)
    a. Insertion: Test program for all cases (LL, RR, RL, LR rotation)
    b. Deletion: Test Program for all cases (R0, R1, R-1, L0, L1, L-1)
    c. Display: using set notation.
11. Write a Program to implement graph traversals techniques.

Text books:

1. Richard F.Gilberg, Behrouz A. Forouzan, "Data Structures –A Pseudocode Approach with C", 2nd Edition, Cengage Learning.
2. Y.Langsam, M.J.Augeustein and A.M.Tenenbaum, "Data Structures Using C", Pearson Education Asia.

ME103 ENGINEERING GRAPHICS

L	T	P	To	C
1	-	3	4	3

Course description and Objectives :

To familiarize students with the conventional concept of engineering drawing and application through AutoCAD.

Course Outcomes:

After completion of this course, student will be able to prepare plan and elevation of any pictorial view either conventional or through AutoCAD.

UNIT - I

Introduction to Engineering drawing: Introduction to Engineering Drawing – Types of lines, lettering, dimensioning Construction of polygon & Conics. (Ellipse, Parabola & Hyperbola by general method)

UNIT - II

Orthographic Projections: Principle of projection-Planes of projections.

Projections of points:

Projection of straight lines: Inclined to one plane and both the planes.

Projections of planes: Simple planes, Planes inclined to reference planes.

UNIT - III

Projections & Sections of solids – projections of prisms – cylinders – cones - pyramids – solid axis inclined to one plane, simple sections- prism, cylinder, pyramid and cone. AutoCAD Fundamentals.

UNIT - IV

Isometric projections: Isometric drawing of simple objects through AutoCAD

UNIT - V

Orthographic projections: Conversion of Pictorial view into orthographic view using AUtoCAD and Conventional.

TEXT BOOKS :

1. N.D.Bhatt, “Engineering Drawing”, 49th ed., Charotar Publication, 2007.
2. K. Venugopal, “Engineering Drawing through Auto CAD”, 1st ed., New Age Publication, 2008.

REFERENCE BOOKS :

1. Jhole, “Engineering Drawing”, 2nd ed., Tata McGraw Hill, 2008.
2. K.L. Narayana, “Engineering drawing” 2nd ed., Scitech Publications, 2008.

ME105 WORKSHOP PRACTICE

L	T	P	To	C
-	-	3	3	2

Course description and Objectives :

To provide the hands on experience to the students on basic workshop skills.

Course Outcomes:

After completion of this course, students will be able to identify various tools connected to all the trades. They are also able to make various objects to the given dimension by using various types of tools.

Trades for exercises:

1. Carpentry:
2. Fitting
3. Tin Smithy & Black smithy4. House wiring
5. Foundry & Welding (Demonstration)
6. Machine shop & CNC (Demonstration)
7. IT Workshop
8. Study of discrete components of computer and networking (1 session)
9. Demonstration of assembling a computer, disk partitioning and installation of system and application software. installation of modem etc. (2 sessions)

Note: In each trade, the students has to perform at least two jobs

TEXT BOOKS :

1. S.K. Hazra Choudhury, Elements of workshop Technology, 11th Edition, Media Promoters, 1997
2. Gopal, T.V., Kumar, T., and Murali, G., A first course on workshop practice – Theory, Practice and Work Book, Suma Publications, Chennai, 2005.
3. Venkatachalapathy, V. S., First year Engineering Workshop Practice, Ramalinga Publications, Madurai, 1999.

VFSTR UNIVERSITY

II Year - B.Tech

SYLLABUS

I SEM & II SEM

B.Tech. II Year	L	T	P	To	C
	3	1	-	4	4

HS213 PROBABILITY & STATISTICS

Course Description and Objectives:

1. *Acquire skills in handling situations involving more than one random variable and functions of random variables.*
2. *Be introduced to the notion of sampling distributions and have acquired knowledge of statistical techniques useful in making rational decision in management problems.*
3. *Be exposed to statistical methods designed to contribute to the process of making scientific judgments in the face of uncertainty and variation.*

Course Outcomes:

- *After studying this subject, student will be in a position to solve all problems related to statistics.*
- *As civil engineer needs to have an idea of failure probabilities and life expectations of structures, this subject will give an easy access to solutions for all these probability related problems.*

UNIT – I

Probability – axiomatic definition, conditional probability, Baye's theorem, Dependent and independent events, Random variables. Distribution function, probability mass and density functions, expectation.

UNIT – II

Special distributions – Binomial, Poisson, uniform, exponential. Independence of random variables, normal and Poisson approximations to binomial.

UNIT – III

Estimation & Sampling Distribution - Population, sample, parameters, point estimation, (unbiasedness, consistency). Comparing two estimators, confidence interval estimation for mean and proportion. Difference of means, variance, proportions, sample size problem.

UNIT – IV

Test of Hypotheses - Test of hypotheses- test of means, variance, two sample problems, test of proportions, relation between confidence interval and Test of hypotheses, chi-square goodness of fit, F- test, T-test.

UNIT – V

Correlation & Regression - Simple linear regression, curve fitting. Covariance correlation tests for slope and correlation, analysis of variance, regression analysis.

TEXT BOOKS :

1. S.C. Gupta and V.K.Kapoor, “Fundamentals of Mathematical Statistics”, 12th ed., Sultan Chand & Co., New Delhi, 2005.

2. T.K.V. Iyengar, “Probability & Statistics”, S.Chand, 2010.

REFERENCE BOOKS :

1. G.S.S. Bhismarao, “Probability and statistics for engineers”, 4th ed., Scitech publications, 2010.

2. B.V. Ramana, “Engineering Mathematics”, 3rd ed., Tata McGraw Hill, 2008.

3. Miller and Freund, “Probability & Statistics for Engineering”, 7th ed., Pearson, 2001.

4. H.K. Dass, “Advanced Engineering Mathematics”, S.Chand, 2009.

5. Shanaz bahthul, “Probability & Statistics”, 2nd ed., Unitech Publishers, 2008.

B.Tech. II Year	L	T	P	To	C
	3	1	-	4	4

HS213 PROBABILITY & STATISTICS

Course Description and Objectives:

1. *Acquire skills in handling situations involving more than one random variable and functions of random variables.*
2. *Be introduced to the notion of sampling distributions and have acquired knowledge of statistical techniques useful in making rational decision in management problems.*
3. *Be exposed to statistical methods designed to contribute to the process of making scientific judgments in the face of uncertainty and variation.*

Course Outcomes:

- *After studying this subject, student will be in a position to solve all problems related to statistics.*
- *As civil engineer needs to have an idea of failure probabilities and life expectations of structures, this subject will give an easy access to solutions for all these probability related problems.*

UNIT – I

Probability – axiomatic definition, conditional probability, Baye's theorem, Dependent and independent events, Random variables. Distribution function, probability mass and density functions, expectation.

UNIT – II

Special distributions – Binomial, Poisson, uniform, exponential. Independence of random variables, normal and Poisson approximations to binomial.

UNIT – III

Estimation & Sampling Distribution - Population, sample, parameters, point estimation, (unbiasedness, consistency). Comparing two estimators, confidence interval estimation for mean and proportion. Difference of means, variance, proportions, sample size problem.

UNIT – IV

Test of Hypotheses - Test of hypotheses- test of means, variance, two sample problems, test of proportions, relation between confidence interval and Test of hypotheses, chi-square goodness of fit, F- test, T-test.

UNIT – V

Correlation & Regression - Simple linear regression, curve fitting. Covariance correlation tests for slope and correlation, analysis of variance, regression analysis.

TEXT BOOKS :

1. S.C. Gupta and V.K.Kapoor, “Fundamentals of Mathematical Statistics”, 12th ed., Sultan Chand & Co., New Delhi, 2005.
2. T.K.V. Iyengar, “Probability & Statistics”, S.Chand, 2010.

REFERENCE BOOKS :

1. G.S.S. Bhismarao, “Probability and statistics for engineers”, 4th ed., Scitech publications, 2010.
2. B.V. Ramana, “Engineering Mathematics”, 3rd ed., Tata McGraw Hill, 2008.
3. Miller and Freund, “Probability & Statistics for Engineering”, 7th ed., Pearson, 2001.
4. H.K. Dass, “Advanced Engineering Mathematics”, S.Chand, 2009.
5. Shanaz bahthul, “Probability & Statistics”, 2nd ed., Unitech Publishers, 2008.

B.Tech.	II Year	L	T	P	To	C
		3	1	-	4	4

CE217 SURVEYING – I

Course Description and Objective:

This course deals with various methods employed for the measurement of areas and volumes and to mark the positions of the proposed structures on the ground by using various techniques.

Course Outcomes:

- *Measuring all the land measurements including horizontal distances, elevations, and areas with chain, compass, and leveling instruments.*
- *Taking horizontal and vertical angle to simplify the calculations involving in height and distance measurements of inaccessible points.*
- *Theodolites are useful to construct closed and open traverses for the finding out of land areas in large scales.*

UNIT – I

Surveying & Measurements: Surveying, History; Definition, Classification, Principles of surveying, Plan and map, Measurements, Basic Measurements and methods, Scale, Scales used for Maps and plans.

Chain Surveying:*(Linear Measurements)* Different methods, Ranging out, Chaining a line on a flat ground, Chaining on an uneven or a sloping ground, Chain & Tape corrections, Degree of accuracy, Principles of chain surveying, Basic definitions, Well, Conditioned Triangle, Instruments used in chain survey, Field book, Field work; Offsets, Cross Staff survey, Obstacles in chain survey.

UNIT – II

Compass Surveying: Compass: Types, Bearings and Angles; Prismatic compass; Magnetic Dip and Declination; Local attraction, Compass traversing, Fieldwork, Plotting of a compass traverse; Errors in Compass surveying; Limits of accuracy.

UNIT – III

Simple Levelling: Basic definitions; Curvature and Refraction; Different methods of leveling; Classification of direct levelling methods, Levels, Dumpy level, Tilting level, Auto level, Sensitivity of a Level tube, Levelling staff; Level field book, Profile levelling, Cross sectioning, Reciprocal levelling; Sources of errors in levelling; Degree of Precision.

Contouring: Methods of representing Relief, Contouring; Contour interval, Characteristics of contours; Methods of locating contours, Direct and indirect methods contouring; Interpolation and sketching of contours; Location of a contour gradient, Ceylon Ghat Tracer; Uses of contour maps, Indian Pattern Tangent Clinometers.

UNIT – IV

Vernier Theodolite: Basic definitions; Fundamental lines and desired relations, Temporary adjustments; Measurement of a horizontal angle; Repetition and Reiteration methods of horizontal angle measurement. Measurement of vertical angle, Sources of errors in Theodolite survey.

UNIT – V

Plane Table Surveying: Plane table and its accessories, setting up, Plane tabling methods, Resection by trial and error method. Three point problem, Errors in plane tabling.

Errors in Surveying : Accuracy; Precision, Sources of errors, Types of errors and their propagation, Measures of precision, weights of measurements, degree of accuracy

TEXT BOOKS:

1. Dr. K. R. Arora,"Surveying Vol. 1", 10th ed., Standard Book House, 2008.
2. AM Chandra,"Plane Surveying",2nd ed., New Age International (P) Ltd.2006.

REFERENCE BOOKS:

1. B.C.Punmia, "Surveying Vol.1&2",15th ed., Laxmi publishers, 2005.
2. Arthur Bannister, A Bannister, Stanly Reymond, "Surveying", 7th ed., Prentice Hall and Reymand Baker addison - Wesly, 1998.

B.Tech. II Year	L	T	P	To	C
	3	1	-	4	4

CE219 SOLID MECHANICS

Course Description and Objective:

To impart the students the knowledge to understand the internal behavior of mechanical elements under the action of applied loads.

Course Outcomes:

- *Calculation of internal stresses and strains to know mechanical behavior of solid material under the externally applied loads and forces*
- *Finding out of shear forces and bending moments of structural components like beams, columns, and slabs, for different load cases.*
- *Calculation of developed internal stresses in beams under flexural actions*
- *Can calculate torsional forces developed in components with circular cross sections like rods*
- *Analysis and observation of thin cylinders under internally applied pressures*

UNIT – I

Simple Stresses and Strains : Elasticity and plasticity, Types of stresses and strains, Hook's law, stress, strain diagram for mild steel, Working stress, Factor of safety, Lateral strain, Poisson's ratio and volumetric strain, Elastic moduli and the relationship between them, Bars of varying section, composite bars, Temperature stresses.

Shear Force and Bending Moment: Definition of beam, Types of beams, Concept of shear force and bending moment, S.F and B.M diagrams for cantilever, simply supported and overhanging beams subjected to point loads, uniformly distributed load, uniformly varying loads and combination of these loads, Point of contra flexure, Relation between S.F., B.M and rate of loading at a section of a beam.

UNIT - II

Flexural Stresses: Theory of simple bending, Assumptions, Derivation of bending equation: M/I = f/y = E/R, Neutral axis, Determination bending stresses, section modulus of rectangular and circular sections (Solid and Hollow), I, T, Angle and Channel sections, Design of simple beam sections.

Shear Stresses: Derivation of formula, Shear stress distribution across various beam sections like rectangular, circular, triangular, I, T, angle sections.

UNIT – III

Principal Stresses and Strains: Introduction, Stresses on an inclined section of a bar under axial loading, compound stresses, Normal and tangential stresses on an inclined plane for biaxial stresses, Two perpendicular normal stresses accompanied by a state of simple shear, Mohr's circle of stresses, Principal stresses and strains, Analytical and graphical solutions.

Torsion: Introduction, Torsion equation, shear stress distribution for circular solid and hollow shafts, Stepped shafts, Shafts fixed at both the ends.

UNIT – IV

Thin Cylindrical Shells: Introduction, hoop and longitudinal stresses and strains, thin spherical shell stresses.

Columns and struts: Introduction-types of columns, Euler's formula, equivalent length-end conditions, Rankine's formula, slenderness ratio.

UNIT – V

Direct and Bending Stresses: Stresses under the combined action of direct loading and B.M, core of a section, determination of stresses in the case of dams, conditions for stability.

Failure Theories: Introduction, maximum normal stress theory, maximum shearing stress theory, maximum strain energy theory, maximum distortion energy theory, comparison of theories.

TEXT BOOKS:

1. Bhavikatti, "Strength of Materials", 3rd ed., Vikas Publishing house, 2008.

2. Ramamrutham, “Strength of Materials”, 7th ed., Dhanpat Rai Publishing house, 1983.

REFERENCE BOOKS:

1. Egor P. Popov, “Engineering Mechanics of Solids”, 2nd ed., Prentice hall of India, New Delhi, 1976.
2. Srinath L.N, “Advanced Mechanics of Solids”, 3rd ed., Tata McGraw Hill Publishing Company Ltd., New Delhi, 2009.
3. S. Timshenko, “Strength of Materials”, 3rd ed., Tata McGraw Hill Publishing Company Ltd., New Delhi, 1956.
4. Vazirani and Ratwani, “Analysis of Structures”, 17th ed., Khanna publishers, 2007.
5. Sadhu Sing, “Strength of Materials”, 8th ed., Khanna Publishers, 2003.
6. R.K.Bansal, “Strength of Materials”, 4th ed., Laxmi Publishers, 2006.

B.Tech.	**II Year**	**L**	**T**	**P**	**To**	**C**
		3	1	-	4	4

CE221 FLUID MECHANICS

Course Description and Objective:

This course is designed to explain basic concepts of fluid flow and to derive basic equations-continuity, energy & momentum and their applications to various flow measuring devices, pipe bend, jets and propeller etc.

Course Outcomes:

- *Basic definitions related to fluids & fluid mechanics*
- *Brief idea about all important properties of fluids like viscosity, density, specific weight etc,*
- *To measure pressure in fluid flowing pipes and vessels,*
- *To handle different kinds of pressure measuring instruments*
- *Apply continuity equation and energy equation in solving problems on flow through conduits*

UNIT - I

Fluids: Definition, Ideal fluids, real fluids, Newtonian and non-Newtonian fluids.

Properties of Fluids: Units of measurement, Mass density, Specific weight, Specific volume, Specific gravity, Viscosity, Surface tension and Capillarity, Compressibility and Elasticity.

Measurement of Pressure: Pressure at a point in a static fluid; pressure variation in an incompressible static fluid; atmospheric pressure, Gauge pressure, vacuum pressure, absolute pressure, Manometers, Bourdon pressure gauge.

UNIT - II

Hydrostatic Forces: Forces acting on immersed plane surfaces, Center of pressure, forces on curved surfaces.

Buoyancy: Conditions of equilibrium for floating bodies, meta-center and meta-centric height, experimental and analytical determination of meta-centric height.

UNIT – III

Fluid kinematics: Types of Flows, Steady and unsteady flows, uniform and non-uniform flows, stream lines, path lines, stream tubes, principles of conservation of mass, equation of continuity, acceleration of fluid particles: local and convective, Rotational and irrotational motions, free and forced vortex, velocity potential and stream function, flow net.

Fluid Dynamics: Euler’s equations of motion and integration of Euler’s equations, Bernoulli’s equation for incompressible fluids.

UNIT – IV

Flow Measuring devices: Pitot tube, Venturimeter, orifice meter, orifices & mouth pieces, time of emptying of tanks by orifices, sharp edged rectangular, triangular and trapezoidal notches, Francis formula, Velocity of approach, End contractions; Cippoletti Weir.

Momentum Equation and its Application: Development of momentum equation by control volume concept, Momentum correction factor, applications, forces on pipe bend.

UNIT – V

Analysis of Pipe Flow: Darcy's equation, Minor losses, pipes in series, pipes in parallel, Total energy line and hydraulic gradient line, Hydraulic power transmission through a pipe, Siphon, Water hammer.

Laminar Flow: Reynolds experiment, Characteristics of laminar flow, Steady laminar flow through a circular pipe (Hazen poiseuilles equation).

Turbulent Flow in Pipes: Characteristics of turbulent flow, Prandtl's mixing length theory, Hydro dynamically smooth and rough boundaries, Velocity distribution, Friction factor for pipe flow, Variation of friction factor with Reynolds number, Moody's chart.

TEXT BOOKS:

1. P. N. Modi & S. N. Seth, "Hydraulics and Fluid Mechanics", 12th ed., Standard book house, New Delhi,1998.
2. R. K. Bansal, "Fluid Mechanics and Hydraulic Machines", 9th ed., Laxmi Publications, New Delhi, 2005.

REFERENCE BOOKS:

1. Streeter and Wyile, "Fluid Mechanics", 1st ed., Mc Graw-hill Publications, 1998.
2. S K Som & G Biswas, "Fluid Mechanics", 2nd ed., TMH, 2008.
3. John F. Douglas, Janusz M. Gasiorek, John A. Swaffield, "Fluid Mechanics", 5th ed., Pearson Education Publishers.

B.Tech.	**II Year**	**L**	**T**	**P**	**To**	**C**
		3	1	-	4	4

CE223 BUILDING MATERIALS AND CONCRETE TECHNOLOGY

Course Description and Objective:

This course is meant to understand various engineering properties of building materials like stones, bricks, lime, timber, steel and paints. This course is also designed to understand the properties and tests on cement, aggregates and concrete. It also covers the mix design of concrete.

Course Outcomes:

- To understand the properties of all engineering materials including bricks, lime, timber etc
- To understand the properties of ingredients of concrete
- To study the behavior of concrete at its fresh and hardened state
- To study about the concrete design mix

UNIT – I

Building Materials :

Stones: Qualities of a good building stones, Common building stones of India.

Bricks: General, Composition of good brick earth, Harmful ingredients in brick earth, Manufacture of bricks by clamp burning and kiln (Hoffman's kiln only) burning, Qualities of good bricks, Tests for bricks, Classification of bricks, Size and weight of bricks.

Lime: General, Some definitions, Sources of lime, Constituents of limestones, Classification of limes, Properties of fat lime and hydraulic lime, manufacture of lime.

Timber: Definition, Structure of a tree, Qualities of good timber; Decay of timber; Seasoning of timber, Preservation of timber; Advantages of timber construction.

UNIT – II

Cements & Aggregates : Cements: Portland cement, chemical composition, hydration, setting of cement, Structure of hydrated cement, Tests on physical properties, Different grades of cement.

Aggregates: Classification, source, size and shape, texture and influence of texture on strength, specific gravity of aggregates, moisture in aggregates, bulking of fine aggregate, methods used for determination of moisture content of aggregates, grading of aggregates, sieve analysis, standard grading curve, grading limits of fine aggregates as per IS: gap grading.

UNIT – III

Fresh Concrete & Admixtures: Workability, Factors affecting workability, Measurement of workability by different tests, Setting times of concrete, Effect of time and temperature on workability, Segregation & bleeding, Mixing and vibration of concrete, Methods of curing, Quality of mixing water.

Admixtures: General, plasticizers and super plasticizer, Dosage, mixing procedure, equipment, effect of super plasticizers on the properties of hardened concrete, Retarders, accelerators, Air-entraining admixtures, factors affecting amount of air-entrainment, effect of air-entrainment on the properties of concrete, fly ash, effect of fly ash on fresh and hardened concrete, high volume fly ash concrete, silica fume, available forms, effect of silica fume on compressive strength of concrete, construction chemicals for curing, construction chemicals for water proofing.

Hardened Concrete: General; water-cement ratio, gel/space ratio; gain of strength with age; maturity concept of concrete, effect of maximum size of aggregate on strength.

Testing Of Hardened Concrete: Compression tests, Factors affecting strength, Flexure test, Splitting tests, Non-destructive testing methods, codal provisions for NDT.

UNIT – IV

Elasticity, Creep & Shrinkage: Modulus of elasticity, Dynamic modulus of elasticity, Posisson's ratio, Creep of concrete, Factors influencing creep, Relation between creep & time, Nature of creep, Effects of creep, Shrinkage, types of shrinkage.

Durability of Concrete: Factors contributing to cracks in concrete, sulphate attack and methods of controlling sulphate attack, chloride attack, corrosion of steel and its control.

UNIT – V

Mix Design: Factors in the choice of mix proportions, Quality Control of concrete, Statistical methods, Acceptance criteria, Proportioning of concrete mixes by various methods, BIS method of mix design.

Special Concretes: Light weight aggregates, Light weight aggregate concrete, Fiber reinforced concrete, Different types of fibers, Factors affecting properties of F.R.C, High performance concrete.

TEXT BOOKS:

1. M.S.Shetty, “Concrete Technology”, 1st ed., S.Chand & Co, 2005.
2. S. C. Rangwala, “Engineering Materials”, 36th ed., Charotar Publishing House, Anad, 2009.

REFERENCE BOOKS:

1. M.L. Gambhir, “Concrete Technology”, 3rd ed., Tata McGraw Hill Publishers, New Delhi, 1986.
2. A.R. Santha Kumar, “Concrete Technology”, 3rd ed., Oxford University Press, New Delhi, 2009.
3. A.M.Neville, “Properties of Concrete”, 4th ed., Longman Technical & Scientific, 2009.

B.Tech. II Year

L	T	P	To	C
-	-	3	3	2

CE209 MATERIAL TESTING LAB

Course Description and Objective:

To evaluate the mechanical and physical properties of steel, wood and cement.

Course Outcomes:

- *To find the Young Modulus, torsional strength, hardness and tensile strength of given specimens*
- *To find impact value and crushing value of coarse aggregates*
- *To find the compressive strength of concrete cubes and bricks*
- *To find stiffness of open coiled and closed coiled springs*
- *To find the physical properties of given coarse aggregate, fine aggregate and cement samples*

Note: A minimum of twelve (12No) shall be done and recorded

1. To study the stress-strain characteristics of HYSD bars by UTM.

2. To find young's modulus of the given material (steel or wood) by conducting bending test on simply supported beam.

3. To find modulus of rigidity by conducting torsion test on solid circular shaft.

4. To find the hardness of the given material by Brinnel's or Vickers hardness tester.

5. To find impact resistance of the given material by conducting Charpy test on Impact testing machine.

6. To determine the ultimate shear strength of steel rod in single and double shear.

7. To determine the modulus of rigidity of the spring.

8. Normal consistency and Initial setting and final setting time of cement

9. Fineness of cement.

10. Compressive strength of Cement.

11. Slump cone test to determine workability of concrete.

12. Compaction factor or Vee-Bee consist meter test to determine the workability of concrete.

13. To determine the compressive strength and split tensile strength of concrete.

14. Specific gravity of fine and coarse aggregates.

15. Bulking of fine aggregate.

16. To determine the fineness modulus of fine aggregate and coarse aggregate.

17. Non-destructive testing on concrete (for demonstration) and concrete mix Design (IS method-For demonstration).

B.Tech.	II Year	L	T	P	To	C
		-	-	3	3	2

CE211 SURVEYING FIELD WORK – I

Course Description and Objective:

To understand basic surveying methods and use of various instruments for surveying of given geographical locations.

Course Outcomes:

- *use conventional surveying tools such as chain/tape, compass, plane table, level in the field of civil engineering applications such as structural plotting and highway profiling*
- *apply the procedures involved in field work and to work as a surveying team*
- *plan a survey appropriately with the skill to understand the surroundings*
- *take accurate measurements, field booking, plotting and adjustment of errors can be understood*
- *plot traverses / sides of building and determine the location of points present on field on a piece of paper*

Chain & Compass Survey

1. Chaining of a line using Chain / Tape and Recording of details along the chain line.
2. Measurement of area – Cross staff survey.
3. Traversing by compass and graphical adjustment.
4. Determination of distance between two inaccessible points.

Simple Levelling

5. Measurement of elevation difference between two points using any leveling Instrument
6. Elevation difference between two points by Reciprocal leveling method.
7. Profile Leveling – Plotting of Profile.
8. Contouring of a small area by method of Blocks.

Plane Table Survey

9. Determination of the distance between two inaccessible points.
10. Plotting of a building by plane table Traversing
11. Resection by Trial and Error method.

Theodolite

12. Measurement of horizontal and vertical angles.
13. Determination of distance between two inaccessible points.

B.Tech.	**II Year**	**L**	**T**	**P**	**To**	**C**
		-	-	3	3	2

HS217 SOFT SKILLS LABORATORY

Course Rationale

Effective communication and interpersonal skills are crucial to increase employment opportunities and to compete successfully in the business environment. The real key to the effectiveness of professionals is their ability to put their domain knowledge into effective practice. In this context, soft skills have a crucial role to play. If future managers know how to deal with people at the emotional level (peers, subordinates, superiors, clients, suppliers, etc.) through Emotional Intelligence (EI), they can build and sustain effective relationships that will result in mutual gain.

Course Objectives:

By the end of the soft skills training programme, the students should be able to:

- Develop effective communication skills (spoken and written).
- Develop effective presentation skills.
- Conduct effective business correspondence and prepare business reports which produce results.
- Become self-confident individuals by mastering inter-personal skills, team management skills, and leadership skills.

- Develop all-round personalities with a mature outlook to function effectively in different circumstances.
- Develop broad career plans, evaluate the employment market, identify the organizations to get good placement, match the job requirements and skill sets.
- Take part effectively in various selection procedures adopted by the recruiters.

Course Content :

The following Course Content is prescribed for the Soft Skills Lab:

- Functional English
- Starting a conversation – responding appropriately and relevantly – using the right body language – role play in different situations.
- Vocabulary building – Synonyms and antonyms, word roots, one-word substitutes, prefixes, suffixes, study of word origin, analogy, idioms and phrases.
- Group Discussion – Dynamics of group discussion , intervention, summarizing, modulation of voice, body language, relevance, fluency and coherence.
- Aspects of Interpersonal Communication – Personal grooming, body language, assertiveness and negotiation skills.
- Presentation Skills – Understanding the audience, Planning & Organising the content, Setting expectation, Using visuals, Using numbers.
- Career planning – Goal Defining, SWOT Analysis, Time Management & Stress Management.
- Interview Skills – concept and process, pre-interview planning, opening strategies, answering strategies, interview through tele and video-conferencing.
- Resume writing – structure and presentation, planning, defining the career objective, projecting ones strengths and skill-sets, summary, formats and styles, letter-writing.

- Listening Comprehension.
- Different types of Listening, Top- Down Approach and Bottom – up Approach.
- Reading comprehension – reading for facts, guessing meanings from context, scanning, skimming, inferring meaning and critical reading.
- Technical Report writing – Types of formats and styles, subject matter – organization, clarity, coherence and style, planning, data-collection, tools and analysis.

REFERENCE BOOKS:

1. Abraham. H.Maslow, "Motivation and personality" 3rd ed., Pearson Education, 2008.
2. John Adair Kegan page, "Leadership for Innovation" 1st ed., Kogan, 2007.
3. Boone L E and Kurtz D.L , "Contemporary Business" , 1994.
4. M.Ashraf Rizvi, "Effective Technical Communication", 1st ed., Tata McGraw Hill, 2005.
5. Krishna Mohan & NP Singh , "Speaking English Effectively" 1st ed., Macmillan, 2008.
6. Drummond Mary Ellen, "Fearless and Flawless Public Speaking with power polish and pizzazz", S.Chand & Co, 1995.
7. Soft Skills Material provided by Infosys Under the Academic Initiative of Campus Connect
8. K.R. Lakshminarayana, "Managing Soft Skills", 1st ed., Scitech Publications, 2009.

B.Tech.	II Year	L	T	P	To	C
		3	1	-	4	4

CE202 STRUCTURAL ANALYSIS – I

Course Description and Objectives:

- *To understand the concept of analysis of indeterminate structures by various classical methods*
- *To study the use of ILD for determinate structure*
- *To learn the concepts of moving loads and its effect on structures*
- *To understand the concept of equivalent UDL*
- *To study the reversal of stress under live load*

Course outcomes:

- *On completion of the course, the students will be able to:*
- *apply the fundamental concepts of working stress method and limit state method*
- *use IS code of practice for the design of concrete elements*
- *design the beams, slab, stairs, column and footing*
- *draw various RCC structural elements*
- *design masonry structures*

UNIT – I

Deflection of Beams: Introduction-deflection equation for elastic curve of a beam-deflection, slope for cantilever beam and simply supported beams-Double integration method - Macaulay's method – Area moment methods.

UNIT – II

Energy Methods : Displacements of Determinate Structures Using Energy Methods: Maxwell's reciprocal theorem, Maxwell, Betti's generalized reciprocal theorem, Castigliano's theorems, Application of Castigliano's theorem for calculating deflection of beams, frames and trusses, Virtual work method for deflections.

UNIT – III

Influence Lines For Statically Determinate Structures: Moving loads and influence lines, Influence lines for beam reactions, Influence lines for shearing force, Influence lines for bending moment, Calculation of maximum shear force and bending moment at a section for rolling loads, Calculation of absolute maximum bending moment, Influence lines for simple trusses.

UNIT – IV

Propped Cantilevers: Analysis of propped cantilever by method of consistent deformations.

Fixed Beams: Fixed moments for a fixed beam of uniform section for different types of loading, Effect of sinking of support, Effect of rotation of a support, Bending moment diagram for fixed beams.

Clapeyron's Theorem of Three Moments: Analysis of continuous beam by Clapeyron's theorem of three moments.

UNIT – V

Strain Energy Method: Strain energy method for analysis of continuous beams and rigid joined plane frames up to second-degree redundancy.

Redundant Pin Jointed Frames: Analysis of pin jointed frames up to second-degree redundancy, Forces in indeterminate pin jointed frames due to temperature variation and lack of fit, Composite structure.

TEXT BOOKS:

1. Vazirani & Ratwani, "Analysis of Structures", Vols.1 & 2, 17th ed., Khanna Publishers, Delhi , 1997.
2. S.S.Bhavikatti, "Structural Analysis", Vol.1, 3rd ed., Vikas Publishing House Pvt. Ltd, 2009.

REFERENCE BOOKS:

1. C. K. Wang, "Indeterminate structural analysis", 1st ed., McGraw-Hill Publications, 1984.
2. Junnarkar & Shah, "Mechanics of Structures–II", 20th ed., Charotar Publishing House, 2008.

B.Tech.	**II Year**	**L**	**T**	**P**	**To**	**C**
		3	1	-	4	4

CE204 BUILDING CONSTRUCTION AND PLANNING

Course Description and Objective:

The course is meant to introduce to the students the construction of various building components. This course also covers principles of planning. At the end of the course, the student will be able to plan residential and public buildings.

Course Outcomes:

- *To promote development, production, standardisation and large-scale application of cost- effective innovative building materials and construction technologies in housing and building sector.*
- *To promote new waste-based building materials and components through technical support and encouraging entrepreneurs to set up production units in urban and rural regions.*
- *To develop and promote methodologies and technologies for natural disaster mitigation & management and retrofitting.*
- *To provide S & T services to professionals, construction agencies and entrepreneurs in*
- *selection, evaluation, design engineering.*

UNIT – I

Stone & Brick Masonry: Technical terms, Types of bonds in brickwork and their suitability. Classification of stone masonry**, Walls:** Classification of walls. **Floors:** Technical terms; Types of ground floors, **Roofs:** Technical terms, Classification of roofs, Steel sloping roofs; Roof covering materials, Types of flat roofs.

UNIT – II

Foundations: Shallow foundations – Spread, combined strap and mat footings. Deep foundations: pile foundations, cofferdam, caissons (Basic description only).

Finishings (Basic description only): Plastering & pointing, white washing and distempering, Painting, Constituents of paint, Types of paints, Painting of new/old Wood, Varnish.

Staircases: Technical terms, Types of staircases, design considerations.

Dampness and Damp Proofing: Causes of dampness, Methods of preventing dampness, Damp proofing materials, Methods of providing DPC under different situations.

Scaffolding & Form Work: Types of scaffolding, Types of formwork, Centering.

UNIT – III

Principles of Planning : An Approach to planning - Principles of Planning: Aspect, prospect, Privacy, Roominess, Furniture requirements, Grouping, Circulation, Orientation, Flexibility, Sanitation, Lighting, Ventilation, Elegance and economy. Climatic considerations, Flow diagram and line plan, Space for equipment for air–conditioning, Space for machinery etc.

UNIT – IV

Building Rules and Bye–Laws: Zoning regulations, Regulations regarding layouts or sub-divisions, Building regulations, Rules for special type of buildings, Calculation of plinth, floor and carpet area, Floor space index.

Building Elements: Conventional signs, Guidelines for staircase planning, Guidelines for selecting doors and windows, Terms used in the construction of door and window, Specifications for the drawing of door and window.

UNIT – V

Residential Buildings: Minimum standards for various parts of buildings, requirements of different rooms and their grouping, characteristics of various types of residential buildings.

Public Buildings: Planning of Educational institutions, hospitals, dispensaries, Office buildings, banks, industrial buildings, hotels and motels, buildings for recreation.

TEXT BOOKS :

1. B. C. Punmia et al., “Building construction”, 5th ed., Laxmi Publications, New Delhi,1993.

2. Kumaraswamy, “Building Planning & Drawing”, 2nd ed., Charothar Publishing House, 2007.

REFERENCE BOOKS:

1. M.G. Shah, C.M. Kale and S.Y. Patki, “Building Drawing”, 4th ed., Tata McGraw-Hill, New Delhi, 2002.
2. McKay, “Building Construction”, Vol. I, II, III & IV, 4th ed., Orient long man,1992.

B.Tech.	**II Year**	**L**	**T**	**P**	**To**	**C**
		3	**1**	**-**	**4**	**4**

CE206 HYDRAULICS AND HYDRAULIC MACHINES

Course Description and Objective:

The course is expected to understand the basic concepts of flow in open channel, working principle of different types of turbines and pumps and similarity of model and prototype.

Course outcomes:

- *The basic aim of hydraulics is to understand, and control for the benefit of society, the occurrence, movement and use of water, whether it is in lakes, rivers, pipes, drains, percolating through soils or pounding the coastline as destructive waves.*
- *To modify the behaviour of water calls inevitably for a large investment of time, resources and effort. Thus hydraulic engineering has only appeared once a society is centralized under an organized government.*

UNIT – I

Dimensional Analysis & Similitude: Dynamical Similarity and Dimensional Homegenity Model experiment, geometric, Kinematic and Dynamic similarity. Reynold’ss, Froude, Weber, Euler and Mach numbers. Distorted and undistorted models, Principle of dimensional analysis Rayleigh method, Buckingham theorem, applications of dimensional analysis to pipe Friction problems, resistance to motion of partially and fully submerged bodies.

UNIT – II

Open Channel Flow: Uniform Flow: Introduction, Classification of flows, Types of channels; Chezy, Manning's, Bazin, Kutter's Equations, Hydraulically efficient channel sections, Rectangular, Trapezoidal and Circular channels; Velocity distribution, Energy and momentum correction factors, Pressure distribution.

Open Channel Flow: Non-Uniform Flow: Concept of specific energy, Specific energy curves, Critical flow, Critical flow in a rectangular channel, Critical slope, Different slope conditions, Channel transitions, Reduction in width of channels, hump, Momentum principle applied to open channel flow, Specific force, Specific force curve.

UNIT – III

Open Channel Flow: Gradually Varied Flow: Dynamic equation, Surface Profiles, Computation of surface profiles by single step & multi step methods, Examples of various types of water surface profiles, Control section.

Open Channel Flow: Rapidly Varied Flow: Hydraulic jump, Elements and characteristics of hydraulic jump, Types of hydraulic jumps, Sequent depths, energy loss in a hydraulic jump.

UNIT – IV

Impact of free Jets: Impact of a jet on a flat or a curved vane, moving and stationary vane, flow over radial vanes.

Turbines: Classification, Efficiencies, Pelton wheel turbine, Francis turbine and Kaplan turbine. Governing of Pelton turbines, Draft-tube, Specific and unit quantities, Characteristic curves, Selection of turbines, model tests.

UNIT - V

Centrifugal pump: Components, working principle, manometric efficiency, work done, Minimum starting speed, Pumps connected in series and parallel, priming, Net positive suction head, Specific speed, Characteristic curves, Model testing

Reciprocating pumps: working principle, single acting and double acting, discharge slip, work done, indicator diagram, air vessels.

TEXT BOOKS :

1. P. N. Modi & S. N. Seth, “Hydraulics & Fluid Mechanics”, 12th ed., Standard Book house, New Delhi, 1998.
2. Dr. R. K. Bansal, “Fluid Mechanics & Hydraulic Machines”, 9 th ed., Laxmi Publications, New Delhi, 2005.

REFERENCE BOOKS :

1. K. Subramanya, “Open channel flow”, 3rd ed.,TMH Publisher, 2008.
2. A. K. Jain, “Fluid Mechanics”, 8 th ed., Khanna Publishers, Delhi, 2002.

B.Tech. II Year	L	T	P	To	C
	3	1	-	4	4

CE208 SURVEYING – II

Course Description and Objectives:

- *To understand the basics and elements of different types of curves on roads and their preliminary survey*
- *To learn about surveying applications in setting out of curves, buildings, culverts and tunnels*
- *To get introduced to different geodetic methods of survey such as triangulation, trigonometric leveling*
- *To learn about errors in measurements and their adjustments in a traverse*
- *To get introduced to modern advanced surveying techniques involved such as Remote sensing, Total station, GPS, Photogrammetry etc.*

Course outcomes:

- On completion of the course, the students will be able to:
- *set out curves, buildings, culverts and tunnels*
- *carry out a geodetic survey, taking accurate measurements using instruments and adjusting the traverse*

- *apply mathematical adjustment of accidental errors involved in surveying measurements*
- *plan a survey for applications such as road alignment and height of the building*
- *invoke advanced surveying techniques over conventional methods in the field of civil engineering*

UNIT – I

Electronic Distance Measurements: Basic concepts, Classification of Electronic Radiation, Basic principle of Electronic Distance Measurement, Computing the distance from the phase differences, Electronic Total Station-Types, measurement, recording, traversing, data retrieval. Instrumental errors in EDM.

UNIT – II

Areas: Introduction: Simpson's rule, Boundaries with offsets at irregular intervals, Meridian distance methods, Coordinate method, Planimeter, Area of Zero circle.

Volumes: Area of cross sections, two level section only, Trapezoidal rule, Prismoidal formula, Volume from spot levels, volume from contour plan, Capacity of a reservoir.

Setting Out Works: Control station, Horizontal control, Reference grid, Vertical control, Positioning of a structure, Setting out a foundation, Setting out with a theodolite, Grade stakes, setting out a sewer, Setting out a culvert.

UNIT – III

Theodolite Traverse: Selection of traverse stations, traversing fast needle method, Sources of errors in theodolite traversing; Field checks in traversing, Traverse Computations, Gale's traverse table, Methods of adjustments, Omitted measurements.

Tacheometric Surveying: Advantages of tacheometric surveying, Basic systems of tacheometric measurements, Determination of constants K and C, Inclined sight with staff vertical, Inclined sight with staff normal to the line of sight.

UNIT – IV

Triangulation: Principles of triangulation, Uses of triangulation survey, Classification of triangulation, Signals and towers, Satellite station, Base line & Extension of the base line.

Trigonometric Leveling: Introduction, Determination of level of top of object, base accessible, base inaccessible, Axis signal correction, Difference in elevation by single observation and reciprocal observations.

UNIT – V

Circular Curves: Basic definitions, Designation of a curve, Relationship between radius and degree of curve, Elements of a simple circular curve, Location of the tangent points, selection of peg interval, Methods of setting out simple curves, Problems in setting out curves.

TEXT BOOKS :

1. K .R. Arora, “Surveying”, Vol.-I & II, 10 th ed., Standard Book House, 2008.
2. B.C. Punmia, “Surveying”, Vol-II , 15 th ed., Laxmi Publications, 2005.

REFERENCE BOOK :

1. S K Roy, “Fundamentals of Surveying” 1st ed., Prentice-Hall of India Private Ltd., 1999.

B.Tech. II Year	**L**	**T**	**P**	**To**	**C**
	-	-	3	3	2

CE210 SURVEYING FIELD WORK - II

Course Description and Objectives:

- *The Lab sessions would include extensive experiments on*
- *Theodolite survey, Trignometric leveling to determine heights/ elevations, Tacheometry*

Course outcomes:

On completion of the course, the students will be able to:

- *use the theodolite along with chain/tape, compass on the field*

- *apply geometric and trigonometric principles of basic surveying calculations*
- *plan a survey, taking accurate measurements, field booking, plotting and adjustment of errors*

Total Station

1. Study of Instrument, Determination of Distances, Directions and Elevations
2. Determination of Boundaries of a Field and computation of area.
3. Determination of Heights of objects.

Setting out Simple Curves & Works

4. Setting out simple curve using tape and theodolite.
5. Setting out a simple curve using Total Station.
6. Setting out foundations for a Building.

Survey Camp is to be conducted for a minimum period of seven days Using Total Station to train in one of the following areas:

i. Preparation of a contour Plan/ Map.
ii. Earth work Computations for a high way / canal projects
iii. Marking of a Sewer line/ Water supply line.
iv. Any type of Execution works.

B.Tech. II Year	**L**	**T**	**P**	**To**	**C**
	-	-	3	3	2

CE212 FLUID MECHANICS & HYDRAULIC MACHINERY LAB

Course Description and Objective:

To create in students awareness about the factors related to determination of efficiencies of hydraulic pumps and turbines.

Course Outcomes:

On completion of the course, the students will be able to:

- *measure discharge in pipes*

- *determine the energy loss in conduits*
- *demonstrate the characteristics curves of pumps*

1. Impact of jets on Vanes.
2. Performance Test on Pelton Wheel.
3. Performance Test on Francis Turbine.
4. Performance Test on Multi Stage Centrifugal Pump.
5. Performance Test on Reciprocating Pump.
6. Calibration of Venturimeter.
7. Calibration of Orifice meter.
8. Determination of friction factor for a given pipe line.
9. Determination of loss of head due to sudden contraction in a pipeline
10. Verification of Bernoulli's equation
11. Determination of Coefficient of discharge by Mouthpiece
12. Determination of Coefficient of discharge by orifice
13. Determination of discharge by V-Notch
14. Determination of discharge by Rectangular - Notch

VFSTR UNIVERSITY

III Year - B.Tech

SYLLABUS

I SEM & II SEM

B.Tech.	III Year	L	T	P	To	C
		4	-	-	4	4

CE317 DESIGN OF REINFORCED CONCRETE STRUCTURES

Course Description and Objective:

To understand the loads coming onto the structure, methods of design and codes of practices used. To understand the analysis of singly reinforced, doubly reinforced, flanged sections by working stress and limit state methods. To understand the design for shear, development length, deflection and cracking.

Course Outcomes:

- *Design the Reinforced Concrete beams using limit state and working stress methods*
- *Design Reinforced Concrete slabs*
- *Design the Reinforced Concrete Columns and footings*
- *Design structures for serviceability*

UNIT - I

Methods of Design of Concrete Structures: Concept of working stress method and limit state method- advantages of limit state method -design codes and specifications of limit state philosophy as per current IS code

Limit State Design of Beams: Singly and doubly reinforced rectangular and flanged beams

UNIT – II

Limit State Design for Shear, Torsion, Bond and Anchorage: Behavior of RC beams in shear and torsion-shear and torsion reinforcement-limit state design of R C members for combined bending shear and torsion- use of design aids.

UNIT – III

Limit State Design of Slabs: Analysis and design of one way , two way and continuous slabs –boundary conditions and corner effects.

UNIT – IV

Limit State Design of Columns: Types of columns-analysis and design of short columns for uni-axial and bi-axial bending-design of long columns-use of design aids.

Limit State Design of Footings: Design of wall footing-design of axially and eccentrically loaded rectangular footing-design of combined rectangular footing for two columns only.

UNIT – V

Working Stress Method: Assumptions; Permissible stresses in concrete and steel; Balanced design; Transformed area method; Analysis and design for flexure of singly reinforced, doubly reinforced sections.

Limit State Design For Serviceability: Design of members for serviceability requirements of deflection and cracking.

TEXT BOOKS:

1. Varghese P C, “Limit State Design of Reinforced Concrete”, 2nd ed., Prentice Hall of India Private Limited, New Delhi, 2009.

2. B.C.Punmia, Ashok Kumar Jain & Arun Kumar Jain “Limit State Design of Reinforced Concrete(AS PER IS 456:2000)”, 1st ed., Laxmi Publications, 2007.

REFERENCE BOOKS:

1. Ashok K. Jain, “Reinforced Concrete (limit state design)”, 23rd ed., Roorkee, Nem Chand & Bros, 2003.

2. S Unnikrishna Pillai & Devdas Menon, “Reinforced Concrete Design”, 2nd ed., Tata McGraw-Hill Education Publishers , May 2003.

3. H. J. Shah, “Reinforced concrete”, 15th ed., Charotar Publishing House, 2000.

B.Tech. III Year	L	T	P	To	C
	4	-	-	4	4

CE319 STRUCTURAL ANALYSIS – II

Course Description and Objective:

At the end of the course, the student is able to analyze continuous beams and multi-storey frames by various methods like slope deflection, moment distribution and Kani's method.

Course Outcomes:

- *Analyze multistoried structures.*
- *Analyze three hinged arches and two hinged arches*

UNIT – I

Slope Deflection Method: Slope - deflection equations; Principles of the method; Applications of the method to the analysis of continuous beams and portal frames (Single bay, single storey with vertical legs without side sway).

UNIT – II

Moment Distribution Method: Principles of the method; Application of the method to analysis of continuous beams and portal frames (Single bay, single storey with vertical legs only) without and with side sway.

UNIT – III

Multi Storey Frames (Approximate Methods): Portal method and cantilever method for lateral loads.

UNIT – IV

Kani's Method: Principles of the method; Application to continuous beams and portal frames (single bay, single storey with vertical legs only) without and with side-sway

UNIT – V

Three-Hinged Arches: Introduction; Eddy's theorem for bending moment; parabolic arch; circular arch; Horizontal thrust; arch supported at different levels.

Two-Hinged Arches: Introduction; Horizontal thrust;circular and parabolic arches carrying concentrated load & uniformly distributed load; Effect of change in temperature .Introduction to fixed arches.

TEXT BOOKS :

1. Vazirani & Ratwani, "Analysis of Structures vols. 1 & 2", 12th ed., Khanna Publishers, Delhi, 1992.
2. S.S.Bhavikatti, "Structural Analysis Vols.1&2", 3rd ed., Vikas Publishing House Pvt.Ltd., Delhi, 2008.

REFERENCE BOOKS :

1. C. K. Wang, "Indeterminate structural analysis", 4th ed., McGraw-Hill Publications, 2003.
2. C.S.Reddy, "Basic Structural Analysis", 2nd ed., Tata Mc Graw Hill Publications, 2009.

B.Tech. III Year	L	T	P	To	C
	4	-	-	4	4

CE 321 GEOTECHNICAL ENGINEERING- I

Course Description and Objective:

This subject is meant to understand the significance of the basic principles of the soil mechanics and their applications and also to go through the basic definitions, simple tests, plasticity characteristics, flow of water through soil, permeability and seepage effective stress principle and shear strength of soil.

Course Outcomes:

- Characterize and classify soils
- Identify shear strength parameters for field conditions
- Compute and analyze the consolidation settlements

UNIT - I

Introduction: Soil formation and soil types; Regional soil deposits of India, Phase diagrams; Simple definitions; some important relationships.

Index Properties: Grain size distribution; Mechanical analysis – Sieve analysis, Stoke's law, hydrometer Analysis; Atterberg Limits; Significance of other Soil Aggregate properties

UNIT - II

Soil Classification: Introduction, Particle size classification as per IS code; Unified soil classification system; Indian standard soil classification system.

Permeability: Capillary rise; Darcy's law and its Validity; Determination of coefficient of permeability - constant and variable head methods, indirect methods, Factors affecting permeability; Permeability of stratified soil deposits.

UNIT - III

Seepage Through Soils: Total, neutral and effective stresses; seepage forces and quicksand condition; Flownets- Characteristics and Uses.

Stress Distribution in Soils: Introduction; Boussinesq's equation; vertical stress distribution diagrams; vertical stress beneath loaded areas; Newmark's influence chart; approximate stress distribution methods for loaded areas; Westergaard's equation.

UNIT - IV

Compaction of Soils: Introduction; Laboratory tests; Factors affecting compaction; Effects of compaction on soil properties. Compaction in the field; Compaction specifications and field control.

Compressibility of Soil and Consolidation: Introduction; Compressibility; Time-rate of consolidation; Consolidation test; Computation of settlement; extrapolation of field consolidation curve; Settlement analysis.

UNIT - V

Shear Strength of Soils: Introduction; Stress at a point- Mohr Circle of stress; Mohr–coulomb Failure Criterion; Measurement of Shear Strength; Shear strength of Clayey soils; Shear Strength of Sands; Drainage conditions and Strength parameters.

TEXT BOOKS:

1. B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain , "Soil Mechanics

and Foundation", 16th ed., Laxmi Publications Pvt.Ltd., New Delhi, 2005.

2. K.R. Arora, "Soil Mechanics and Foundation Engineering", 7th ed., Standard Publishers and Distributors, Delhi, 2009.

REFERENCE BOOKS:

1. Manoj Datta, S Gulhati, "Geotechnical Engineering", 1st ed., Mcgraw-hill Education (india) Ltd (2008)
2. P. PurushotthamaRaj , "Soil Mechanics and Foundation Engineering", 2nd ed., Pearson Education, 2013.
3. Alam Singh, "Basic Soil Mechanics & Foundations", 1st Ed, CBS Publisher (2012),
4. Gopal Ranjan & ASR Rao , "Basic and Applied Soil Mechanics", 2nd ed., New age International Pvt . Ltd., New Delhi, 2004.

B.Tech.	**III Year**	**L**	**T**	**P**	**To**	**C**
		4	-	-	4	4

CE323 ENVIRONMENTAL ENGINEERING – I

Course Description and Objective:

Water is a basic need of the society and pure form of water is not available on the earth now a days. Identification of source, estimation of quantity required, treatment of water to the desired degree and conveyance of water to the community are the essential features of water supply. At the end of the course the student is expected to familiarize with the water supply.

Course Outcomes:

- *Analyze characteristics of water and wastewater*
- *Estimate the quantity of drinking water and domestic wastewater generated*
- *Design components of water supply systems*

UNIT – I

Introduction to Water Supply Engineering: Need for protected water supplies, Objectives of water supply systems, Role of Environmental Engineers.

Quantity of Water: Estimating requirements, Design period, Per capita consumption, Factors affecting per capita consumption, Fire demand, Fluctuations in demand, Prediction of population.

UNIT - II

Sources & Intake Works: Classification of sources of water supply, Choice of source, Suitability with regard to quality and quantity, Lake, river, reservoir and canal intakes.

Transportation and Pumping of Water: Types of conduits, Capacity and design, Materials for pipes, Laying and Jointing of pipes, Testing of pipe line, Classification of pumps, Efficiency and choice of pumps.

UNIT – III

Quality of Water: Impurities in water, Routine water analysis, physical, chemical and bacteriological tests, BIS Standards for drinking water, Water borne diseases.

Purification of Water: Methods of purification of water, Sequence of treatment.

Plain Sedimentation and Coagulation: Theory of sedimentation, Stoke's law, Sedimentation tanks, Design aspects, Principle of coagulation, Chemicals used for coagulation, Units of coagulation plant, Optimum dose of coagulant.

UNIT – IV

Filtration of Water: Theory of filtration, Filter materials, Slow sand and rapid sand filters, Construction operation and design, Under drainage system design in rapid sand filters, Troubles in rapid sand filters, Pressure filters.

Disinfection of Water: Different methods of disinfection, Chlorination, Types of chlorination.

Other Treatment Methods: Water softening, Methods of removing temporary hardness, Methods of removing permanent hardness, Removal of color, odour and taste from water, De-fluoridation, Reverse osmosis.

UNIT – V

Distribution System: General requirements, Classification, Methods of supply, Available pressure in the distribution system, Layouts of distribution networks, Distribution reservoirs, Functions, Types, Capacity of balancing tank, Analysis of distribution system, Methods of analysis, Design of Pipe network

Pipe Appurtenances: Appurtenances in the distribution system, Service connection, Sluice valves, Check valve, Air valve, Drain valve, Hydrants, Meters.

TEXT BOOKS :

1. B.C.Punmia, "Environmental Engineering", Vol.1, 2nd ed., Laxmi Publishers, 2009.
2. S. K.Garg, "Environmental Engineering", Vol.1, 10th ed., Khanna Publishers, Delhi, 2005.

REFERENCE BOOKS:

1. Peavy and Rowe, "Environmental Engineering", 7 th ed., Mc Graw-Hill, New York, 1987.
2. CPH and EEO, "Manual on Water Supply & Treatment", CPH and EEO, Ministry of Urban Development, Govt. of India, New Delhi,1999.
3. E.W. Steel and Terrance J, "Water Supply and Sewerage", 6 th ed., Mc Ghee, Mc Graw-Hill, Singapore,1991.

B.Tech	III Year	L	T	P	To	C
		4	-	-	4	4

CE325 WATER RESOURCES ENGINEERING – I

(Dept. Elective-I)

Course Description and Objective:

By the end of the course, the student should be able to estimate the quantity of water available, irrigation requirement and design of irrigation canals & diversion head works.

Course Outcomes:

- *Estimation of rainfall,Plan an Irrigation System*
- *Design irrigation canals and canal network*
- *Plan and design diversion head work*

UNIT – I

Hydrology : Hydrologic cycle; Precipitation types; Rain gauges; Computation of average rain fall over a basin; Run off; Factors affecting run off; Computation of run-off; Estimation of maximum rate of run-off.

Hydrographs : Hydrograph analysis; Unit hydrograph; S-hydrograph; Application of the unit hydrograph to the construction of a flood hydrograph resulting from rainfall of unit duration; Application of unit hydrograph to construction of a flood hydrograph resulting from two or more periods of rainfall; Construction of unit hydrograph of different unit duration from a unit hydrograph of some given unit duration.

UNIT – II

Ground Water - Introduction to Irrigation : Introduction;Aquifer; Aquicludes; Aquifuge; Specific yield; Specific retention; Divisions of sub–surface water; Water table; Types of aquifers; Well hydraulics; Steady radial flow to a well–Dupuit's theory for confined and unconfined aquifers; Yield of an open well–Constant level pumping test, Recuperation test.

Introduction to Irrigation : Definition; Necessity; Scope of irrigation science; Benefits of irrigation; Ill-effects of irrigation; Types of irrigation.

Methods of Irrigation : Methods of applying water to crops; Uncontrolled or wild flooding; Free flooding; Contour laterals; Border strip method; Check flooding; Basin flooding; Zig zag method; Furrow method; Contour Famring; Sub-surface irrigation; Sprinkler irrigation; Drip irrigation.

UNIT – III

Water Requirement of Crops : Functions of irrigation water; Classes and availability of soil water; Saturation capacity; Field capacity; Wilting point; Available moisture and readily available moisture; Moisture equivalent; Soil – moisture deficiency; Limiting soil moisture conditions; Depth and frequency of irrigation; Duty and Delta; Base period; Relation between Duty and Delta; Factors affecting duty; Methods of improving duty; Gross command area; Culturable command area; Culturable cultivated and uncultivated area; Kor depth and Kor period; Consumptive use of water (Evapo – Transpiration); Irrigation efficiencies – Water conveyance efficiency, Water application efficiency, Water distribution efficiency and Consumptive use efficiency; Determination of irrigation requirements of crops; Assessment of irrigation water.

UNIT – IV

Irrigation Channels - SILT Theories & Design Procedure : Classification; Canal alignment; Cross–section of an irrigation channel; Balancing depth; Borrow pit; Spoil bank; Land width; Silt theories–Kennedy's theory, Lacey's regime theory; Kennedy's method of channel design; Silt supporting capacity according to Kennedy's theory; Use of Garret's diagram in channel design; Lacey's theory applied to channel design; Use of Lacey's regime diagrams; Comparison of Kennedy's theory and Lacey's theory; Sediment transport.

Water Logging : Water logging; Effects of water logging; Causes of water logging; Remedial measures; Losses in canal; Land drainage; Tile drains; Lining of irrigation channels – necessity, advantages and disadvantages.

UNIT – V

Diversion Head Works : Component parts of a Diversion Head work; Types of weirs; Causes of failure of weirs and their remedies; Design of weirs– Bligh's creep theory, Lane's weighted creep theory and Khosla's theory; Silt control at head works;

Canal Outlets and Regulation Works : Types of outlets; Non– modular outlets; Semi-module outlets; Rigid modules; Canal falls; Necessity and location of falls; Development of falls; Classification of falls; Canal regulators; Off-take alignment; Head regulators and cross-regulators; Canal escape.

TEXT BOOKS:

1. Dr. B.C. Punmia & Dr. Pande B.B. Lal, " Irrigation and water power Engineering ", 12th ed., Laxmi Publications Pvt. Ltd., New Delhi, 1992.
2. S. K. Garg, "Irrigation Engineering and Hydraulic structures", 23rd ed., Khanna Publishers, Delhi, 2009.

REFERENCE BOOKS:

1. Dr. P.N. Modi, "Irrigation, Water Resources & Water Power Engineering", 7th ed., Standard Book House, New Delhi, 2008.
2. K. Subramanya, "Engineering Hydrology", 3rd ed., Tata McGraw Hill, New Delhi, 2010.

B.Tech	**III Year**	**L**	**T**	**P**	**To**	**C**
		4	-	-	4	4

CE327 OPERATION RESEARCH

(Dept. Elective-I)

Course Description and Objective:

To make the students aware about the solutions to the problems in management for efficient utilization and optimum allocation of resources

Course Outcomes:

- *Identify and develop operational research models from the verbal description of the real system.*
- *Understand the mathematical tools that are needed to solve optimisation problems.*
- *Use mathematical software to solve the proposed models. Develop a report that describes the model and the solving technique*
- *analyse the results and propose recommendations in language understandable to the decision-making processes in Management Engineering*

UNIT – I

Introduction: History and development of operation research, Applications, modeling in operation research, operation research models and their applications.

Linear Programming-I: Introduction, requirements of LP problem, basic assumptions, Formulation of problem, Graphical solution,

UNIT – II

Linear Programming-II: Introduction, Principle of Simplex Method, procedure for maximization and minimization, Two-phase simplex method, Duality concept

UNIT – III

Transportation Model: Mathematical formulation, methods to obtain initial basic feasible solution, North West Corner method, Vogel’s Approximation method, conditions for testing optimality, MODI method for testing optimality solution of balanced and unbalanced problems, Degeneracy and its resolution.

UNIT – IV

Project Management: Introduction, critical path method (CPM), Programme evaluation and review technique (PERT), distinction between PERT and CPM

UNIT – V

Dynamic Programming: Introduction, Bellman's Principle of optimality, shortest route (stage coach) problem, maximization problem

TEXT BOOKS:

1. Hamdy Taha, "Operations Research – An Introduction", 8th ed., PHI, 2007.
2. S. D. Sharma, "Operation Research", 15th ed., Kedarnath and Rannalt Publications, 2010.

REFERENCE BOOKS:

1. Susy Philipose, "Operations Research", 3rd ed., T.M.H., New Delhi, 2001.
2. Hira and Gupta, "Operation Research", 3rd ed., S. Chand and Co., 2001.
3. Manohar Mahajan, "Operations Research",10th ed., Dhanpat Rai & Co., 2005.
4. R. Panneerselvam, "Operations Research", 16th ed., PHI, 2002.

B.Tech	III Year	L	T	P	To	C
		4	-	-	4	4

CE329 CONSTRUCTION TECHNIQUES, EQUIPMENT AND PRACTICES

(Dept. Elective-I)

Course Description and Objective:

The main objective of this course is to make the student aware of the various construction techniques, practices and the equipment needed for different types of construction activities. At the end of this course the student shall have a reasonable knowledge about the various construction procedures for sub to super structure and also the equipment needed for construction of various types of structures from foundation to super structure.

Course Outcomes:

- Cycle Times
- Production Rates
- Equipment Knowledge
- Dirt Work Estimations

UNIT I

CONCRETE TECHNOLOGY : Cements – Grade of cements - manufacture of cement – concrete chemicals and Applications –Mix design concept – mix design as per BIS & ACI methods – manufacturing of concrete –Batching – mixing – transporting – placing – compaction of concrete – curing and finishing. Testing of fresh and hardened concrete – quality of concrete - Non – destructive testing.

UNIT II

CONSTRUCTION PRACTICES: Specifications, details and sequence of activities and construction co-ordination – Site Clearance – Marking – Earthwork - masonry – stone masonry – Bond in masonry - concrete hollow block masonry – flooring – damp proof courses – construction joints – movement and expansion joints – pre cast pavements – Building foundations – basements – temporary shed –centering and shuttering – slip forms – scaffoldings – de-shuttering forms – Fabrication and erection of steel trusses – frames – braced domes – laying brick –– weather and water proof –roof finishes – acoustic and fire protection.

UNIT III

SUB STRUCTURE CONSTRUCTION: Techniques of Box jacking – Pipe Jacking -under water construction of diaphragm walls and basement-Tunneling techniques – Piling techniques - well and caisson - sinking cofferdam -cable anchoring and grouting-driving diaphragm walls, sheet piles - shoring for deep cutting -well points -Dewatering and stand by Plant equipment for underground open excavation.

UNIT IV

SUPER STRUCTURE CONSTRUCTION: Launching girders, bridge decks, off shore platforms – special forms for shells - techniques for heavy decks – in-situ pre-stressing in high rise structures, Material handling - erecting light weight components on tall structures - Support structure for heavy Equipment and conveyors -Erection of articulated structures, braced domes and space decks.

UNIT V

CONSTRUCTION EQUIPMENT: Selection of equipment for earth work - earth moving operations - types of earthwork equipment - tractors, motor graders, scrapers, front end waders, earth movers – Equipment for foundation and pile driving. Equipment for compaction, batching and mixing and concreting - Equipment for material handling and erection of structures - Equipment for dredging, trenching, tunneling,

TEXT BOOKS:

1. Peurifoy, R.L., Ledbetter, W.B. and Schexnayder, C., “Construction Planning, Equipment and Methods”, 5th Edition, McGraw Hill, Singapore, 1995.

2. Arora S.P. and Bindra S.P., Building Construction, Planning Techniques and Method of Construction, Dhanpat Rai and Sons, 1997.

REFERENCE BOOKS:

1. Jha J and Sinha S.K., Construction and Foundation Engineering, Khanna Publishers, 1993.

2. Sharma S.C. “Construction Equipment and Management”, Khanna Publishers New Delhi, 1988.

3. Deodhar, S.V. “Construction Equipment and Job Planning”, Khanna Publishers, New Delhi, 1988.

4. Dr. Mahesh Varma, “Construction Equipment and its Planning and Application”, Metropolitan Book Company, New Delhi-, 1983.

5. Gambhir, M.L, Concrete Technology, Tata McGraw – Hill Publishing Company Ltd, New Delhi, 2004.

6. Varghese , P.C. Building construction, Prentice Hall of India Pvt. Ltd, New Delhi, 2007.

7. Sheety, M.S, Concrete Technology, Theory and Practice, S. Chand and Company Ltd, New Delhi, 2005.

B.Tech	**III Year**	**L**	**T**	**P**	**To**	**C**
		-	-	3	3	2

CE331 GEOTECHNICAL ENGINEERING LAB

Course Description and Objective:

Determination of various properties of soil like water content, permeability and to conduct compaction test, shear test, consolidation test etc. on soil.

Course Outcomes:

- *Determine index properties of soils*
- *Classify soils*
- *Determine engineering properties of soils.*

1. Determination of water content by oven drying method.
2. Determination of specific gravity by
   a) Density bottle method b) Pycnometer method.
3. Gradation analysis
   a) Mechanical Sieve analysis b) Hydrometer analysis.
4. Determination of Atterberg limits
5. Determination of free swell index
6. Determination of field unit weight by
   a) Core cutter method. b) Sand replacement method.
7. Determination of permeability by
   a) Constant head permeameter. b) Variable head permeameter.
8. Direct shear test.
9. Vane shear test.
10. Unconfined compression test
11. Standard proctor compaction test
12. Modified proctor compaction test
13. Triaxial shear test.
14. Consolidation test.

B.Tech	III Year	L	T	P	To	C
		-	-	3	3	2

CE333 COMPUTER APPLICATIONS IN CIVIL ENGINEERING

Course Description and Objective:

Students are expected to write and execute programmes to solve the following problems. Programmes shall be in C or C++ language or MS-Office Software's.

Course Outcome:

- *Design of civil engineering elements using softwares like excel and c*

Note: A minimum of twelve (10No) shall be done and recorded

(Write any Four programmes)

1. Design of Reinforced Beam for flexure by limit state method.
2. Design of T- Beam for flexure by limit state method.
3. Design of Reinforced beam for Shear by limit state method.
4. Design of R.C.C. section subjected to Bending moment, Shear force and Torsional moment.
5. Design of simply supported one-way slab.

(Write any THREE programmes)

6. Classification of soil by Indian standard classification system.
7. Stresses due to applied loads both Boussinesq and Westerguard analysis
   a) Concentrated load
   b) Circular loaded area
   c) Rectangular loaded area
8. Determination of permeability coefficient by constant head and falling permeability tests.
9. Determination of index properties of soil.

(Write any THREE programmes)

10. Design of an open channel

12. Analysis of water distribution networks (Hardy cross method).

13. Determination of the height of the building when base is accessible.

14. Determination of included angles from the given bearing and check for local attraction.

B.Tech	**III Year**	**L**	**T**	**P**	**To**	**C**
		-	-	3	3	2

CE335 BUILDING DRAWING USING AUTOCAD

Course Description and Objective:

The Course Description and Objectives is to make the student competence in building drawing by conventional as well as CAD software.

Course Outcomes:

- *Prepare plans*
- *section and elevations of Buildings by using AutoCAD software*

1. Conventional signs
2. Plan, section and elevation of doors and windows
3. English and Flemish bonds King-post and Queen-post trusses
4. Plan, Section and Elevation of a single storied residential building
5. Generating Plan, Section and elevation of a two storied residential building
6. Generating plan, Section and elevation of a post-office/Bank
7. Learning Basic commands of CAD software
8. Drawing the line diagram of basic building components like door, window by CAD software

9.. Drawing plan, section and elevation of a single storied residential building by CAD software

B.Tech	**III Year**	**L**	**T**	**P**	**To**	**C**
		4	-	-	4	4

CE320 DESIGN OF STEEL STRUCTURES

Course Description and Objective:

To design tension and compression members. To design laterally supported and unsupported beams.To understand the behaviour of riveted and welded connections and their design. To draw design details of built-up columns with lacing of battering, grillage foundations.

Course Outcomes:

- *Limit state design of tension members*
- *compression members*
- *Beams,Plate Girder*

UNIT - I

Introduction: Type of steel structures, Methods of Design of Steel Structures, Limit States for Steel Design, Partial Safety factors, Types of loads, Types of Bolts and Bolted Joints, Design of Bolted Connections (Lap and Butt Joint connections), Failure of Bolted Joints.

UNIT – II

Design of Tension Members: Introduction, Types of Tension Members, Net Sectional Area, Effective Net Area, Types of Failures, Design Strength of Tension Members, Slenderness Ratio, Design Procedure, Tension Member Splices, Lug Angles, Gusset Plate.

UNIT – III

Design of Compression Members: Introduction, Effective length, Slenderness Ratio, Types of Sections, Types of Buckling, Classification of Cross Sections, Column Formula, Design Strength, Design of Axially Loaded Compression Members, Design of Built-Up Columns(Latticed Columns) , Design of Laced and Battened Columns, Design of Column Splices, Design of Slab Base and Gusseted Base.

UNIT – IV

Design of Beams: Plastic Moment Carrying Capacity of a Section, Types of Sections, Bending Strength of Laterally Supported Beam, Web Buckling, web Crippling, Design of simple beams based on strength and stiffness as per IS code- Design of built up beams and curtailment of flange plates.

UNIT – V

Design of Bolted Beam Connections: Types of Beam Connections, Design of Framed Connections Using Bolt, Design of Unstiffened and Stiffened Seated Connections, Design of Moment Resistant Connections.

Plate Girder: Elements of Plate Girder, General Considerations, Shear Strength of Web; Proportion of Web and flanges, Stiffeners and their connections (using welding); Web splice (using bolts); Design Procedure up to Main Section.

TEXT BOOKS:

1. Ram Chandra, "Design of steel structures", 12th ed., Standard Publishers, New Delhi, 2009.
2. S K Duggal, "Limit State Design of Steel Structures", 2nd ed., Tata McGraw-Hill Education Publishers , May 2010.

Reference Book:

1. Subramanian, "Design of Steel Structures", 1st ed., Pearson Education, 2008.
2. . SS Bhavikatti, "Design of Steel Structures", 2nd ed., PHI Publishers, 2010.

B.Tech	III Year	L	T	P	To	C
		4	-	-	4	4

CE322 STRUCTURAL ANALYSIS – III

Course Description and Objective:

At the end of the course, the student is able to analyze curved beams, cables and plastic analysis of beams and also it is expected to analyze beams and frames by matrix approach.

Course Outcomes:

- *Analyze cables and curved beams*
- *analyze one dimensional and two dimensional structures using matrix methods of structural analysis*

UNIT – I

Curved Beams: Analysis for internal forces – circular beams supported on equally spaced columns – semicircular beams on three equally spaced supports.

UNIT – II

Plastic Behavior of Structures: Idealized stress - strain curve for mild steel; Ultimate load carrying capacity of members carrying axial forces; Moment - Curvature relationship for flexural members; Evaluation of fully plastic moment; Shape factor; Collapse load factor; Upper and lower bound theorems; Collapse load analysis of simply supported, propped cantilever and fixed beams.

UNIT – III

Cables: Analysis of cables under uniformly distributed and concentrated loads; Shape of the cable under self weight; Effect of temperature changes in suspension cables; Anchor cables.

UNIT – IV

Flexibility Method (Matrix Approach): Flexibility matrix Analysis of continuous beams and rigid jointed plane frames (Single bay, single storey with vertical legs only) by flexibility method with matrix approach.

UNIT – V

Stiffness Method (Matrix Approach): Stiffness matrix; Relationship between flexibility matrix and stiffness matrix. Analysis of continuous beams, rigid jointed plane frames (Single bay, single storey with vertical legs only) by stiffness method with matrix approach.

TEXT BOOKS :

1. Vazirani & Ratwani "Analysis of Structures Vols.1 & 2", 12th ed., Khanna Publishers, Delhi, 1992.
2. G. S. Pandit & S. P. Gupta, "Structural Analysis – A matrix approach", 2nd ed., Tata Mc. Graw – Hill Publishing Co. Ltd., New Delhi, 2009.

REFERENCE BOOKS :

1. C.S.REDDY, "BASIC STRUCTURAL ANALYSIS", 2ND ED., TATA MC GRAW HILL PUBLICATIONS, NEW DELHI, 2009.
2. S.S. Bhavikatti, "Strucutral Analysis Vol. 2", 3rd ed., Vikas Publishing House Pvt. Ltd., New Delhi, 2008.

B.Tech. III YEAR	L	T	P	To	C
	4	-	-	4	4

CE324 GEOTECHNICAL ENGINEERING - II

Course Description and Objective:

The primary objective of this course is to equip the student with the knowledge of how to explore the soil, design the foundations for different conditions and check the stability of structures.

Course Outcomes:

- *Determine the earth pressures on foundations and retaining structures*
- *Analyze shallow and deep foundations*
- *Calculate the bearing capacity of soils and foundation settlements*
- *understand soil exploration methods*

UNIT - I

Sub–Soil Investigation and Sampling: Introduction; Methods of exploration; Methods of Boring; Soil Samples; Soil samples and Sampling; Number and disposition of trial pits and borings; Depth of exploration; Ground water observations; Field tests visà- vis Laboratory tests; Plate load test; Penetrometer tests; Geophysical methods; Borehole logs; Site investigation report;

UNIT – II

Lateral Earth Pressure & Retaining Walls: Introduction; Effect of wall movement on Earth Pressure; Earth Pressure at rest; Rankine's theory of Earth pressure; Coulomb's theory of earth pressure; Culmann's graphical method for active earth pressure; Design considerations for retaining walls.

UNIT – III

Stability of Slopes: Introduction; Infinite slopes and translational slides; Definitions of factor of safety; Finite slopes- forms of slip surface; Total stress and Effective stress methods of analysis; Cu-0 Analysis (Total Stress Analysis) ; C- Analysis- Method of slices; Location of most Critical Circle; Stability of Earth Dam Slopes; Friction Circle Method; Taylor's Stability Number.

UNIT – IV

Shallow Foundations: Concept of foundations; Types of foundations and their applicability; General requirements of foundations; Location and Depth of foundation.

Bearing Capacity of Shallow Foundation: Terminology relating to bearing capacity; Bearing Capacity of Shallow Foundations; Terzaghi's Bearing Capacity theory; Skempton's Bearing Capacity Analysis for Clay soils; IS-Code Recommendations for Bearing Capacity; Influence of water table on bearing capacity.

Settlement Analysis: Settlement of Shallow foundation – types; Methods to reduce differential settlements; Allowable Bearing Pressure; Immediate settlemtent –Terzaghi's Method; Allowable Bearing pressure of Granular Soils based on Standard Penetration Test Value – Terzaghi and IS methods;

UNIT – V

Pile Foundations: Introduction; Uses of Piles; Types of Piles; Cast- in-situ Pile construction; Selection of Pile type; Pile driving; Pile load carrying capacity in compression – Static Pile Load formula, Load tests, Dynamic Pile formulae; Correlations with Penetration test data; Group action of Piles – load carrying capacity and settlement; Negative skin friction.

Well Foundations: Types of wells; Components of well foundation; Shapes of wells; Forces acting on well foundation; Construction and Sinking of wells;

TEXT BOOKS :

1. B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain , "Soil Mechanics and Foundation", 16th ed., Laxmi Publications Pvt. Ltd., New Delhi, 2005.
2. K.R. Arora, " Soil Mechanics and Foundation Engineering", 7th ed., Standard Publishers and Distributors, Delhi, 2009.

REFERENCE BOOKS :

1. Dass, B.M, "Principles of Foundation Engineering", 7th ed., Cengage Learning India,2013.
2. Bowles, J.E., "Foundation Analysis and Design" 5th ed., McGraw-Hill Education India Pvt.Ltd - New Delhi
3. P.Purushotthama Raj, "A Text book of Soil Mechanics and Foundation Engineering", 1st ed., Pearson Education, 2004.
4. Gopal Ranjan & ASR Rao , "Basic and Applied Soil Mechanics", 4th ed., New Age International Pvt. Ltd, New Delhi, 2004.

B.Tech	**III Year**	**L**	**T**	**P**	**To**	**C**
		4	0	-	4	4

CE326 ENVIRONMENTAL ENGINEERING – II

Course Description and Objective:

Water is a basic need of the society and pure form of water is not available on the earth now a days. Identification of source, estimation of quantity required, treatment of water to the desired degree and conveyance of water to the community are the essential features of water supply. At the end of the course the student is expected to familiarize with the water supply and wastewater disposal.

Course Outcomes:

- *determine the sewage characteristics and design various sewage treatment plants*
- *analyze the status of surface water and ground water quality and the remediation technologies*
- *carry out municipal water and wastewater treatment system design and operation*
- *manage hazardous wastes, risk assessment and treatment technologies*
- *apply environmental treatment technologies and design processes.*

UNIT – I

Introduction To Sanitary Engineering: Sanitation; Conservancy and water carriage systems – sewage and storm water estimation – time of concentration – storm water Overflows combined flow characteristics of sewage – cycles of decay – decomposition of sewage, examination of sewage – B.O.D. – C.O.D. Equations, design of sewers - Sewer appurtenances – Man holes, Drop man holes, Lamp holes, Flushing tanks, Inverted syphons; Street inlets; Catch basins

UNIT – II

Primary Treatment of Sewage: Layout and general out line of various units in a waste water treatment plant – primary treatment design of screens – grit chambers – skimming tanks – sedimentation tanks – principles of design

UNIT – III

Secondary Treatment of Sewage: Biological treatment – Trickling filters – Standard and high rate - Activated sludge process; Principle of action; Activated sludge process vs. Trickling filter process; Sewage Disposal: Objects; Methods; Disposal by dilution; Disposal by irrigation; Sewage sickness; Reuse of treated sewage; Ground water recharge.

UNIT – IV

Sludge Treatment and Disposal: Characteristics of sewage sludge - Sludge digestion – factors effecting the sludge digestion – Sludge disposal by drying – sludge thickening - sludge conditioning - methods of dewatering the sludge - methods of sludge disposal.

UNIT – V

Urban Solid Waste Management: Sources of the solid waste - Quantities and characteristics of the solid waste - Classification; Collection and transportation - Recovery and reuse - Treatment methods of the solid waste: composting, incineration, sanitary landfill and pyrolysis.

TEXT BOOKS :

1. K. N. Duggal, "Elements of Environmental Engineering", Vol. II, 7th ed., S.Chand & Company Ltd., New Delhi, 2010.
2. S. K. Garg; "Environmental Engineering", Vol.-II, 4th ed., Khanna Publishers, Delhi, 2005.

REFERENCE BOOKS:

1. Met Calf & Eddy, "Wastewater Engineering Treatment, Disposal & Reuse", 2nd ed., Tata Mc. Graw – Hill publishing Co. Ltd., New Delhi, 2001.
2. Peavy and Rowe, "Environmental Engineering", Vol.-I, 4th ed., McGrawhill, Newyork, 1998.
3. Ministry of Works and Housing, "Manual on Sewerage & Sewage treatment", 2nd ed., CPH and EEO, Govt. of India, New Delhi,1996.
4. C. S. Rao, "Environmental pollution control engineering", Vol.-I, 5th ed., Wiley Eastern Limited, New Delhi, 2006.

B.Tech	III Year	L	T	P	To	C
		4	-	-	4	4

CE328 WATER RESOURCES ENGINEERING – II

(Dept.Elective-II)

Course Description and Objective:

Student is expected to plan and design reservoirs and dams at the end of the course.

Course Outcomes:

- *Selection of Cross drainage work, Analyze gravity and earth dam and spillways*
- *Planning a Reservoir*
- *Fundamentals of Hydropower engineering*

UNIT – I

Stream Gauging : Necessity; Selection of gauging sites; Methods of discharge measurement; Area-Velocity method; Measurement of velocity; Floats – Surface floats, Sub–surface float or Double float, Twin float, Velocity rod or Rod float; Pitot tube; Currentmeter; Measurement of area of flow; Measurement of width - Pivot point method; Measurement of depth – Sounding rod, Echo-sounder.

Cross Drainage Works : Introduction; Types of cross - drainage works; Selection of suitable type of cross - drainage work; Classification of Aqueducts and Syphon Aqueducts; Selection of a suitable type.

UNIT – II

Reservoir Planning: Introduction; Investigations for reservoir planning; Selection of site for a reservoir; Zones of storage in a reservoir; Storage capacity and yield; Mass inflow curve and demand curve; Calculation of reservoir capacity for a specified yield from the mass inflow curve; Determination of safe yield from a reservoir of a given capacity; Reservoir sedimentation; Life of reservoir; Reservoir sediment control; Multipurpose reservoir, flood routing; Methods of flood routing-Graphical Method (Inflow – storage discharge curves method), Trial and error method.

UNIT – III

Dams in General : Introduction; Classification; Gravity dams, Arch dams, Buttress dams, Earth dams and rock fill dams; Physical factors governing selection of type of dam and selection of site for a dam.

Gravity Dams : Introduction; Forces acting on a gravity dam; Modes of failure and criteria for stability requirements; Stability analysis; Elementary profile of a gravity dam; Practical profile of a gravity dam; Limiting height of a gravity dam; High and low gravity dams;Design of gravity dams–single step method; Galleries; Joints; Keys and water seals;

UNIT – IV

Earth Dams: Introduction; Types of earth dams; Causes of failure of earth dams; Criteria for safe design of earth dams; Section of an earth dam; Design to suit available materials; Seepage control measures; Slope protection.

Spillways : Introduction; Types of spillways; Profile of ogee spillway; Energy dissipation below spillways for relative positions of jump height curve and tail water curve; Stilling basins; Indian standards on criteria for design of hydraulic jump type stilling basins with horizontal and slopping aprons; Spillway crest gates-Types and description only.

UNIT – V

Water Power Engineering : Introduction; Hydropower - Advantages & disadvantages; Estimation of hydro-power; Flow duration curve; Power duration curve; Load curve; Load factor; Capacity factor; Utilization factor; Diversity factor; Load duration curve; Firm Power; Secondary power; Types of hydel schemes; Forebay; Intake structures; Penstocks; Surge tank; Tail race; Turbines; Selection of suitable type of turbine.

TEXT BOOKS:

1. Dr. B.C. Punmia & Dr. Pande B.B. Lal, “Irrigation and water power Engineering”, Laxmi Publications Pvt. Ltd., New Delhi, 12th ed., Laxmi Publication, 1992.
2. S. K. Garg, “Irrigation Engineering and Hydraulic Structures”, 23rd ed., Khanna Publishers, Delhi, 2009.

REFERENCE BOOKS:

1. Dr. P.N. Modi, “Irrigation, Water Resources & Water Power Engineering”, 7th ed., Standard Book House, New Delhi, 2008.
2. K. Subramanya, “Engineering Hydrology”, 3rd ed., Tata Mc Graw Hill, New Delhi, 2010.
3. M.M. Dandekar and K. K. Sharma, “Water Power Engineering”, 4th ed., Vikas Publishing House Pvt. Ltd., New Delhi.

B.Tech	**III Year**	**L**	**T**	**P**	**To**	**C**
		4	-	-	4	4

CE330 ADVANCED REINFORCED CONCRETE DESIGN

(Dept. Elective - II)

Course Description and Objective:

The course is prepared to know the advance procedures to design reinforced concrete structures like Grid floors, raft foundation, water tanks and beams.

Course Outcomes:

- *Design Raft foundation using grid beams*
- *Design underground and elevated water tanks*
- *Design bunkers and silos*

UNIT – I

Grid Floors: Introduction, Analysis and Design of Grid Floors.

Raft Foundation: Introduction**,** Analysis and Design of Raft Foundation using grid beams.

UNIT – II

Underground Circular water tanks: Design of Underground Circular water tanks, Design of elevated INTZ Tanks including staging.

UNIT – III

Flat slabs: Design of flat slabs

UNIT – IV

Bunkers And Silos: Design of rectangular and circular bunkers; design of silos.

UNIT – V

Yield line Theory: Introduction; assumptions; analysis by virtual work method; analysis by equilibrium method; analysis and design of simply supported square, rectangular slabs.

TEXT BOOKS:

1. N.Krishna Raju, “Advanced Reinforced Concrete Design”, 2nd ed., CBS Publishers, 2007.
2. H.J Shah, “Reinforced Concrete”, Volume II, 4th ed., Charotar, 2002.

REFERENCE BOOKS:

1. P.C. Varghese, “Advanced Reinforced Concrete Design”, 2nd ed., PHI, 2009.
2. S. S. Bhavikatti, “Advanced Reinforced Concrete Design”, (Vol-II), 6th ed., New age international, 2002.

B.Tech	III Year	L	T	P	To	C
		3	1	-	4	4

CE332 PRESTRESSED CONCRETE

(Dept. Elective - II)

Course Description and Objective:

The primary objective of this course is to equip the student with the knowledge of prestressed concrete designs and its related IS codes practice in the design.

Course Outcomes:

- design a prestressed concrete beam accounting for losses
- design the anchorage zone for post tensioned members
- design composite members
- deflections of prestressed concrete beams
- introduction to design water tanks

UNIT – I

Introduction: Historic development – General principles of prestressing pretensioning and post tensioning – Advantages and limitations of prestressed concrete – Materials – High strength concrete and high tensile steel their characteristics. I.S.Code provisions, Methods and Systems of Prestressing; Pre-tensioning and post tensioning methods – Analysis of post tensioning – Different systems of prestressing like Hoyer System, Magnel System Freyssinet system and Gifford – Udall System.

UNIT – II

Losses of prestress : Loss of prestress in pre-tensioned and post-tensioned members due to various causes like elastic shortage of concrete, shrinkage of concrete, creep of concrete, Relaxation of steel, slip in anchorage bending of member and frictional losses.

UNIT – III

Flexure : Analysis of sections for flexure in accordance with elastic theory- Allowable stresses-Design criteria as per I.S code of practice –Elastic design of Beams (rectangular, I and T sections) for Flexure –Introduction to partial prestressing.

UNIT – IV

Shear, bond, Bearing and Anchorage: Shear in PSC beams –Principal stresses – Conventional elastic design for shear-transfer of prestress in pretensioned member transmission length –Bond stresses-bearing at anchorage –Anchorage zone stresses in post tensioned members-Analysis and design of end blocks by Guyon, Magnel and approximate methods – Anchorage zone reinforcements.

UNIT – V

Composite section: Introduction – Analysis of stress – Differential shrinkage – General designs considerations.

Deflections of prestressed concrete beams: Importance of control of deflections – factors influencing deflections – short term deflections of uncracked member prediction of long term deflections.

TEXT BOOKS :

1. Krishna Raju, “Prestressed Concrete”, 4th ed., Tata McGraw Hill Publications, 2009.
2. N.Rajasekharan, “Prestressed Concrete”, 3rd ed., Narosa Publications, 1999.

REFERENCE BOOKS :

1. Ramamrutham, “Prestressed Concrete”, 12th ed., Dhanpatrai Publications, 2000.
2. T.Y. Lin & Ned H.Burns, “Design of Prestressed Concrete Structures”, 4th ed., John Wiley & Sons, 2000.
3. Codes**:** BIS code on prestressed concrete, IS 1343.

B.Tech	III Year	L	T	P	To	C
		-	-	3	3	2

CE334 COMPUTER AIDED ANALYSIS AND DESIGN OF STRUCTURES LAB

Course Description and Objective:

Students are required to analyze and design the following structures using software package like STAAD Pro.

Course Outcome:

- *Design of structural elements using STAAD Pro softaware*

1. (At least five of the following)

1. Analysis and design of simply supported continuous beam.
2. Analysis and design of fixed end supported continuous beam.
3. Analysis of single storey unsymmetrical portal frame
4. Analysis and design of plane frame subjected to gravity loads and Lateral load (wind load)
5. Analysis and design of plane roof truss
6. Detailing of continuous beam
7. Detailing of isolated footing and R.C.C footing with steel column.

2. (At least four of the following)

1. Design of one-way and two way slabs.
2. Design of Retaining wall.
3. Design of Pile foundation.
4. Detailing of welded column base.

3. (At least one of the following)

1. Analysis and design of two-storied R.C.C.Framed building.
2. Analysis and design of Industrial steel building.

B.Tech III Year

L	T	P	To	C
-	-	3	3	2

CE336 ENVIRONMENTAL ENGINEERING LAB

Course Description and Objective:

Students are expected to determine water quality, properties of wastewater and its analysis.

Course Outcomes:

- *Determine physical*
- *chemical and biological characteristics of water and wastewater*
- *Determine optimum dosage of coagulant*
- *Assess the quality of water and wastewater*

Note: A minimum of ten (10 No.) shall be done and recorded

1. Determination of total, suspended and dissolved solids in water / sewage sample.
2. Determination of fixed and volatile solids in water / sewage sample.
3. Determination of Settle able Solids.
4. Determination of turbidity of water / sewage sample.
5. Determination of ---pH value of water / sewage sample.
6. Determination of optimum dose of coagulant.
7. Determination of residual chlorine.
8. Determination of temporary and permanent hardness of water sample.
9. Determination of chloride concentration of water / sewage sample.
10. Determination of acidity of water sample.
11. Determination of alkalinity of water sample.
12. Determination of fluorides in water sample.
13. Determination of Dissolved Oxygen of water / sewage sample.
14. Determination of Biochemical Oxygen Demand (BOD) of waste water.
15. Determination of Chemical Oxygen Demand (COD) of waste water.

IV Year B.Tech. Civil Engg. **I - Semester**

L	T	P	To	C
3	1	-	4	4

CE401 STRUCTURAL ANALYSIS – III

Objective of the Course:

At the end of the course, the student is able to analyse curved beams, cables and plastic analysis of beams and also it is expected to analyse beams and frames by matrix approach.

UNIT – I

Curved Beams: Analysis for internal forces – circular beams supported on equally spaced columns – semicircular beams on three equally spaced supports.

UNIT – II

Cables: Analysis of cables under uniformly distributed and concentrated loads; Shape of the cable under self weight; Effect of temperature changes in suspension cables; Anchor cables.

UNIT – III

Plastic Behavior of Structures: Idealized stress - strain curve for mild steel; Ultimate load carrying capacity of members carrying axial forces; Moment - Curvature relationship for flexural members; Evaluation of fully plastic moment; Shape factor; Collapse load factor; Upper and lower bound theorems; Collapse load analysis of simply supported, propped cantilever and fixed beams.

UNIT – IV

Flexibility Method (Matrix Approach): Flexibility matrix Analysis of continuous beams and rigid jointed plane frames (Single bay, single storey with vertical legs only) by flexibility method with matrix approach.

UNIT – V

Stiffness Method (Matrix Approach): Stiffness matrix; Relationship between flexibility matrix and stiffness matrix. Analysis of continuous beams, rigid jointed plane frames (Single bay, single storey with vertical legs only) by stiffness method with matrix approach.

TEXT BOOKS :

1. Vazirani & Ratwani "Analysis of Structures Vols.1 & 2", 12th ed., Khanna Publishers, Delhi, 1992.
2. G. S. Pandit & S. P. Gupta, "Structural Analysis – A matrix approach", 2nd ed., Tata Mc. Graw – Hill Publishing Co. Ltd., New Delhi, 2009.

REFERENCE BOOKS :

1. C.S.Reddy, "Basic Structural Analysis", 2nd ed., Tata Mc Graw Hill Publications, New Delhi, 2009.
2. S.S. Bhavikatti, "Strucutral Analysis Vol. 2", 3rd ed., Vikas Publishing House Pvt. Ltd., New Delhi, 2008.

IV Year B.Tech. Civil Engg.	**II-Semester**	**L**	**T**	**P**	**To**	**C**
		3	1	-	4	4

CE402 OPERATIONS RESEARCH

Objective of the Course:

To make the students aware about the solutions to the problems in management for efficient utilization and optimum allocation of resources

UNIT – I

Introduction: History and development of operation research, Applications, modeling in operation research, operation research models and their applications.

Linear Programming-I: Introduction, requirements of LP problem, basic assumptions, Formulation of problem, Graphical solution,

UNIT – II

Linear Programming-II: Introduction, Principle of Simplex Method, procedure for maximization and minimization, Two-phase simplex method, Duality concept

UNIT – III

Transportation Model: Mathematical formulation, methods to obtain initial basic feasible solution, North West Corner method, Vogel's Approximation method, conditions for testing optimality, MODI method for testing optimality solution of balanced and unbalanced problems, Degeneracy and its resolution.

UNIT – IV

Project Management: Introduction, critical path method (CPM), Programme evaluation and review technique (PERT), distinction between PERT and CPM

UNIT – V

Dynamic Programming: Introduction, Bellman's Principle of optimality, shortest route (stage coach) problem, maximization problem

TEXT BOOKS:

1. Hamdy Taha, "Operations Research – An Introduction", 8th ed., PHI, 2007.
2. S. D. Sharma, "Operation Research", 15th ed., Kedarnath and Rannalt Publications, 2010.
3. R. Panneerselvam, "Operations Research", 16th ed., PHI, 2002.

REFERENCE BOOKS:

1. Susy Philipose, "Operations Research", 3rd ed., T.M.H., New Delhi, 2001.
2. Hira and Gupta, "Operation Research", 3rd ed., S. Chand and Co., 2001.
3. Manohar Mahajan, "Operations Research",10th ed., Dhanpat Rai & Co., 2005.

IV Year B.Tech. Civil Engg. **I - Semester**

L	T	P	To	C
3	1	-	4	4

CE403 WATER RESOURCES ENGINEERING – II

Objective of the Course:

Student is expected to plan and design reservoirs and dams at the end of the course.

UNIT – I

Stream Gauging : Necessity; Selection of gauging sites; Methods of discharge measurement; Area-Velocity method; Measurement of velocity; Floats – Surface floats, Sub–surface float or Double float, Twin float, Velocity rod or Rod float; Pitot tube; Currentmeter; Measurement of area of flow; Measurement of width - Pivot point method; Measurement of depth – Sounding rod, Echo-sounder.

Cross Drainage Works : Introduction; Types of cross - drainage works; Selection of suitable type of cross - drainage work; Classification of Aqueducts and Syphon Aqueducts; Selection of a suitable type.

UNIT – II

Reservoir Planning: Introduction; Investigations for reservoir planning; Selection of site for a reservoir; Zones of storage in a reservoir; Storage capacity and yield; Mass inflow curve and demand curve; Calculation of reservoir capacity for a specified yield from the mass inflow curve; Determination of safe yield from a reservoir of a given capacity; Reservoir sedimentation; Life of reservoir; Reservoir sediment control; Multipurpose reservoir, flood routing; Methods of flood routing-Graphical Method (Inflow – storage discharge curves method), Trial and error method.

UNIT – III

Dams in General : Introduction; Classification; Gravity dams, Arch dams, Buttress dams, Steel dams, Timber dams, Earth dams and rock fill dams; Physical factors governing selection of type of dam and selection of site for a dam.

Gravity Dams : Introduction; Forces acting on a gravity dam; Modes of failure and criteria for stability requirements; Stability analysis; Elementary profile of a gravity dam; Practical profile of a gravity dam; Limiting height of a gravity dam; High and low gravity dams;Design of gravity dams–single step method; Galleries; Joints; Keys and water seals;

UNIT – IV

Earth Dams: Introduction; Types of earth dams; Causes of failure of earth dams; Criteria for safe design of earth dams; Section of an earth dam; Design to suit available materials; Seepage control measures; Slope protection.

Spillways : Introduction; Types of spillways; Profile of ogee spillway; Energy dissipation below spillways for relative positions of jump height curve and tail water curve; Stilling basins; Indian standards on criteria for design of hydraulic jump type stilling basins with horizontal and slopping aprons; Spillway crest gates-Types and description only.

UNIT – V

Water Power Engineering : Introduction; Hydropower - Advantages & disadvantages; Estimation of hydro-power; Flow duration curve; Power duration curve; Load curve; Load factor; Capacity factor; Utilization factor; Diversity factor; Load duration curve; Firm Power; Secondary power; Types of hydel schemes; Forebay; Intake structures; Penstocks; Surge tank; Tail race; Turbines; Selection of suitable type of turbine.

TEXT BOOKS:

1. Dr. B.C. Punmia & Dr. Pande B.B. Lal, “Irrigation and water power Engineering”, Laxmi Publications Pvt. Ltd., New Delhi, 12th ed., Laxmi Publication, 1992.
2. S. K. Garg, “Irrigation Engineering and Hydraulic Structures”, 23rd ed., Khanna Publishers, Delhi, 2009.

REFERENCE BOOKS:

1. Dr. P.N. Modi, “Irrigation, Water Resources & Water Power Engineering”, 7th ed., Standard Book House, New Delhi, 2008.
2. K. Subramanya, “Engineering Hydrology”, 3rd ed., Tata Mc Graw Hill, New Delhi, 2010.
3. M.M. Dandekar and K. K. Sharma, “Water Power Engineering”, 4th ed., Vikas Publishing House Pvt. Ltd., New Delhi.

IV Year B.Tech. Civil Engg.   II-Semester

	L	T	P	To	C
	3	1	-	4	4

CE404 REMOTE SENSING AND GIS APPLICATIONS

Objective of the Course:

Remote sensing is the art and science of making measurements of the earth using sensors on airplanes or satellites. These sensors collect data in the form of images and provide specialized capabilities for manipulating, analyzing, and visualizing those images. Remote sensed imagery is integrated within a GIS. A geographic information system (GIS) is a computer-based tool for mapping and analyzing features and events on earth. GIS manages location based information and provides tools for display and analysis of various statistics, including population characteristics, economic development opportunities, and vegetation types.

UNIT – I

Basic Principles: Introduction, Electromagnetic waves and their properties, interaction with Earth surface materials, recent developments in Remote sensing, Social and legal implications of Remote Sensing, status of Remote Sensing. **Geographic Information System**: Introduction, GIS definition and terminology, GIS categories, components of GIS, fundamental operations of GIS, A theoretical framework for GIS.

UNIT – II

Data Acquisition Platforms & Sensors: Introduction, Characteristics of imaging and remote sensing instruments, satellite remote sensing system – a brief over view, other remote sensing satellites.
Pre-Processing Of Remotely Sensed Data: Introduction, cosmetic operation; Geometric connection and registration, atmospheric correction.

UNIT – III

Digital image processing: Digital image and its characteristics, satellite data formats, Image rectification and restoration, Image Enhancement- Contrast Manipulation, Spatial Feature Manipulation, Multi-image manipulation, Image Classification- Unsupervised and Supervised Classification, Classification Accuracy, Details of digital image processing software packages.

UNIT - IV

GIS Spatial Analysis: Computational Analysis Methods (CAM), Visual Analysis Methods (VAM), Data storage-vector data storage, attribute data storage, overview of the data manipulation and analysis. Integrated analysis of the spatial and attribute data.

UNIT – V

Applications of remote sensing in Natural resources management, Environmental impact assessment and water resources management.

TEXT BOOKS:

1. LRA Narayana, “Remote Sensing and its applications” 3rd ed., University Press, 1999.
2. C.P.Lo. & Albert K.W. Yonng, “Concepts & Techniques of GIS”, 2nd ed., Prentice Hall (India) Publications, 2009.
3. S.Kumar, “Basics of Remote sensing & GIS”, 1st ed., Laxmi Publications, 2005.

REFERENCE BOOKS:

1. John R Jensen, “Introductory Digital Image Processing, A Remote Sensing Prospective”, 4th ed., Printicehall, 1986.
2. Paul Jumani, “Principles of Remote Sensing”, 4th ed., ELBS, 1985.
3. Peter A Burragh and Rachael A. Mc Donnell, “Principals of Geo physical Information Systems”, 1st ed., Oxford Publishers, 2010.
4. M.Anji Reddy, “Remote Sensing and Geographical Information systems”, 3rd ed., B.S.Publications, 2010.

IV Year B.Tech. Civil Engg. **I - Semester**

L	T	P	To	C
3	1	-	4	4

CE405 DESIGN OF STEEL STRUCTURES

Objective of the Course:

To design tension and compression members. To design laterally supported and unsupported beams.To understand the behaviour of riveted and welded connections and their design. To draw design details of built-up columns with lacing of battering, grillage foundations.

UNIT - I

Introduction: Type of steel structures- properties of rolled steel sections- allowable stresses in steel. Requirements of structural design – steps involved in design-load analysis-types of load- Applicable codes for load estimation- load combination-general design requirements of a steel structure-increase in allowable stresses- light gauge steel as a structural material- uses-and application-applicable IS codes for light gauge steel.

UNIT – II

Joints : Riveted and bolted connections-failure of joints-simple and multiple riveted lap and butt joints under axial loading –strength of fillet weld and butt welded joints- design of brackets, design of riveted and welded joints for systems subjected to moment in the plane of joints and moment acting at right angles to the plane of joints- -design of joints between beam connected to flange of column-secondary beam connected to web of main beam-beam column connection using seat connections-moment resisting connections.

UNIT – III

Tension and Compression : Design of simple and built-up members subjected to tension-tension splices-effective area of angles connected to gusset- maximum slenderness ratio of compression members-IS code provisions of compression members-design of simple and built up compression members with lacing and battens- design of column bases design of tension splice –web splice, shear splice, moment splice.

UNIT – IV

Beams: Design of simple beams based on strength and stiffness as per IS code- design if built up beams and curtailment of flange plates-connection of flange plate and beams-design of plate girder-design of beam column as per IS code.

UNIT – V

Plate Girder : Introduction; Effective depth; Stability of flanges and webs; Shear stress in stiffened web; Web and flange dimensions; Stiffeners and their connections (using welding); Web splice (using bolts); Detailed design of welded plate girder.

Gantry Girder: Introduction; Loads on Gantry girders; Fatigue effects; Design of gantry girder (using welding).

TEXT BOOKS:

1. Ram Chandra, “Design of steel structures”, Vol. 1,7th ed., Standard Book House, New Delhi, 2006.
2. Arya & Ajmani, “Design of Steel Structures”, 16th ed., Nem Chand & Bros, 1997.
3. SS Bhavikatti, “Design of Steel Structures”, 2nd ed., PHI Publishers, 2010.

REFERENCE BOOK:

1. Subramanian, “Design of Steel Structures”, 1st ed., Pearson Education, 2008.

IV Year B.Tech. Civil Engg. II-Semester

L	T	P	To	C
3	1	-	4	4

CE406 ADVANCED REINFORCED CONCRETE DESIGN
(Dept. Elective - III)

Objective of the Course:

The course is prepared to know the advance procedures to design reinforced concrete structures like Grid floors, raft foundation, water tanks and beams.

UNIT – I

Grid Floors: Introduction, Analysis and Design of Grid Floors.
Raft Foundation: Introduction**,** Analysis and Design of Raft Foundation using grid beams.

UNIT – II

Circular Water Tanks: Introduction, Underground circular water tanks, on ground circular water tanks Design of concrete corbels.

UNIT – III

Elevated Water Tanks: Introduction, Analysis & Design of INTZ Tanks including staging.

UNIT – IV

Bunkers And Silos: Design of rectangular and circular bunkers; design of silos.

UNIT – V

Yield line Theory: Introduction; assumptions; analysis by virtual work method; analysis by equilibrium method; analysis and design of simply supported square, rectangular and circular slabs.
Introduction to Deep Beams: Parameters influencing design; IS code provisions; design of simply supported and continuous deep beams.

TEXT BOOKS:

1. N.Krishna Raju, “Advanced Reinforced Concrete Design”, 2nd ed., CBS Publishers, 2007.
2. H.J Shah, “Reinforced Concrete”, Volume II, 4th ed., Charotar, 2002.

REFERENCE BOOKS:

1. P.C. Varghese, “Advanced Reinforced Concrete Design”, 2nd ed., PHI, 2009.
2. S. S. Bhavikatti, “Advanced Reinforced Concrete Design”, (Vol-II), 6th ed., New age international, 2002.

IV Year B.Tech. Civil Engg. **I - Semester**

L	T	P	To	C
3	1	-	4	4

CE 407 ESTIMATION & COSTING

Objective of the Course:

By the end of the course students will be in a position to estimate quantities of various items of a residential building. He will also be in a position to estimate the earth work required in roads and canals. He will be able to calculate rates of various items of work. He will learn the methods of building valuation and rent fixation.

UNIT – I

Procedure of Estimating : Methods of estimating; Main items of work; Deduction for openings; Degree of accuracy; Units of measurement.

Methods of Building Estimates : Individual wall method; Centre line method; Arch masonry calculation; Estimate of steps.

UNIT – II

Estimate of Buildings : Centre line method - Estimate of residential building ;Estimate of a building from line plan.

Estimate of Buildings : Individual Wall Method - Estimate of residential building; Estimate of a building from line plan.

UNIT – III

Estimate of RCC works : Standard hooks and cranks; Estimate of RCC slab; RCC beam; RCC T–beam slab and RCC column with foundation.

Road Estimate : Estimate of earthwork; Estimate of pitching of slopes; Estimate of earthwork of road from longitudinal sections; Estimate of earthwork in hill roads.

Canal Estimate : Earthwork in canals–different cases; Estimate of earthwork in irrigation channels.

UNIT – IV

Specifications : Purpose and method of writing specifications; General specifications. Detailed Specifications for Brick work; R.C.C; Plastering; Mosaic Flooring; R.R.Stone Masonary.

Analysis of Rates : Task or out – turn work; Labour and materials required for different works; Rates of materials and labour; Preparing analysis of rates for the following items of work:

i) Concrete ii) RCC Works iii) Brick work in foundation and super structure iv) Plastering v) CC flooring vi) White washing.

UNIT – V

PWD Accounts and Procedure of Works : Organization of Engineering department; Work charged establishment; Contract; Tender; Tender notice; Tender Schedule; Earnest money; Security money; Measurement book; Administrative approval; Technical sanction; Plinth area; Floor Area; Carpet area; Approximate Estimate; Plinth area estimate; Revised Estimate; Supplementary estimate.

Valuation : Cost; Price & value; Methods of valuation; Out goings; Depreciation; Methods for estimating cost depreciation; Valuation of building.

Miscellaneous Topics : Gross income; Net income; Scrap value; Salvage value; Obsolescence; Annuity; Capitalized value; Years purchase; Life of structures; Sinking fund; Standard rent; Process of fixing standard rent; Mortgage.

TEXT BOOK :

1. B.N. Dutta, “Estimating & Costing in Civil Engineering”, 22nd ed., U.B.S. Publishers & Distributors, New Delhi, 2001.

REFERENCE BOOK :

1. S. C. Rangwala, “Valuation of Real properties”, 12th ed., Charotar Publishing House, Anand, 2002.

IV Year B.Tech. Civil Engg. **II-Semester**

	L	T	P	To	C
	3	1	-	4	4

CE408 ENVIRONMENTAL IMPACT ASSESSMENT

(Dept. Elective - III)

Objective of the Course:

The course is designed to know the various environmental aspects like assessment of soil, surface water environment, impact of air pollution, which are essential to consider before establishment of any civil engineering projects at a particular location. It also deals with different legislative acts and environment audits regarding selection of location of the project.

UNIT – I

Basic concepts of EIA : Initial Environmental Examination; Elements of EIA; Factors affecting EIA; Impact evaluation and analysis; Preparation of Environmental Base map; Classification of Environmental parameters. EIA Methodologies; Introduction; criteria for the selection of EIA Methodology; EIA Methods: Ad-hoc methods, Matrix methods, Network method, Environmental media quality index method; Overlay methods; Cost/benefit Analysis.

UNIT – II

Impact of Developmental Activities and Land Use : Introduction and Methodology for the assessment of soil and ground water; Delineation of study area; Identification of activities. Procurement of relevant soil quality; Impact prediction; Assessment of Impact significance; Identification and Incorporation of mitigation measures.

UNIT – III

EIA in surface water, Air and Biological Environment : Methodology for the assessment of Impacts on surface water environment; Air pollution sources; Generalized approach for assessment of Air pollution Impact. Assessment of Impact of Development activities on vegetation and wildlife; Environmental Impact of Deforestation; Causes and effects of deforestation.

UNIT - IV

Environmental Audit and Environmental legislation : Objectives of Environmental Audit; Types of Environmental Audit; audit protocol; stages of Environmental Audit; On-site activities; Evaluation of Audit data and preparation of Audit report.

UNIT - V

Post Audit activities; The Environmental Pollution Act, The Water Act; The Air (Prevention and Control of Pollution) Act; Wild life protection Act. Case Studies and preparation of Environmental Impact Assessment statement for various industries.

TEXT BOOK :

1. Y. Anjaneyulu; “Environmental Impact Assessment Methodologies”, Vol.-I, 2nd ed., B.S. Publication, Sultan Bazar, Hyderabad, 2007.

REFERENCE BOOKS :

1. J. Glynn and Gary W. Hein Ke, “Environmental Science and Engineering”, Vol-I, 3rd ed., Prentice Hall Publishers,1998.
2. K. Dhameja, S.K. Kataria, “Environmental Science and Engineering”, Vol-II, 2nd ed., Suresh & Sons Publications, New Delhi, 2001.
3. Dr. H.S. Bhatia, “Environmental Pollution and Control”, Vol-I, 4th ed., Galgotia Publications Pvt. Ltd., 1998.

IV Year B.Tech. Civil Engg. I - Semester

L	T	P	To	C
3	1	-	4	4

CE409 PRESTRESSED CONCRETE

(Dept. Elective - II)

Objective of the Course:

The primary objective of this course is to equip the student with the knowledge of prestressed concrete designs and its related IS codes practice in the design.

UNIT – I

Introduction: Historic development – General principles of prestressing pretensioning and post tensioning – Advantages and limitations of prestressed concrete – Materials – High strength concrete and high tensile steel their characteristics. I.S.Code provisions, Methods and Systems of Prestressing; Pre-tensioning and post tensioning methods – Analysis of post tensioning – Different systems of prestressing like Hoyer System, Magnel System Freyssinet system and Gifford – Udall System.

UNIT – II

Losses of prestress : Loss of prestress in pre-tensioned and post-tensioned members due to various causes like elastic shortage of concrete, shrinkage of concrete, creep of concrete, Relaxation of steel, slip in anchorage bending of member and frictional losses.

UNIT – III

Flexure : Analysis of sections for flexure in accordance with elastic theory-Allowable stresses-Design criteria as per I.S code of practice –Elastic design of Beams (rectangular, I and T sections) for Flexure –Introduction to partial prestressing.

UNIT – IV

Shear, bond, Bearing and Anchorage: Shear in PSC beams –Principal stresses – Conventional elastic design for shear-transfer of prestress in pretensioned member transmission length –Bond stresses-bearing at anchorage –Anchorage zone stresses in post tensioned members-Analysis and design of end blocks by Guyon, Magnel and approximate methods –Anchorage zone reinforcements.

UNIT – V

Composite section: Introduction – Analysis of stress – Differential shrinkage – General designs considerations.

Deflections of prestressed concrete beams: Importance of control of deflections – factors influencing deflections – short term deflections of uncracked member prediction of long term deflections.

TEXT BOOKS :

1. Krishna Raju, “Prestressed Concrete”, 4th ed., Tata McGraw Hill Publications, 2009.
2. N.Rajasekharan, “Prestressed Concrete”, 3rd ed., Narosa Publications, 1999.

REFERENCE BOOKS :

1. Ramamrutham, “Prestressed Concrete”, 12th ed., Dhanpatrai Publications, 2000.
2. T.Y. Lin & Ned H.Burns, “Design of Prestressed Concrete Structures”, 4th ed., John Wiley & Sons, 2000.
3. Codes**:** BIS code on prestressed concrete, IS 1343.

IV Year B.Tech. Civil Engg.	**II-Semester**	**L**	**T**	**P**	**To**	**C**
		3	1	-	4	4

CE410 DESIGN & DRAWING OF HYDRAULIC STRUCTURES
(Dept. Elective - III)

Objective of the Course:

At end of the course the student will be in a position to understand the design principles and able to design and draw the hydraulic structures.

Design and drawing of the following hydraulic structures.

1. Sloping glacis weir.
2. Tank sluice with tower head
3. Type III Syphon aqueduct.
4. Surplus weir.
5. Trapezoidal notch fall.
6. Canal regulator.

Final Examination pattern:

Any two questions of the above six designs may be asked out of which the candidate has to answer one question. The duration of examination will be three hours.

TEXT BOOKS:

1. C.Satyanarayana Murthy, "Design of minor irrigation and canal structures", 3rd ed., Wiley Eastern Ltd., 1998.
2. S.K.Garg, "Irrigation engineering and Hydraulic structures", 4th ed., Standard Book House, 2002.

IV Year B.Tech. Civil Engg. **I - Semester**

L	T	P	To	C
3	1	-	4	4

CE411 TRAFFIC ENGINEERING
(Dept. Elective - II)

Objective of the Course:
The course is meant to give a brief account on characteristics of vehicles, traffic analysis and traffic control systems. It also deals with various aspects of traffic management.

UNIT - I

Traffic Characteristics : Road user's characteristics - general human characteristics, physical, mental and emotional factors, factors affecting reaction time, PIEV theory.
Vehicular characteristics: Characteristics affecting road design-width, height, length and other dimensions. weight, power, speed and braking capacity of a vehicle.

UNIT - II

Traffic Studies :
Spot Speed Studies, Volume Studies; Speed and Delay Studies: Purpose, causes of delay, methods of conducting speed and delay studies.
Origin and Destination Studies (O & D) : Various methods, collection and interpretation of data, planning and sampling.
Traffic Capacity Studies: Volume, density, basic practical and possible capacities, level of service.
Parking Studies: Methods of parking studies cordon counts, space inventories, parking practices.

UNIT - III

Traffic Operations and Control : Traffic regulations and various means of control - One way streets- advantages and limitations.
Traffic signals: Traffic signals, isolated signals, coordinated signals, simultaneous, alternate, flexible and progressive signal systems. Types of traffic signals, fixed time signals, traffic actuated signals, speed control signals, pedestrian signals, flashing signals, clearance interval and problems on single isolated traffic signal.

UNIT - IV

Street Lighting : Design of street lighting system; Definitions- Luminaire, foot candle, Lumen, utilization and maintenance factors; Different types of light sources used for street lighting; Fundamental factors of night vision.

UNIT - V

Accident Studies & Mass Transportation :

Accident Studies : Causes of accidents, accident studies and records, condition and collision diagrams, preventive measures.

Expressways and freeways : problems on mass transportation and remedial measures, brief study of mass transportation available in the country.

TEXT BOOK :

1. L.R. Kadiyali, "Traffic Engineering and Transport Planning", 5th ed., Khanna Publishers, Delhi, 2008

REFERENCE BOOKS :

1. R.J. Slater,N.B. Hounsell, "Highway Traffic Analysis and Design", 12th ed., Palgrave Macmillan Publishers, 2001.
2. W.S.Smith & F.W. Hurd, "Traffic Engineering by Matson", 3rd ed., Mc Graw Hill Publishers, New York, 2002.
3. G.J. Pingnataro, "Principles of Traffic Engineering", 4th ed., Mc Graw Hill Publishers, New York, 2000.

IV Year B.Tech. Civil Engg. II-Semester

L	T	P	To	C
3	1	-	4	4

CE412 BRIDGE ENGINEERING

(Dept. Elective - III)

Objective of the Course:

The student is expected to know the various types of a bridge and its related specifications. Is also deals with design considerations of bridge and its substructure and foundation. (Working stress method is to be adopted for all designs)

UNIT – I

Introduction & Investigation For Bridges : Components of a Bridge; Classification; Standard Specifications; Need for Investigation; Selection of Bridge Site; Preliminary Data to be Collected; Preliminary Drawings; Determination of Design Discharge; Economical Span; Location of Piers and Abutments; Vertical clearance above HFL; Scour depth; Traffic Projection; Choice of Bridge type; Importance of Proper Investigation.

UNIT – II

Concrete Bridges : Various types of bridges; I. R. C. Specifications for road bridges.

Culverts : Design of R. C. slab culvert.

UNIT – III

T – Beam Bridge : Pigeaud's method for computation of slab moments; Courbon's method for computation of moments in girders; Design of simply supported T – beam bridge.

UNIT – IV

Sub Structure For Bridges : Pier and abutment caps; Materials for piers and abutments; Design of pier; Design of abutment; Backfill behind abutment; Approach slab.

UNIT – V

Bearings For Bridges : Importance of bearings; Bearings for slab bridges; Bearings for girder bridges; Expansion bearings; Fixed bearings; Design of elastomeric pad bearing.

Foundations For Bridges : Scour at abutments and piers; Grip length; Types of foundations; Design of well foundation.

TEXT BOOK :

1. Dr. Johnson Victor, “Essentials of Bridge Engineering”, 4^{th} ed., Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi, 2000.

REFERENCE BOOKS:

1. S. Ponnuswami, “Bridge Engineering”, 2^{nd} ed., Tata Mc Graw Hill Publishing House, New Delhi, 2002.
2. T.R. Jagadeesh and M.A. Jayaram, “Design of Bridge Structures”, 2^{nd} ed., PHI Learning Pvt. Ltd., New Delhi, 2010.
3. N. Krishna Raju, “Design of Bridges”, 4^{th} ed., Oxford Publishnig Co. Pvt. Ltd., New Delhi, 2001.

IV Year B.Tech. Civil Engg. **I - Semester**

L	T	P	To	C
3	1	-	4	4

CE413 GROUND WATER DEVELOPMENT & MANAGEMENT

(Dept. Elective - II)

Objective of the Course:

The student is expected to have thorough knowledge on occurrence and movement of ground water, analyzing the data of pumping test and artificial recharge of ground water at the end of the course.

UNIT – I

Ground Water Occurrence: Ground water hydrologic cycle, origin of ground water, vertical distribution of ground water, zone of aeration and zone of saturation, geologic formation as Aquifers, types of aquifers, porosity, Specific yield and Specific retention.

UNIT – II

Ground Water Movement: Permeability, Darcy's law, storage coefficient. Transmissivity, differential equation governing ground water flow in three dimensions, derivation, ground water flow equation in polar coordinate system. Ground water flow contours their applications.

UNIT – III

Analysis of Pumping Test Data – I: Steady flow groundwater flow towards a well in confined and unconfined aquifers – Dupit's and Theim's equations, Assumptions, Formation constants, yield of an open well.

UNIT – IV

Analysis of Pumping Test Data – II: Unsteady flow towards a well – Non equilibrium equations – Thesis solution – Jocob and Chow's simplifications, Leak aquifers. Surface and Subsurface Investigation: Surface methods of exploration – Electrical resistivity and Seismic refraction methods. Subsurface methods – Geophysical logging and resistivity logging. Aerial Photogrammetry applications along with Case Studies in Subsurface Investigation.

UNIT – V

Artificial Recharge of Ground Water: Concept of artificial recharge – recharge methods, relative merits, Applications of GIS and Remote Sensing in Artificial Recharge of Ground water along with Case studies. Saline Water Intrusion in aquifer: Occurrence of saline water intrusions, Ghyben- Herzberg relation, Shape of interface, control of seawater intrusion.,Groundwater Basin Management: Concepts of conjunction use, Case studies.

TEXT BOOKS:

1. David Keith Todd, "Ground water Hydrology", 6th ed., John Wiley & Son, New York, 2001.
2. H.M.Raghunath, "Groundwater", 5th ed., Wiley Eastern Ltd., 2002.

REFERENCES BOOKS:

1. R.Willes & W.W.G.Yeh, "Groundwater System Planning & Management", 4th ed., Printice Hall, 1998.
2. C.W.Fetter, "Applied Hydrogeology", 7th ed., CBS Publishers & Distributers, 2002.

IV Year B.Tech. Civil Engg.	I - Semester	L	T	P	To	C
		3	1	-	4	4

CE415 STRUCTURAL DYNAMICS
(Dept. Elective - II)

Objective of the Course:

The course is designed to make a detailed analysis of structures in case of earthquake, wind and other dynamic/impacts loads are considered.

UNIT - I

Difference between static loading and dynamic loading – Nature of dynamic loads – Wind, Earthquake and Impact Loads – Damping – Viscous and structural damping – single degree of freedom (SDOF) Systems – Formulation of equation of motion – Newton's Law and D'Alembert's principles – Examples of SDOF modeling.

UNIT - II

Free vibration response of SDOF system – Response of undamped and damped SDOF system to harmonic excitation – characteristic of resonance – Response to impulse and an arbitrary forcing function – Duhamel Integral formulation.

UNIT - III

MDOF systems – examples – Lumped parameter model – Formulation of equation of motion – Free vibration of MDOF systems as Eigen value problem – concept of mode shapes and natural frequencies –2 DOF examples – orthogonal properties of normal modes.

UNIT - IV

Harmonic excitation of 2 DOF system – Principle of mode superposition (principle only) for dynamic analysis – vibration isolation – vibration measuring instruments.

UNIT - V

Effect of wind and earthquake on structures – Principles of a seismic design – Methods of vibration control – codal provisions for design for wind and earthquake (explanation of provisions only – no design).

TEXT BOOKS :

1. Mario Paz, "Structural Dynamics Theory and Computation", 3rd ed., Van Nostrand Reinhold, 1992.
2. Anil K.Chopra, "Dynamics of Structures Theory and Applications to Earthquake Engineering", 12th ed., Prentice Hall of India (P) Ltd., New Delhi, 1996.

REFERENCE BOOKS :

1. Thomson W.T., "Theory of Vibration and Applications", 4th ed., Prentice Hall of India, 1992.
2. Clough R.W. and Penzien, J., "Dynamics of Structures", 5th ed., McGraw-Hill, 1990.
3. Craig R.R. Jr., "Structural Dynamics – An Introduction to Computer Methods", 4th ed., John Wiley and Sons, 1981.

B.Tech IV Year

L	T	P	To	C
4	-	-	4	4

CE416 DESIGN & DRAWING OF HYDRAULIC STRUCTURES

(Dept. Elective - V)

Course Description and Objective:

At end of the course the student will be in a position to understand the design principles and able to design and draw the hydraulic structures.

Course Outcome:

- *Design of Tank sluice with tower head*
- *Design of surplus weir*
- *Design of canal regulator*

Design and drawing of the following hydraulic structures.

1. Sloping glacis weir.
2. Tank sluice with tower head
3. Type III Syphon aqueduct.
4. Surplus weir.
5. Trapezoidal notch fall.
6. Canal regulator.

Final Examination pattern:

Any two questions of the above six designs may be asked out of which the candidate has to answer one question. The duration of examination will be three hours.

TEXT BOOKS:

1. C.Satyanarayana Murthy, "Design of minor irrigation and canal structures", 3rd ed., Wiley Eastern Ltd., 1998.
2. S.K.Garg, "Irrigation engineering and Hydraulic structures", 4th ed., Standard Book House, 2002.

REFERENCE BOOKS:

1. Introduction To Water Resources And Waterpower Engineering, Dr. P N Modi , - Standard Publication, Delhi
2 Irrigation And Water Resources Engineering, By G L Asawa, - Pub:- New Age Int. Ltd.

B.Tech.	**IV Year**	**L**	**T**	**P**	**To**	**C**
		4	-	-	4	4

CE418 EARTHQUAKE RESISTANT DESIGN OF STRUCTURES

(Dept. Elective - V)

Course Description and Objective:

This course integrates information from various engineering and scientific disciplines in order to provide a rational basis for the design of earthquake-resistant structures.

Course Outcomes:

- *apply the basics of Earthquake Engineering*
- *demonstrate the dynamics of structural system under earthquake load*
- *analyze the influence of the structural / geometrical design in building characteristics*

UNIT-I:

Design forces for buildings : Introduction; Equivalent static method; Mode superposition technique; Dynamic inelastic-time history analysis; Advantages and disadvantages of these methods; Determination of lateral forces as per IS1893(Part 1) – Equivalent static method, Model analysis using response spectrum.

UNIT-II

Earthquake resistant design of a long two-storey , two-bay RCC building : Determination of lateral forces on an intermediate plane frame using Equivalent static methods and Model analysis using response spectrum; Analysis of the intermediate frame for various load combinations as per IS1893(Part 1); Identification of design forces and moments in the members; Design and detailing of typical flexural members ,typical column, footing and detailing of a exterior joint as per IS13920.

UNIT-III

Steel Buildings: Behavior of steel; Materials and workmanship; Steel frames – unbraced, braced; Ductile design of frame members; Flexural members; Frame members subjected to axial compression and bending; Connection design and joint behaviour ; Stee Panel zones; Bracing members

UNIT-IV

Seismic protection of structures: Introduction; Considerations for seismic isolation; Basic elements of seismic isolation; seismic-isolation design principle; Feasibility of seismic isolation; Seismicisolation configurations-Seismic dampers - Types of Dampers: Viscous, Friction, Yielding dampers – Seismic vibration control-Seismic Strengthening Measures.

UNIT-V

Ductility considerations in earthquake resistant design of RCC buildings: Introduction; Impact of ductility; Requirements for ductility; Assessment of ductility– Member/element ductility, Structural ductility; Factor affecting ductility; Ductility factors; Ductility considerations as per IS13920.

TEXT BOOKS :

1. Earthquake resistant design of structures by Pankaj Agarwal and Manish Shrikhande, Prentice-Hall of India, 2006.

2. Seismic design of reinforced concrete and masonry buildings by T.Paulay and M.J.N.Priestley, John Wiley & Sons, 1991.

REFERENCE BOOKS:

1. Earthquake resistant design of structures by SK Duggal , Oxford University Press.2007

2. The seismic design handbook, Edited by F.Naeim, Kluwer Academic

B.Tech. IV Year

L	T	P	To	C
4	-	-	4	4

CE420 TRAFFIC ENGINEERING

(Dept. Elective - V)

Course Description and Objective:

The course is meant to give a brief account on characteristics of vehicles, traffic analysis and traffic control systems. It also deals with various aspects of traffic management.

Course Outcomes:

- *Conduct traffic studies for estimating traffic flow characteristics*
- *Design of traffic signal*
- *caonduct accident studies*

UNIT - I

Traffic Characteristics: Road user's characteristics **-** general human characteristics, physical, mental and emotional factors, factors affecting reaction time, PIEV theory.

Vehicular characteristics: Characteristics affecting road design-width, height, length and other dimensions. weight, power, speed and braking capacity of a vehicle.

UNIT - II

Traffic Studies : Spot Speed Studies, Volume Studies; Speed and Delay Studies**:** Purpose, causes of delay, methods of conducting speed and delay studies.

Origin and Destination Studies (O & D) : Various methods, collection and interpretation of data, planning and sampling.

Traffic Capacity Studies: Volume, density, basic practical and possible capacities, level of service.

Parking Studies: Methods of parking studies cordon counts, space inventories, parking practices.

UNIT - III

Traffic Operations and Control : Traffic regulations and various means of control - One way streets- advantages and limitations.

Traffic signals: Traffic signals, isolated signals, coordinated signals, simultaneous, alternate, flexible and progressive signal systems. Types of traffic signals, fixed time signals, traffic actuated signals, speed control signals, pedestrian signals, flashing signals, clearance interval and problems on single isolated traffic signal.

UNIT - IV

Street Lighting : Design of street lighting system; Definitions- Luminaire, foot candle, Lumen, utilization and maintenance factors; Different types of light sources used for street lighting; Fundamental factors of night vision.

UNIT - V

Accident Studies : Causes of accidents, accident studies and records, condition and collision diagrams, preventive measures.

Expressways and freeways : problems on mass transportation and remedial measures, brief study of mass transportation available in the country.

TEXT BOOK :

1. L.R. Kadiyali, “Traffic Engineering and Transport Planning”, 5th ed., Khanna Publishers, Delhi, 2008.

REFERENCE BOOKS :

1. R.J. Slater,N.B. Hounsell, “Highway Traffic Analysis and Design”, 12th ed., Palgrave Macmillan Publishers, 2001.
2. W.S.Smith & F.W. Hurd, “Traffic Engineering by Matson”, 3rd ed., Mc Graw Hill Publishers, New York, 2002.
3. G.J. Pingnataro, “Principles of Traffic Engineering”, 4th ed., Mc Graw Hill Publishers, New York, 2000.

B.Tech.	**IV Year**	**L**	**T**	**P**	**To**	**C**
		4	-	-	4	4

CE422 ENVIRONMENTAL IMPACT ASSESSMENT

(Dept. Elective - VI)

Course Description and Objective:

The course is designed to know the various environmental aspects like assessment of soil, surface water environment, impact of air pollution, which are essential to consider before establishment of any civil engineering projects at a particular location. It also deals with different legislative acts and environment audits regarding selection of location of the project.

Course Outcomes:

- *Identify the environmental attributes to be considered for the EIA study*
- *Formulate objectives of the EIA studies*
- *Identify the methodology to prepare rapid EIA*
- *Prepare EIA reports and environmental management plans*

UNIT – I

Basic concepts of EIA : Initial Environmental Examination; Elements of EIA; Factors affecting EIA; Impact evaluation and analysis; Preparation of Environmental Base map; Classification of Environmental parameters. EIA Methodologies; Introduction; criteria for the selection of EIA Methodology; EIA Methods: Ad-hoc methods, Matrix methods, Network method, Environmental media quality index method; Overlay methods; Cost/benefit Analysis.

UNIT – II

Impact of Developmental Activities and Land Use : Introduction and Methodology for the assessment of soil and ground water; Delineation of study area; Identification of activities. Procurement of relevant soil quality; Impact prediction; Assessment of Impact significance; Identification and Incorporation of mitigation measures.

UNIT – III

EIA in surface water, Air and Biological Environment : Methodology for the assessment of Impacts on surface water environment; Air pollution sources; Generalized approach for assessment of Air pollution Impact. Assessment of Impact of Development activities on vegetation and wildlife; Environmental Impact of Deforestation; Causes and effects of deforestation.

UNIT - IV

Environmental Audit and Environmental legislation : Objectives of Environmental Audit; Types of Environmental Audit; audit protocol; stages of Environmental Audit; On-site activities; Evaluation of Audit data and preparation of Audit report.

UNIT - V

Post Audit activities; The Environmental Pollution Act, The Water Act; The Air (Prevention and Control of Pollution) Act; Wild life protection Act. Case Studies and preparation of Environmental Impact Assessment statement for various industries.

TEXT BOOK :

1. Y. Anjaneyulu; "Environmental Impact Assessment Methodologies", Vol.-I, 2nd ed., B.S. Publication, Sultan Bazar, Hyderabad, 2007.

REFERENCE BOOKS :

1. J. Glynn and Gary W. Hein Ke, "Environmental Science and Engineering", Vol-I, 3rd ed., Prentice Hall Publishers,1998.
2. K. Dhameja, S.K. Kataria, "Environmental Science and Engineering", Vol-II, 2nd ed., Suresh & Sons Publications, New Delhi, 2001.
3. Dr. H.S. Bhatia, "Environmental Pollution and Control", Vol-I, 4th ed., Galgotia Publications Pvt. Ltd., 1998.

B.Tech. IV Year

L	T	P	To	C
4	-	-	4	4

CE424 BRIDGE ENGINEERING

(Dept. Elective - VI)

Course Description and Objective:

The student is expected to know the various types of a bridge and its related specifications. Is also deals with design considerations of bridge and its substructure and foundation. (Working stress method is to be adopted for all designs)

Course Outcomes:

- *Design the slab culvert, Box culvert*
- *Design the T beam bridge and substructures*
- *Design the Bridge bearings.*

UNIT – I

Introduction & Investigation For Bridges : Components of a Bridge; Classification; Standard Specifications; Need for Investigation; Selection of Bridge Site; Preliminary Data to be Collected; Preliminary Drawings; Determination of Design Discharge; Economical Span; Location of Piers and Abutments; Vertical clearance above HFL; Scour depth; Traffic Projection; Choice of Bridge type; Importance of Proper Investigation.

UNIT – II

Concrete Bridges : Various types of bridges; I. R. C. Specifications for road bridges.

Culverts : Design of R. C. slab culvert.

UNIT – III

T – Beam Bridge : Pigeaud's method for computation of slab moments; Courbon's method for computation of moments in girders; Design of simply supported T – beam bridge.

UNIT – IV

Sub Structure For Bridges : Pier and abutment caps; Materials for piers and abutments; Design of pier; Design of abutment; Backfill behind abutment; Approach slab.

UNIT – V

Bearings For Bridges : Importance of bearings; Bearings for slab bridges; Bearings for girder bridges; Expansion bearings; Fixed bearings; Design of elastomeric pad bearing.

Foundations For Bridges : Scour at abutments and piers; Grip length; Types of foundations; Design of well foundation.

TEXT BOOK :

1. Dr. Johnson Victor, "Essentials of Bridge Engineering", 4th ed., Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi, 2000.

REFERENCE BOOKS:

1. S. Ponnuswami, "Bridge Engineering", 2nd ed., Tata Mc Graw Hill Publishing House, New Delhi, 2002.
2. T.R. Jagadeesh and M.A. Jayaram, "Design of Bridge Structures", 2nd ed., PHI Learning Pvt. Ltd., New Delhi, 2010.
3. N. Krishna Raju, "Design of Bridges", 4th ed., Oxford Publishnig Co. Pvt. Ltd., New Delhi, 2001.

B.Tech	IV Year	L	T	P	To	C
		4	-	-	4	4

CE 425 ESTIMATION & CONSTRUCTION PLANNING

Course Description and Objective:

By the end of the course students will be in a position to estimate quantities of various items of a residential building. He will also be in a position to estimate the earth work required in roads and canals. He will be able to calculate rates of various items of work. He will learn the methods of building valuation and rent fixation.

Course Outcomes:

- *Prepare quantity estimates for buildings*
- *roads, rails and canal works*
- *Calculate the quantity of materials required for civil engineering works as per specifications*
- *Evaluate contracts and tenders in construction practices*

UNIT – I

Procedure of Estimating : Methods of estimating; Main items of work; Deduction for openings; Degree of accuracy; Units of measurement.

Methods of Building Estimates : Individual wall method; Centre line method; Arch masonry calculation; Estimate of steps.

UNIT – II

Estimate of Buildings : Centre line method - Estimate of residential building ;Estimate of a building from line plan.

Estimate of Buildings : Individual Wall Method - Estimate of residential building; Estimate of a building from line plan.

UNIT – III

Estimate of RCC works : Standard hooks and cranks; Estimate of RCC slab; RCC beam; RCC T–beam slab and RCC column with foundation.

Road Estimate : Estimate of earthwork; Estimate of pitching of slopes; Estimate of earthwork of road from longitudinal sections; Estimate of earthwork in hill roads.

Canal Estimate : Earthwork in canals–different cases; Estimate of earthwork in irrigation channels.

UNIT – IV

Specifications : Purpose and method of writing specifications; General specifications. Detailed Specifications for Brick work; R.C.C; Plastering; Mosaic Flooring; R.R.Stone Masonary.

Analysis of Rates : Task or out – turn work; Labour and materials required for different works; Rates of materials and labour; Preparing analysis of rates for the following items of work:

i) Concrete ii) RCC Works iii) Brick work in foundation and super structure iv) Plastering v) CC flooring vi) White washing.

UNIT – V

PWD Accounts and Procedure of Works : Organization of Engineering department; Work charged establishment; Contract; Tender; Tender notice; Tender Schedule; Earnest money; Security money; Measurement book; Administrative approval; Technical sanction; Plinth area; Floor Area; Carpet area; Approximate Estimate; Plinth area estimate; Revised Estimate; Supplementary estimate.

Valuation : Cost; Price & value; Methods of valuation; Out goings; Depreciation; Methods for estimating cost depreciation; Valuation of building.

Miscellaneous Topics : Gross income; Net income; Scrap value; Salvage value; Obsolescence; Annuity; Capitalized value; Years purchase; Life of structures; Sinking fund; Standard rent; Process of fixing standard rent; Mortgage.

TEXT BOOK :

1. B.N. Dutta, "Estimating & Costing in Civil Engineering", 22nd ed., U.B.S. Publishers & Distributors, New Delhi, 2001.

REFERENCE BOOK :

1. S. C. Rangwala, "Valuation of Real properties", 12th ed., Charotar Publishing House, Anand, 2002.

B.Tech.	**IV Year**	**L**	**T**	**P**	**To**	**C**
		4	-	-	4	4

CE426 REPAIR & REHABILITATION OF STRUCTURES

(Dept. Elective - VI)

Course Description and Objective:

The course seeks to recognize the mechanisms of degradation of concrete structures, provide the students with the knowledge of available techniques and their application for

strengthening or upgrading existing structural systems. It also provides how to conduct field monitoring and non-destructive evaluation of concrete structures.

Course Outcomes:

- *Assess strength and materials deficiency in concrete structures*
- *Suggest methods and techniques used in repairing / strengthening existing concrete structures*
- *Apply Non Destructive Testing techniques to field problems*

UNIT-I

Introduction: Deterioration of structures with aging; Need for rehabilitation. Effects due to climat, temperature, chemicals , wear and erosion , design and construction errors , corrosion mechanism , Effects of cover thickness and cracking, Method of corrosion production., corrosion inhibitors , corrosion resistant steels , coatings , cathodic production Distress in concrete /steel structures Types of damages; Sources or causes for damages; effects of damages; Case studies.

UNIT-II

Structural Health Monitoring: An overview of Structural Health Monitoring, Structural Health Monitoring and Smart Materials, Structural Health Monitoring versus Non Destructive Testing, A broad overview of smart materials, Overview of Application potential of SHM.

UNIT-III

Maintenance and Repair Strategies: Definitions: Maintenance, Repair , Rehabilitation, Facets of maintenance , Importance of maintenance , preventive measures on various aspects , assessment procedure for evaluating damaged structure, causes of deterioration – Testing techniques.

UNIT-IV

Materials and Methods of Repair: Special concrete and mortar , Concrete chemicals , special elements for accelerator, strength gain, expansive cement , polymer concrete , sulphur infiltrated concrete , ferro cement, fibre reinforced concrete. Shortcreting; Grouting; Epoxy-cement mortar injection; Crack ceiling.

UNIT-V

Seismic Retrofitting of reinforced concrete buildings: Introduction; Considerations in retrofitting of structures; Source of weakness in RC frame building – Structural damage due to the discontinuous load path; Structural damage due to lack of deformation; Quality of workmanship and materials; Classification of retrofitting techniques; Retrofitting strategies for RC buildings – Structural level (global) retrofits methods; Member level (local) retrofit methods; Comparative analysis of methods of retrofitting.

TEXT BOOKS:

1. Diagnosis and treatment of structures in distress by R.N.Raikar, Published by R&D Centre of Structural Designers & Consultants Pvt.Ltd., Mumbai, 1994.

2. Earthquake resistant design of structures by Pankaj Agarwal and Manish Shrikhande, Prentice-Hall of India, 2006.

REFERENCE BOOKS:

1. Handbook on Repair and Rehabilitation of RCC buildings, Published by CPWD, Delhi, 2002.

2. Denison Campbell, Allen and Harold Roper , Concrete Structures, materials, maintenance and repair , Long man, Scientific and Technical UK 1991.

B.Tech	IV Year	L	T	P	To	C
		4	-	-	4	4

CE427 TRANSPORTATION ENGINEERING

Course Description and Objective:

At the end of this course, students are expected to know planning of highways, fixing of the best alignment, design of various Geometric elements, pavement design, and construction of the roads. Also the students are expected to design surface drainage system for pavements.

Course Outcomes:

- *Plan highway networks*
- *Design highway geometrics*
- *Design Intersections and prepare traffic management plans*
- *Design flexible and rigid pavements*
- *understand the principles of construction and maintenance of highways*

UNIT – I

Highway Development and Planning: Brief Introduction; necessity of highway planning; surveys; preparation of master plan; highway planning in India.

Highway alignment: Factors controlling alignment; Engineering surveys, Drawings & reports.

UNIT – II

Highway Geometric Design: Highway cross section elements; Sight distance; Design of horizontal alignment; Design of vertical alignment.

Highway materials: Sub grade soils- CBR tests; Stone aggregates; Bitumen materials; Paving mixes.

UNIT – III

Design of Highway Pavements: Design factors; Design of flexible pavements – IRC method, IRC recommendations; Design of Rigid pavements - Westergard's stress equation for wheel loads and temperatures stress; IRC recommendations.

UNIT – IV

Highway construction and maintenance: Construction of water bound macadam roads; Bituminous pavements and cement concrete pavements; Construction of joints in cement concrete pavements; Maintenance of highways- Water bound macadam roads, Bituminous pavements, Cement concrete pavements,Highway drainage.

UNIT – V

Traffic engineering: Basic Parameters of Traffic-Volume, Speed and Density-Traffic Volume Studies- Data Collection and Presentation-speed studies-Data Collection and Presentation

Design of Traffic Signals –Webster Method –IRC Method.Types of At-Grade Intersections- Channelization: Objectives –Traffic Islands and Design criteria-Types of Grade Separated Intersections.

TEXT BOOKS :

1. S. K. Khanna & C. E. G. Justo , “Highway Engineering”, 8th ed., Nemchand & Brothers, Roorkee, 2001.
2. Partha Chakroborty & Animesh Das, “Principles of Transportation Engineering”, 2nd ed., Prentice Hall of India, New Delhi, 2003.

REFERENCE BOOKS :

1. G. Venkatappa Rao, “Principles of Transportation Engineering and Highway Engineering”, 3rd ed., Tata Mc Graw-Hill Publishing Company Limited, New Delhi, 2000.
2. Traffic Engineering & Transportation Planning – Dr.L.R.Kadyali, Khanna publications – 6th Edition – 1997

B.Tech	IV Year	L	T	P	To	C
		4	-	-	4	4

CE429 ENGINEERING GEOLOGY

Course Description and Objective:

The course is intended to explore the scope of geology in terms of Civil Engineering applications and to explain the geological agents and their role in constantly moulding the surface of the earth.

Course Outcomes:

- *Understand weathering process and mass movement*
- *Distinguish geological formations*
- *Identify geological structures and processes for rock mass quality*
- *Identify subsurface information and groundwater potential sites through geophysical investigations Apply geological principles for mitigation of natural hazards and select sites for dams and tunnels*

UNIT - I

Introduction : Branches of Geology, Importance of geology from Civil Engineering Importance of Physical geology, Petrology and Structural geology.

Physical Geology : Weathering -process with reference to dams, reservoirs and tunnels weathering of common rock like “Granite”.

Mineralogy : Definition of mineral, Importance of study of minerals, Different methods of study of minerals. Physical properties of minerals. Role of study of physical properties of minerals in the identification of minerals. Study of physical properties of following common rock forming minerals: Feldsper, Quartiz , Flint, Jasper, Olivine , Augite , Hornblende, Muscovite , Biotite , Asbestos, Chlorite , Kyanite, Garnet, Talc, Calcite. Study of other common economic minerals such as Pyrite, Hematite,Magnetite, Chromite, Galena, Pyrolusite, Graphite, Magnesite, and Bauxite.

UNIT - II

Petrology : Definition of rock: Geological classification of rocks into igneous, Sedimentary and metamorphic rocks. Dykes and sills, common tructures and textures of igneous. Sedimentary and metamorphic rocks. Their distinguishing features, Megascopic study of Granite, Dolerite, Basalt, Pegmatite, Laerite, Conglomerate, Sandstone, Shale, Limestone, Gneiss, Schist, Quartzite, Marble.

UNIT – III

Structural Geology: Out crop, strike and dip study of common geological structures associating with the rocks such as folds, faults unconformities, and joints - their important types. Earthquakes, their causes and effects, shield areas and seismic belts. Seismic waves, Richter scale, precautions to be taken for building construction in seismic areas. Landslides, their causes and effect; measures to be taken to prevent their occurrence. Importance of study of ground water, earth quakes and land slides.

UNIT – IV

Geophysical methods: Importance of geophysical studies principles of geophysical study by gravity methods. Magnetic methods, electrical methods. Seismic methods, radio metric methods and geothermal method. special importance of electrical resistivity methods and seismic refraction methods.

UNIT – V

Geology of Dams and Reservoirs: Types of dams and bearing of Geology of site in their selection, Geological Considerations in the selection of a dam site. Analysis of dam failures of the past. Factors Contributing to the success of a reservoir. Geological factors influencing water tightness and life of reservoirs.

Tunnels: Purposes of tunneling, Effects of Tunneling on the ground Role of Geological Considerations in tunneling, over break and lining in tunnels.

TEXT BOOKS:

1. K.V.G.K. Gokhale, "Principals of Engineering Geology", 1st ed., B.S Publications, New Delhi, 2005.
2. N.Chennakesavulu, "Engineering Geology", 2nd ed., MacMillan, India Ltd., New Delhi, 2009.

REFERENCE BOOKS:

1. D.Venkata Reddy, "Engineering Geology for Civil Engineers", 1st ed., Oxford & IBM Publishing Company Pvt. Ltd., New Delhi., 1997.
2. Parbin Singh, "Engineering & General Geology",6th ed., S.K.Kataria & Sons, NewDelhi, 2001.
3. F.G. Bell, "Fundamental of Engineering Geology", 1st ed., B.S Publications, New Delhi, 2005.
4. Krynine & Judd, "Principles of Engineering Geology & Geotechnics", 1st ed., MC Graw-Hill Book Company, 1957.

B.Tech	IV Year	L	T	P	To	C
		4	-	-	4	4

CE431 FINITE ELEMENT METHODS IN CIVIL ENGINEERING

(Dept. Elective -III)

Course Description and Objective:

This course deals with the theory and application of the finite element methods for analyzing structural systems and other civil engineering problems. To equip the students with the Finite Element Analysis fundamentals. To enable the students to formulate the design problems into FEA.

Course Outcomes:

- *Develop shape functions and stiffness matrices for spring and bar elements*
- *Develop global stiffness matrices and global load vectors*
- *Apply natural and arial coordinate systems to constant strain triangle and linear strain triangle elements*

UNIT – I

Introduction: A brief history of FEM, Need of the Method, Finite Difference Method, Equilibrium equations, linear strain-displacement relations; linear constitutive relations– Plane stress and plane strain.

UNIT – II

Finite Element formulation technique: Virtual Work and Variational Principle, Galerkin Method, Finite Element Method: Displacement Approach, Stiffness Matrix and Boundary Conditions, Potential energy; Principle of stationary potential energy

UNIT –III

Element Properties: One Dimensional FEM: Stiffness matrix for bar element - shape functions for one-dimensional elements – one-dimensional problems. Two Dimensional FEM: Different types of elements for plane stress and plane strain analysis – Displacement models – generalized coordinates – shape functions – convergent and compatibility requirements – Geometric invariance – Natural coordinate system – area and volume coordinates.

UNIT – IV

Direct Stiffness method and Solution Technique : Assemblage of elements–Obtaining Global stiffness matrix and Global load vector; Governing equilibrium equation for static problems; Application of boundary conditions; Solution to resulting simultaneous equations using Gauss elimination method.

UNIT – V

Solution to one- and two- dimensional problems: Solution to plane truss, plane-frame, plane-stress and plane-strain problems. Axis-symmetric analysis- Basic principles-Formulation of 4-node isoparamatric axis-symmetric element, Gauss Quadrature, Numerical integration

TEXT BOOKS:

1. C.S.Krishna Murthy, "Finite Element Analysis", 2nd ed., Tata McGraw-Hill Publishing Company Ltd., 2009.
2. S. S.Rao, "The finite element method in engineering", 3rd ed., Butterworth- Heinemann, New Delhi, 2000.

REFERENCE BOOKS :

1. S.S. Bhavakatti, "Finite element analysis", 2nd ed., New age International Publishers, 2010.
2. Robert D. Cook et al, Concepts and Application of Finite Element Analysis, Fourth Edition, John Wiley &jons (Asia) Pte. Ltd.,.

B.Tech IV Year

	L	T	P	To	C
	4	-	-	4	4

CE433 GROUND WATER DEVELOPMENT & MANAGEMENT

(Dept. Elective - III)

Course Description and Objective:

The student is expected to have thorough knowledge on occurrence and movement of ground water, analyzing the data of pumping test and artificial recharge of ground water at the end of the course.

Course Outcomes:

- *Evaluate groundwater resources using geophysical methods*
- *Estimate aquifer parameters*
- *Model regional groundwater flow and design water wells*
- *Design water wells*

UNIT – I

Ground Water Occurrence: Ground water hydrologic cycle, origin of ground water, vertical distribution of ground water, zone of aeration and zone of saturation, geologic formation as Aquifers, types of aquifers, porosity, Specific yield and Specific retention.

UNIT – II

Ground Water Movement: Permeability, Darcy's law, storage coefficient. Transmissivity, differential equation governing ground water flow in three dimensions, derivation, ground water flow equation in polar coordinate system. Ground water flow contours their applications.

UNIT – III

Analysis of Pumping Test Data – I: Steady flow groundwater flow towards a well in confined and unconfined aquifers – Dupit's and Theim's equations, Assumptions, Formation constants, yield of an open well.

UNIT – IV

Analysis of Pumping Test Data – II: Unsteady flow towards a well – Non equilibrium equations – Thesis solution – Jocob and Chow's simplifications, Leak aquifers. Surface and Subsurface Investigation: Surface methods of exploration – Electrical resistivity and Seismic refraction methods. Subsurface methods – Geophysical logging and resistivity logging. Aerial Photogrammetry applications along with Case Studies in Subsurface Investigation.

UNIT – V

Artificial Recharge of Ground Water: Concept of artificial recharge – recharge methods, relative merits, Applications of GIS and Remote Sensing in Artificial Recharge of Ground water along with Case studies. Saline Water Intrusion in aquifer: Occurrence of saline water intrusions, Ghyben- Herzberg relation, Shape of interface, control of seawater intrusion.,Groundwater Basin Management: Concepts of conjunction use, Case studies.

TEXT BOOKS:

1. David Keith Todd, "Ground water Hydrology", 6th ed., John Wiley & Son, New York, 2001.
2. H.M.Raghunath, "Groundwater", 5th ed., Wiley Eastern Ltd., 2002.

REFERENCES BOOKS:

1. R.Willes & W.W.G.Yeh, "Groundwater System Planning & Management", 4th ed., Printice Hall, 1998.
2. C.W.Fetter, "Applied Hydrogeology", 7th ed., CBS Publishers & Distributers, 2002.

B.Tech	IV Year	L	T	P	To	C
		4	-	-	4	4

CE435 REMOTE SENSING AND GIS APPLICATIONS

(Dept. Elective - III)

Course Description and Objective:

These sensors collect data in the form of images and provide specialized capabilities for manipulating, analyzing, and visualizing those images. Remote sensed imagery is integrated within a GIS. A geographic information system (GIS) is a computer-based tool for mapping and analyzing features and events on earth. GIS manages location based information and provides tools for display and analysis of various statistics, including population characteristics, economic development opportunities, and vegetation types.

Course Outcomes:

- *Retrieve the information content of remotely sensed data*
- *Analyse the energy interactions in the atmosphere and earth surface features*
- *Interpret the images for preparation of thematic maps*
- *Analyze spatial and attribute data for solving spatial problems*

UNIT – I

Basic Principles: Introduction, Electromagnetic waves and their properties, interaction with Earth surface materials, recent developments in Remote sensing, Social and legal implications of Remote Sensing, status of Remote Sensing.

Geographic Information System: Introduction, GIS definition and terminology, GIS categories, components of GIS, fundamental operations of GIS, A theoretical framework for GIS.

UNIT – II

Data Acquisition Platforms & Sensors: Introduction, Characteristics of imaging and remote sensing instruments, satellite remote sensing system – a brief over view, other remote sensing satellites.

Pre-Processing Of Remotely Sensed Data: Introduction, cosmetic operation; Geometric connection and registration, atmospheric correction.

UNIT – III

Digital image processing: Digital image and its characteristics, satellite data formats, Image rectification and restoration, Image Enhancement- Contrast Manipulation, Spatial Feature Manipulation, Multi-image manipulation, Image Classification- Unsupervised and Supervised Classification, Classification Accuracy, Details of digital image processing software packages.

UNIT - IV

GIS Spatial Analysis: Computational Analysis Methods (CAM), Visual Analysis Methods (VAM), Data storage-vector data storage, attribute data storage, overview of the data manipulation and analysis. Integrated analysis of the spatial and attribute data.

UNIT – V

Applications of remote sensing in Natural resources management, Environmental impact assessment and water resources management.

TEXT BOOKS:

1. LRA Narayana, "Remote Sensing and its applications" 3rd ed., University Press, 1999.
2. C.P.Lo. & Albert K.W. Yonng, "Concepts & Techniques of GIS", 2nd ed., Prentice Hall (India) Publications, 2009.

REFERENCE BOOKS:

1. John R Jensen, "Introductory Digital Image Processing, A Remote Sensing Prospective", 4th ed., Printicehall, 1986.
2. Paul Jumani, "Principles of Remote Sensing", 4th ed., ELBS, 1985.
3. Peter A Burragh and Rachael A. Mc Donnell, "Principals of Geo physical Information Systems", 1st ed., Oxford Publishers, 2010.
4. M.Anji Reddy, "Remote Sensing and Geographical Information systems", 3rd ed., B.S.Publications, 2010.
5. S.Kumar, "Basics of Remote sensing & GIS", 1st ed., Laxmi Publications, 2005.

B.Tech	**IV Year**	**L**	**T**	**P**	**To**	**C**
		4	-	-	4	4

CE437 AIR POLLUTION AND CONTROL

(Dept. Elective - IV)

Course Description and Objective:

This course serve to provide the student with an introduction or refresher in the basics of air pollution control. After completing this course, the student should be familiar with the various interrelated aspects of air pollution control, understand the basic terminology, and have a rudimentary understanding of some of the technical aspects of regulating, measuring, and controlling air pollution. The student will find links to the Environmental Protection Agency (EPA) Web site for further research in the air pollution control field.

Course Outcomes:

- *Identify sampling and analysis techniques for air quality assessment*
- *Describe the plume behaviour for atmospheric stability conditions*
- *Apply plume dispersion modelling and assess the concentrations*
- *Design air pollution controlling devices*

UNIT – I

Introduction to air pollution : Air Pollution – Definitions, Scope, Significance and Episodes, Air Pollutants – Classifications – Natural and Artificial – Primary and Secondary, point and Non- Point, Line and Areal Sources of air pollution- stationary and mobile sources.

UNIT – II

Effects of air pollution: Effects of Air pollutants on man, material and vegetation: Global effects of air pollution – Green House effect, Heat Islands, Acid Rains, Ozone Holes etc.

UNIT - III

Air pollution Modeling : Thermodynamics and Kinetics of Air-pollution – Applications in the removal of gases like SOx, NOx, CO, HC etc., air-fuel ratio. Computation and Control of products of combustion.

UNIT – IV

Meteorology of air pollutants : Meteorology and plume Dispersion; properties of atmosphere; Heat, Pressure, Wind forces, Moisture and relative Humidity, Influence of Meteorological phenomena on Air Quality-wind rose diagrams. Lapse Rates, Pressure Systems, Winds and moisture plume behaviour and plume Rise Models; Gaussian Model for Plume Dispersion.

UNIT - V

Control of air pollution : Control of particulates – Control at Sources, Process Changes, Equipment modifications, Design and operation of control. Equipment's – Settling Chambers, Centrifugal separators, filters Dry and Wet scrubbers, Electrostatic precipitators. General Methods of Control of NOx and Sox emissions – In-plant Control Measures, process changes, dry and wet methods of removal and recycling.,Air Quality Management – Monitoring of SPM, SO; NO and CO Emission Standards.

TEXT BOOKS:

1. M.N.Rao and H.V.N.Rao , "Air pollution controlling" ; Vol.-I, 4th ed. , Tata Mc.Graw Hill Company,1998.
2. Wark and Warner, "Air Pollution", Vol.-II, 6th ed., Harper & Row, New York, 1996.

REFERENCE BOOK:

1. R.K. Trivedy and P.K. Goel , "An introduction to Air pollution", Vol.-I, 1st ed., B.S. Publications, 2005

B.Tech	IV Year	L	T	P	To	C
		4	0	-	4	4

CE439 GROUND IMPROVEMENT TECHNIQUES

(Dept. Elective - IV)

Course Description and Objective:

At the end of course work the student is expected to learn various techniques of insitu ground modification. He is also expected to know other stabilization techniques depending upon the soil characteristics.

Course Outcomes:

- *Identify ground conditions and suggest method of improvement*
- *Design and assess the degree of improvement*
- *understand the principles of soil reinforcement and confinement in engineering constructions*
- *Design reinforced soil structures*

UNIT – I

Ground Improvement in Cohesion less Soil: Need for Ground Improvement, Objectives of Ground Improvement, Different types of problematic soils, and emerging trends in ground Improvement.

Shallow and deep compaction: Requirements, Principles and methods of soil compaction, Shallow compaction and methods. Properties of compacted soil and compaction control, Deep compaction and Vibratory methods, Dynamic compaction.

UNIT - II

Ground Improvement in Cohesive Soil: Drainage and Dewatering: Drainage techniques - Well points - Vacuum and electro osmotic methods,Preloading with and without vertical drains: Compressibility, vertical and radial consolidation, preloading methods. Types of Drains, Design of vertical Drains, Construction techniques,Stone Column: Function Design principles, load carrying capacity, construction techniques, settlement of stone column foundation.

UNIT - III

Geosynthetics & Reinforced Earth: Geosynthetics: Introduction, Types of

Geosynthetics, Functions and applications of different Geosynthetics. Geotextiles: Types of Geotextiles, tests for Geotextiles.

Reinforced Earth: Principles, components of reinforced earth, design principles of reinforced earth walls.

UNIT - IV

Soil Stabilization: Mechanical Stabilization: Soil aggregate mixtures, properties and proportioning techniques, soft aggregate stabilization, Cement Stabilization: Mechanism, factors affecting and properties, use of additives, design of soil cement mixtures, construction techniques, Lime and Bituminous Stabilization: Type of admixtures, mechanism, factors affecting, design of mixtures, construction methods.

UNIT - V

Grouting: Types of grouts - Grouting equipment and machinery - Injection methods – Grout Monitoring – Stabilization with Cement, Lime and Chemicals - Stabilization of Expansive Soils.

Foundations in Expansive Soils: Identification of expansive soil; Field conditions that favour swelling; consequences of swelling; Different alternative foundation practices in swelling soils; Construction practice of UR piles in swelling soils.

TEXT BOOKS:

1. Purushothama Raj. P, "Ground Improvement Techniques", 2nd ed., Laxmi Publications (p) Ltd., New Delhi, 1998.
2. Craig, R.F., "Soil Mechanics", 3rd ed., Van Nostrant Reinhold Co.,New York, 1993.

REFERENCE BOOKS:

1. Moseley M.P., "Ground Improvement Blockie Academic and Professional", 2nd ed., Chapman and Hall, Glasgow, 1993.
2. Jones J.E.P., "Earth Reinforcement and Soil Structure", 3rd ed., Butterworths, 1995.

B.Tech	IV Year	L	T	P	To	C
		4	0	-	4	4

CE441 RAILWAY AND AIRPORT ENGINEERING

(Dept. Elective - IV)

Course Description and Objective:

In Railway Engineering, the students are taught various components of permanent way, design of geometric elements of railway track and types of stations and yards and signaling and control systems in railways. In Air transportation the growth of air transport, aircraft characteristics, planning of airports, imaginary surfaces, and the design of runways are dealt.

Course Outcomes:

- *Design and analyze the railway track system*
- *Understand the process of execution of railway projects*
- *Carryout the geometrical design of the airport infrastructure*
- *Prepare structural designs of runway*
- *taxiway, and apron-grate area*

UNIT - I

Introduction: Role of railways in transportation; Comparison of railway and highway transportation; Development of railway systems with particular reference to India; Classification of railways.

Railway Track Permanent way: Gauges in Railway track, Railway track cross – section; Coning of wheels.

Rails & Rail Joints: Functions of rails; Requirements of rails; Types of rails sections; Standard rail sections; Length of rails; Rail failures; Wear on rails, Requirements of an ideal joint; Types of rail joints; Welding of rails.

Sleepers: Functions of sleepers; Requirements of sleepers; Classification of Sleepers – Timber sleepers, Metal sleepers & Concrete sleepers; Comparison of different types of sleepers.

UNIT – II

Fish Plates: Fish plates, section of fish plates, failure of fish plates.

Ballast: Functions and requirements of ballast; Types of ballast; Renewal of ballast.

Geometric Design of Track: Necessity; Gradients & Grade Compensation; Elements of horizontal alignment; Super elevation; Cant deficiency and Cant excess; Negative Super elevation; Length of Transition Curve, Length of vertical curve.

UNIT – III

Points And Crossings: Functions of components of turnouts; Crossings.

Stations And Yards: Site selection for railway station; Requirements of railway station; Classifications; Station yards; Level crossings.

Signaling: Objects of signaling; Classification of signals; Controlling- absolute block system. Standards of inter locking.

UNIT – IV

Introduction to Airport Planning: Development of air transportation system with particular reference to India; Air craft components; Air–craft characteristics.

Airport planning and layout: Selection of site; Apron; Hangar; Typical airport layouts; Airport markings; Airport lighting; Drainage systems.

Airport Obstruction: Zoning laws; Classification of obstructions; imaginary surfaces; Approach zone; Turning zone.

UNIT – V

Runway Design: Runway orientation; Basic runway length; Corrections for elevation, temperature and gradient; Runway geometric design.

Specifications for Structural Design of Airport Pavements: Design factors methods for flexible and rigid pavements; LCN system of pavement design.

TEXT BOOKS:

1. S.C.Saxena and S.Arora, “Railway Engineering”, 12th ed., Dhanpat Rai & Sons, 2009.
2. S. K. Khanna & M. G. Arora, “Airport Planning and Design”, 16th ed., Nemchand & Bros, Roorkee, 2007.

REFERENCE BOOKS:

1. M.M.Agarwal, “Railway Engineering” 1st ed., Prabha & Co., New Delhi, 2010.
2. G.V.Rao, “Airport Engineering”, 2nd ed., Tata Mc Graw Hill, New Delhi, 2000.

HS111 ENGINEERING MATHEMATICS - I

I Year B.Tech. CSE I - Semester

L	T	P	To	C
4	-	-	4	4

Course description and Objectives :

Without mathematics not a single day of an engineer will pass! All the topics of this course are relevant to all branches of engineering. Differential equations are used in various places. Laplace transformations are used, for example, for conversion of domains, from time domain to frequency domain. These are also used to solve ordinary differential equations. When data is given at only a finite points, we use numerical methods for find the approximate values of functions, also to solve differential equations approximately etc. Maxima, minima of a function has got many applications.

Course Outcomes:

- Students will understand that Mathematics which they learn can be used at different levels in their Engineering course irrespective of their branches.
- This course will help to sketch the graph of a differential equation and its direction mixing fields
- Laplace transform used to compute solutions of equations involving impulse functions
- They will be able to use Laplace transformations for conversion of domains from time domain to frequency domain.
- Differential Equations help them to find approximate values of function.
- They will be able to analyze and use them in different applications.
- Eigen values and Eigen vectors play a prominent role in the study of ordinary differential equations and in many applications of physical sciences.

UNIT I - Ordinary Differential Equations & Differential Equations of Second Order :

Differential Equations of First Order : Definiton, Order and degree of a differential equation, Formation of differential equations, Solution of a differential equation, Differential equations of first order and first degree : variables separable, Homogenous equations, Linear equations, Exact differential equations.

Differential Equations of Second Order : Linear differential equations of second order with constant coefficients, Methods for finding the complementary functions and particular integral, General method of finding the particular integral of any function.

UNIT II - Applications of Differential Equations and Laplace Transformations

Applications of Differential Equations : Newton's law of cooling, Natural law of growth, Orthogonal trajectiories**.**

Laplace transformations : Definition, Properties, Convolution theorem, Inverse Laplace transformation, Solving differential equations using Laplace Transformation.

UNIT III - Numerical Methods

Taylor's Method, Picard Method, Euler Method, Modified Euler Method, Runga-Kutta Methods.

Interpolation by Lagrange and Newton methods.

UNIT IV - Matrices

Rank of a matrix, finding rank of a matrix using Echelon form, Normal form, triangular form, PAQ form, inverse of a matrixEigen values, Eigen vectors, properties, Cayley-Hamilton theorem (without proofs), Diagonalisation of a matrix.

Solving System of equations (Gauss-Siedal method only)

UNIT V - Maxima and Minima & Jacobians

Maxima and Minima : Review of partial differentiation: Partial derivatives, Partial derivatives of higher order, Homogeneous function, Euler's theorem, Total differential coefficient,

Maxima and Minima of a function of two variables, Conditions for extreme values, Lagrange method of undetermined multipliers.

Jacobians : Definition, Properties, Jacobian of implicit functions, Partial derivaties of Implicit functions using Jacobian.

TEXT BOOKS :

1. *H. K. Dass* and *Er. Rajnish Verma*, Higher Engineering Mathematics, S. Chand & Co., New Delhi, 2011.
2. *B.S. Grewal*, "Higher Engineering Mathematics", 40th edition, Khanna Publishers, 2009.

REFERENCE BOOKS :

1. *B.V. Ramana*, "Higher Engineering Mathematics", 3rd Edition, Tata McGraw-Hill Publishing Co, 2008.
2. *R K Jain, S R K Iyengar*, "Advanced Engineering Mathematics", 2nd Edition, Narosa Publishing House.
3. *Erwin Kreyszig*, "Advanced Engineering Mathematics", 8th Edition, John Wiley & Sons (Asia) Pvt. Ltd. 2001.

HS113 ENGINEERING PHYSICS

L	T	P	To	C
4	-	-	4	4

Course description and Objectives :

There is a symbiotic relation between physics and engineering. Broadly speaking, engineering is mainly applied physics. Recent technical developments have been the result of joint efforts of physicists and engineers. A proper study of physics is therefore indispensable for an engineering student to excel in his field. The purpose of this course is to present the principles and concepts of physics as relevant to an engineer.

Course Outcomes:

The students will be made to get acquainted to the following learning outcomes:

- Concepts of Physical optics, devices and applications.
- Ultrasonic waves, production, applications in NDT.
- Introduction to Quantum mechanics in relevance to that of modern physics.
- Exposure to latest inventions like lasers, fibers and applications
- Insight into nano technology and applications, solar energy to combat energy crisis.

UNIT I - Physical Optics

Interference – Types - Interference in thin films (Reflection) – Newton’s Rings – Michelson’s Interferometer, Fabry-perot interferomenter – Applications.

Diffraction – Fraunhoffer Diffraction at single slit – Diffraction grating

Polarization – Production of plane polarized light – Nicol prism – Optical activity – photo elasticity.

UNIT II - Ultrasonics & NDT

Ultrasonics : Introduction – production of ultrasonic waves – piezoelectric method – Properties of ultrasonic waves – Types of ultrasonic waves – Determination of Velocity of ultrasonic waves in solids and liquids – Applications.

NDT : Introduction - Types – Theory and practice of Ultrasonic Testing – Ultrasonic Testing Systems – Ultrasonic Testing Methods – X-Ray Radiography.

UNIT - III Quantum Mechanics & Free electron theory of metals

Quantum Mechanics : Matter waves - Schroedinger's time independent wave equation - Physical significance of the wave function - Particle in one dimensional potential well – tunneling phenomenon.

Free electron theory of metals : Introduction – Classical free electron theory – Electrical conductivity of metal – Fermi - Dirac distribution function and its variation with temperature – Quantum free electron theory.

UNIT IV - Lasers & Fiber Optics:

Lasers: Characteristics of Laser light – Spontaneous and Stimulated emission of radiation – Low power and High power lasers, He-Ne Laser – CO_2 Laser – Nd-Yag laser - Applications of Lasers, Holography and Applications

Fiber Optics: Principle of optical fiber - materials – Numerical Aperture – Types of fibers – Dispersion and Attenuation in optical fibers – Optical sensors – Optical fiber communication system.

UNIT V - Solar Energy & NanoScience and Technology

Solar Energy : Solar radiation – Photovoltaic effect – solar cells – Efficiency of solar cell – Solar thermal energy conversion systems.

NanoScience & Technology : Introduction to nano meterials – Basic principles of nanoscience & Technology – Fabrication of nanomaterials – Physical & Chemical properties of nanomaterials – Applications of nanotechnology.

TEXT BOOKS :

1. M.R.Srinivasan, "Physics for Engineers" New Age International, 2002-2003.
2. M.N. Avadhanulu & P.G. Kshirasagar, "Engineering Physics", 1st edition, S. Chand & Company Ltd, 1992.

REFERENCE BOOKS :

1. Halliday, Resnic and Walker, "Fundamentals of Physics", 6th edition, John Willey publishers, 2003.
2. Grawfor F.S., Berkley Physics courses, "Waves and Oscillations", Volume III McGraw Hill, 1992.
3. V. Raghavan, "Materials Science and Engineering", 5th edition, Prentice-Hall India, 2004.
4. S.O.Pillai, "Solid State Physics", 6th edition, New Age International Publications, Revised, 2005.
5. V.Rajendran, "Engineering Physics", 1st edition, TMH Publications, 2010.

ME101 ENGINEERING MECHANICS

L	T	P	To	C
4	-	-	4	4

Course description and Objectives :

The course aims to impart the knowledge to understand the forces and their reactions on various static and dynamic conditions.

Course Outcomes:

- Use scalar and vector analytical techniques for analyzing forces in statically determinate structures.
- Solve the engineering problems in case of equilibrium conditions and to calculate the reaction forces of various supports of different structures.
- Determine the centroid, centre of gravity and moment of inertia of various surfaces and solids.
- Solve the problems involving dry friction.
- Apply fundamental concepts of kinematics and kinetics of particles to the analysis of simple, practicalproblems.

UNIT I - Basic Concepts and Principles of Statics :

Introduction to Engineering Mechanics, Scalar and Vector quantities, Forces, Characteristics of a force, Definitions and examples of various types of force systems, Law of transmissibility, Definition of resultant, Composition and resolution of forces, Moment of a force, Principles of moments of force, Couples, characteristics of a couple, Transformations of a couple, Resultants of Force Systems, Possible resultants of different types of force systems, Resultant of a concurrent coplanar force system, Resultant of a non concurrent coplanar force system

UNIT II - Equilibrium of Rigid Bodies

Free body diagrams, Types of supports and their reactions, requirements of stable equilibrium, Equations of equilibrium of a concurrent coplanar force system, Equilibrium of Bodies acted on by two or three forces, Equilibrium of bodies acted on by non-concurrent coplanar force system

UNIT III - Properties of Surfaces and Solids :

Centroid and Center of Gravity: Centre of gravity of parallel forces in a plane, centroids and center of gravity of composite bodies, Distributed Loads on Beams.

Moments of Inertia: Definition, Parallel axis theorem and perpendicular axis theorem for areas, Polar Moment of inertia, Second moment of area by

integration, Radius of gyration of areas, Moments of inertia of composite areas.

UNIT IV - Friction :

Nature of friction, Laws of friction, Coefficient of friction, Angle of friction, Cone of friction, Types of Friction - Sliding Friction, Rolling Friction, Belt Friction, Ladder Friction, Wedge friction.

UNIT V - Kinematics and Kinetics :

Absolute Motion: Introduction, Recapitulation of basic terminology of mechanics, Displacement, Velocity and acceleration their relationship, Rectilinear motion of a particle

Relative Motion: Introduction to kinematics of relative motion, Relative displacement, Relative velocity

Kinetics: Introduction to Kinetics, Force, Mass and Acceleration, Newton's Laws of motion, Equation of motion for a particle, D Alembert's principle, Rectilinear translation of a rigid body, Work done by a force, Work done by a force system, Energy, Potential energy, Kinetic energy, Principle of Work and kinetic energy, Conservation of energy, Linear impulse, Linear momentum, Principle of linear impulse and linear momentum, Conservation of linear momentum.

TEXT BOOKS :

1. J. L. Meriam, L. G. Kraige, "Engineering Mechanics: Dynamics", 7th ed., John wiley & sons, 2012
2. A. K. Tayal, "Engineering Mechanics", Umesh Publications, 2005.

REFERENCE BOOKS :

1. L. Singer - Harper, "Engineering Mechanics", 3rd ed., Fedinand . , Collins, 1975.
2. Timoshenko & Young, "Engineering Mechanics", 4th ed., Tata McGraw Hill, New Delhi, 2007.
3. S. S. Bhavakati & J. G. Rajasekharappa, "Engineering Mechanics", 3nd ed., New Age International Publications, New Delhi, 2008.

HS114 TECHNICAL ENGLISH COMMUNICATION

L	T	P	To	C
3	2	-	5	5

Course description and Objectives :

To introduce students to the specific use of language for the purposes of Technical Communication which would be an essential prerequisite for success in the areas of writing and speech. The teaching efforts in this course will be directed towards making students develop their technical and non-technical writing abilities using the fundamental principles that apply to the correct use of the English language free of grammatical and other related errors.

Course Outcomes:

Students shall achieve the ability to write and demonstrate college-level proficiency in the following:

- Clear and effective communication of meaning in speaking and writing.
- The ability to perform effectively the essential steps of the writing process (Note making, organizing, composing, revising, and editing).
- The ability to explain, develop, and criticize ideas effectively.
- Effective organization within the paragraph and the essay.
- Accuracy, variety, and clarity of sentences.
- Appropriate diction.
- Control of conventional mechanics (e.g., punctuation, spelling)

UNIT - I

- Text : Environmental Consciousness (Climate Change – Green Cover – Pollution)
- Grammar : Articles – Prepositions – Sentence Types and Construction
- Vocabulary : Root – Prefixes - Suffixes
- Composition : Paragraph Writing (Descriptive & Narrative)
- Lab Practice : Introduction to Phonetics (Organs of Speech; Consonants, Vowels & Diphthongs; Syllable, Stress & Intonation)

UNIT - II

- Text : Emerging Technologies (Solar Power – Cloud Computing – Nanotechnology)
- Grammar : Time and Tense (Present-Past-Future; Helping Verbs; Modals)
- Vocabulary : Synonyms – Antonyms
- Composition : Note-making
- Lab Practice : Grammar Practice (Speaking of past, present & future)

UNIT - III

- Text : Energy (Renewable and Non-renewable Sources – Alternative Sources – Conservation – Nuclear Energy)
- Grammar : Subject-Verb Agreement - Sentence Construction (Characteristics of Technical Writing)
- Vocabulary : Idioms & Phrases
- Composition : Summarizing
- Lab Practice : Situational Conversations – Role-Plays (Introducing; Greeting; Enquiring; Informing; Requesting; Inviting)

UNIT - IV

- Text : Engineering Ethics (Challenger Disaster – Biotechnology – Genetic Engineering – Protection from Natural Calamities)
- Grammar : Sentence Transformation (Degrees, Voice, Speech & Synthesis)
- Vocabulary : Phrasal Verbs
- Composition : Letter Writing (Informal)
- Lab Practice : Situational Conversations – Role-Plays (Emotions; Directions; Descriptions; Agreements; Refusals; Suggestions)

UNIT - V

- Text : Travel and Tourism (Advantages and Disadvantages of Travel-Tourism – Atithi Devo bhava – Tourism in India)
- Grammar : Common Errors
- Vocabulary : One-word Substitutes
- Composition : Letter Writing (Formal)
- Lab Practice : Group Discussions

TEXT BOOK :

Mindscapes - English for Technologists and Engineers, Orient Black Swan, 2012.

REFERENCE BOOKS :

1. V. R. Narayana Swamy***, "Strengthen Your Writing",*** 1st edition, Orient Longman, 2003.
2. Thomas Elliott Berry***, "The Most Common Mistakes in English Usage",*** 1st edition, Tata McGraw Hill, 2004.
3. T. Balasubramanyam, ***A Textbook of English Phonetics for Indian Students***, Macmillan Ltd., 2000.
4. Sasikumar.V and P.V. Dhamija,. ***Spoken English: A Self-Learning Guide to Conversation Practice,*** 34th Reprint, Tata McGraw Hill, New Delhi, 1993.
5. Margaret M Maison, **"Examine your English",** 1st edition**,** Orient Longman, 1999.
6. Ashraf Rizwi, "***Technical English Communication***", Tata McGraw Hill, Latest Edition.

CS101 PROBLEM SOLVING AND COMPUTER PROGRAMMING

L	T	P	To	C
5	-	-	5	5

Course description and Objectives :

Aim of this course is to introduce the techniques of problem solving and concepts of programming language to the students. Because of its popularity and suitability to develop different types of applications, 'C' language has become the de-facto programming language to engineers. A comprehensive introduction of C language is offered through this course to enable the students to write diversified programs.

Course Outcomes:

On Completion of this course student should be able to

- Able to understand the basic terminology used in computer programming and to write, compile and debug programs in C language.
- Use different data types in a computer program and design programs involving decision structures, loops and functions.
- Able to understand the allocation of dynamic memory using pointers
- Use different data types to create/update basic data files.

UNIT I - Fundamentals of computers

Basic functional units and discrete components of a computer, computer networks, networking components, Binary representation of integers and real numbers, ASCII, EBCDIC, Unicode, Generations of computer languages.

UNIT II - Problem Solving Steps & Preliminaries of C

Problem understanding, Formulating a mathematical model, Development of an algorithm, Representation of an algorithm, Flow chart and Pseudo code, Coding, Testing and Debugging, Comments, Processor statement, Function header statement, Variable declaration statement and Executable statement, C Character Set, constants, identifiers, operators, punctuations, keywords, Basic data types, modifiers, identifiers, variables, C scopes, type qualifiers, storage class specifiers, variable initializations, constants, reading and writing characters, formatted I/O.

UNIT III – Controal Statements & Functions

Assignment, arithmetic , relational, logical, bitwise, ternary, address, indirection, sizeof, dot, arrow, and parentheses operators, Expressions Precedence of operators and associatively, Category of Statements, Selection, Iteration, jump, label, expression and block, Function declaration, prototype, definition, calling by value and address, standard library functions and recursive functions.

UNIT IV - Arrays and Pointers

Declaration, initialization, reading, writing, accessing and passing as a parameter to functions, Multidimensional arrays and String functions, pointer expressions, pointer and arrays, multiple indirection, initializing pointers, pointer to functions, Dynamic memory allocation functions.

UNIT V - Structures and Files

declaration, initialization and accessing, array of structures and passing structures to functions, structure pointers, arrays and structures within structures, unions, bit-fields, typedef and enumerations, I/O and processing operations on text and binary files. pre-processor directives.

TEXT BOOKS :

1. Reema Thareja, “Introduction to C Programming”, Oxford University Press, India, 2013
2. Herbert Schildt, C: “The Complete Reference”, 4th Edition, Tata McGraw-Hill, 2000.

REFERENCE BOOKS :

1. E. Balagurusamy, “ Programming in ANSI C”, 4TH Edition, Tata McGraw- Hill, 2008.
2. R Ravichandran and T Jeyapoovan, “ Computer Programming with C”, Soni Graphics, India, 2014.

CS105 NETWORK SECURITY

L	T	P	To	C
2	-	-	2	-

Course description and Objectives :

This Course focuses towards the introduction of System, Information and Network security using various methodologies. It also focuses on the practical aspects that have been used to provide e_mail and web security.

Course Outcomes:

On Completion of this course student should be able to

- understand the Importance of Information Security
- Know the ways to protect the information
- understand the Firewall importance
- understand the need of Virtual Private Networks.

UNIT I - History of security :

History of security – Physical security, communications security, emissions security, computer security, network security and information security. Security process - Anti-virus software, access controls, firewalls, smart cards, biometrics, intrusion detection, policy management, vulnerability scanning, encryption, physical security mechanisms.

UNIT II - Access attacks

Snooping, eavesdropping, interception; Modification attacks - Changes, insertion and deletion; Denial of service attacks- Denial of access to information, applications, systems and communication; Repudiation attacks - Masquerading and denying an event. Hacking - Hacker motivation, historical hacking techniques, IP spoofing and malicious code.

UNIT III - Security Services

Confidentiality of files, information in transmission and traffic flow, integrity, availability and accountability; Integrity of files and information during transmission; Availability - backups, failover and disaster recovery; Accountability – identification and authentication, and audit.

UNIT IV - Firewalls

Concepts of firewalls, Application layer and packet filtering firewalls; Virtual Private Networks.

UNIT V - Encryption

Basic encryption concepts, Private Key encryption standards-DES, triple DES and AES. Public key encryption – RSA. Concepts of digital signatures.

TEXT BOOK :

Eric Maiwald, Fundamentals of Network security, Dreamtech Press, 2007.

REFERENCE BOOK :

William Stallings, "Cryptography and Network security", 4th edition, Pearson Education, 2010.

HS120 ENGINEERING PHYSICS LAB

L	T	P	To	C
-	-	3	3	2

Course description and Objectives :

This lab is intended to make the students realize the theoretical concepts of physics having hands on experience in conducting the following experiments. Students may have to take up any 10 experiments from each section.

Course Outcomes:

- Students realize concept of resonance of sound conducting the experiment of Sonometer Melde's experiment and volume generator.
- The students understand the concepts of light conducting the experiments of dispersion of light, diffraction of light, optical fibers and lasers.
- The students acquire the knowledge of magnetic field theory, thermal energy and elastic properties by conducting the experiments of field along the axis of circular coil, Lee's experiment, Seebeck effect and Torsional pendulum.

PHYSICS LAB

1. Verification of laws of transverse vibrations in stretched string - Sonometer
2. Melde's Experiment - Transverse and Longitudinal modes.
3. Determination of Rigidity modulus of a material in the form of a wire - Torsional pendulum
4. Dispersive power of the material of a Prism - Spectrometer
5. Determination of wavelength of a monochromatic light source - Diffraction Grating.
6. Field along the axis of a circular coil – stewart Gee's apparatus.
7. Volume Resonator.
8. Band gap of semiconductor
9. Hall coefficient
10. Thermal conductivity of bad conductor Lee's method
11. Optical Fiber – Determination of numerical aperture
12. Solar Cell
13. Seebeck effect

REFERENCE BOOKS:

1. Vogel's Text book of qualitative Chemical Analysis J.Mendham, R.C Denney, J.D. Bares, M.Thomas & B. Siva Sankar, Pearson Publications – Volume I (2009).

CS107 COMPUTER PROGRAMMING LAB

L	T	P	To	C
-	-	3	3	2

Course description and Objectives :

To familiarize the students in preparation of documents and presentations with office automation tools. A comprehensive problem solving skills through C language is offered to enable the students to write diversified solutions using this language.

Course Outcomes:

- Able to write, compile and debug programs in C language.
- Able to formulate problems and implement algorithms in C.
- Able to effectively choose programming components that efficiently solve computing problems in real-world

1. Write A Program to find simple Interest, compound interest
2. Write A Program to covert given temperature from C to F & F to C
3. Write A Program to check Entered number is positive or zero or Negative
4. Write A Program to print given year is Leap year or not
5. Write A Program to do arithmetic operations using switch
6. Write A Program to find biggest among 3 Numbers
7. Write A Program to print grade of a student for 5 sub avg>70(A), 60-70(B), 50-60(C),<50(F)
8. Write A Program to find Roots fo Quadratic Equation
9. Write A Program to find sum of individual digits of a given number
10. Write A Program to check whether the given number is PALINDRAM or not
11. Write A Program to check whether the given number is PERFECT or not
12. Write A Program to check whether the given number is PRIME or not
13. Write A Program to check whether the given number is ARMSTRONG or not
14. Write A Program to check whether the given number is STRONG or not
15. Write A Program to find sum of Natural Numbers

16. Write A Program to print the following triangle

```
      1
    2   3
  4   5   6
7   8   9   10 etc……….
```

17. C Progrm to find Factorial of Given number using Recursive and Non Recursive Functions.
18. Write A Program to print Fibonacci Series upto given limit using recursive, Non recursive
19. Write program in C for determining the minimum and maximum and sum of elements of an array of 'n' elements and searching for a given element.
20. C Program for computing range, mean and standard deviation of a given numeric dataset.
21. Write A Program in C for performing addition, subtraction, multiplication and transpose operations on matrices.
22. Write program to perform the following string operations on the given string. a) string length b) string copy c) string concatenation d) string comparison e) reverse string f) sub string
23. Write A Program to read student record (no, name, marks1, marks2, marks3, marks4, marks5, calculate average and Grade) and display the student record.
24. Write A Program to do arithmetic operations using pointers.
25. Write A Program to create two data files and copy the content of these two data files as a single file in another new file?

REFERENCE BOOKS :

1. E. Balagurusamy, " Programming in ANSI C", 4TH Edition, Tata McGraw- Hill, 2008.
2. R Ravichandran and T Jeyapoovan, " Computer Programming with C", Soni Graphics, India, 2014.
3. Reema Thareja, "Introduction to C Programming", Oxford University Press, India, 2013
4. Herbert Schildt, C: "The Complete Reference", 4th Edition, Tata McGraw-Hill, 2000.

ME105 WORKSHOP PRACTICE

L	T	P	To	C
-	-	3	3	2

Course description and Objectives :

To provide the hands on experience to the students on basic workshop skills.

Course Outcomes:

After completion of this course, students will be able to identify various tools connected to all the trades. They are also able to make various objects to the given dimension by using various types of tools.

Trades for exercises:

1. Carpentry:
2. Fitting
3. Tin Smithy & Black smithy4. House wiring
5. Foundry & Welding (Demonstration)
6. Machine shop & CNC (Demonstration)
7. IT Workshop
8. Study of discrete components of computer and networking (1 session)
9. Demonstration of assembling a computer, disk partitioning and installation of system and application software. installation of modem etc. (2 sessions)

Note: In each trade, the students has to perform at least two jobs

TEXT BOOKS :

1. S.K. Hazra Choudhury, Elements of workshop Technology, 11th Edition, Media Promoters, 1997
2. Gopal, T.V., Kumar, T., and Murali, G., A first course on workshop practice – Theory, Practice and Work Book, Suma Publications, Chennai, 2005.
3. Venkatachalapathy, V. S., First year Engineering Workshop Practice, Ramalinga Publications, Madurai, 1999.

HS115 ENGINEERING MATHEMATICS - II

L	T	P	To	C
4	-	-	4	4

Course description and Objectives :

Without mathematics not a single day of an engineer will pass! All the topics of this course are relevant to all branches of engineering. In real life, many quantities are dependent on more than one quantity. Hence study of functions of several variables is crucial. In this course, we study partial differentiation, partial differential equations, multiple integrals all involving functions of two variables. We also study Fourier series and Z-transformations and difference equations.

Course Outcomes:

- The students will understand that many quantities are dependent on more than one quantity so they learn functions of several variables.
- They will be able to solve Partial Differential Equations, multiple integrals which are involving functions of two variables.
- They can apply Z – transforms to solve difference equations.
- They will be able to calculate areas and volumes.
- The student will enable to locate the maxima and minima of a function is an important task which arises often in applications of mathematics to problems in engineering and science.
- Vector differentiation and integration used to find the arc lengths and curvatures of space curves

UNIT I - Partial Differential Equations :

Formation of Partial Differential Equations, Linear (Lagrange) Equations, Method of multipliers, Non-linear partial differential equations (Types), Charpit's method.

Second order linear equations, classifications, Solution by method of separation of variables.

UNIT II - Fourier Series :

Periodic functions, Fourier series, Dirichlet's conditions, Determination of Fourier coefficients, Discontinuous functions, even and odd functions, Half-range series, Functions having arbitrary period.

UNIT III - Z-transformations & Applications :

Z-transformations : Sequences, Z-transformation, Properties, Inverse Z-transformation, Multiplication and division by k, Initial and final value theorems, Convolution, Determination of inverse Z-transformation.

Applications : Solutions of difference equations using Z-transformations.

UNIT IV - Multiple Integrals :

Double integrals, Evaluation, Evaluation in Polar coordinates, Change of order of integration, Change of variables, Applications to Area in Cartesian coordinates and polar coordinates.

Triple integrals, Fundamentals, Evaluation of triple integrals.

UNIT V - Vector Differentiation and Integration

Vector Function, Differentiation, Scalor and Vector point function, Gradient, Normal, Divergence, Directional Derivate, Curl, Vector identities.

Line Integral, Surface Integral, Volume integral, Green's theorem, Stoke's theorem, Gauss theorem of divergence (without proofs).

TEXT BOOKS :

1. *H. K. Dass* and *Er. Rajnish Verma*, Higher Engineering Mathematics, S. Chand & Co., New Delhi, 2011.
2. *B.S. Grewal*, "Higher Engineering Mathematics", 40th edition, Khanna Publishers, 2009.

REFERENCE BOOKS :

1. *B.V. Ramana*, "Higher Engineering Mathematics", 3rd Edition, Tata McGraw-Hill Publishing Co, 2008.
2. *R K Jain, S R K Iyengar*, "Advanced Engineering Mathematics", 2nd Edition, Narosa Publishing House.
3. *Erwin Kreyszig*, "Advanced Engineering Mathematics", 8th Edition, John Wiley & Sons (Asia) Pvt. Ltd. 2001.

HS118 ENVIRONMENTAL STUDIES

L	T	P	To	C
4	-	-	4	4

Course description and Objectives :

The objective of this course is to heighten on awareness of nature and its importance to students

and make them understand the need to make judicious use of all natural resources for long team sustenance of life on this planet.

Course Outcomes:

- To provide Knowledge on importance of natural resources and integrate technical "field" knowledge with analytical skills to prevent natural resources depletion
- To maintain healthy and Diverse Ecosystems ,
- Work together to conserve the biodiversity
- Take immediate measures to control the Pollution
- Adopt Ecofriendly technology.
- Maintenance of hygienic conditions

UNIT I - Environment and Natural Resources :

Environment: Definition, Scope and Importance – Need for Public Awareness

Natural Resources: Renewable and non-renewable resources – Natural resources and associated problems – Forest Resources: Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources: Use and over utilization of surface and ground water – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources - Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity–Energy resources: renewable and non-renewable energy sources, alternate energy sources. Land resources: Land as a resource, land degradation, Soil erosion – case studies - Role of an individual in conservation of natural resources.

UNIT II - Ecosystems and Biodiversity :

Ecosystem: Concept of an ecosystem. – Complete and incomplete ecosystem - Structure and functions of an ecosystem - Ecological succession. - Food chains, food webs -Structure and functional features of the following ecosystem: a. Forest ecosystem b. Grassland ecosystem c. Desert ecosystem, d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) **Biodiversity**: introduction of biodiversity, Bio-geographical classification of India - Value of biodiversity- Biodiversity at global, National and local levels - Hot-spots of biodiversity - Threats to biodiversity - Endangered and endemic species of India – Conservation of biodiversity

UNIT III - Environmental Pollution and Applications of Remote Sensing / GIS on Environment

Definition, Cause, effects and control measures of: Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution - Solid waste Management: Causes, effects and control measures of municipal and industrial wastes - Climate change, global warming, acid rain, ozone layer depletion -Case Studies - Role of an individual in prevention of pollution - Pollution case studies. – Green technology and its concept, role of green technology in controlling environmental problems.

UNIT IV - Social issues and EIA :

Sustainable development -water conservation: Cloud Seeding (Artificial rain making system), rainwater harvesting, watershed management - Disaster management: floods, earthquake, cyclone and landslides - Environment Protection Act. - Air (Prevention and Control of Pollution) Act. - Water (Prevention and control of Pollution) Act - Wildlife Protection Act - Forest Conservation Act

EIA: introduction to E.I.A.-definition of E.I.A and E.I.S – scope and objectives of E.I.A.- methods of E.I.A –CEIA, REIA, MOEF, CPCB, SPCB – Importance of E.I.A in proposed Projects / Industry /

Developmental activity - Remote sensing / GIS: Introduction of remote sensing / GIS, definition of remote sensing, applications of the remote sensing on environment (site selection, land use/land cover pattern, water/air/soil quality models, a criteria of environmental information systems)

UNIT V - Environmental Sanitation :

Food sanitation: food and drugs Act, food preservations, food borne diseases- Milk sanitation: tests for milk, pasteurization of the milk - water borne diseases-air borne diseases-viral diseases (HIV/AIDS, SARS, bird-flu, anthrax)- maintenance of sanitary and hygienic conditions

Field Work/Environmental Visit: Visit to a local area to document environmental assets – river/ forest/ grassland / hill /mountain - Study of local environment - common plants, insects, birds - Study of simple ecosystems – pond, river, hill, slopes etc - Visits to industries, water treatment plants, effluent treatment plants

TEXT BOOKS :

1. Y. Anjaneyulu, "Introduction to Environmental Science", B S Publications, 2008.
2. Dr. M. Chandrasekhar, "A Text book of Environmental Studies", HI-TECH publications, 2006

REFERENCE BOOKS :

1. Dr. M. Anji Reddy, "A Text book of environmental science and Technology", B S Publications, 2008
2. Dr. K. Mukkanti, "A Text book of Environmental Studies", S.CHAND Company Ltd, 2009.
3. EHILRS and ST, "Text book of Municipal and Rural Sanitation", M.S Hill, 1998.
4. C. S. Rao, Wiley Eastern Ltd, "Environmental Pollution Control Engineering", New Age International Ltd, 2001
5. Dr. M. Anji Reddy, "Introduction to Remote Sensing", B S Publications, 2004.
6. Kurian Joseph and R.Nagendram, "Essentials of environmental studies", Pearson Education Pt Ltd, Delhi, 2007.
7. Sharma & Kour "Text book of Environmental pollution".
8. H.C Perkins "Text book of Air Pollution".

EE111 FUNDAMENTALS OF ELECTRICAL ENGINEERING

L	T	P	To	C
4	-	-	4	4

Course description and Objectives :

To understand the basic concepts, laws, techniques in analyzing various DC and AC circuits and concepts in coupled circuits. Study of construction details, working of various electrical machines and Semiconductor Devices and operation

Course Outcomes:

- Able to explain the notation and components of electric circuits
- Able to analyze DC and single phase and three phase AC circuits using different methods and theorems
- Able to operate various electrical machines.
- Able to explain the concepts of Semiconductor Devices and operation

UNIT I - Fundamentals Of DC Circuits

Circuit Concepts: Concepts of network, Active and passive elements, voltage and current sources, concept of linearity and linear network, unilateral and bilateral elements, R, L and C as linear elements. Ohm's Law – Kirchhoff's Laws –application to simple series, parallel circuits, mesh and nodal analysis of simple resistive circuits.(simple numerical problems).

UNIT II - Fundamentals of A.C. Circuits:

Generation of A.C. voltage - frequency, average value, R.M.S. value, form factor, peak factor for sinusoidal only - phasor representation of alternating quantities. Analysis of simple series and parallel A.C. circuits-(simple numerical problems)

Balanced Three phase systems – relation between phase and line quantities of voltages and currents in star and delta connected systems (Elementary treatment only)

UNIT III - Fundamentals of Electromagnetism and Transformers:

Concepts of Magneto motive force, reluctance, flux and flux density , concept of Self Inductance and Mutual Inductance, Coefficient of coupling-only elementary treatment. (simple numerical problems).

Transformers: Principle of operation of single phase transformer – constructional features – EMF equation (simple numerical problems)

UNIT IV - Electrical Machines:

DC Machines: Constructional details of a D.C. Machine.

D.C. Generator – Principle of operation – EMF equation – types of D.C. generators (simple numerical problems)

D.C. Motor – Principle of operation – Torque equation – types of D.C. motors (simple numerical problems)

A.C Machines: Principle of operation of three phase induction motors – slip ring and squirrel cage motors – Torque equation derivation, Constructional details of synchronous machines.

UNIT V - Semiconductor Devices:

Classification of solids based on energy band theory - Intrinsic semiconductors - Extrinsic semiconductors - P type and N type semiconductors - P-N junction diode and its characteristics –Half and Full wave rectifiers- Zener diode and its characteristics - Voltage regulator. Bipolar junction transistor – Operation- Types- Applications.

TEXT BOOKS:

1. Mittle, V.N., "Basic Electrical Engineering", 2nd ed., TMH, New - Delhi, 1990.
2. V.K.Mehta,"Principles of Electrical Engineering and Electronics", 3rd ed., S. Chand Publications, New Delhi, 2010.

REFERENCE BOOKS:

1. Millman & Halkias, "Integrated Electronics", McGraw Hill, 1979.
2. A.K. Thereja & B.L. Thereja, "Electrical Technology", Vol. – II, S.Chand Publications, 2007.
3.. U.Bakshi & A.Bakshi, "Basic Electrical Engineering", 1st ed., Technical Publications, Pune, 2005.
4. U.Bakshi & A.Bakshi, "Basic Electrical Engineering", 1st ed., Technical Publications, Pune, 2005.

HS117 ENGINEERING CHEMISTRY

L	T	P	To	C
4	-	-	4	4

Course description and Objectives :

Chemistry is the backbone in designing and understanding the nature and properties of various engineering materials. Currently, the electronics and computer engineers are waiting for suitable polymers for using miniature super computers. So this subject develops fundamental knowledge about new engineering materials and their significance in technical fields and industrial sectors. Water is an essential element for the existence of human, plant and animal lives, besides that it has greater industrial applications. The knowledge about water is the basic requirement for a professional student. Characterization of materials with instrumental techniques is essential for engineers.

Course Outcomes:

- Differentiate between soft and hard water. Understand the disadvantages of using hard water domestically and industrially. Select and apply suitable softening methods (Soda-lime, zeolite, ion-exchange methods, etc.) to soften the hard water for industrial and domestic applications.
- Acquaintance of primary and secondary cells, Hydrogen-Oxygen and Methanol fuel cells, dry and wet corrosions, corrosion controlling methods
- Acquaintance of the properties and engineering applications of Ceramics, Refractories, Glasses, Cement, Abrasives, Lubricants
- Acquaintance of Preparation, properties and applications of different polymers (Polyethylene, PVC, Tefflon, Bakelite,Urea-Formaldehyde, Silicones, Rubber – Vulcanization, Synthetic Rubbers-(Buna-S, Buna-N, Neoprene); treatment of membranes.
- Acquaintance of various spectroscopic methods (UV-visible / IR), Beer-Lambert's Law, qualitative and quantitative analysis, block diagrams of UV and IR spectrophotometers.

UNIT I - Water Technology :

Introduction-Hardness of water-Determination of hardness by EDTA-Disadvantages of hard water-Scales & Sludges-Caustic embrittlement-Boiler corrosion-Priming & Foaming, WHO, BIS Standards of water-Softening Methods- Lime Soda process, Zeolite process, Ion Exchange process - Desalination of brackish water-Reverse osmosis, Electro dialysis.

UNIT II - Electrochemical cells and AND Corrosion:

Electrochemical cells: primary cell-(Dry or lecalanche cell), Secondary cell-(Lead-acid storage cell, Lithium ion battery), Hydrogen-Oxygen Fuel cell, Methanol fuel cell.

Corrosion: Introduction-Dry corrosion (chemical)-Wet corrosion (electrochemical)-Mechanism of wet corrosion-Bimetallic corrosion-Concentration cell corrosion-Factors influencing corrosion-Corrosion control methods- Cathodic protection and Electroplating.

UNIT III - Engineering Materials :

Properties and engineering applications of Ceramics, Refractories, Glasses, Cement,Abrasives, Lubricants.

UNIT IV - Polymers :

Introduction –Types of polymerization-Preparation, properties and applications of Polyethylene, PVC, Tefflon, Bakelite, UreaFormaldehyde, Silicones, Rubber – Vulcanization, Synthetic Rubbers - (Buna-S, Buna-N, Neoprene). Elementary treatment of Membranes

UNIT V - Instrumental Techniques :

Interaction of radiation with matter,UV-Visible Spectroscopy-Beer –Lambert's law ,Qualitative and Quantitative Analysis,Block diagram of UV-Visible Spectrophotometer.IRSpectroscopy-Types of Vibrations,Identification of functional groups,Block diagram of IR Spectrophotometer**.**

TEXT BOOKS :

1. P.C Jain and Monica Jain, "Engineering Chemistry", 15th edition, Dhanpat Rai Publications 2009.
2. Gurudeep Raj and Chatwal Anand, "Instrumental Methods of Analysis", 5th edition, Himalaya Publications, 2007.

REFERENCE BOOKS :

1. S.S.Dara, "Text book of Engineering Chemistry" 1st edition, S. Chand Publications, 2009.
2. C.V. Agarwal, C.P. Murthy, A.Naidu, "Chemistry of Engineering materials", 9th edition, BSP Publications, 2008.
3. M.R. Senapati, "Advanced Engineering Chemistry" 2nd edition, Lakshmi Publications, 2006
4. H.W. Wilard and Demerit, "Instrumental methods of Analysis", 7th edition, CBS Publications, 1986.

CS103 DATA STRUCTURES

L	T	P	To	C
4	-	-	4	4

Course description and Objectives :

In this course, students will learn the basic skills and knowledge of the general-purpose data structures to solve computational problems. The main objective of this course is to provide an introduction to basic data structures and manipulating them, by using C programming language and the evaluation of the data structure needs of particular problems.

Course Outcomes:

Having successfully completed this course, the student will be able to:

- Apply advance C programming techniques such as pointers, dynamic memory allocation, structures to developing solutions for particular problems;
- Design and implement abstract data types such as linked list, stack, queue and tree by using C as the programming language using static or dynamic implementations;
- Evaluate and choose appropriate abstract data types to solve particular problems;
- Design and implement C programs that apply abstract data types.

UNIT I - Linear Data Structures-arrays

Introduction – Data, Data type, Data Structures – Primitive and Non-primitive, Storage structures – Sequential and linked storage representations, File structures, Abstract Data Type (ADT). Overview of Structures-arrays, operations on arrays(retrieval of an element, search an element, insertion deletion of an element), manipulations on arrays such as finding the sum of elements of an array, adding two arrays, and reversing an array. Maximum sub sequence problem, Multi dimensional arrays.

UNIT II - Linked Lists

Types of Linked Lists Singly Linked List, Doubly Linked List, Circular Linked List. Operations on linked lists-insertion, deletion, traversing forward/reverse order. Multi lists, Applications of Linked Lists.

UNIT III - Stacks And Queues

Stacks – ADT, Array and Linked representations, Implementation and their applications. Queues – ADT, array and linked representations, Implementation of linear, circular and doubly-ended queues, and their applications.

UNIT IV - Non-linear Data Structures-trees

Preliminaries –Binary Tree – ADT, array and linked representations, Binary tree properties, tree traversal, Implementation, Expression trees. The Search Tree ADT –Binary Search Trees, Implementation. AVL Trees – Single Rotations, Double rotations.

UNIT V - Graphs

Graphs – ADT, definitions and properties, modeling problems as graphs, representation – adjacency matrix and adjacency list, basic graph traversals – breath first search and depth first search. Applications of graphs.

TEXT BOOKS:

1. Richard F.Gilberg, Behrouz A. Forouzan, “Data Structures –A Pseudocode Approach with C”, 2nd Edition, Cengage Learning, 2005.

2. Y.Langsam, M.J.Augeustein and A.M.Tenenbaum, “Data Structures Using C”, Pearson Education Asia, 2004.

REFERENCE BOOKS:

1. Mark Allen Weiss, “Data Structures and Algorithm Analysis in C”, Second Edition, Pearson Education,1997
2. Sartaj Sahni, Data Structures, Algorithms and Applications in C++ , Universities Press, Second Edition, 2005
3. Jean Paul Tremblay and Paul G. Sorenson, An Introduction to Data Structures with Applications,Tata Mc-Graw Hill, Second Edition, 26th Reprint 2004
4. KRUSE, Data Structures and Programming Design-PHI

HS119 PROFESSIONAL ETHICS, VALUES AND HUMAN RIGHTS

L	T	P	To	C
2	-	-	2	-

Course description and Objectives :

• *To create an awareness on Engineering Ethics and Human Values.*

• *To instill Moral and Social Values and Loyalty*

• *To appreciate the workplace rights of Others, responsibilities and Safety of others.*

Course Outcomes:

The course will enable the students to attain the following:

- an understanding of professional and ethical responsibility in workplace
- the broad education necessary to understand the impact of engineering solutions in a global and societal context
- a knowledge of contemporary issues related to human and professional interactions at workplace
- an engineer's life-long commitment to serve the disadvantaged

UNIT I - Human Values :

Morals, Values and Ethics – Integrity – Work Ethic – Service Learning – Civic Virtue – Respect for Others – Living Peacefully – Caring – Sharing – Honesty – Courage – Valuing Time – Co-operation – Commitment – Empathy – Self-Confidence – Character – Spirituality.

UNIT II - Engineering Ethics & **Engineering as social experimentation :**

Engineering Ethics : Variety of moral issues – types of inquiry moral dilemmas – moral autonomy – The problems of Many Hands – Kohlburg's theory – Gilligan's theory Impediments to Responsible Action.

Engineering as social experimentation - Codes of ethics - a balanced outlook on law - the challenger case study.

UNIT III - Engineer's Responsibility for Safety :

Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis – Reducing Risk – The Government Regulator's Approach to Risk - Chernobyl Case Studies and Bhopal.

UNIT IV - Workplace Rights and Responsibilities & Work Environment :

Workplace Rights and Responsibilities : Engineers and Managers. Oganizational complaint procedures. Government agencies. Resolving Employee concerns. Limits on acceptable behaviour in large corporation.

Work Environment : Ethical and legal considerations, Organizational responses to offensive behaviour and harassment. Ethics in a Global Context.

UNIT V - Global Issues :

Multinational Corporations – Business Ethics - Environmental Ethics – Computer Ethics - Role in Technological Development – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Honesty – Moral Leadership – Sample Code of Conduct.

TEXT BOOKS :

1. Mike Martin and Roland Schinzinger, “Ethics in Engineering”, McGraw Hill, New York, 2005.

REFERENCE BOOKS :

1. Prof. (Col) P S Bajaj and Dr. Raj Agrawal, “Business Ethics – An Indian Perspective”, Biztantra, New Delhi, 2004
2. Charles E Harris, Michael S. Protchard and Michael J Rabins, “Engineering Ethics – Concepts and Cases”, Wadsworth Thompson Learning, United States, 2000 (Indian Reprint now available)
3. Engineering Ethics-An industrial Perspective, Gail Dawn Baura
4. Charles E Harris, Michael S Pritchard and Michael J Rabins, “Engineering Ethics – Concepts and Cases”, Thompson Learning, 2000.
5. Charles E Harris, Michael S Pritchard and Michael J Rabins, “Engineering Ethics – Concepts and Cases”, Thompson Learning, 2000.
6. PSR Murthy, “Indian Culture Values and Professional Ethics”, BS Publications
7. Edmund G Seebauer and Robert L Barry, “Fundamentals of Ethics for Scientists and Engineers”, Oxford University Press, Oxford, 2001.

CS108 DATA STRUCTURES LAB

L	T	P	To	C
-	-	3	3	2

Course Description & Objectives

In this course, students will learn the basic skills and knowledge of the general-purpose data structures to solve computational problems. The main objective of this course is to provide an introduction to basic data structures and manipulating them, by using C programming language

Course Outcomes

- Able to understand the importance of structure and abstract data type, and their basic usability in different applications through different programming languages.
- Able to understand the linked implementation, and its uses both in linear and non-linear data structure.
- Able to understand various data structure such as stacks, queues, trees, graphs, etc. to solve various computing problems.
- Able to decide a suitable data structure to solve a real world problem.

Programs

1. Code the following list ADT operations using array.
   (a) void is_emptyList(List 1)
   (b) List makeNullList(size n)
   (c) Position firstPost(List 1)
   (d) Position endPost(List 1)
   (e) Position nextPost(List 1, Position p)
   (f) Position prevPos(List 1, position p)
   (g) Position find(List 1, Element x)
   (h) Position findKth(List 1, int k)
2. Code the following list ADT operations using array
   (i) void insert(List 1, Position p)
   (j) void delete(List 1, Position p)
   (k) void append(List 1, Element x)
   (l) int cmp(List 1, Position p1, Position p2)
   (m) int cmp2(List11, List12, Position p1, Position p2)
   (n) void swap(List 1, Position p1, Position p2)
   (o) Element retrieve Element(List 1, Position p)
   (p) void print element(List 1, Position p)

3. Implement singly linked list
   i. Create list
   ii. Insert a new node into linked list at front, middle, end
   iii. Delete an existing node from list.
   iv. Traverse the list in forward direction
4. Write a program that reads two lists of elements, prints them, reverses them, prints the reverse list, merges the list, prints merge list.
5. Implement a polynomial ADT and write a program to read two polynomials and print them, adds the polynomials, prints the sum, multiply the polynomials and print the product.
6. write a program that reads an infix arithmetic expression of variables, constants, operators (+, -, *, /) and converts it into the corresponding postfix form. Using Stack data structure.
7. Implement Circular Queue ADT .
8. Implement Binary search Tree ADT and write a program that interactively allows

   (a) Insertion (b) Deletion (c) Find_min (d) Find_max (e) Find operations (f) Height of tree.
9. Implement Binary Tree Traversals recursion/non recursion.
10. WAP for AVL Tree to implement following operations: (For nodes as integers)
    a. Insertion: Test program for all cases (LL, RR, RL, LR rotation)
    b. Deletion: Test Program for all cases (R0, R1, R-1, L0, L1, L-1)
    c. Display: using set notation.
11. Write a Program to implement graph traversals techniques.

Text books:

1. Richard F.Gilberg, Behrouz A. Forouzan, “Data Structures –A Pseudocode Approach with C”, 2nd Edition, Cengage Learning.
2. Y.Langsam, M.J.Augeustein and A.M.Tenenbaum, “Data Structures Using C”, Pearson Education Asia.

ME103 ENGINEERING GRAPHICS LAB

L	T	P	To	C
1	-	3	4	3

Course description and Objectives :

To familiarize students with the conventional concept of engineering drawing and application through AutoCAD.

Course Outcomes:

After completion of this course, student will be able to prepare plan and elevation of any pictorial view either conventional or through AutoCAD.

UNIT - I

Introduction to Engineering drawing: Introduction to Engineering Drawing – Types of lines, lettering, dimensioning Construction of polygon & Conics. (Ellipse, Parabola & Hyperbola by general method)

UNIT - II

Orthographic Projections: Principle of projection-Planes of projections.

Projections of points:

Projection of straight lines: Inclined to one plane and both the planes.

Projections of planes: Simple planes, Planes inclined to reference planes.

UNIT - III

Projections & Sections of solids – projections of prisms – cylinders – cones - pyramids – solid axis inclined to one plane, simple sections- prism, cylinder, pyramid and cone. AutoCAD Fundamentals.

UNIT - IV

Isometric projections: Isometric drawing of simple objects through AutoCAD

UNIT - V

Orthographic projections: Conversion of Pictorial view into orthographic view using AUtoCAD and Conventional.

TEXT BOOKS :

1. N.D.Bhatt, “Engineering Drawing”, 49th ed., Charotar Publication, 2007.
2. K. Venugopal, “Engineering Drawing through Auto CAD”, 1st ed., New Age Publication, 2008.

REFERENCE BOOKS :

1. Jhole, “Engineering Drawing”, 2nd ed., Tata McGraw Hill, 2008.
2. K.L. Narayana, “Engineering drawing” 2nd ed., Scitech Publications, 2008.

EE113 FUNDAMENTALS OF ELECTRICAL ENGG. LAB

L	T	P	To	C
-	-	3	3	2

Course description and Objectives :

To understand basic electrical elements, electrical energy its consumption and measurement. To develop practical knowledge on electrical machines, electronic devices and circuits

Out Comes :

- Able to realize characteristics of electrical elements.
- Able to analyze given simple ac and dc networks.
- Able to work on different electrical machines.
- Able to reflect the knowledge of electronic devices to verify experimentally.

List of Experiments

1. Familiarization with basic components such as Resistors, Capacitors, Diodes, Transistors
2. Familiarization with basic electrical measuring instruments
3. Verification of ohm's law
4. Verification of KVL and KCL
5. Calculation of power factor in simple RL and RC circuits
6. Magnetization characteristic of a D.C. self excited generator
7. Measurement of power and energy.
8. Measurement of transformation ratio of single phase transformer.
9. Measurement of Power, Power factor of 3-phase induction motor.
10. Characteristics of PN junction diode.
11. Characteristics of Zener diode.
12. Operation of Full wave Rectifier
13. Operation of half wave Rectifier
14. Study and Working of fluorescent lamp
15. Measurement of armature and field resistances of d c machine using voltmeter-ammeter method.

Note : Any 10 of above experiments are to be conducted.

VFSTR UNIVERSITY

II Year - B.Tech

SYLLABUS

I SEM & II SEM

II Year B.Tech. CSE I - Semester

L	T	P	To	C
4	-	-	4	4

CS217 DISCRETE MATHEMATICAL STRUCTURES

Course Description and Objectives:

Discrete mathematics is the study of mathematical structures that are discrete rather than continuous. Discrete mathematics deals with discrete objects. Its objective is to extend student's Logical and Mathematical ability to deal with abstraction. Also its goal is to introduce most of the basic terminologies used in computer science courses and application of ideas to solve practical problems.

Course Outcomes:

- *At the end of the course, students would have knowledge of the concepts needed to test the logic of a program.*
- *Have an understanding in identifying structures on many levels.*
- *Be aware of a class of functions which transform a finite set into another finite set which relates to input output functions in computer science.*
- *Be aware of the counting principles*
- *Be exposed to concepts and properties of algebraic structures such as semi groups, monoids and groups.*

UNIT I - Mathematical reasoning

Propositions; negation disjunction and conjuction; implication and equivalence; truth tables; predicates; quantifiers; natural deduction; rules of Inference; methods of proofs; use in program proving; resolution principle; application to PROLOG.

UNIT II - Set theory

Paradoxes in set theory; inductive definition of sets and proof by induction; Peono postulates; Relations; representation of relations by graphs; properties of relations; equivalence relations and partitions; Partial orderings; Posets; Linear and well-ordered sets;

UNIT III - Graph Theory

Elements of graph theory, cut vertices and edges, covering, matching, Euler graph, Hamiltonian path, trees traversals, spanning trees Independent sets, Isomorphism, planarity.

UNIT IV - Functions

Mappings; injection and surjections; composition of functions; inverse functions;special functions; Peono postulates; pigeonhole principle; recursive function theory;

UNIT V - Group Theory& Elementary Combinatorics

Definition and elementary properties of groups, semigroups, monoids, rings, fields, vector spaces and lattices;Elementary combinatorics; counting techniques; recurrence relation; generating functions;

TEXT BOOKS:

1. K.H.Rosen, Discrete Mathematics and applications,TataMcGraw Hill, fifth edition, 2003.
2. C.L.Liu, Elements of Discrete Mathematics, McGraw-Hill Book, Second Edition, 2006.

REFERENCE BOOKS:

1. J .L.Mott, A.Kandel, T.P .Baker, Discrete Mathematics for Computer Scientists and Mathematicians, Prentice Hall of India, second edition, 1986.
2. W.K.Grassmann and J.P.Trembnlay, Logic and Discrete Mathematics, A Computer Science Perspective, Prentice Hall, First edition, 1996.

II Year B.Tech. CSE I - Semester

L	T	P	To	C
4	-	-	4	4

CS219 DIGITAL LOGIC DESIGN

Course Description and Objectives:

To understand basic number systems, codes and logic gates. To understand the boolean algebra and minimization logic. To understand the design of combinational and sequential circuits. To understand the basics of various memory.

Course outcomes:

- *Students learn the concept of number system, gates and boolean algebra.*
- *After this course students should be able to design the combinational and sequential circuits.*
- *They will acquire enough knowledge necessary to continue with Computer Organization course in next semester.*

UNIT I - Digital Systems

Binary Numbers, Octal, Hexa-Decimal and other base numbers, Number base conversions, complements, signed binary numbers, Floating point number representation, binary codes, error detecting and correcting codes, digital logic gates (AND, NAND,OR,NOR, Ex-OR, Ex-NOR), Boolean algebra, basic theorems and properties, Boolean functions, canonical and standard forms.

UNIT II - Gate –Level Minimization and combination circuits

The K-Maps Methods, Three Variable, Four Variable, Five Variable , sum of products , product of sums Simplification, Don't care conditions, NAND and NOR implementation and other two level implantation.

UNIT III - Combinational Circuits

Design Procedure, Combinational circuit for different code converters and other problems, Binary Adder, subtractor, Multiplier, Magnitude comparator, Decoders, Encoders, Multiplexers, De-multiplexers.

UNIT IV - Sequential Circuits

Synchronous Sequential Circuits: Latches, Flip-flops, analysis of clocked sequential circuits, design of counters, Up-down counters, Ripple counters, Registers, Shift registers, Synchronous Counters,.

Asynchronous Sequential Circuits:Reduction of state and flow tables, Role free Conditions.

UNIT V - Memory

Random Access memory, types of ROM, Memory decoding, address and data bus, Sequential Memory, Cache Memory, Programmable Logic Arrays, memory Hierarchy in terms of capacity and access time .

TEXT BOOKS:

1) M. Morris Mano, Digital Design, Pearson Prentice Hall, Third Edition, 2002.
2) A. Anand Kumar, Switching theory & Logic Design, PHI Learning private Limited, Third Edition, 2010.

REFERENCE BOOKS:

1) Zvi Kohavi and Niraj K.Jha, Switching and Finite Automata Theory, Tata McGraw Hill, Third Edition, 2010.
2) C.V.S. Rao, Switching Theory and Logic Design, Pearson Education, First Edition, 2007.
3) Donald D.Givone, Digital Principles and Design, Tata McGraw Hill, First Edition, 2002.
4) M. Rafiquzzaman, Fundamentals of Digital Logic & Micro Computer Design, John Wiley, 5th Edition, 2005.

II Year B.Tech. CSE I - Semester

L	T	P	To	C
4	-	-	4	4

CS221 ADVANCED DATA STRUCTURES

Course Description and Objectives:

Describe and implement a variety of advanced data structures (hash tables, priority queues, balanced search trees). Demonstrate an understanding of external memory and external search and sorting algorithms. Data structures for querying large collections of large strings. Emphasis on object-oriented design, writing and documenting medium-sized programs.

Course Outcomes:

At the end of the course students should be able to :

- *Analyze run-time execution of sorting methods.*
- *Understand and implement priority based queues;*
- *Understand and implement binary search trees;*
- *Understand and analyze heap sort;*
- *Knowledge on basic search and sort algorithms. Adequate knowledge to choose appropriate data structure and algorithm to solve a problem.*

UNIT I - Sorting

Internal sorting -Insertion sort, Selection sort ,Shell sort , Bubble sort ,Quick sort ,Merge sort, radix sort. External sorting -Multi way merge. Searching Sequential search, Binary search and ternary search.

UNIT II - Hashing

General Idea, Hash function, separate chaining, linear probing, quadratic probing, double hashing, rehashing. Priority queues- Applications, heap sort, Huffman codes.

UNIT III - Tree

Representation –insertion, deletion , searching. Balanced Search Trees AVL Trees: Representation –insertion, deletion , searching. Binary Search trees Red black trees: Representation –insertion, deletion , searching. B-Trees – Representation – insertion, deletion , searching.

UNIT IV - Graphs

Graph Representation, Graph Traversals, Shortest Paths Problems (Dijkstras Algorithm, Floyd warshalls Algorithm) Connectivity – Directed and Undirected Graphs, Minimum spanning trees- Prims Algorithm, Kruskals Algorithm, Topological Sort

UNIT V - Text Processing

String operations, pattern matching problems, Treis, Text compression, Text similarity testing. Sub string search problems: brute force method , knuth morris pratt, Boyer moore algorithm.

TEXT BOOKS:

1. Sartaj Sahni, Data Structures, Algorithms and Applications in Java, Universities Press, Second Edition, 2005.
2. A.Drozdek Data Structures and Algorithms in Java, 3rd edition, , Cengage Learning, 2008.

REFERENCE BOOKS:

1. Michael T Goodrich Roberto Tamassia, David Mount "Data Structures & Algorithms in C++" WSE, WILEY, 2014.
2. Jean Paul Tremblay and Paul G. Sorenson, An Introduction to Data Structures with Applications,Tata Mc-Graw Hill, Second Edition, 26th Reprint 2004.

II Year B.Tech. CSE I - Semester

L	T	P	To	C
4	-	-	4	4

CS223 OBJECT ORIENTED PROGRAMMING THROUGH JAVA

Course description and Objectives:

On Completion of this course, the student will be able to understand fundamentals of object- oriented programming in Java, including defining classes, invoking methods, using class libraries. Have the ability to write a computer program to solve specified problems. Be able to use the Java SDK environment to create, debug and run simple Java programs.

Course Outcomes:

The student is expected to have

- *Understanding of OOP concepts and basics of java programming (Console and GUI based)*
- *The skills to apply OOP and Java programming in problem solving*
- *Should have the ability to extend his knowledge of Java programming further on his/her own.*

UNIT I - Introduction, Classes and Objects

Creation of Java, Importance of Java to Internet, Byte code, Java buzzwords, OOP Principles- Encapsulation, Inheritance and Polymorphism, Data types, Variables, Declaring variables, Dynamic initialization, Scope and life time of variables, Arrays, Operators, Control statements, Type conversion and casting, Compiling and running of simple Java program, Concepts of classes and objects Class fundamentals – Declaring objects, Assigning object reference variables, Introducing methods, Constructors, Usage of static with data and methods, Usage of final with data, Access control, this key word, Garbage collection, Overloading methods and constructors, Call by value, Recursion, Nested classes and Inner classes, Exploring the String class.

UNIT II - Inheritance, Packages and Interfaces

Basic concepts, Member access rules, Usage of super key word, Forms of inheritance, Method overriding, Abstract classes, Dynamic method dispatch, Using final with inheritance, the Object class. Defining, Creating and Accessing a Package,

Understanding CLASSPATH, Importing packages, Differences between classes and interfaces, Defining an interface, Implementing interface, Applying interfaces, Variables in interface and Extending interfaces.

UNIT III - Exception Handling, Multithreading

Concepts of Exception handling, Types of exceptions, Usage of try, Catch, Throw, Throws and Finally keywords, Built-in exceptions, Creating own exception Sub classes, Concepts of Multithreading, Differences between process and thread, Thread life cycle, Creating multiple threads using Thread class, Runnable interface, Synchronization, Thread priorities, Inter thread communication, Daemon threads, deadlocks, Thread groups.

UNIT IV - Window Programming

Applet Class, Applet Architecture, Applet Skeleton - Applet Initialization and Termination, Overriding update(), Simple Applet, Display Methods, Requesting Repainting - A simple banner Applet, Using The Status Window, The HTML APPLET Tag, Passing parameters to Applets, Applet Context and show Document.

Event sources, Event classes – ActionEvent, AdjustmentEvent, ComponentEvent, Container Event, Focus Event, InputEvent, ItemEvent, KeyEvent and MouseEvent, Delegation event model, Event Listeners, Handling mouse and Keyboard events, Adapter classes.

UNIT V - AWT & Swing

Concepts of components, Container, Panel, Window, Frame, Canvas, Font class, Color class and Graphics. AWT Controls : Buttons, Labels, Text fields, Text area, Check boxes, Check box groups, Lists, Choice, Scrollbars, Menus, Layout Managers - Flow, Border, Grid, Card and Grid bag.

JApplet, JFrame and JComponent, Icons and Labels, Handling threading issues, Text fields, Buttons – The JButton class, Check boxes, Radio buttons, Combo boxes, Tabbed Panes, Scroll Panes, Trees, and Tables.

TEXT BOOKS:

1. Herbert Schildt, “The Complete Reference Java J2SE”, 7th ed., TMH Publishing Company Ltd, New Delhi, 2008.
2. Joe Wiggles worth and Paula McMillan, “Java Programming Advanced Topics”, 3rd ed., TMH, 2009.

REFERENCE BOOK:

1. Cay Horstmann, “Big Java”, 2nd ed., John Wiley and Sons, 2006.

II Year B.Tech. CSE I - Semester

L	T	P	To	C
4	-	-	4	4

CS225 SOFTWARE ENGINEERING

Course Description and Objectives:

This course will be helpful for the student to understand the concept of a software life cycle, the role of process models and how to produce a set of software requirements. This course introduces the concepts and methods required for the construction of large software intensive systems. It aims to develop a broad understanding of the discipline of software engineering.

Course Outcomes:

After completing the course students will be able to:

- *Plan a software engineering process to account for quality issues and non-functional requirements;*
- *Employ a selection of concepts and techniques to complete a small-scale analysis and design project.*
- *Interact with a client to elicit input, and communicate progress.*
- *Employ group working skills - including general organization, planning and time management, and inter-group negotiation, etc.*
- *Translate a specification into a design, and then realize that design practically, all using an appropriate software engineering methodology.*

UNIT I - Software Engineer Model

The evolving role of software, Changing Nature of Software, Software myths. Software engineering- A layered technology, a process framework, The Capability Maturity Model Integration (CMMI), Process patterns, process assessment, personal and team process models. The waterfall model, Incremental process models, Evolutionary process models, The Unified process.

UNIT II - Requirements Engineering & Analysis

Requirements engineering Tasks: Inception, elicitation, elaboration, negotiation, specification, validation, requirements management.

Initiation of requirements engineering process: Identify stakeholders recognizing multiple view points, working towards collaborator, asking the first question. Building the analysis model: data modeling-data objects, attributes, relationship, cardinality and modularity. Class based modeling: identify analysis classes, specify attributes, and define operations, CRC model, association and dependency, analysis package.

UNIT III - Software Design

Design Engineering: Design process and Design quality, Design concepts, the design model, Data flow diagrams, process specification.

Creating an architectural design: Software architecture, Data design, Architectural styles and patterns, Architectural Design.

Performing User interface design: Golden rules, User interface analysis and design, interface analysis, interface design steps, Design evaluation.

UNIT IV - Metrics and Testing

Product metrics: Software Quality, Metrics for Analysis Model, Metrics for Design Model, Metrics for source code, Metrics for testing, Metrics for maintenance. Metrics for Process and Products: Software Measurement, Metrics for software quality.

Testing Strategies: A strategic approach to software testing, test strategies for conventional software, Black-Box and White-Box testing, Validation testing, System testing, the art of Debugging.

UNIT V - Risk & Quality Management

Risk management: Reactive vs. Proactive Risk strategies, software risks, Risk identification, Risk projection, Risk refinement, RMMM, RMMM Plan.

Quality Management: Quality concepts, Software quality assurance, Software Reviews, Formal technical reviews, Statistical Software quality Assurance, Software reliability, The ISO 9000 quality standards.

TEXT BOOK:

1. Roger S. Pressman "Software Engineering, A practitioner's Approach", 6^{th} ed., McGrawHill International Edition, 2008.

REFERENCE BOOKS:

1. Sommervelle "Software Engineering",7^{th} ed., Pearson education, 2008.
2. Shely Cashman Rosenblatt," Systems Analysis and Design" 1^{st} ed., Thomson Publications,2006.

II Year B.Tech. CSE I - Semester

L	T	P	To	C
-	-	3	3	2

CS227 ADVANCED DATA STRUCTURES LAB

Course description and Objectives:

The fundamental design, and implementation of data structures. Principles for good program design, especially the uses of data abstraction.

Course Outcomes:

At end of this laboratory the student will be able to

- *Write well-structured object-oriented programs of medium size of code.*
- *Write programs and class libraries given a specification.*
- *Students will collaboratively design and then individually implement a robust set of tools to efficiently and elegantly organize data, with optimized access methods.*

List of Programs:

1. Write Java programs that use recursive and non-recursive functions to traverse the given binary tree in
   a) Preorder b) Inorder c) Postorder.
2. Write a Java program to perform the following operations:
   a) Construct a binary search tree with given elements.
   b) Search for a key element in the above binary search tree.
   c) Delete an element from the above binary search tree.
3. Write Java programs that use both recursive and non-recursive functions for implementing the following searching methods:
   a) Linear search b) Binary search
4. Write a Java program to implement priority queue ADT.
5. Write Java programs for implementing the following sorting methods:
   a) Bubble sort b) Insertion sort c) Radix sort
6. Write Java programs for implementing the following sorting methods:
   a) Quick sort b) Merge sort
7. Write a Java program to implement all the functions of a dictionary (ADT) using Hashing.

8. Write a Java program to perform the following operations:
   a) Insertion into a B-tree b) Searching in a B-tree
9. Write a Java program that implements KMP algorithm for pattern matching.

REFERENCE BOOKS:

1. A.Drozdek, Data Structures and Algorithms in Java, 3rd edition, Cengage Learning, 2008
2. J.R.Hubbard, Data Structures with Java, 2nd edition, Schaum's Outlines, TMH, 2013.
3. S.Sahani Data structures, Algorithms and Applications in java, 2nd Edition, universities Press, 2009.

II Year B.Tech. CSE	**I - Semester**	**L**	**T**	**P**	**To**	**C**
		-	-	3	3	2

CS229 OBJECT ORIENTED PROGRAMMING THROUGH JAVA LAB

Course description and Objectives:

This course is introduced to understand the basic concepts of Java,Class syntax, data types, flow of control, classes, methods, objects, arrays, exception handling, recursion, and graphical user interfaces (GUIs). Writing and testing applets for potential inclusion in web pages. Understanding how to access enterprise data bases from the application programs.

Course outcomes:

The student is expected to have hands on experience with the following:

1. Basics of Java programming, multi-threaded programs and Exception handling
2. The skills to apply OOP in Java programming in problem solving
3. Use of GUI components (Console and GUI based)

List of Experiments:

1. Write a Java program that prompts the user for an integer and then prints out all prime numbers up to that. Integer.
2. Write a Java program that checks whether a given string is a palindrome or not.
   Ex: MADAM is a palindrome.
3. Write a Java program for sorting a given list of names in ascending order.
4. Write a Java Program that reads a line of integers, and then displays each integer, and the sum of all the integers (use StringTokenizer class)
5. Write a Java program that reads a file and displays a file and displays the file on the screen, with a line number before each line.
6. Write a Java program that displays the number of characters, lines and words in a text file.
7. Write a Java program for creating multiple threads
   a) Using Thread class.
   b) Using Runnable interface.

8. Write a Java program that illustrates how run time polymorphism isachieved.
9. Write a java program that illustrates the following
   a) Creation of simple package.
   b) Accessing a package.
   c) Implementing interfaces.
10. Write a java program that illustrates the following
    a) Handling predefined exceptions.
    b) Handling user defined exceptions
11. APPLETS
    a) Working with Frames and various controls.
    b) Working with Dialogs and Menus.
    c) Working with Panel and Layout.
    d) Incorporating Graphics.
    e) Working with colors and fonts
12. SWINGS
    Jpanel- Jframe – Jtoolbar—JwindowFramework

REFERENCE BOOKS:

1. Dietel & Dietel, Java How to Program, 5th Edition, Pearson Education, 2009.
2. P.J.Deitel and H.M.Deitel, Java for Programmers, Pearson education, PHI, 2008.
3. P.Radha Krishna, Object Oriented Programming through Java, Universities Press, 2010.
4. Bruce Eckel, Thinking in Java, Pearson Education, 2010.
5. S.Malhotra and S.Choudhary, Programming in Java, Oxford Univ. Press, 2009.

II Year B.Tech. CSE	**I - Semester**	**L**	**T**	**P**	**To**	**C**
		-	-	3	3	2

HS217 SOFT SKILLS LAB

Course Description & Objectives:

The Soft Skills Laboratory course equips students with required skills such as interpersonal skills, communication skills, leadership skills etc. It aims at training undergraduate students on employability skills to win in the job interviews and building confidence to handle professional tasks.

Training Methodology:

The training methodology is designed to bring about changes in attitudes through experience-based learning. Activities in simulated environments such as role plays, group discussions, micro-presentations, audio-video clippings, case studies, psychometric tests etc., will provide students insights into their strengths and weaknesses.

Course Outcomes:

To help students to develop formal communication skills in a work place. To make them acquire team skill by working in group activities. To equip them with suitable language and speech patterns in a workplace. To enhance the ability of critical & lateral thinking while addressing the issues at any situation. To enable them to present themselves confidently in job interviews.

Course Contents:

Personality Development Skills

a) Role of language in Personality – How language reflects, impacts personality – Using gender-neutral language in MNCs – being culturally sensitive.

   Activity – Appraising each other – Worksheets related to the above

b) Career Planning- job vs. career- goal setting- SWOT analysis- planning and prioritization - four quadrant time management system - time management – self-management – stress-management.

   Activity: Setting a SMART goal - SWOT analysis of the self – Writing a Statement of Purpose (SOP).

c) Effective Resume-Writing: structure and presentation - planning and defining the career objective - projecting one's strengths and skill-sets – summarizing - formats and styles - covering letter.
Activity: Resume preparation –writing a covering letter.

Language Skills

a) Functional English - Formal/informal context – purpose - interpersonal dynamics - ideation –content organization - initiating a conversation – responding appropriately - right body language.
Activity - Role play in different situations, - self-introduction - social background (family, home town etc.,) - role model - my future - likes/ dislikes (movies, persons, places, food, music etc.,) - a mini project on functional English.

b) Vocabulary-Building: Etymology of words - word roots - prefixes & suffixes - synonyms & antonyms- collocations - one-word substitutes – analogies - idioms and phrases - contextual guessing of unfamiliar words – task-oriented learning (100 words).
Activity: Flash cards (200 words) – vocabulary exercises with hand-outs.

Communication Skills

a) Group Discussion: Articulation and flow of oral presentation - dynamics of group discussion – intervention – summarizing - voice modulation – content generation – Key Word Approach (KWA) – Social, Political, Economic, Legal and Technical Approach (SPELT) – View Point of Affected Part (VAP) - language relevance - fluency and coherence.
Activity: Mock sessions on four types of GD topics.

b) Facing Interviews: Interview process - understanding employer expectations - pre-interview planning - opening strategies - answering strategies – stress-based interviews - tele-interviews, video interviews- frequently asked questions (FAQs).
Activity: Writing responses to FAQs - mock interviews.

Comprehensive skills

a) Reading Comprehension: Reading as a skill- techniques for speed reading- skimming- scanning- appreciating stylistics - impediments for speed reading - eye fixation - sub-vocalisation - critical reading - reading based on purpose - reading for information - reading for inference - understanding tone.

Activity: Reading comprehension exercises with texts drawn from subject areas. (Hand-outs)

b) Listening Comprehension: Listening as skill - different types of listening - hidden data of communication - active listening - top-down approach - bottom-up approach.

Activity: Following different accents (Indian, British, American) listening comprehension exercises with audio and video excerpts.

Analytical Skills

a) Data Commentary: Deductive & inductive reasoning - data interpretation - tables & charts - bar charts - pie charts - line graphs - ratios & proportions – percentages - coding and decoding - reasoning by analogy - artificial language etc.,

b) Analytical Thinking: Statement and Conclusion - Data Sufficiency - Statement and Argument - Statement and Assumption - Logical Deduction - Logical Problems.

Activity: Exercises with handouts.

REFERENCE BOOKS:

1. *Edward Holffman, **“**Ace the Corporate Personality**”**, McGraw Hill,2001* Adrian Furnham, *Personality and Intelligence at Work*, Psyc
2. hology Press, 2008.
3. John Adair Kegan Page, “*Leadership for Innovation**”*** 1st ed., Kogan, 2007.
4. M.Ashraf Rizvi, “*Effective Technical Communication**”,*** 1st edition, Tata McGraw Hill, 2005.
5. Krishna Mohan & NP Singh , “*Speaking English Effectively**”*** 1st edition, Macmillan, 2008.
6. ***Soft Skills Material* of Infosys** Under the Academic Initiative of Campus Connect, 2011.
7. K.R. Lakshminarayana & T. Murugavel***, “Managing Soft Skills”,*** Scitech Publications. 2009
8. Dr. S.P. Dhanvel***,** English and Soft Skills,* Orient Blackswan, 2011
9. Rajiv K. Mishra, ***Personality Development-***, Rupa & Co. 2004.
10. R.S.Agarwal, Quantitative Aptitude, S. Chand& Co. Latest edition, 2013.
11. R.S.Agarwal, Verbal & Non-verbal Reasoning, S. Chand& Co. Latest ed.,2003

II Year B.Tech. CSE II - Semester

L	T	P	To	C
4	-	-	4	4

HS213 PROBABILITY & STATISTICS

Course description and Objectives:

Aim of this course is to introduce statistical techniques which are useful in every walk of life. It also introduces some probability which has many applications. By the end of the course, student would have learned regression, correlation techniques, probability, distributions, test of hypothesis and their applications.

Course outcomes:

- *The students will understand the use of statistical techniques in every walk of life.*
- *The statistical techniques like regressions, correlation can be used for finding qualitative and quantitative relation between two or more variables*
- *Probability , probability distributions can be used in many places like academics ,real life problems for decision making.*
- *Test of hypothesis will be useful for them in taking decisions .*
- *All these topics are useful in academics as well as in research work.*
- *They find applications at work places as well as in their real life.*

UNIT I - Descriptive Statistics

Basic Definitions, Frequencies, Graphical Representation, Histogram, Ogive curves, Measures of Central tendency, Arithmetic mean, Median, Mode, mean deviation, standard deviation, Symmetry and Skewness, Karl Pearson's Coefficient of skewness.

UNIT II - Curve Fitting and Correlation, Regression

Least squares method, curve fitting (straight line and parabola only) Covariance, Correlation, Types, Pearson's Coefficient of correlation, Rank correlation, Spearman's rank correlation. Regression, Regression lines, multiple regression.

UNIT III - Probability

Introduction, Definition (Classical and Axiomatic approach), Addition theorem, Conditional probability, Multiplication theorem, Total probability, Bayes theorem.

UNIT IV - Distributions

Random variables, Discrete and Continuous variables, Introduction to Distributions.

Binomial distribution : Definition, Mean and Standard deviation, Recurrence relation, Applications, Fitting of binomial distribution.

Poisson Distribution : Definition, Mean and Standard deviation, Recurrence relation, Poisson Distribution is an approximation of Binomial distribution, Applications, Fitting of Poisson distribution.

Geometric Distribution : Definition, Properties.

Normal Distribution : Definition, Normal curve, Mean and Standard deviation, Median, Mode, Normal Distribution applications, Normal Distribution is an approximation to Binomial distribution.

Exponential Distribution : Definition, Properties.

UNIT V - Sampling Methods

Population and Sampling, Parameters and Statistics, Types of sampling, Sampling Distributions, Central limit theorem, Standard Error of mean from infinite population, Standard deviation of variance.Test of hypothesis and test of significance, confidence limits, confidence interval, Test of significance of Large samples, T-distribution, Chi square test.

TEXT BOOKS :

1. H. K. Dass and Er. Rajnish Verma, Higher Engineering Mathematics, S. Chand & Co., New Delhi, 2011.
2. Miller and Fruinds, Fundamentals of Probability and Statistics, PHI publication, 2003.

REFERENCE BOOKS :

1. S.C. Gupta and V.K .Kapoor, “Fundamentals of Mathematical Statistics”, Sultan Chand & Co., New Delhi, 2005.
2. B.V. Ramana, “Higher Engineering Mathematics”, 3rd Edition, Tata McGraw-Hill Publishing Co, 2008.
3. R K Jain, S R K Iyengar, “Advanced Engineering Mathematics”, 2nd Edition, Narosa Publishing House, 2005.
4. Erwin Kreyszig, “Advanced Engineering Mathematics”, 8th Edition, John Wiley & Sons (Asia) Pvt. Ltd. 2001.

II Year B.Tech. CSE II - Semester

L	T	P	To	C
4	-	-	4	4

CS220 COMPUTER ORGANIZATION

Course description and Objectives:

To understand the basic chip design and organization of 8086 with assembly language programming.

Course Outcomes:

After this course,

- *Students understand in a better way the I/O and memory organization in depth.*
- *They should be in a position to write assembly language programs for various applications.*

UNIT I - Introduction

Organization and architecture, Block diagram of digital computer, Structure and function, Data Representation, Fixed Point Representation, Floating – Point Representation and Error Detection codes.

UNIT II - RTL and Computer Arithmetic

Register Transfer language – Register Transfer Bus and memory transfers, Arithmetic Mircrooperations, Logic Micro Operations, Shiftmicro operations and Arithmetic logic shift unit, Addition and subtraction, Multiplication Algorithms and Division Algorithms, Floating – point Arithmetic operations.

UNIT III - Instructions ande Micro Programmed Control

Instruction codes, Computer Registers, Computer instructions – Instruction cycle, Memory – Reference Instructions, Register Reference instructions, Input – Output and Interrupt, Stack organization, Instruction formats, Addressing modes, DATA Transfer and manipulation, Program control, Reduced Instruction set computer, Control memory, Address sequencing, Micro program example, Design of control unit, Hard-wired control and Micro programmed control unit.

UNIT IV - The Memory System

Memory Hierarchy, Main memory, Auxiliary memory, Associative memory, Cache memory, Virtual memory and Memory management hardware.

UNIT V - Input Output Organization

Peripheral Devices, Input-Output Interface, Asynchronous data transfer Modes of Transfer, Priority Interrupt Direct memory Access, Input-Output Processor (IOP) Serial communication, Introduction to peripheral component and Interconnect (PCI) bus.

TEXT BOOK:

1. M. Moris Mano, “Computer Systems Architecture”, 3rd ed., Pearson/PHI, 1993.

REFERENCE BOOKS :

1. William Stallings, “Computer Organization and Architecture”, 7th ed., Pearson/ PHI, 2007.
2. Carl Hamacher, Zvonko Vranesic, Safwat Zaky, “Computer Organization”, 5th ed., TMH, 2007.

II Year B.Tech. CSE II - Semester

L	T	P	To	C
4	-	-	4	4

CS222 DATABASE SYSTEMS

Course description and Objectives:

The objective of the course is to present an introduction to database management systems, with an emphasis on how to organize, maintain and retrieve - efficiently, and effectively - information from a DBMS. The course will focus on 5 main areas such as Information gathering, Data analysis, Database design, Concurrency and robustness, Efficiency and scalability.

Course Outcomes:

Upon successful completion of this course, students should be able to:

- *Describe the fundamental elements of relational database management systems*
- *Explain the basic concepts of relational data model, entity-relationship model, relational database design, relational algebra and SQL.*
- *Design ER-models to represent simple database application scenarios*
- *Convert the ER-model to relational tables, populate relational database and formulate SQL queries on data.*
- *Improve the database design by normalization.*

UNIT I - Concepts and architecture

Data modelling using the Entity Relationship (ER) modelling and Enhanced Entity Relationship (EER) modelling, Specialization and Generalization.

UNIT II - The Relational Model

Relational database design using ER to relational mapping, Relational algebra and relational calculus, Tuple Relational Calculus, Domain Relational Calculus, SQL.

UNIT III - Normalization

Functional dependencies and normalization of relations, Normal Forms, Properties of relational decomposition, Algorithms for relational database schema design.

UNIT IV - Transaction processing

Schedules and serializability, Concurrency control, Two Phase Locking Techniques, Optimistic Concurrency Control, Database recovery concepts and techniques.

UNIT V - Data Storage and indexing

Single level and multi level indexing, Dynamic Multi level indexing using B Trees and B+ Trees, Query processing and Query Optimization, Introduction to database security.

TEXT BOOKS:

1. Ramez Elmasri and Shamkant B. Navathe, Fundamentals of Database Systems (5/e), Pearson Education, 2008.
2. Raghu Ramakrishnan and Johannes Gehrke, Database Management Systems (3/e), McGraw Hill, 2003.

REFERENCE BOOKS:

1. Silberschatz, Korth, “Data base System Concepts”, 4th ed., McGraw hill, 2006.
2. Peter Rob and Carlos Coronel, Database Systesm- Design, Implementation and Management (7/e), Cengage Learning, 2007.

II Year B.Tech. CSE II - Semester

L	T	P	To	C
4	-	-	4	4

CS224 FORMAL LANGUAGES AND AUTOMATA THEORY

Course description and Objectives:

The purpose of this course is to acquaint the student with an overview of the theoretical foundations of computer science from the perspective of formal languages. Classify machines by their power to recognize languages. Employ finite state machines to solve problems in computing. Explain deterministic and nondeterministic machines.

Course Outcomes:

As a result of the content and structure of this course, students should be able to:

- *Understand the functioning of Finite-State Machines, Deterministic Finite-State Automata, Nondeterministic Finite-State Automata and Pushdown Automata and Turing Machines.*
- *Create Automata to accept strings from various simple languages.*
- *Understand Formal Grammars.*
- *Beware of the Regular, Context-Free and Context-Sensitive languages.*

UNIT I - Introduction & Notations

Alphabets, Strings and Languages; Automata and Grammars, Regular Languages. Deterministic finite Automata (DFA)-Formal Definition. State transition graph, Transition table, Language of DFA, Nondeterministic finite Automata (NFA), NFA with epsilon transition, Language of NFA, Equivalence of NFA and DFA, Minimization of Finite Automata, Distinguishing one string from other, Myhill-Nerode Theorem. FA with output: Moore and Mealy machine, Equivalence of Moore and Mealy Machine, Applications and Limitation of FA.

UNIT II - Regular expression (RE)

Definition, Operators of regular expression and their precedence, Algebraic laws for Regular expressions, Kleen's Theorem, Regular expression to FA, DFA to Regular expression, Arden Theorem, Non Regular Languages, Pumping Lemma for regular Languages. Application of Pumping Lemma, Closure properties of Regular Languages, Decision properties of Regular Languages. (Proofs not required)

UNIT III - Grammar Formalism

Regular grammars-right linear and left linear grammars, equivalence between regular linear grammar and FA, Context Free Grammar, Definition, Examples, Derivation, Derivation trees, Ambiguity in Grammar, Inherent ambiguity, Ambiguous to Unambiguous CFG, Useless symbols, Simplification of CFGs, Normal forms for CFGs: CNF and GNF, Closure properties of CFLs, Decision Properties of CFLs: Emptiness, Finiteness and Membership, Pumping lemma for CFLs. (Proofs not required)

UNIT IV - Push Down Automata (PDA)

Description and definition, Instantaneous Description, Language of PDA, Acceptance by Final state, Acceptance by empty stack, Deterministic PDA, Equivalence of PDA and CFG, CFG to PDA and PDA to CFG, Two stack PDA.

UNIT V - Turing machines (TM)

Basic model, definition and representation, Instantaneous Description, Language acceptance by TM, Computable functions, Types of Turing machines, Universal TM, Church's Thesis, Recursive and recursively enumerable languages, Halting problem, Introduction to Undecidability, Undecidable problems about TMs. Post correspondence problem (PCP), Modified PCP.

TEXT BOOK :

1. Hopcroft, Ullman, "Introduction to Automata Theory, Languages and Computation", 2nd ed., Pearson Education, 2007.

REFERENCE BOOKS:

1. K.L.P. Mishra and N.Chandrasekaran, "Theory of Computer Science: Automata, Languages and Computation", 2nd ed., PHI, 2004.
2. Martin J. C., "Introduction to Languages and Theory of Computations", 2nd ed., TMH, 2005.
3. Papadimitrou, C. and Lewis, C.L., "Elements of the Theory of Computation", 2nd ed., PHI, 2009.

II Year B.Tech. CSE II - Semester

L	T	P	To	C
4	-	-	4	4

CS226 DESIGN AND ALALYSIS OF ALGORITHMS

Course description and Objectives:

The course enables the students to understand the importance of algorithms in the problem solving process, create algorithms for solving simple problems.

Course Outcomes:

At the end of the course students should be able to :

- *Analyze behavior of various algorithms with respect to space and time complexities.*
- *Apply existing techniques to solve new real world problems.*
- *Understood algorithm techniques like divide and conquer, greedy approach dynamic programming, and back tracking and their applicability.*
- *Understood deterministic and non deterministic problems.*

UNIT I - Introduction

Algorithm, Pseudo code for expressing algorithms, Performance Analysis-Space and Time complexity, Asymptotic Notation - Big oh notation, Omega notation, Theta notation and Little oh notation, Randomized algorithms.

UNIT II - Divide and conquer

General method, Applications - Binary search, Quick sort, Merge sort, and Stassen's matrix multiplication, Greedy method, General method, Applications - Job sequencing with deadlines, Knapsack problem, Minimum cost spanning trees and Tree vertex splitting problem.

UNIT III - Dynamic Programming

General method, Applications - Multi stage graphs, Optimal binary search trees, matrix chain multiplication 0/1 knapsack problem, All pairs shortest path problem, Travelling sales person problem,

UNIT IV - Backtracking

Disjoint Sets - disjoint set operations, Union and find algorithms, connected components and Biconnected components.

General method, Applications – n-queen problem, Sum of subsets problem, Graph coloring, Hamiltonian cycles.

UNIT V - Branch and Bound & Complete problems

General method, Applications - Traveling sales person problem, 0/1 knapsack problem – LC Branch and Bound solution, FIFO Branch and Bound solution, NP - Hard and NP - Basic concepts, non-deterministic algorithms, NP - Hard and NP Complete classes, Cook's theorem.

TEXT BOOKS:

1. Ellis Horowitz, SatrajSahni and Rajasekharam, “Fundamentals ofComputer Algorithms”,2nded., Galgotia publications pvt. Ltd., 2006.
2. Introduction to Algorithm 2nd Edition Thomas H.Coremen, Charles E.Leiserson, Ronald L.Rivest, Clifford Stein, 2014.

REFERENCE BOOK:

1. AnonyLevitin,” Introduction to Design and Analysis of Algorithms”, 2nd ed., Pearson Education, 2008.

II Year B.Tech. CSE II - Semester

L	T	P	To	C
-	-	3	3	2

CS228 DATABASE SYSTEMS LAB

Course description and Objectives:

Course Objective: *This lab course will enhance database handling, data manipulation and dataprocessing skills in student through SQL & PL/SQL, and helps them gain knowledge in designing forms, Menus and also helps them in developing database applications.*

Course Outcomes:

Completion of this course, Students would be able to perform the following tasks:

- *Understand, analyze, and apply common SQL Statements including DDL, DML and DCL statements to perform different operations.*
- *Understand, analyze, and apply PL/SQL blocks using Cursors and Triggers.*
- *Design and implement a database for a given problem according to well-known design principles that balance data retrieval performance with data consistency.*

1. Introduction to ER Design tool (ex. TOAD)
2. Familiarization of MYSQL RDBMS
3. Data Definition, Table Creation, Constraints, Insert, Select Commands, Update and Delete Commands.
4. Nested Queries and Join Queries
5. Views
6. Design and development of database using MYSQL
7. High level programming language extensions (Control structures, Procedures and Functions).
8. Front end Tools
9. Forms
10. Triggers
11. Menu Design
12. Reports.
13. Case Study/ Database application project.

REFERENCE BOOKS:

1. Oracle certified associate Mysql beginner’s guide.
2. Oracle certified associate Oracle 10g &11g SQL fundamentals.

II Year B.Tech. CSE II - Semester

L	T	P	To	C
-	-	3	3	2

CS230 DESIGN AND ANALYSIS OF ALGORITHM LAB

Course Objectives:

In this laboratory after completing experiments student has to learn how to analyze a problem & design the solution for the problem. In addition to that, solution must be optimum, i.e., time complexity & memory usage of the solution must be very low.

Course Outcomes:

At end of this laboratory the student will be able to code,

- *Well-structured object-oriented programs of medium size of code in C++.*
- *Various algorithmic techniques to solve problems like spanning trees, knap sack and queens.*
- *Students will collaboratively design and then individually implement a robust set of tools to solve new problems efficiently.*

List of Experiments

1. Write C++ programs to implement the following:
   a) Prim's algorithm.
   b) Kruskal's algorithm.
2. Write a C++ program to find optimal ordering of matrix multiplication. (Note: Use Dynamic programming method).
3. Consider the problem of eight queens on an (8x8) chessboard. Two queens are said to attack each other if they are on the same row, column, or diagonal. Write a C++ program that implements backtracking algorithm to solve the problem i.e. place eight non-attacking queens on the board.
4. Write a C++ program to find the strongly connected components in a digraph.
5. Write a C++ program to implement file compression (and un-compression) using Huffman's algorithm.
6. Write a C++ program to implement dynamic programming algorithm to solve all pairs shortest path problem.
7. Write a C++ program to solve 0/1 knapsack problem using the following:
   a) Greedy algorithm.
   b) Dynamic programming algorithm.
   c) Backtracking algorithm.
   d) Branch and bound algorithm.

REFERENCE BOOK:

1. AnonyLevitin," Introduction to Design and Analysis of Algorithms", 2nd ed., Pearson Education, 2008.

II Year B.Tech. CSE II - Semester

L	T	P	To	C
-	-	3	3	2

HS304 PROFESSIONAL COMMUNICATION LAB

Course description and Objectives:

The Professional Communication exposes students to conventions of corporate communication and documentation procedures involved in the day-to-day functioning of the business world. The

course is aimed at improving written communication skills of undergraduate students and preparing them to meet professional challenges in the work spheres. Writing and Personality are not two exclusive spheres of influence and this course will work on the relationship between professional writing and a personality that is able to meet the goals of an organization in creative and innovative ways.

Training Methodology:

The methodology is designed to give hands-on practice to students in formal and informal report writing, structure and format of letters as well as other organization related work.

Course outcomes:

To enable students to write logical sentences and paragraphs, use appropriate diction, grammar and punctuation.

To expose them to the world of business and business register

To make them compose clear and concise business messages

To produce business documents for mailing to external recipients or intra-organizational circulation

To enable them to speak business English for handling various business situations

Mechanics of writing

- Elements of Technical Writing : Sentence structure - reducing verbosity - arranging ideas logically – building coherence - paragraph level and document level - topic sentence - cohesive devices – transitionals – paraphrasing – précis-writing.

- Mechanics of Writing: Stylistic elements – the rapporteur- the purpose- the reader (audience) -elementary rules of grammar- choice of diction - elementary principles of composition - matters of form – punctuation - conventions of business communication -language and tone - weak links in business correspondence - ethical concerns in business writing

Business Report Writing

- Parts of the Report: Writing an abstract - features of a good abstract – approach - compare and contrast - cause and effect.
- Types of Technical Reports : Drafting a technical proposal - formal and informal proposals - factual reports, feasibility reports, survey reports – parts of a report - title page –declaration – acknowledgements – table of contents - abstract – introduction – conclusion – citations – references - appendices - oral reports and presentations

Business Letter Writing

- Letter-Writing - Formal and informal letters - structure of formal letters - expressions of salutations, introductory and concluding paragraphs - different types of letters - sales letter - complaint letter - adjustment letter - letter to the editor - covering letter - claim letter – letter of condolence.

Business E- writing:

- E-mail – nature and scope - e-mail etiquette – Common Errors in composing e-mails – Quotations - Inviting quotations - sending quotations –placing orders. Office Communication - agenda - notice - circular
- Effective Resume-Writing: Structure and presentation - defining career objective - projecting one’s strengths and skill-sets
- Summarizing - formats and styles - covering letter.

Business visual presentations

- Business Proposals: Drafting business proposals - calculating profit and loss-averages - ratios and proportions – partnership - simple interest - compound interest - calculating volumes and areas
- Course of action - cause and effect- theme detection - making judgments - logical deductions - analyzing arguments – syllogisms - Venn diagrams - matching definitions -verbal reasoning - numerical reasoning - working out justifications.

REFERENCE BOOKS:

1. Strunk , William, Jr.*The Elements of Style*, Fourth Edition
2. Rozakis, Laurie, Ph.D, (2003). *English Grammar for the Utterly Confused*, McGraw-Hill
3. Sharma. C. (1978) *Business Correspondence & Report Writing*, Tata McGraw-Hill
4. Kirkman, John. *Good Style: Writing for science & technology*, Routledge Study Guides, second edition.
5. Monippally, Matthukutty. M. 2001. *Business Communication Strategies*. 11th Reprint. Tata McGraw-Hill. New Delhi

VFSTR UNIVERSITY

III Year - B.Tech
SYLLABUS

I SEM & II SEM

III Year B.Tech. CSE I - Semester

L	T	P	To	C
4	-	-	4	4

CS234 WEB TECHNOLOGIES

Course Description and Objectives:

On completion of this course, a student will be familiar with client server architecture and able to develop a web application using java technologies. Students will gain the skills and project-based experience needed for entry into web application and development careers. Students will be able to use a variety of strategies and tools to create websites and also integrate with IDE's for fast development of web applications.

Course Outcomes:

- *Students are able to develop a dynamic webpage by the use of java script and DHTML.*
- *Students will be able to write a well formed / valid XML document.*
- *Students will be able to connect a java program to a DBMS and perform insert, update and delete operations on DBMS table.*
- *Students will be able to write a server side java application called Servlet to catch form data sent from client, process it and store it on database.*
- *Students will be able to write a server side java application called JSP to catch form data sent from client and store it on database.*

UNIT I - Tier Architecture & **HTML**

Client/Server Architecture**,** J2EE Multi Tier Architecture. HTML Common tags-Block Level and Inline Elements, Lists, Tables, Images, Forms, Frames; Cascading Style sheets, CSS Properties;

UNIT II - Java Script & XML

Introduction to Java Script, Objects in Java Script, Dynamic HTML with Java Script.

The Need for XML, SGML and XML, Well-Formed XML, Valid XML, Displaying XML, XML Application Languages, Document type definition, XML Schema.

UNIT III - JDBC

Data Base, Database Schema, A Brief Overview Of The JDBC Process, JDBC Driver Types, JDBC Packages, Database Connection, Associating The JDBC-ODBC Bridge With Database, Creating, Inserting, Updating And Deleting Data In Database Tables, Result Set, Metadata.

UNIT IV - Web Servers and Servlets

Tomcat web server, Introduction to Servlets: Servlets, the Advantage of Servlets over "Traditional" CGI, Basic Servlet Structure, Simple Servlet Generating Plain Text, Compiling and Installing the Servlet, Invoking the Servlet, Lifecycle of a Servlet, The Servlet API, Reading Servlet parameters, Reading Initialization parameters, Context Parameters, Handling Http Request & Responses, Using Cookies-Session Tracking, Servlet with JDBC.

UNIT V - JSP

The Problem with Servlet. The Anatomy of a JSP Page, JSP Processing, JSP Application Development: Generating Dynamic Content, Using Scripting Elements, Implicit JSP Objects, Declaring Variables and Methods , Sharing Data Between JSP pages, Users Passing Control and Data between Pages, JSP application design with JDBC, JSP Application Design with MVC.

TEXT BOOKS:

1. Beginning Web Programming-Jon Duckett, WROX, 2008.
2. Core Servlets and Java Server pages Vol. 1: Core Technologies By Marty Hall and Larry Brown Pearson, 2006.

REFERENCE BOOKS:

1. Programming world wide web-Sebesta,Pearson, 2015.
2. Internet and World Wide Web – How to program by Dietel and Nieto PHI/ Pearson Education Asia, 2011.
3. Jakarta Struts Cookbook, Bill Siggelkow, S P D O'Reilly, 2015
4. Murach's beginning JAVA JDK 5, Murach, SPD, 2005.
5. An Introduction to web Design and Programming –Wang-Thomson, 2011.

III Year B.Tech. CSE I - Semester

L	T	P	To	C
4	-	-	4	4

CS313 COMPUTER NETWORKS

Course Description and Objectives:

This course will focus on imparting knowledge about the aspects of data communication and computer network systems with the required basic principles behind them. This course provides essential knowledge about the OSI model and TCP/IP model. It creates a good foundation covering the physical, data link, network, transport, and application layers.

Course Outcomes:

- *To understand the communication basics.*
- *To have the knowledge of different networks.*
- *To know about different protocols.*
- *To understand how to find the routes by using different routing algorithms.*
- *To understand the basics of Internet.*

UNIT I - Introduction

Use of computer networks, network hardware, network software, reference models, example networks.

UNIT II - Physical layer, Data link layer & MAC sublayer

Physical layer, Datalink layer and Medium access control sublayer, Guided Transmission Media.

Design issues, Error detection & correction, Elementary data link protocols, Sliding window protocols.

The channel allocation problem, multiple access protocols.

UNIT III - Network Layer

Design issues, Routing algorithms, Congestion control algorithms, Quality of Service (QOS), Internetworking, the network layer in the Internet.

UNIT IV - Transport layer

The transport service, elements of transport protocols, the internet transport protocols: UDP & TCP

UNIT V - Application Layer

DNS-Domain Name System. The World Wide Web, Multimedia.

TEXT BOOK:

1. Andrew S Tanenbaum, "Computer Networks", 4th ed., Pearson Education, 2003.

REFERENCE BOOKS:

1. Behrouz A. Forouzan, "Data communications and Networking", 3rd ed.,TMH, 2003.
2. William Stallings, "Data and Computer Communications", 7th ed., Pearson Education, 2004.
3. J.F. Kurose and K . W. Ross, "Computer Networking-A Top-Down Approach Featuring Internet," 3rd ed., Perason Education, 2005.

III Year B.Tech. CSE I - Semester

L	T	P	To	C
4	-	-	4	4

CS315 OPERATING SYSTEMS

Course Description and Objectives:

In this course students should understand how the operating system effectively manages system resources.

Course Outcomes:

- *To understand the types of Operating systems and analyze the process scheduling Algorithms and Case study on processing Scheduling.*
- *To understand the resource sharing among the processes in the system.*
- *To understand how to manage the memory during the process execution (Memory Management) and File Management system.*

UNIT I - Introduction

What Operating System do, Operating System structure. Process Concept: Overview, Process scheduling, Operations on process, Inter process communication. Process Scheduling: Scheduling Criteria, Scheduling Algorithms, Multiple-Processor Scheduling, Case Study: Process scheduling in Linux.

UNIT II - Process Synchronization

The Critical-Section Problem, Peterson's Solution, Synchronization Hardware, Semaphores, Monitors, Classical problems of synchronization, Case Study : Process Synchronization in Linux.

.

UNIT III - Deadlocks

Deadlock Characterization, Methods of Handling Deadlocks, Deadlock prevention, Deadlock avoidance, Deadlock Detection and Recovery.

UNIT IV - Memory Management

Continuous memory allocation, paging, structure of the page table, segmentation, demand paging, page replacement algorithms.

UNIT V - File System

File Concept, Access Methods, Directory Structure, File System Mounting, File Sharing, Protection, File-System Structure, File System Implementation, Directory Implementation, Allocation Methods, Free Space Management.

Secondary-Storage Structure: Overview of Mass-Storage Structure, Disk Structure, Disk Scheduling, RAID Structure.

TEXT BOOK:

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, “Operating System Principles”, 7th edition, John Wiley & Sons Inc, 2006.

REFERENCE BOOKS:

1. William Stallings, “Operating Systems – Operating System: Internals and Design Principles”, 6th edition, , Prentice Hall, 2005.
2. Andrew S Tanenbaum ,”Modern Operating Systems”, 3rd edition, , Prentice Hall, 2007.

III Year B.Tech. CSE   I - Semester

L	T	P	To	C
4	-	-	4	4

CS317 COMPILER DESIGN

Course Description & Objectives:

To understand, design and implement a lexical analyzer , parser and code generation schemes. To understand optimization of codes and runtime environments.

Course Outcomes:

On completion of the course the student will:

- *Be able to prove an understanding of a program language structure and its translation to executable code by constructing and demonstrating a compiler for a language defined by a certain grammar.*
- *Prove knowledge of ongoing events when executing programs written in high level language. This is done by explaining and demonstrating these events while running a simple program translated by a personally designed compiler.*
- *Know how to design a compiler for a regular high level language.*

UNIT I - Introduction to Compiling

Compilers – Analysis of the source program – Phases of a compiler – Cousins of the Compiler – Grouping of Phases – Compiler construction tools – Lexical Analysis – Role of Lexical Analyzer – Input Buffering – Specification of Tokens, data structures in compilation – LEX lexical analyzer generator

UNIT II - Syntax Analysis

Role of the parser –Writing Grammars –Context-Free Grammars – Top Down parsing –Recursive Descent Parsing – Predictive Parsing – Bottom-up parsing – Shift Reduce Parsing – Operator Precedent Parsing – LR Parsers – SLR Parser – Canonical LR Parser – LALR Parser ,YACC – automatic parser generator.

UNIT III - Semantic analysis

Intermediate forms of source Programs – abstract syntax tree, polish notation and three address codes. Attributed grammars, Syntax directed translation, Conversion of popular Programming languages language Constructs into Intermediate code forms, Declarations – Assignment Statements –Boolean Expressions.

UNIT IV - Code optimization and Run Time Environments

Introduction– Principal Sources of Optimization –Optimization of basic Blocks – Introduction to Global Data Flow Analysis - Basic blocks, Flow graphs, data flow equation, global optimization, data flow analysis for structured Programs.

UNIT V - Code Generation

Issues in the design of code generator – The target machine – Next-use Information – A simple Code generator – DAG representation of Basic Blocks – Peephole Optimization.

TEXT BOOK :

1. Alfred Aho, Ravi Sethi, Jeffrey D Ullman, "Compilers Principles, Techniques and Tools", 1st ed., Pearson Education Asia, 2003.

REFERENCE BOOKS :

1. Allen I. Holub "Compiler Design in C", 1st ed., Prentice Hall of India, 2003.
2. C. N. Fischer and R. J. LeBlanc, "Crafting a compiler with C", 1st ed., Benjamin Cummings, 2003.
3. J.P. Bennet, "Introduction to Compiler Techniques", 2nd ed., Tata McGraw-Hill, 2003.
4. Henk Alblas and Albert Nymeyer, "Practice and Principles of Compiler Building with C", 3rd ed., PHI, 2001.
5. Kenneth C. Louden, "Compiler Construction: Principles and Practice", 1st ed., Thompson Learning, 2003.

III Year B.Tech. CSE I - Semester

L	T	P	To	C
4	-	-	4	4

CS319 OPEN SYSTEMS FOR WEB TECHNOLOGIES (ELECTIVE I)

Course Description & Objective:

It makes familiar of Open Source technologies like LINUX, MySQL, CGI, PHP, Webserver and various tools which are used to develop web programming.

Course Outcomes:

- Students can develop web pages using HTML
- Can write dynamic web pages
- Can write server programs handling database connection
- Can generate responses accordingly

UNIT I - Introduction & Open Source Operating System

Nature of Open sources –Maturity Model- Design Strategy-Support Models-Advantages – Application of Open Sources.

Open Source Operating System: General Overview - Case Study: Linux - Files and Directories - Intermediate File Management - Process Management-Memory Addressing - Process Scheduling - Signals – Virtual File System- Page Cache- Program Execution.

UNIT II - Open Source Database

General Overview- Case Study: MySQL -Introduction – MySQL Basic- Directory Structure-Creating Users and Super Users- Designing a Relational Database-Managing Databases, Tables and Indexes-Operators-functions-Transaction Management

UNIT III - Open Source Programming Languages

General Overview - Case Study: PHP -Introduction – Basics of PHP- functions-Error Handling- Interaction between PHP and MySQL Database using Forms-Using PHP to manipulate and Retrieve Data in MySQL.

UNIT IV -Open Source Web Server

General Overview of Web Server - Case Study: Apache Web server – Working with Web Server – Configuring and using Apache Web services-Case Study Apache Tomcat.

UNIT V - Open Source Tools and Technologies

Open Source IDE-Modeling Tools- Mozilla Firefox- Wikipedia- Eclipse

TEXT BOOKS:

1. Dan Woods and Gautam Guliani,"Open Source for the Enterprise: Managing Risks, Reaping Rewards", O'Reilly, Shroff Publishers and Distributors, 2005.

2.Daniel.P.Bovet and Marco Cesati," Understanding the Linux Kernel ", O, Reilly, 2007.

REFERENCE BOOKS:

1. Ivan Bayross and Sharanam Shah,"MySQL 5 for Professionals", Shroff Publishers and Distributors, 2007

2. Ivan Bayross and Sharanam Shah," PHP 5.1 for Beginners", Shroff Publishers and Distributors, 2006

3. Vivek Chopra, Sing Li, Jeff genender, "Professional Apache Tomcat 6", Wiley India, 2007

III Year B.Tech. CSE I - Semester

L	T	P	To	C
4	-	-	4	4

CS321 COMPUTER GRAPHICS (ELECTIVE I)

Course Description & Objective:

To provide a comprehensive introduction to computer graphics leading to understand the contemporary terminology andalgorithms of computer graphics.To make the students learn the basic principles of visualization. To give an introduction to 2D and 3D modeling and animation.

Course Outcomes:

- Students will understand the working of various graphics systems along with the algorithms used for these devices for drawing.
- They will have an understanding of 2D graphics and algorithms including: line drawing, polygon filling, clipping, and transformations.
- They will understand the concepts of and techniques used in 3D computer graphics and basic about animation.

UNIT I - Overview of Graphics System

Introduction: Application areas of Computer Graphics, overview of graphics systems, video-display devices, raster-scan systems, random scan systems, graphics monitors and work stations and input devices

Output primitives, Points and lines, line drawing algorithms, mid-point circle and ellipse algorithms. Filled area primitives: Scan line polygon fill algorithm, boundary-fill and flood-fill algorithms.

UNIT II - 2D geometric transformations and viewing

Basic transformation: Translation, scaling, rotation, reflection and shear transformations, matrix representations and homogeneous coordinates, composite transforms, transformations between coordinate systems.

2-D Viewing, The viewing pipeline, viewing coordinate reference frame, window to view-port coordinate transformation, viewing functions, Cohen-Sutherland and Cyrus-beck line clipping algorithms, Sutherland –Hodgeman polygon clipping algorithm.

UNIT III - 3D geometric transformations

3-D Object representation, Polygon surfaces, quadric surfaces, spline representation, Hermite curve, Bezier curve and B-spline curves, Bezier andB-spline surfaces, sweep representations, octrees BSP Trees, 3-D Geometric transformations, Translation, rotation, scaling, reflection and shear transformations, composite transformations, 3-D viewing: Viewing pipeline, viewing coordinates, view volume and general projection transforms and clipping.

UNIT IV - Visible surface detection methods

Visible surface detection methods: Classification, back-face detection, depth-buffer, scan-line, depth sorting, BSP-tree methods, area sub-division and octree methods Illumination Models and Surface rendering Methods: Basic illumination models, polygon rendering methods

UNIT V - Computer animation

Computer animation: Design of animation sequence, general computer animation functions, raster animation, computer animation languages, key frame systems, motion specifications

Text Books:

1.Donald Hearn and M. Pauline Baker, Computer Graphics C version, Pearson education, Second Edition, 2008

2. Zhigang Xiang, Roy Plastock, Computer Graphics, Schaum's outlines, Second Edition, Tata McGraw Hill Edition, 2000

Reference Books:

1. Foley, VanDam, Feiner and Hughes, Computer Graphics Principles &Practice in C, Pearson Education.Second Edition, 1996
2. David F Rogers, Procedural elements for Computer Graphics, Tata McGraw Hill, 2nd edition., 1988
3. Neuman and Sproul, Principles of Interactive Computer Graphics, Tata McGraw Hill, 2nd edition., 1978
4. Shalini, Govil-Pai, Principles of Computer Graphics,Springer. First Edition, 2006
5. Steven Harrington, Computer Graphics, TMH, Second Edition, 1987

III Year B.Tech. CSE I - Semester	L	T	P	To	C
	4	-	-	4	4

CS323 PERFORMANCE EVALUATION OF COMPUTER SYSTEMS (ELECTIVE I)

Course Description & Objective :

To impart the fundamental concepts of computer system performance evaluation.

Course Outcomes :

- Design of simulation models that represent the real-life computer systems
- Usage of simulation models as laboratory models for generating artificial history of the computer systems over time
- Design of experiments; and performance evaluation metrics computation and presentation

UNIT I - *Performance Evaluation*

A Systematic Approach to Performance Evaluation; Techniques for Performance Evaluation - Analytical Modelling, Simulation and Measurement; Performance Metrics - Selection and Utility Classification; Performance Requirements Specification; Types of Workloads; Art of Data Presentation; Ratio Games.

UNIT II - Probability Distributions

Key Characteristics of Commonly used Probability Distributions; Stochastic Processes, Markov Processes, Markov Chains and Markov Models.

UNIT III - Queuing Models

Introduction to Queuing Theory, Analysis of a single Queue, Queuing Networks, Operational laws, Mean Value Analysis, Convolution Algorithm and Hierarchical Decomposition of Large Queuing Networks.

Unit IV - Simulation

Introduction, Examples and Concepts in Discrete-Event Simulation; Random-Numbers - Properties and Techniques for Generating; Random-Variate generation techniques; Input Modelling. Simulation Models - Verification and validation;

Unit V - Design of Experiments

Introduction, 2^k Factorial Designs, 2^krFactorial Designs, 2^{k-p} FractionalFactorial Designs and Full Factorial Designs with k Factors.

Text Books

1. Raj Jain, The Art of Computer Systems Performance Analysis,Wiley India Pvt Ltd, Reprint 2010 (for Units I, III and V)

2. KishorShridharbhai Trivedi, Probability and Statistics with Reliability, Queuing, and Computer Science Applications, 2nd Edition, Wiley 2001 (for Unit II)

References

1. Jerry Banks, John S. Carson II, Barry L. Nelson, David M. Nicol and P Shahabudeen, Discrete-Event System Simulation, Fourth Edition, Pearson Prentice Hall, Second Impression 2008 (For Unit IV).
2. NPTEL Video Lectures on course topics

III Year B.Tech. CSE I - Semester

L	T	P	To	C
4	-	-	4	4

CS325 OPERATIONS RESEARCH (ELECTIVE I)

Course Description & Objectives:

Operations Research uses mathematical, analytical and computational techniques to provide quantitative and qualitative information that will improve managerial decision making .This subject will provide students withability to understand and analyze managerial problems in industry so that they are able to use resources (capitals, materials, staffing, and machines) more effectively.

Course Outcomes:

Upon completion of the subject, students will be able to

- Recognize the importance and value of Operations Research and mathematical modeling in solving practical problems in industry;
- Formulate a managerial decision problem into a mathematical model;
- Understand Operations Research models and apply them to real-life problems; use computer tools to solve a mathematical model for a practical problem.

UNIT I - Introduction

Nature & Meaning of OR, Management applications of OR, Characteristics of operations research, Scope of operations research, Role of computers in Operations Research, Computational procedure of simplex method, Two phase method, Big-M Method, Methods to resolve degeneracy, solution of simultaneous equations by simplex method.

UNIT II - Transpotation problem

Introduction, Mathematical formulation of transportation problem, Types of transportation problem, Basic feasible solution by northwest corner method, least cost entry method, vogel's approximation method, U-V Method.

UNIT III

Assignment Problem, introduction, Zero one programming model for assignment problem, Types of assignment problem, Hungarian method, Branch and Bound technique for assignment problem

UNIT IV - Game Theory

Introduction, Characteristics of Game theory,Basic Definitions ,Minimax(Maximin) criterion and optimal strategy, saddle point,optimal strategies and value of the game, solution of games without saddle points, rectangular games with out saddle point, equivalence of rectangular game and linear programming, 2 ×2 games without saddle points, Arithmetic Methods for 2 ×2 games, Principle of dominance to reduce size of the game

Unit V - Network Techniques

Introduction, Shortest path model, Minimum spanning tree problem, Maximum flow problem

Text Books:

1.R.Panneer selvam , " Operations Research ", Second edition Prentice-Hall of India Private Limited , 2006 by (II, III, V Units)

2. S.D.Sarma," Operations Research Theory Methods &applications", 13th Edition Kedarnath Ramnath & co, Meerut (I,IV Units)

Reference Books

1. J.C.Pant "Introduction to Operations Research ", (Jain Brothers, New Delhi)

2.Kanti Swarup, Man Mohan & P.K.Gupta "Introduction to Operations Research " 5th Edition sultan Chand & sons

III Year B.Tech. CSE I - Semester

L	T	P	To	C
-	-	3	3	2

CS236 WEB TECHNOLOGIES LAB

Course Description & Objective:

To createafullyfunctionalwebsite/web applicationwithMVC architecture.

Course Outcomes:

- *Students are able to develop a dynamic webpage by the use of java script and DHTML.*
- *Students will be able to write a well formed / valid XML document.*
- *Students will be able to connect a java program to a DBMS and perform insert, update and delete operations on DBMS table.*
- *Students will be able to write a server side java application called Servlet to catch form data sent from client, process it and store it on database.*
- *Students will be able to write a server side java application called JSP to catch form data sent from client and store it on database.*

List of Experiments:

Lab Cycle – 1

1. Create an HTML page having Four frames named
   a. Top
   b. Center
   c. Bottom
   d. Left

   The Top frame should contain company logo and title. The bottom frame should contain copy right information. The Left frame should contain various links like Home, Products, Services, Branches, About us, etc. When we click on those links, the contents should come in to Center Frame.
2. Create a HTML document to demonstrate Form Elements that i ncludes Form, input-text, password, radio, checkbox, hidden, button, submit, reset, label, textarea, select, option, file upload.
3. Write a HTML program with at least two <h1>, two images, two buttons and appropriate CSS to display
   a. All <h1> with font-size 12pt, and bold in Verdana font using Inline CSS.
   b. All <img> with border color yellow, thickness 10px using Document Level CSS
   c. All <input type='button'>should change background color to red on mouse over them using External CSS.

4. Design an HTML having a text box and four buttons viz Factorial, Fibonacci, Prime, and Palindrome. When a button is pressed an appropriate javascript function should be called to display
   a. Factorial of that number
   b. Fibonacci series up to that number
   c. Prime numbers up to that number
   d. Is it palindrome or not
5. Write java script programs to demonstrate
   a. Math Object with at least five methods.
   b. String Object with at least five methods.
   c. Array Object with at least five methods.
   d. Date Object with at least five methods.
6. Write a java script program to display message on OnBlur and OnFocus events.
7. Create an XML document where CSEBooks is the root tag,it consists of 5 books named as(book1, book2, book3, book4, book5) whose copies of books are 10 and provide the child tag such as author,title,pages,price for all books.
8. For the above program, provide an associate DTD.
9. Create an XML document where automobiles is the root tag,it consists of 5 vehiclesnamed as (vehicle1,vehicle2,vehicle3, vehicle4, vehicle5) and use attributestype,model,engine no,color,cc.
10. For the above program, provide an associatedSchema.

Lab Cycle – 2

1. Write a java program to connect to a database server using JDBC and insert 10 students information of user choice in to student table.

2. Write a java program to display all records in the student table.

3. Develop a simple Servlet to display Welcome to Servlet.

4. Develop a Servlet to validate user name and passwordwith the data stored in Servlet configuration file. Display authorized user if she/he is authorized else display unauthorized user.

5. Demonstrate Life cycle of Servlet

6. Develop a Servlet to validate user name and password stored in database. Display authorized user is she/he is authorized else display unauthorized user.

7. Write a Servlet program to store student details sent from registration form in to database table.

8. Write JSP Program to store student information sent from registration page into database table.

9. Develop a program to validate username and password that are stored in Database table using JSP.

10. Write appropriate JSP pages to insert, update and delete data in student table in a single application with proper linking of JSP pages and session management.

TEXTBOOKS :

1. ChrisBates,"Webprogramming-BuildingInternet Applications", 2nded.,WileyPublishers,2006.
2. DietelandNieto,"InternetandWorldWideWeb-Howtoprogram", 4thed., PHI/PearsonEducationAsia,2007.

REFERENCE BOOK:

1. HansBergsten,"JavaServerPages", 1sted., O'REILLYPublications, 2000.
2. Jennifer Niederst, Robbins, "Learning Web Design", 3rd ed., SPD O'REILLY Publications, 10.
3. FiruzaAibara, "HTML for Beginners", 2nd ed., SPD O'REILLY Publications, 2010.
4. Marty Hall, "Core Servlets and Java Server Pages", 1st ed., Prentice Hall PTR, 2000.
5. The complete Reference Java 2 Fifth Edition by Patrick Naughton and Herbert Schildt. TMH

III Year B.Tech. CSE I - Semester	**L**	**T**	**P**	**To**	**C**
	-	-	3	3	2

CS329 COMPUTER NETWORKS LAB

Course Description & Objective:

Learn basic concepts of computer networking and acquire practical notions of protocols with the emphasis on TCP/IP. A lab provides a practical approach to Ethernet/Internet networking: networks are assembled, and experiments are made to understand the layered architecture and how do some important protocols work.

Course Outcomes:

- After completing the course, students will be able to:
- Understand the structure and organization of computer networks; including the division into network layers, role of each layer, and relationships between the layers.
- Understand the basic concepts of application layer protocol design; including client/server models, peer to peer models, and network naming.
- In depth understanding of transport layer concepts and protocol design; including connection oriented and connection-less models, techniques to provide reliable data delivery and algorithms for congestion control and flow control.

List of experiments:

1. Study of Network devices in detail
2. Connect the computers in Local Area Network
3. Implementation of Data Link Framing method - Character Count.
4. Implementation of Data link framing method - Bit stuffing and De stuffing.
5. Implementation of Error detection method - even and odd parity.
6. Implementation of Error detection method - CRC Polynomials.
7. Implementation of Data Link protocols - Unrestricted simplex protocol
8. Implementation of data link protocols - Stop and Wait protocol
9. Implementation of routing algorithms - Dijkstra's algorithm
10. Study of Network IP Addressing
11. Study of sockets in detail
12. Design TCP client and server application to transfer file
13. Design UDP client and server application to transfer file
14. Working on Network Protocol Analyzer Tool (Ethereal/Wireshark)
15. Working on NMAP Tool for Port scanning.

III Year B.Tech. CSE I - Semester

L	T	P	To	C
-	-	3	3	2

CS331 OPERATING SYSTEMS LAB

Course Description & Objective:

To obtain the familiarity of Operating Systems tasks, simulation programs were designed using UNIX system calls.

Course Outcomes:

Student obtain practical exposure on

- Basic commands in UNIX
- Process scheduling algorithms simulation
- Inter Process Communication
- Memory management simulation

List of Programs

1. Write programs using the following system calls of UNIX operating system:
   fork, exec, getpid, exit, wait, close.
2. Write programs using the I/O System calls of UNIX operating system. (open, read, write, etc)
3. Write C programs to simulate UNIX commands like ls, grep, cp
4. Obtain the list of processes, their CPU burst times and arrival times through the keyboard. Display/print the Gantt chart for FCFS and SJF. For each of the scheduling policies, compute and print the average waiting time and average turnaround time.
5. Obtain the list of processes, their CPU burst times and arrival times through the keyboard. Display/print the Gantt chart for Priority and Round robin. For each of the scheduling policies, compute and print the average waiting time and average turnaround time.
6. Develop Application using Inter-Process-Communication (Using shared memory, pipes or message queues).
7. Implement the Producer-Consumer problem using semaphores (Using UNIX system calls)
8. Implement some Memory management schemes like Paging and Segmentation.

9. Implement some Memory management schemes like FIRST FIT, BEST FIT & WORST FIT.
10. Implement any file allocation techniques (Contiguous, Linked or Indexed)

TEXT BOOK:

1. Richard. Stevens, “Advanced Programming in the Unix Environment”, Addison-Wesley, 2^{nd} edition, 1992

REFERENCE BOOK

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, “Operating System Principles”, 7^{th} edition, John Wiley & Sons Inc, 2006.

III Year B.Tech. CSE II - Semester

L	T	P	To	C
4	-	-	4	4

CS322 OBJECT ORIENTED ANALYSIS & DESIGN

Course Description & Objective:

This course explains how a software design may be represented as a set of interacting objects that manage their own state and operations. It describes the activities in the object - oriented design process and introduces various models that can be used to describe an object-oriented design.

Course Outcomes:

- To understand the fundamental principles of Object Oriented programming.
- To master key principles in Object Oriented analysis, design, and development.
- Be familiar with the application of the Unified Modelling Language (UML) towards analysis and design.
- To know common patterns in Object Oriented design and implement them.
- To be familiar with alternative development processes.

UNIT I - Introduction to UML

Importance of Modeling, Principles of Modeling, Object Oriented Modeling, Conceptual model of the UML, Architecture, Software Development Life Cycle.

UNIT II - Basic Structural Modeling

Classes, Relationships, Common Mechanisms, and Diagrams.

Basic Behavioral Modeling, Use cases, Use case Diagrams, Interactions, Interaction Diagrams, Activity Diagrams.

UNIT III - Class & Object Diagrams

Terms, Concepts, Modeling Techniques for Class & Object Diagrams.

UNIT IV - Advanced Structural Modeling

Advanced Classes, Advanced Relationships, Interfaces, Types and Roles, Packages.

Advanced Behavioral Modeling, Events and Signals, State Machines, Processes and Threads, Time and Space, State Chart Diagrams.

UNIT V - Architectural Modeling

Component, Deployment, Component Diagrams and Deployment Diagrams.

TEXT BOOK:

1. Booch G., Rumbaugh J. & Jacobsons I., "The Unified Modeling Language User Guide", Addison Wesley, 2002.

REFERENCE BOOKS:

1. Meilir Page-Jones, "Fundamentals of Object Oriented Design in UML", 4th ed., Pearson Education, 2008.
2. Pascal Roques, "Modeling Software Systems Using UML2", 2nd ed., WILEY- Dreamtech India Pvt. Ltd, 2004.
3. Atul Kahate, "Object Oriented Analysis & Design", 1st ed., The McGraw-Hill Companies, 2008.
4. Hans-Erik Eriksson, Magnus Penker, Brian Lyons, David Fado, "UML 2 Toolkit", 1st ed., WILEYDreamtech India Pvt. Ltd., 2003.

III Year B.Tech. CSE II - Semester

L	T	P	To	C
4	-	-	4	4

CS324 MIDDLEWARE TECHNOLOGIES

Course Description & Objective:

The main objective of this course is to get on awareness of a the various technologies which can help in the implementation of the various live project

Course Outcome:

Upon completion of the subject, students will be able to:

- Understand the basic structure of distributed systems;
- Understand the motivation of using middleware;
- Understand the basic concepts underlying the ASP.net and C#.net;
- Learn to make judgment in choosing a suitable middleware for application problems;
- Understand the basic concepts of Web Services and EJB.

UNIT I- Emergence of Middleware

Introduction,Objects, Web Services,Middleware Elements,Vendor Architecture,interoperability,Middleware in distributed applications, Types of Middleware,RMI, JDBC,Client/Server CORBA Style.

UNIT II - ASP.NET

Introduction,Lifecycle,ServerControls,Basic Controls,Directives,Validators, Database Access,ADO.Net,File Uploading, Data Sources, Data Binding,Custom Controls,Security,Data Caching,Multithreading, Deployment.

UNIT III - Fundamentals of C#& .NET platform

Comprehensive .NET Assemblies.OOPs with C#,Attributes, Reflection, Properties,Indexers ,Delegates ,Events,Collections, Generics, Anonymous Methods, Unsafe Codes and Multithreading

UNIT IV - Web Services

Introduction,Architecture, Components,Security,XML Web Service Standards,Creating Web Services,Extending Web Services, Messaging Protocol,describing,discovering,securing

UNIT V - EJB

Java Bean Component Model,EJB Architecture,Session Bean,Java Message Service,Message Driven Bean,Entity Bean

TEXT BOOKS:

1. WortgangEmmerichJohn,"Engineering Distributed Objects", Wiley, 2000.
2. Mesbah Ahmed, Chris Garrett, Jeremy Faircloth, Chris Payne, DotThatCom.com, "ASP.net web developer guide",Wei Meng Lee (Series Editor),Jonothon Ortiz (Technical Editor),Syngress Publications, 2001.

REFERENCE BOOKS:

1. Andrew Troelsen, "C# and the .NET Platform",Apress Wiley-dreamtech, India Pvt.Ltd, 2011.
2. ".NET Web Services-Architecture and Implementation", Keith Ballinger, Pearson Education, 2002.

III Year B.Tech. CSE II - Semester

L	T	P	To	C
4	-	-	4	4

CS326 MICROPROCESSORS AND INTERFACING

Course Description &objectives :

This course introduces basic architecture and operation of microprocessor and microcontroller to the student. The course objective is to study the architecture and addressing modes of 8086/8051 and to know the importance of different peripheral devices.

Course Outcomes:

Upon successful completion of this course, students should be able to:

- Impart knowledge on the architecture and software aspects of microprocessor 8086
- Write assembly language program in 8086 for various application.
- Create the memory and IO interfacing techniques with 8086 and 8051
- Give an overview on the architecture and basic concepts of microcontroller

UNIT I - Introduction to microprocessors

Evaluation of microprocessors, 8086 microprocessor, architecture, register model, physical address generation, instruction set classification, addressing modes, I/O addressing. Assembly language programs for arithmetic operations, logical operations, CALL-RET operations, Intra and inter segment calls, sorting and string operations. Interrupts of 8086, Interrupt vector table, explanation of interrupts.

UNIT II - Hardware features of 8086

Pin diagram of 8086, multiplexed ADD/DATA and ADD/STATUS buses, control bus, minimum and maximum modes, Memory READ/WRITE and I/O READ/WRITE machine cycles, machine cycle with WAIT states. Physical Memory organization & memory interfacing to 8086.

UNIT – III

I/O Interfacing - I, 8255-PPI: Architecture, Modes of operation and Interfacing to 8086, A/D and D/A converter interfacing. 8259 - PIC: Architecture, working.

UNIT IV - I/O Interfacing - II

Direct Memory Access (DMA): Architecture, Working, Serial Data Communication **:** Fundamentals of Serial Data Communication, 8251 USART, Architecture, working.

UNIT V - Introduction to Microcontroller

Differences between microprocessor and microcontrollers, 8051 architecture,Internal & External memory organization, Pin diagram, addressing modes, Instruction set and assembly language programming.

TEXT BOOKS :

1. Douglas V.Hall, “Microprocessors & Interfacing” , 2nd ed., TMH, 2003.
2. AK Ray and KM Bhurchandi, “Advanced Microprocessors & Peripherals”, 2nd ed., TMH, 2006.

REFERENCE BOOKS :

1. Kenneth J. Ayala, “8086 Microprocessor Programming and Interfacing the PC”, 2nd ed., Cengage Learning, 2008.
2. Barry B. Brey, “The Intel Microprocessors”, 6th ed., Pearson Education, 2003.
3. Kenneth J. Ayala, “8051 Microcontrollers”, 1st ed., Cengage Learning, 2008.

III Year B.Tech. CSE II - Semester

L	T	P	To	C
4	-	-	4	4

CS328 MOBILE COMPUTING

Course Description & Objective:

Introducing the mobile and wireless data communication to the student. Describing the main characteristics of WLAN, Blue tooth, mobile IP. Illustrating how the data is routed using mobile IP, using Home Agent & Foreign Agent. Describing the current areas of emerging interest in wireless and mobile computing.

Course outcomes:

- Able to understand how communication is established when mobile node is moved from one location to another location.
- Able to think and develop new mobile applications.
- Able to develop new ad hoc network applications and/or algorithms/ protocols.
- Able to understand & develop any existing or new protocol related to mobile environment

UNIT I - Introduction

Wireless Communication Fundamentals Introduction, Wireless transmission, Frequencies for radio transmission, Signals, Antennas, Signal Propagation, Multiplexing, Modulations, Spread spectrum, Medium Access Control - SDMA, FDMA, TDMA, CDMA, Cellular Systems.

UNIT II - GSM

Mobile Telecommunications Systems Introduction to 1G,2G,3G systems, GSM – System Architecture, Protocols, Connection Establishment, Frequency Allocation, Routing, Handover, Security, GPRS,UMTS.

UNIT III - Categories of Wireless Networks

Wireless Local Area Networks Infrared Vs. Radio LANs, IEEE 802.11 Standards, Architecture, Physical Layer, MAC Layer, versions of 802.11, Blue Tooth - Introduction, Networking, Pico net, Scatter net, Protocol Architecture and Layers.

UNIT IV - Routing in Wireless Networks

Network Layer Mobile IP, Dynamic Host Configuration Protocol, Routing, Destination Sequence Distance Vector Routing, Dynamic Source Routing, Ad hoc On Demand Distance Vector Routing, Mobile Adhoc Networks, Wireless Sensor Networks - MAC protocols, Routing protocols, Applications of sensor networks.

UNIT V - Protocols and Tools

Transport and Application Layers TCP over Wireless Networks, Indirect TCP, Snooping TCP, Mobile TCP, Fast Retransmit / Fast Recovery, Transmission/ Timeout Freezing, Selective Retransmission, Transaction Oriented TCP, Wireless Application Protocol –WAP Architecture, Wireless Datagram Protocol, Warless Transport Layer Protocol, Wireless Transaction Protocol, Wireless Security Protocol, Wireless Markup Language,WML Script, Wireless Application Environment.

TEXT BOOKS :

1. Jochen Schiller, “Mobile Communications “, 2nd ed., Pearson Education, 2003.
2. William Stallings, “Wireless Communications and Networks “,2nd ed., Prentice Hall of India / Pearson Education, 2007.

REFERENCE BOOKS :

1. Uwe Hansmann, Lothar Merk, Martin S.Nicklons and Thomas Stober, “ Principles of Mobile Computing, 2nd ed., Springer International, 2007.
2. Raj Kamal “Mobile Computing” , Oxford University Press 3. http://www.zigbee.org/
3. Dharma P.Agarwal, Carlos Cordeiro “Adhoc and Sensor Networks - Theory and Applications”, 1st ed., World Scientific Publications, 2007.
4. C.Siva Ram Murthy, “ Adhoc Wireless Networks Architecture and Protocols”, 2nd ed., Prentice Hall PTR, 2008.

III Year B.Tech. CSE II - Semester

L	T	P	To	C
4	-	-	4	4

CS330 NETWORK PROGRAMMING (ELECTIVE II)

Course Description & Objective:

The main objectives of this course is to provide hands on experience on the usage of the multiprocessing systems like UNIX for basic communication needs among processes and further, how the basic communication between two computers can be enabled using socket programming.

Course Outcomes:

- demonstrate advanced knowledge of networking
- make use of various solutions to perform inter-process communications
- demonstrate knowledge of protocols and languages used in Web and multimedia delivery
- demonstrate advanced knowledge of programming for network communications
- describe major technologies used in network communications

UNIT I - Introduction to Network Programming

OSI model, Unix standards, TCP and UDP & TCP connection establishment and Format, Buffer sizes and limitation, standard internet services.

Inter Process Communication: Pipes, FIFOs

UNIT II - Elementary Sockets

Address structures, value – result arguments, Byte ordering and manipulation function and related functions.

Elementary TCP sockets – Socket, connect, bind, listen, accept, fork and exec function, concurrent servers. Close function and related function.

UNIT III - TCP client server

Introduction, TCP Echo server functions, Normal startup, terminate and signal handling server process termination.

UNIT IV - I/O Multiplexing and socket options

I/O Models, select function, Batch input, shutdown function, poll function, TCP Echo server. Socket Options getsockopt and setsockopt functions. Socket states, Generic socket option.

UNIT V - UDP sockets

Introduction UDP Echo server function, lost datagram.
Elementary name and Address conversions,DNS-Resource Records, Resolver and name servers.

TEXT BOOK :

1. W.Richard Stevens,"UNIX Network Programming Sockets API", Vol. I, 3rd ed., PHI, 2011.

REFERNCE BOOKS :

1. T CHAN ,"UNIX Systems Programming Using C++",1st ed., PHI, 2005.
2. GRAHAM GLASS, KING ABLES ,"UNIX for programmers and Users", 3rd ed., Pearson Education,2008.
3. M J Rochkind, "Advanced UNIX programming", 2nd ed., Pearson education, 2007.
4. W.Richard Stevens, "UNIX Network Programming",1st ed., PHI, 2005.

III Year B.Tech. CSE II - Semester

L	T	P	To	C
4	-	-	4	4

CS332 ARTIFICIAL INTELLIGENCE (ELECTIVE II)

Course Description & Objectives:

Provide knowledge of ideas and techniques underlying the design of intelligent computer systems. Develop problem solving skills in students. Provide knowledge of the tools and applications of AI. Lay the foundation for research areas like Natural language Processing(NLP) and Machine learning(ML).

Course Outcomes:

- Basic knowledge of AI principles, techniques, Expert Systems
- Applications of basic AI techniques for problem solving.
- Knowledge representation and new knowledge deduction in intelligent systems.
- A brief idea of NLP, and Machine learning techniques.

UNIT I - Intelligent Systems

Introduction- What is AI? Examples of AI systems, Brief history of AI. Intelligent Agent- Agents and environments, The concept of rationality, The nature of environments, Structure of agents, stimulus-response agents (simple reflex agents), Model based agents, Goal based agents, Utility based agents, Learning agents.

UNIT II - Problem Solving

Searching, Solving problems by searching, A* algorithm, AO* algorithm, Heuristic functions, Hill climbing. Searching game trees (Adversarial search): Games, Optimal decisions in games, Minimax procedure, Alpha-beta pruning.

UNIT III - Knowledge Representation

Propositional logic, Logical agents, reasoning patterns in propositional logic, Inference in propositional logic i.e. Resolution, Forward chaining, Backward chaining. First order logic, Reasoning patterns in First order logic, Inference in First order logic i.e. Resolution, Forward chaining, Backward chaining.

UNIT IV - Planning

The planning problem, planning with state space search, partial order planning, planning graphs, planning with propositional logic, analysis with planning approaches.

UNIT V - Learning

Forms of learning, Inductive learning, Learning Decision Trees, Ensemble Learning, Why learning works. Natural Language Processing(NLP): Introduction, Understanding, Perception, Machine learning.

Text Book:

1. Stuart Russell, Peter Norvig, “Artificial Intelligence”, Second Edition, Pearson Education, 2003.

Reference Books:

1. G.Luger, W.A. Stubblefield, “Artificial Intelligence”, Third Edition, Addison-Wesley Longman, 1998.
2. N.J. Nilsson, “Principles of Artificial Intelligence”, Narosa Publishing House, 1980.

III Year B.Tech. CSE II - Semester

L	T	P	To	C
4	-	-	4	4

CS334 PRINCIPLES OF PROGRAMMING LANGUAGES (ELECTIVE II)

Course Description & Objective:

After the completion of this course Student should be able to understand how to design a new Programming Language. Know the differences between Structured and unstructured programming constructs.

Course Outcomes:

On completion of the course the student will:

- Understand the concepts in programming languages
- The way of using those constructs in different programming languages.
- Familiar with the design of a new programming language.

UNIT I - Syntax and Semantic

Reasons for studying concepts of programming languages, Programming domains, Language Evaluation Criteria, Von Neuman Architecture, Language categories, Implementation Methods, Programming environments, General Problem of describing Syntax – Language. Recognizers and Language Generators, Formal methods of describing syntax – BNF, EBNF , Attribute grammars, Dynamic Semantics – Axiomatic , Operational and Denotational semantics.

UNIT II - Variables and Data Types

Names, Variables, Concept of binding, Type checking, Strong typing, Type compatibility, Named constants, Variable initialization, Data types – Primitive, Character, User defined, Array, Associative Arrays, Record, Union, Pointer and Reference types, Design and implementation uses related to these data types.

UNIT III - Expressions and Statements

Arithmetic, Relational and Boolean expressions, Short circuit evaluation, Mixed mode assignment, Assignment Statements, Statement-Level Control structures – Introduction, Selection and Iteration statements, Unconditional branching, Guarded commands.

UNIT IV - Language Features

Fundamentals of sub-programs, Static and Dynamic, Scope and lifetime of variable, Design issues of subprograms, Local referencing environments, Parameter passing methods, Overloaded sub-programs, Generic sub-programs, Parameters that are sub-program names, Design issues for functions, User defined overloaded operators, Co routines.

UNIT V - Concurrency and Exception Handling

Subprogram level concurrency, Introduction to Exception Handling, Exception Handling in Ada, C++ and Java, Functional Programming languages-Haskell, LISP

TEXT BOOKS :

1. Robert .W. Sebesta,"Concepts of Programming Languages", 8th ed., Pearson Education, 2009.

2. Ellis Horowitz, "Fundamentals of Programming Languages", 2nd ed., Computer Science Press, 2003.

REFERENCE BOOKS

1. Pratt and Zelkowitz," Programming Languages Design and Implementation" , 4th ed., PHI/Pearson Education,2002.

2. Watt, "Programming Languages", 4th ed., Wiley Dreamtech, 2002.

3. H.M.Dietel and P.J.Dietel, "Java How to Program", 6th ed., Pearson Education/PH

III Year B.Tech. CSE II - Semester

L	T	P	To	C
4	-	-	4	4

CS336 SIMULATION AND MODELING (ELECTIVE II)

Course Description and Objectives:

The objective of this course is to teach students methods for modeling of systems using discrete event simulation. Emphasis of the course will be on modeling and on the use of simulation software. The students are expected to understand the importance of simulation in IT sector, manufacturing, telecommunication, and service industries etc. By the end of the course students will be able to formulate simulation model for a given problem, implement the model in software and perform simulation analysis of the system.

Course outcomes:

1. Students will be enable to understand the types of system models.
2. Students will be able to generate random variables and random numbers.
3. Students can verify and validate simulation models.

UNIT I - Introduction to Simulation

static physical models,dynamic physical models,static mathematical models,dynamic mathematical models,principles used in modeling.
System studies, a corporate model:Environment segment,production segment,management segment. Types of system study.

UNIT II - Mathematical and Statistical Models

Probability concepts, Queuing Models, Methods for generating random variables and Validation of random numbers.

UNIT III - Language for simulation

Input modeling:data collection,identifying the distribution with data,parameter estimation,goodness of fit test,fitting a non stationary Poisson process,selecting input models with out data,multivariate and time series input models.

Verification and validation of simulation models, model building,verification and validation ,verification of simulation models,calibration and validation of models.

UNIT IV - **Experiments**

Experiments-Simulation of different systems, Analysis, validation and verification of input and output simulated data, study of alternate techniques.

UNIT V - **Case Study**

Manufacturing and material handling simulation,goals and performance measures,issues in manufacturing and material handling simulations,case studies of the simulation of manufacturing and material handling systems. Manufacturing example, a job shop analysis,simualtion of computer systems:simulation tools,model input,high level computer system simulation,memory simulation.

Text Books:

1. Geoffrey Gordon, “System Simulation”, Second edition, Prentice Hall, India, 2002[unit I]

2. Jerry Banks and John S.Carson, Barry L.Nelson, David M.Nicol, “Discrete Event System Simulation”, fourth edition, Prentice Hall, India, 2002[unit II,III,IV,V]

Reference Books:

1. Robert E.Shannon, “System Simulation The art and science”, Prentice Hall, New Jersey, 1995.

2. D.S. Hira, “System Simulation”, S.Chand and company Ltd, New Delhi, 2000

III Year B.Tech. CSE II - Semester

L	T	P	To	C
-	-	3	3	2

CS338 OBJECT ORIENTED ANALYSIS AND DESIGN LAB

Course Description & Objective:

The analysis, design, coding, documentation, database design of mini project which will be carried out in 4thyear can be done in object-oriented approach using UML and by using appropriate software which supportsUML.

Course Outcomes:

After completing this course the student must demonstrate the knowledge and ability to:

- Show the importance of systems analysis and design in solving complex problems.
- Show how the object-oriented approach differs from the traditional approach to systems analysis and design.
- Construct various UML models (including use case diagrams, class diagrams, interaction diagrams, statechart diagrams, activity diagrams, and implementation diagrams) using the appropriate notation.
- Recognize the difference between various object relationships: inheritance, association, whole-part, and dependency relationships.
- Show the role and function of each UML model in developing object-oriented software.

Mini-Project - I :

A Point-of-Sale (POS) System :A POS system is a computerized application used to record sales andhandle payments; it is typically used in a retail store, it includes hardware components such as a computerand bar code scanner, and software to run the system. It interfaces to various service applications, such asa third-party tax calculator and inventory control. These systems must be relatively fault tolerant; that is,even if remote services are temporarily unavailable they must still be of capturing sales and handling at leastcash payments. A POS system must support multiple and varied client-side terminals and interfaces such asbrowser, PDAs, touch-screens.

Mini-Project - II :

Online Bookshop Example : Following the model of amazon.com or bn.com, design and implement anonline bookstore.

Mini-Project - III :

A Simulated Company : Simulate a small manufacturing company. The resulting application will enable the user to take out a loan, purchase a machine, and over a series of monthly production runs, follow theperformance of their company.

Mini-Project - IV :

A Multi-Threaded Airport Simulation : Simulate the operations in an airport. Your application shouldsupport multiple aircrafts using several runways and gates avoiding collisions/conflicts.

Landing: an aircraft uses the runway, lands, and then taxis over to the terminal. Take-Off: an aircraft taxiesto the runway and then takes off.

Mini-Project - V :

An Automated Community Portal : Business in the 21st Century is above all BUSY. Distractions areeverywhere. The current crop of “enterprise intranet portals” is often high noise and low value, despite thelarge capital expenditures it takes to stand them up. Email takes up 30 - 70% of an employee’s time. Chatand Instant Messaging are either in the enterprise or just around the corner. Meanwhile, management istasked with unforeseen and unfunded leadership and change-agent roles as well as leadership developmentand succession management. What is needed is a simplified, repeatable process that enhancescommunications within an enterprise, while allowing management and peers to self-select future leaders andeasily recognize high performance team members in a dynamic way. Additionally, the system shouldfunction as a general-purpose content management, business intelligence and peer-review application.Glasscode’s goal is to build that system. The software is released under a proprietary license, and will havethe following features: Remote, unattended moderation of discussions However, it will have powerfuldiscovery and business intelligence features, and be infinitely extendable, owing to a powerful API andadherence to Java platform standards. Encourages peer review and indicates for management potentialleaders, strong team players and reinforces enterprise and team goals seamlessly and with zeroadministration.

Mini-Project - VI :

A Content Management System : The goal is to enable non-technical end users to easily publish, access,and share information over the web, while giving administrators and managers complete control over thepresentation, style, security, and permissions.

Features:

- Robust Permissions System
- Templates for easy custom site designs
- Total control over the content
- Search engine friendly URL’s
- Role based publishing system
- Versioning control
- Visitor profiling

Mini-Project - VII :

An Auction Application : Several commerce models exist and are the basis for a number of companies like eBay.com, pricellne.com etc. Design and implement an auction application that provides auctioningservices. It should clearly model the various auctioneers, the bidding process, auctioning etc.

Mini-Project - VIII :

A Notes and File Management System : In the course of one’s student years and professional career oneproduces a 1 lot of personal notes, documents. All these documents are usually kept 1 on papers orindividual files on the computer. Either way the bulk of the information is often erased corrupted andeventually lost. The goal of this 1 project is to build a distributed software application that addresses this “|problem. The system will provide an interface to create, organize and manage I personal notes through theInternet for multiple users. The system will also allow users to collaborate by assigning permissions formultiple users to view and edit notes.

Mini-Project - IX :

Library Management System(LMS): The goal is to enable students and librarians to easily access and manage the library and run it smoothly. Each physical library item - book, tape cassette, CD, DVD, etc. could have its own item number. To support it, the items may be barcoded. The purpose of barcoding is to provide a unique and scannable identifier that links the barcoded physical item to the electronic record in the catalog.

Barcode must be physically attached to the item, and barcode number is entered into the corresponding field in the electronic item record. Barcodes on library items could be replaced by RFID tags. The RFID tag can contain item's identifier, title, material type, etc. It is read by an RFID reader, without the need to open a book cover or CD/DVD case to scan it with barcode reader.

Mini-Project - X

Hospital Management System: Simulate to show and explain hospital structure, staff, and relationships with patients, and patient treatment terminology

TEXT BOOK :

1. Craig Larman, "Applying UML and Patterns: An Introduction to Object-Oriented Analysis and Design and the Unified Process", 2nd ed., Pearson Education Asia, 2002.

REFERENCE BOOKS:

1. Simon Sennet, Steve McRobb, and Ray Farmer, "Object Oriented Systems Analysis and Design using UML", 2nd ed., McGraw Hill, 2002.
2. Andrew Haigh, "Object-Oriented Analysis & Design," 1st ed., Tata McGraw-Hill, 2001.

III Year B.Tech. CSE II - Semester

L	T	P	To	C
-	-	3	3	2

CS340 MOBILE COMPUTING LAB

Course Description & Objective:

After performing the below experiments, the students can simulate various network topologies with different routing algorithms and they can analyze how each routing algorithm is performing its job. The students will also be able to design, develop and deploy mobile applications in different different platforms.

1) Installing NS2 or NS3.
2) Create a TCL Script for the following network.

   N2 —— 1MB, 10ms, DropTail —— N1

   Create FTP traffic over TCP. Find out the throughput using GREP command.
3) Create a TCL Script for the following network.

   N2 —— 1MB, 10ms, DropTail —— N1

   Create CBR traffic over UDP. Find out the throughput using GREP command.
4) Simulate the Distance Vector Routing Algorithm and Analyze the performance metrics such as throughput, packet drop rate etc
5) Simulate the Link State Routing Algorithm and Analyze the performance metrics such as throughput, packet drop rate etc
6) Develop a simple mobile application for swapping images by using either Android or IBM Worklight.
7) Develop a mobile calculator application that performs addition, subtraction, multiplication, division, modulus operations on mobile by using either Android or IBM Worklight.
8) Design and develop a mobile application to validate user name and password by using either Android or IBM worklight.
9) Design and develop a College Information system by using either Android or IBM worklight.

10) Simulate the mobile chatting application by using either Android or IBM Worklight.

Text Books

1. Ian G Clifton, “Android User Interface Design , “Turning Ideas and Sketches into beautifully designed Apps” , Kindle Edition.
2. Teerawat Issari Yakul, Ekram Hossain, “ Introduction to Network Simulator NS2”, 2nd Edition, Springer.
3. Mohammad Siaf Uddin, Talha Haroon “ , IBM Worklight Mobile Application Development Essentials”, Kindle Edition.

III Year B.Tech. CSE II - Semester	L	T	P	To	C
	-	-	3	3	2

CS342 MINI PROJECT

Course Description & Objective:

The main objective of this course is that the student has to employ all the skills acquired so far to develop a working model or software or project. Student has to take up a live project or come up with a new idea or propose an alternative solution to an existing problem that is related to computer science. Student has to develop a software solution to the problem identified or proposed.

Course Outcome:

- Student should know all the phases of SDLC
- How requirements are gathered
- How gathered requirements are analyzed.
- Proposing an design model for the requirements
- Writing the appropriate modules using any of the programming languages
- Testing the developed software

Mini project and its report shall be evaluated along with labs at the end of the semester. Mini project shall be submitted in report form and should be presented before the committee, which shall evaluate for 50 Marks. The committee consists of an external examiner, HOD, supervisor of the mini project and a senior faculty member of the department. There shall be 50 internal marks for mini project and its evaluation on continuous basis.

E.g., The goal of the GEF project is to build a graph editing library that can be used to construct many, high-quality graph editing applications. Some of GEF's features are:

A simple, concrete design that makes the framework easy to understand and extend.

Node-Port-Edge graph model that is powerful enough for the vast majority of connected graph applications.

Model - View - Controller design based on the Swing Java UI library makes GEF able to act as a GUI to existing data structures, and also minimizing learning time for developers familiar with Swing.

High-quality user interactions for moving, resizing, reshaping, etc. GEF also supports several novel interactions such as the broom alignment tool and secltion-action-buttons. Generic properties sheet based on JavaBeans introspection. XML-based file formats based on the PGML standard

TEXT BOOK :

1. Craig Larman, "Applying UML and Patterns: An Introduction to Object-Oriented Analysis and Design and the Unified Process", 2nd ed., Pearson Education Asia, 2002.

REFERENCE BOOKS:

1. Simon Sennet, Steve McRobb, and Ray Farmer, "Object Oriented Systems Analysis and Design using UML", 2nd ed., McGraw Hill, 2002.
2. Andrew Haigh, "Object-Oriented Analysis & Design," 1st ed., Tata McGraw-Hill, 2001.

VIGNAN UNIVERSITY

IV Year B.Tech. CSE	**I - Semester**	**L**	**T**	**P**	**To**	**C**
		3	1	-	4	4

CS401 INFORMATION SECURITY

Objective of the Course :

This Course focuses towards the introduction of network security using various cryptographic algorithms. Underlying network security applications. It also focuses on the practical applications that have been implemented and are in use to provide e_mail and web security.

UNIT - I

Classical Encryption Techniques – Symmetric Cipher Model – Substitution Techniques – Transposition Techniques – Rotor Machines – Steganography

UNIT - II

BLOCK CIPHERS AND DATA ENCRYPTION STANDARD Block Cipher Principles – Data Encryption Standard – Strength of DES – Differential and Linear Cryptanalysis - Block Cipher Design Principles.-Advanced Encryption Standard – Evaluation Criteria of AES – AES Cipher – More on Symmetric Ciphers – Multiple encryption and Triple DES – Block Cipher Modes of Operation – RC4.

UNIT - III

PUBLIC-KEY ENCRYPTION AND HASH FUNCITONS Principles of Public – Key Cryptosystems – RSA Algorithm – Key Management – Message Authentication and Hash Functions – Authentication Requirements – Authentication Functions – Message Authentication – Hash Functions – Security of Hash Functions and MACs- Digital Signatures - Authentication Protocols – Digital Signature Standard.

UNIT - IV

NETWORK SECURITY INTRODUCTION Security Trends – Security attacks – Security services – Security Mechanisms – A Model for Network Security Model APPLICATIONS Kerberos – X.509 Authentication Service – Public Key Infrastructure – Pretty Good Privacy – S/MIME- IP Security Overview – IP Security architecture- Authentication Header – Encapsulating Security Payload – Combining Security associations – Key Management

UNIT - V

Web Security- Secure Socket Layer and Transport Layer Security – Secure Electronic Transaction. SYSTEM SECURITY Intruders – Intrusion Detection – Password Management – Malicious Software - Firewalls – Trusted Systems.

TEXT BOOKS :

1. William Stallings, "Cryptography and Network security", 4th ed., Pearson Education, 2010.
2. William Stallings "Network Security Essentials Applications and Standards", 2nd ed.,Pearson Education, 2009.

REFERENCE BOOKS :

1. Eric Malwald, "Fundamentals of Network Security ", 4th ed., Pearson Education, 2010.
2. Charlie Kaufman, "Radis Perlman and Mike Speciner ,Network Security – Private Communication in a Public World", 1st ed., Pearson Education,2009 .
3. Buchmann, Springer ,"Introduction to Cryptography", 2nd ed., Pearson Education, 2009.
4. William Stallings,"Cryptography and Network security", 1st ed., Pearson Education, 2008.
5. Lorrie Faith Cranor, Simson Garfinkel, "Security & Usability", 2nd ed., SPD OREILLY Publications, 2005.
6. Chris Frj & Martin Nystrom "Security Monitoring", 1st ed., SPD OREILLY Publications, 2009.

IV Year B.Tech. CSE	I - Semester	L	T	P	To	C
		3	1	-	4	4

CS403 EMBEDDED SYSTEMS

Objective of the Course :

Emphasis on Comprehensive treatment of Embedded Hardware and Real TimeOperating systems alongwith case studies in tunewith the requirements of Industry. The example-driven approach will put students on a fast track to understanding embedded-system programming and applying what they learn to their projects.

UNIT - I

Introduction to Embedded Systems : Applications of ES, Embedded Hardware Units and Devices, Embedded Software, Examples of Embedded Systems, Design Metrics in ES, Challenges in ES Design.

UNIT - II

Introduction to 8051 : 8051 Micro controller Hardware, Input/Output Ports and Circuits, External Memory, Counter and Timers, Serial data Input/Output, Interrupts.

UNIT - III

Data Transfer and Logical Instructions : Arithmetic Operations, Decimal Arithmetic. Jump and Call Instructions, Further Details on Interrupts.

UNIT - IV

Introduction to Real Time Operating Systems : Tasks and Task States, Tasks and Data, Semaphores, and Shared Data; Message Queues, Mailboxes and Pipes, Timer Functions, Events, Memory Management, Interrupt Routines in an RTOS Environment.

UNIT - V

Principles Basic Design : Using a Real-Time Operating System: Embedded Software Development Tools: Host and Target machines, Linker/Locators for Embedded Software, Getting Embedded Software into the Target System

TEXT BOOKS:

1. Raj Kamal, "Embedded Systems", 2nd ed., TMH, 2009. (Unit - I)
2. Kenneth J. Ayala, Thomson, "The 8051 Microcontroller", 3rd ed., 2008. (Unit - II, III)
3. David E. Simon, "An Embedded Software Primer", 1st ed., Pearson Education, 2008 (Unit - IV, V)

REFERENCE BOOKS :

1. Wayne Wolf, "Computers as Components-principles of Embedded Computer system Design", 1st ed., Elseveir, 2009.
2. Labrosse "Embedding system building blocks", 2nd ed., CMP Publishers, 2007.
3. Ajay V Deshmukhi," Micro Controllers", 1st ed., TMH, 2008.
4. Frank Vahid, Tony Givargis, John Wiley, "Embedded System Design", Microcontrollers, 3rd ed., Pearson Education, 2008.

IV Year B.Tech. CSE   I - Semester

L	T	P	To	C
3	1	-	4	4

CS405 DATAWAREHOUSING & DATAMINING

Objective of the Course :

To understand and implement classical algorithms in data mining and data warehousing. To assess the strengths and weaknesses of the algorithms. To identify the application area of algorithms, and apply them

UNIT - I

Data Warehouse : Introduction-A Multi-dimensional data model, Data Warehouse Architecture, Data Warehouse Implementation, From Data Warehouse to Data Mining.

Data Mining : Introduction, Data Mining, Kinds of Data, Data Mining Functionalities, Classification of Data Mining Systems, Major issues in Data Mining.

UNIT - II

Data Preprocessing : Data cleaning, Data Integration & Transformation, Data Reduction, Discritization & Concept Hierarchy Generation, Data Mining Primitives.

Mining Association rules in large databases : Association rule mining, mining single-dimensional Boolean Association rules from Transactional Databases, Mining Multi-dimensional Association rules from relational databases & Data Warehouses.

UNIT - III

Concept Description : Introduction, Data Generalization and Summarization-Based Characterization, Analytical Characterization, Mining Class Comparisons, Mining Descriptive Statistical Measures in Large Databases.

UNIT - IV

Classification & Prediction : Introduction, Classification by Decision tree induction, Bayesian Classification, Classification by Back propagation, Other Classification Methods, Prediction, Classifier accuracy.

Mining Complex Type of Data : Multidimensional Analysis and Descriptive Mining of Complex Data Objects, Mining Spatial Databases, Mining Multimedia Databases, Mining Text Databases, Mining the World Wide Web.

UNIT - V

Cluster Analysis : Introduction, Types of data in Cluster analysis, A categorization of major clustering methods, partitioning methods, Hierarchical methods, Density-Based Methods: DBSCAN, Grid-based Method: STING; Model-based Clustering Method: Statistical approach, Outlier analysis.

TEXT BOOKS :

1. Jiawei Han Micheline Kamber – “Data Mining Concepts & Techniques”, 1st ed., Morgan Kaufmann Publishers, 2007.

REFERENCE BOOKS :

1. Usama M.Fayyad, Gregory Piatetsky Shapiro, Padhrai Smyth, Ramasamy Uthurusamy, “Advances in Knowledge Discover and Data Mining”, 1st ed., The M.I.T. Press, 1996.
2. Ralph Kimball, Margy Ross, “The Data Warehouse Toolkit”, 1st ed., John Wiley and Sons Inc., 2002.
3. Alex Berson, Stephen Smith, Kurt Thearling, “Building Data Mining Applications for CRM”, 1st ed., Tata McGraw Hill, 2000.
4. Margaret Dunham, “Data Mining: Introductory and Advanced Topics”, 1st ed., Prentice Hall, 2002.
5. Paulraj Ponnaiah, “Data Warehousing Fundamentals”, 1st ed., Wiley Publishers, 2001.

IV Year B.Tech. CSE   I - Semester

L	T	P	To	C
3	1	-	4	4

CS407 SOFTWARE PROJECT MANAGEMENT

Objective of the Course :

To describe activities of SPM highlights and train in the planning and implementation of project management. It brings a specific project to complete on time and on budget.

UNIT - I

Conventional Software Management : The waterfall model, conventional software Management performance. Evolution of Software Economics : Software Economics, pragmatic software cost estimation.

Improving Software Economics : Reducing Software product size, improving software processes, improving team effectiveness, improving automation, Achieving required quality, peer inspections.

UNIT - II

The old way and the new : The principles of conventional software Engineering, principles of modern software management, transitioning to an iterative process. Life cycle phases : Engineering and production stages, inception, Elaboration, construction, transition phases.

UNIT - III

Artifacts of the process : The artifact sets, Management artifacts, Engineering artifacts, programmatic artifacts.

Model based software architectures : A Management perspective and technical perspective.

UNIT - IV

Iterative Process Planning : Work breakdown structures, planning guidelines, cost and schedule estimating, Iteration planning process, Pragmatic planning.

Project Organizations and Responsibilities : Line-of-Business Organizations, Project Organizations, evolution of Organizations.
Process Automation : Automation Building blocks, The Project Environment.

UNIT - V

Project Control and Process instrumentation : The seven core Metrics, Management indicators, quality indicators, life cycle expectations, pragmatic Software Metrics, Metrics automation.

Future Software Project Management : Modern Project Profiles, Next generation Software economics, modern process transitions.

TEXT BOOK :

1. Walker Royce ,"Software Project Management", 1st ed., Pearson Education, 2005.

REFERENCES BOOKS :

1. Bob Hughes and Mike Cotterell, "Software Project Management", 3rd ed., Tata McGraw - Hill Edition, 2005.
2. Joel Henry, "Software Project Management", 1st ed., Pearson Education, 2006.
3. Pankaj Jalote, "Software Project Management in practice", 1st ed., Pearson Education, 2005.

IV Year B.Tech. CSE	I - Semester	L	T	P	To	C
		3	1	-	4	4

CS409 NETWORK PROGRAMMING
(Dept. Elective - II)

Objective of the Course :

To teach students various forms of IPC through UNIX and socket Programming.

UNIT - I

IPC : Introduction, File and record locking, Pipes, FIFOs streams and messages, Name spaces, system IPC,Message queues, Semaphores.

UNIT - II

Introduction to Network Programming: OSI model, Unix standards, TCP and UDP & TCP connection establishment and Format, Buffer sizes and limitation, standard internet services, Protocol usage by common internet application.

UNIT - III

Sockets : Address structures, value – result arguments, Byte ordering and manipulation function and related functions Elementary TCP sockets – Socket, connect, bind, listen, accept, fork and exec function, concurrent servers. Close function and related function.

UNIT - IV

TCP client server : Introduction, TCP Echo server functions, Normal startup, terminate and signal handling server process termination.

I/O Multiplexing and socket options: I/O Models, select function, Batch input, shutdown function, poll function, TCP Echo server, getsockopt and setsockopt functions. Socket states, Generic socket option IPV6 socket option ICMPV6 socket option IPV6 socket option and TCP socket options.

UNIT - V

Elementary UDP sockets : Introduction UDP Echo server function, lost datagram,

Elementary name and Address conversions : DNS, gethost by Name function, Resolver option, Function and IPV6 support, uname function.

TEXT BOOK :

1. W.Richard Stevens,"UNIX Network Programming Sockets API", Vol. I, 2nd ed., Pearson Education, 2006.

REFERNCE BOOKS :

1. T CHAN ,"UNIX Systems Programming Using C++",1st ed., PHI, 2005.
2. GRAHAM GLASS, KING ABLES ,"UNIX for programmers and Users", 3rd ed., Pearson Education,2008.
3. M J Rochkind, "Advanced UNIX programming", 2nd ed., Pearson education, 2007.
4. W.Richard Stevens, "UNIX Network Programming",1st ed., PHI, 2005.

IV Year B.Tech. CSE	I - Semester	L	T	P	To	C
		3	1	-	4	4

CS411 MOBILE COMPUTING
(Dept. Elective - II)

Objective of the Course :

Introduce the mobile and wireless data communication to the student. Describe the main characteristics of WLAN, Blue tooth, ZIGBEE, mobile IP. Illustrate how data is routed usingmobile IP, using HomeAgent & Foreign Agent Describe current areas of emerging interest in wireless and mobile computing.

UNIT - I

Wireless Communication Fundamentals Introduction, Wireless transmission, Frequencies for radio transmission, Signals, Antennas, Signal Propagation, Multiplexing, Modulations, Spread spectrum, Medium Access Control - SDMA, FDMA, TDMA, CDMA, Cellular Systems.

UNIT - II

Mobile Telecommunications Systems Introduction to 1G,2G,3G systems, GSM – System Architecture, Protocols, Connection Establishment, Frequency Allocation, Routing, Handover, Security, GPRS,UMTS.

UNIT - III

Wireless Local Area Networks Infrared Vs. Radio LANs, IEEE 802.11 Standards,

Architecture, Physical Layer, MAC Layer, versions of 802.11, Blue Tooth - Introduction, Networking, Pico net, Scatter net, Protocol Architecture and Layers.

UNIT-IV

Network Layer Mobile IP, Dynamic Host Configuration Protocol, Routing, Destination Sequence Distance Vector Routing, Dynamic Source Routing, Ad hoc On Demand Distance Vector Routing, Mobile Adhoc Networks, Wireless Sensor Networks - MAC protocols, Routing protocols, Applications of sensor networks.

UNIT - V

Transport and Application Layers TCP over Wireless Networks, Indirect TCP, Snooping TCP, Mobile TCP, Fast Retransmit / Fast Recovery, Transmission/ Timeout Freezing, Selective Retransmission, Transaction Oriented TCP, Wireless Application Protocol –WAP Architecture, Wireless Datagram Protocol, Warless Transport Layer Protocol, Wireless Transaction Protocol, Wireless Security Protocol, Wireless Markup Language, WML Script, Wireless Application Environment.

TEXT BOOKS :

1. Jochen Schiller, "Mobile Communications ", 2nd ed., Pearson Education, 2003.
2. William Stallings, "Wireless Communications and Networks ",2nd ed., Prentice Hall of India / Pearson Education, 2007.

REFERENCE BOOKS :

1. Uwe Hansmann, Lothar Merk, Martin S.Nicklons and Thomas Stober, " Principles of Mobile Computing, 2nd ed., Springer International, 2007.
2. Raj Kamal "Mobile Computing" , Oxford University Press 3. http:// www.zigbee.org/
3. Dharma P.Agarwal, Carlos Cordeiro "Adhoc and Sensor Networks - Theory and Applications", 1st ed., World Scientific Publications, 2007.
4. C.Siva Ram Murthy, " Adhoc Wireless Networks Architecture and Protocols", 2nd ed., Prentice Hall PTR, 2008.

IV Year B.Tech. CSE I - Semester

L	T	P	To	C
3	1	-	4	4

CS413 GRID COMPUTING
(Dept. Elective - II)

Objective of the Course :

To provide an overview of the basic concepts of Grid Computing. To highlight the advantages of deploying Grid Computing. To illustrate the practical adoption of a Grid deployment through real life case studies.

UNIT - I

Grid Computing : Introduction Grid Computing Worldwide Initiatives Grid Computing Organizations and Their Roles The Grid Computing Anatomy The Grid Computing Road Map.

UNIT - II

The New Generation Of Grid Computing Applications : Merging the Grid Services Architecture with the Web Services Architecture.

UNIT - III

The Grid Computing Technological Viewpoints : Open Grid Services Architecture (OGSA) Some Sample Use Cases that Drive the OGSA The OGSA Platform Components Open Grid Services Infrastructure (OGSI) OGSA Basic Services

UNIT - IV

The Grid Computing Toolkits : GLOBUS GT3 Toolkit: Architecture GLOBUS GT3 Toolkit: Programming Model.

UNIT - V

Globus GT3 Toolkit : A Sample Implementation GLOBUS GT3 Toolkit: High-Level Services OGSI.NET Middleware Solutions.

TEXT BOOK :

1. Joshy Joseph Craig Fellenstein: “Grid Computing”, 1st ed., IBM Press, 2003

REFERENCE BOOKS :

1. Joshy Joseph & Craig Fellenstein:”Grid Computing”, 1st ed., Pearson/ PHI PTR, 2003.
2. Ahmar Abbas: “Grid Computing: A Practical Guide to technology and Applications”, 2nd ed., Charles River media, 2003.

IV Year B.Tech. CSE I - Semester

L	T	P	To	C
3	1	-	4	4

CS415 INTRODUCTION TO MAINFRAME SYSTEMS
(Dept. Elective - II)

Objective of the Course :

The mainframe is the backbone of many industries that are the lifeblood of the global economy. More mainframe processing power is being shipped now than has ever been shipped. Businesses that require unparalleled security, availability, and reliability now-a-days required need to study of this course.

UNIT - I

Evolution of Mainframe hardware : Overview of Computer Architecture - Classification of Computers - micro, mini, mainframes and super computer - Mainframe computer - key features - benefits - Evolution of Mainframes - Different hardware systems

Mainframes OS and Terminology - Operating systems on mainframes, Batch processing vs. online processing - mainframe operating system. - evolution - concepts of Address space, Buffer management - Virtual storage - paging - swapping - Dataset management in mainframes

UNIT - II

z/OS and its features : Z-operating system (Z/OS) - Virtual storage - Paging process - storage Managers - Program execution modes - Address space - Multiple virtual system(MVS) , MVS address space, Z/OS address space - Dataset - sequential and partial dataset - Direct access storage device(DASD) -Access methods - Record formats - Introduction to virtual storage access methods(VSAM) - Catalog - VTOC

Overview of JCL : Introduction to Job Control language - Job processing - structure of JCL statements - Various statements in JCL

UNIT - III

JOB statement, EXEC statement, DD statement in JCL - JCL procedures and IBM utility programs.

Overview of DB2 : · Introduction to DB2 – System Service component, Database Service component, Locking Service component, Distributed Data Facility Services component, Stored Procedure component, catalogs and optimizer.

- DB2 Objects and Data Types - DB2 Objects Hierarchy, Storage groups, Database, Table space, Table, Index, Clustered index, Synonyms and aliases, Views, Data Types.
- DB2 SQL programming – Types of SQL statements, DCL, DDL, DML, SPUFI utility.
- Embedded SQL programming – Host variable, DECLGEN utility, SQLCA, single/multiple row manipulation, cursors, scrollable cursors.

UNIT - IV

COBOL Programming 1 : Introduction – History, evolution and Features, COBOL program Structure, steps in executing COBOL; Language Fundamentals – Divisions, sections, paragraphs, sections, sentences and statements, character set, literals, words, figurative constants, rules for forming user defined words, COBOL coding sheet. Data division – Data names, level numbers, PIC and VALUE clause, REDEIFNES, RENAMES and USAGE clause. Procedure Division – Input / Output verbs, INITIALIZE verb, data movement verbs, arithmetic verbs, sequence control verbs.

COBOL Programming 2 : File processing – Field, physical / logical records, file, file organization (sequential, indexed and relative) and access mode, FILE-CONTROL paragraph, FILE SECTION, file operations. File handling verbs – OPEN, READ, WRITE, REWRITE, CLOSE.

UNIT - V

COBOL Programming 2 cont., Table processing – Definition, declaration, accessing elements, subscript and index, SET statement, SEARCH verb, SEARCH ALL verb, comparison. Miscellaneous verbs – COPY, CALL, SORT, MERGE, STRING, UNSTRING verbs.

Mainframe Application Development guidelines : COBOL coding standards, relation between a COBOL file handling program and JCL, Different types of ABEND codes, COBOL-DB2 program pre-compilation, DBRM (Database Request Module), Application plan/packages, program execution methods (EDIT JCL, foreground and background modes).

TEXT BOOKS :

1. Gary DeWard Brown, "JCL Programming Bible (with z/OS)", 4th ed., Wiley India Dream Tech, 2002.
2. IBM Redbook, "COBOL - Language Reference", 5th ed., Ver 3, Release 2, 2003.

REFERENCE BOOKS

1. Doug Lowe, "MVS JCL", 2nd ed., Mike Murach and Associates, 2002.
2. z/OS V1R4.0 MVS JCL Reference found online at http://www-1.ibm.com/support/docview.wss?uid=pub1sa22759706
3. z/OS V1R1.0 MVS JCL Reference found online at http://publibz.boulder.ibm.com/cgibin/bookmgr_OS390/BOOKS/iea2b600/CCONTENTS
4. Nancy Stern & Robert A Stern, "Structured Cobol Programming", 9th ed., John Wiley & Sons, 2000.

IV Year B.Tech. CSE	I - Semester	L	T	P	To	C
		-	-	3	3	2

CS417 NETWORKS & SECURITY LAB

Objective of the Course :

To understand about socket Programming using Unix BSD and security tools.

Recommended Systems/Software Requirements:

- Intel based desktop PC with minimum of 166 MHZ or faster processor with atleast 64 MB RAM and 100 MB free disk space LAN Connected
- Any flavour of Unix / Linux
- Ethereal
- NMAP
- GNUPGP

Network Programming :

1. Design TCP iterative Client and server application to reverse the given input sentence
2. Design TCP client and server application to transfer file
3. Design a TCP concurrent server to convert a given text into upper case using multiplexing system call "select".
4. Design a TCP concurrent server to echo given set of sentences using poll functions
5. Design UDP Client and server application to reverse the given input sentence
6. Design UDP Client server to transfer a file

7. Design using poll client server application to multiplex TCP and UDP requests for converting a given text into upper case.
8. Design a RPC application to add and subtract a given pair of integers.

Network Security:

9. Network Protocol Analyzer (Ethereal)
10. Demonstrate NMAP for ports monitoring
11. Demonstrate GNU PGP.
12. Demonstrate S/MIME for e-mail communication

TEXT BOOKS :

1. Richard Stevens, “Advance Unix Programming”, 2nd ed., Pearson Education, 2008.
2. N.B. Venkateswarlu, “Advance Unix Programming”, 2nd ed., BS Publication, 2008
3. William Stallings, “Network Security Essentials” (Applications and Standards) 2nd ed., Pearson Education, 2009.

IV Year B.Tech. CSE	I - Semester	L	T	P	To	C
		-	-	3	3	2

CS419 EMBEDDED SYSTEMS LAB

1. Write a program to perform Arithmetic operation
2. Write a program to perform Logical operation
3. Write a program to perform Control operation
4. Read inputs from switches using I/O interface
5. Program to make LEDs blink using I/O Interface
6. Program to write a program for serial communication
7. Write a program for encryption/ description
8. Develop necessary interfacing circuit to read data from a sensor and process using the 8051 board. The data has to be displayed on PC monitor
9. Sort RTOS (MCOS) on to 89CS1 board and verify
10. Simulate an elevator movement using RTOS on 89CSI board
11. Familarization of ARM programming model using ARM kit.

TEXT BOOK :

1. KVKKF Prasad, “Embedded/real - TimeSystems”, 2nd ed., Dreamtech.Press, 2008.

REFERENCE BOOK :

1. Michael Barr, Rick Lobtimen, “Programming Embedded Systems in C & C++”, 1st ed., OREILLY Publications, 2010.

IV Year B.Tech. CSE	I - Semester	L	T	P	To	C
		-	-	2	2	2

CS421 PROJECT - I

B.Tech Project - I

The evaluation details of Project - I are given in section 4.3 in Rules and Regulations.

I Year B.Tech. ECE I - Semester

L	T	P	To	C
4	-	-	4	4

ENGINEERING MATHEMATICS - I

Course description and Objectives :

Without mathematics not a single day of an engineer will pass! All the topics of this course are relevant to all branches of engineering. Differential equations are used in various places. Laplace transformations are used, for example, for conversion of domains, from time domain to frequency domain. These are also used to solve ordinary differential equations. When data is given at only a finite points, we use numerical methods for find the approximate values of functions, also to solve differential equations approximately etc. Maxima, minima of a function has got many applications.

Course Outcomes:

Upon successful completion of this course, students should be able to:

CO1: This course will help to sketch the graph of a differential equation and its direction mixing fields.

CO2: Laplace transform used to compute solutions of equations involving impulse functions.

CO3: Understand the process of evaluation ODE numerically.

CO4: Eigen values and Eigen vectors play a prominent role in the study of ordinary differential equations and Application of partial differentiation.

UNIT I - Ordinary Differential Equations & Differential Equations of Second Order :

Differential Equations of First Order : Definiton, Order and degree of a differential equation, Formation of differential equations, Solution of a differential equation, Differential equations of first order and first degree : variables separable, Homogenous equations, Linear equations, Exact differential equations.

Differential Equations of Second Order : Linear differential equations of second order with constant coefficients, Methods for finding the complementary functions and particular integral, General method of finding the particular integral of any function.

UNIT II - Applications of Differential Equations and Laplace Transformations

Applications of Differential Equations : Newton's law of cooling, Natural law of growth, Orthogonal trajectories**.**

Laplace transformations : Definition, Properties, Convolution theorem, Inverse Laplace transformation, Solving differential equations using Laplace Transformation.

UNIT III - Numerical Methods

Taylor's Method, Picard Method, Euler Method, Modified Euler Method, Runga-Kutta Methods.

Interpolation by Lagrange and Newton methods.

UNIT IV - Matrices

Rank of a matrix, finding rank of a matrix using Echelon form, Normal form, triangular form, PAQ form, inverse of a matrixEigen values, Eigen vectors, properties, Cayley-Hamilton theorem (without proofs), Diagonalisation of a matrix.

Solving System of equations (Gauss-Siedal method only)

UNIT V - Maxima and Minima & Jacobians

Maxima and Minima : Review of partial differentiation: Partial derivatives, Partial derivatives of higher order, Homogeneous function, Euler's theorem, Total differential coefficient,

Maxima and Minima of a function of two variables, Conditions for extreme values, Lagrange method of undetermined multipliers.

Jacobians : Definition, Properties, Jacobian of implicit functions, Partial derivaties of Implicit functions using Jacobian.

TEXT BOOKS :

1. *H. K. Dass* and *Er. Rajnish Verma*, Higher Engineering Mathematics, S. Chand & Co., New Delhi, 2011.
2. *B.S. Grewal*, "Higher Engineering Mathematics", 40th edition, Khanna Publishers, 2009.

REFERENCE BOOKS :

1. *B.V. Ramana*, "Higher Engineering Mathematics", 3rd Edition, Tata McGraw-Hill Publishing Co, 2008.
2. *R K Jain, S R K Iyengar*, "Advanced Engineering Mathematics", 2nd Edition, Narosa Publishing House.
3. *Erwin Kreyszig*, "Advanced Engineering Mathematics", 8th Edition, John Wiley & Sons (Asia) Pvt. Ltd. 2001.

I Year B.Tech. ECE I - Semester

L	T	P	To	C
4	-	-	4	4

ENGINEERING MATERIALS

Course description and Objectives :

The course will help students to learn about the elementary relationships between structure and properties of materials how materials can be classified. It also reveals the engineering applications of metals, alloys, semi conductors and magnetic materials and relation between properties and engineering applications.

Course Outcomes:

Upon successful completion of this course, students should be able to:

CO1: Understand the fundamentals related to bonding in solids, Crystal systems and their structural features, phase equilibria and their relevance in Materials Science

CO2: Understand the Mechanical properties of solids and factors affecting such properties

CO3: ILLUSTRATE Classification of solids based on band theory, sources of resistivity in metals, semi conductors transport mechanism and applications.

CO4: UNDERSTAND Classification of magnetic materials, hysteresis, ferrites, Dielectric materials and applications.

UNIT I - Bonding in Solids & Crystallography:

Bonding in Solids: Inter atomic forces – Types of bonds – Primary & Secondary bonded materials and their properties – Cohesive energy.

Crystallography: Introduction – classification of Crystal systems – SC, BCC & FCC structures –Miller indices of planes & directions – Separation between successive planes – X-ray diffraction – Bragg's Law – Powder method – Crystal imperfection – Point and line imperfections – Grain boundaries

UNIT II - Phase Equilibria & Mechanical Properties :

Phase Equilibria: Gibb's phase rule & terms involved – Reduced phase rule - Two component systems–invariant reactions – Eutectic system & Iron – Carbon system - Lever rule.

Mechanical Properties : Introduction – mechanical properties of materials – Stress-Strain relations of various solids – Elastic moduli- deformations in solids- Fracture – Creep- Fatigue – Factors affecting mechanical properties of materials.

UNIT III - Conducting Materials & Semiconductors :

Conducting Materials: Introduction – Classification of solids based on the band models - Relaxation time and electrical conductivity of a metal – Collision time & mean free path – Sources of resistivity of metals.

Semiconductors: Introduction – Generation & recombination – Intrinsic semiconductors – Extrinsic semiconductors – Drift and diffusion (Qualitative treatment) – Einstein relation – Hall effect – Direct and Indirect band gap.

UNIT IV - Magnetic Properties & Superconductivity

Magnetic Properties: Introduction – Origin of magnetic moment – Classification of magnetic materials – Domain theory of ferromagnetism – Hysteresis curve - Soft and hard magnetic materials – Ferrites and their applications.

Superconductivity – Introduction - Meissner Effect – Types of superconductors – High Temperature superconductors – Applications.

UNIT V - Dielectrics & Functional materials

Dielectrics : Introduction – Dielectric polarization – Internal electric field – Clausius – Mossotti relation – Ferro and Piezo electricity - Electrets – Applications.

Functional materials: Introduction – Metallic glasses – Biomaterials – Composites – Metal matrix composites - Fiber reinforced plastics – Conducting polymers - shape memory alloys – smart materials.

TEXT BOOKS :

1. V. Raghavan, "Materials Science and Engineering", 3 rd ed., PHI, 1996.
2. Lawrence H. Van Vlack, "Element s of Materials Science and Engineering", 6th ed., Wesley Publication, 1989.

REFERENCE BOOKS :

1. Arumugam. M "Material Science" Anuradha Technical Book Publishers, Kumbakonam.K, 1997.
2. Manas Chandra, "Science of Engineering Materials", Vol 1-3, Mc - Millian Company of India, Delhi.
3. Pillai, S.O, "Solid State Physics", New Age International, 1998.
4. William F. Smith, "Principles of Materials Science and Engineering", MGH, Publishers, 1988.
5. Structure and Properties of Materials – John Wulff – Wiley Eastern Ltd

I Year B.Tech. ECE I - Semester

L	T	P	To	C
4	-	-	4	4

FUNDAMENTALS OF ELECTRICAL ENGINEERING

Course description and Objectives :

To understand the basic concepts, laws, techniques in analyzing various DC and AC circuits and concepts in coupled circuits. Study of construction details, working of various electrical machines and Semiconductor Devices and operation

Course Outcomes:

Upon successful completion of this course, students should be able to:

CO1: Explain the notation and components of electric circuits.

CO2: Analyze DC and single phase and three phase AC circuits using different methods and theorems.

CO3: Operate various electrical machines.

CO4: Explain the concepts of Semiconductor Devices and operation of transformers.

UNIT I - Fundamentals Of DC Circuits

Circuit Concepts: Concepts of network, Active and passive elements, voltage and current sources, concept of linearity and linear network, unilateral and bilateral elements, R, L and C as linear elements. Ohm's Law – Kirchhoff's Laws –application to simple series, parallel circuits, mesh and nodal analysis of simple resistive circuits.(simple numerical problems).

UNIT II - Fundamentals of A.C. Circuits:

Generation of A.C. voltage - frequency, average value, R.M.S. value, form factor, peak factor for sinusoidal only - phasor representation of alternating quantities. Analysis of simple series and parallel A.C. circuits-(simple numerical problems)

Balanced Three phase systems – relation between phase and line quantities of voltages and currents in star and delta connected systems (Elementary

treatment only)

UNIT III - Fundamentals of Electromagnetism and Transformers:

Concepts of Magneto motive force, reluctance, flux and flux density , concept of Self Inductance and Mutual Inductance, Coefficient of coupling-only elementary treatment. (simple numerical problems).

Transformers: Principle of operation of single phase transformer – constructional features – EMF equation (simple numerical problems)

UNIT IV - Electrical Machines:

DC Machines: Constructional details of a D.C. Machine.

D.C. Generator – Principle of operation – EMF equation – types of D.C. generators (simple numerical problems)

D.C. Motor – Principle of operation – Torque equation – types of D.C. motors (simple numerical problems)

A.C Machines: Principle of operation of three phase induction motors – slip ring and squirrel cage motors – Torque equation derivation, Constructional details of synchronous machines.

UNIT V - Semiconductor Devices:

Classification of solids based on energy band theory - Intrinsic semiconductors - Extrinsic semiconductors - P type and N type semiconductors - P-N junction diode and its characteristics –Half and Full wave rectifiers- Zener diode and its characteristics - Voltage regulator. Bipolar junction transistor – Operation- Types- Applications.

TEXT BOOKS:

1. Mittle, V.N., “Basic Electrical Engineering”, 2nd ed., TMH, New - Delhi, 1990.
2. V.K.Mehta,”Principles of Electrical Engineering and Electronics”, 3rd ed., S. Chand Publications, New Delhi, 2010.

REFERENCE BOOKS:

1. Millman & Halkias, “Integrated Electronics”, McGraw Hill, 1979.
2. A.K. Thereja & B.L. Thereja, “Electrical Technology”, Vol. – II, S.Chand Publications, 2007.
3.. U.Bakshi & A.Bakshi, “Basic Electrical Engineering”, 1st ed., Technical Publications, Pune, 2005.
4. U.Bakshi & A.Bakshi, “Basic Electrical Engineering”, 1st ed., Technical Publications, Pune, 2005.

I Year B.Tech. ECE I - Semester

L	T	P	To	C
4	-	-	4	4

ENGINEERING CHEMISTRY

Course description and Objectives :

Chemistry is the backbone in designing and understanding the nature and properties of various engineering materials. Currently, the electronics and computer engineers are waiting for suitable polymers for using miniature super computers. So this subject develops fundamental knowledge about new engineering materials and their significance in technical fields and industrial sectors. Water is an essential element for the existence of human, plant and animal lives, besides that it has greater industrial applications. The knowledge about water is the basic requirement for a professional student. Characterization of materials with instrumental techniques is essential for engineers.

Course Outcomes:

Upon successful completion of this course, students should be able to:

CO1: Differentiate between soft and hard water. Understand the disadvantages of using hard water domestically and industrially. Select and apply suitable softening methods (Soda-lime, zeolite, ion-exchange methods, etc.) to soften the hard water for industrial and domestic applications.

CO2: Acquaintance of primary and secondary cells, Hydrogen-Oxygen and Methanol fuel cells, dry and wet corrosions, corrosion controlling methods.

CO3: Acquaintance of the properties and engineering applications of Ceramics, Refractories, Glasses, Cement, Abrasives, Lubricants.

CO4: Acquaintance of Preparation, properties and applications of different polymers and instrumental techniques.

UNIT I - Water Technology :

Introduction-Hardness of water-Determination of hardness by EDTA-Disadvantages of hard water-Scales & Sludges-Caustic embrittlement-Boiler corrosion-Priming & Foaming, WHO, BIS Standards of water-Softening Methods- Lime Soda process, Zeolite process, Ion Exchange process - Desalination of brackish water-Reverse osmosis, Electro dialysis.

UNIT II - Electrochemical cells and AND Corrosion:

Electrochemical cells: primary cell-(Dry or lecalanche cell), Secondary cell-(Lead-acid storage cell, Lithium ion battery), Hydrogen-Oxygen Fuel cell, Methanol fuel cell.

Corrosion: Introduction-Dry corrosion (chemical)-Wet corrosion (electrochemical)-Mechanism of wet corrosion-Bimetallic corrosion-Concentration cell corrosion-Factors influencing corrosion-Corrosion control methods- Cathodic protection and Electroplating.

UNIT III - Engineering Materials :

Properties and engineering applications of Ceramics, Refractories, Glasses, Cement,Abrasives, Lubricants.

UNIT IV - Polymers :

Introduction –Types of polymerization-Preparation, properties and applications of Polyethylene, PVC, Tefflon, Bakelite, UreaFormaldehyde, Silicones, Rubber – Vulcanization, Synthetic Rubbers - (Buna-S, Buna-N, Neoprene). Elementary treatment of Membranes

UNIT V - Instrumental Techniques :

Interaction of radiation with matter,UV-Visible Spectroscopy-Beer –Lambert's law ,Qualitative and Quantitative Analysis,Block diagram of UV-Visible Spectrophotometer.IRSpectroscopy-Types of Vibrations,Identification of functional groups,Block diagram of IR Spectrophotometer**.**

TEXT BOOKS :

1. P.C Jain and Monica Jain, "Engineering Chemistry", 15th edition, Dhanpat Rai Publications 2009.
2. Gurudeep Raj and Chatwal Anand, "Instrumental Methods of Analysis", 5th edition, Himalaya Publications, 2007.

REFERENCE BOOKS :

1. S.S.Dara, "Text book of Engineering Chemistry" 1st edition, S. Chand Publications, 2009.
2. C.V. Agarwal, C.P. Murthy, A.Naidu, "Chemistry of Engineering materials", 9th edition, BSP Publications, 2008.
3. M.R. Senapati, "Advanced Engineering Chemistry" 2nd edition, Lakshmi Publications, 2006
4. H.W. Wilard and Demerit, "Instrumental methods of Analysis", 7th edition, CBS Publications, 1986.

I Year B.Tech. ECE I - Semester

L	T	P	To	C
3	-	-	3	3

ENVIRONMENTAL STUDIES

Course description and Objectives :

The objective of this course is to heighten on awareness of nature and its importance to students

and make them understand the need to make judicious use of all natural resources for long team sustenance of life on this planet.

Course Outcomes:

Upon successful completion of this course, students should be able to:

CO1: Understand the importance of natural resources and integrate technical "field" knowledge with analytical skills to prevent natural resources depletion.

CO2: UNDERSTAND to maintain healthy diverse ecosystems and work together to conserve biodiversity.

CO3: Understand and Take immediate measures to control the Pollution.

CO4: Adopt Eco friendly technology.

UNIT I - Environment and Natural Resources :

Environment: Definition, Scope and Importance – Need for Public Awareness

Natural Resources: Renewable and non-renewable resources – Natural resources and associated problems – Forest Resources: Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources: Use and over utilization of surface and ground water – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources - Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity–Energy resources: renewable and non-renewable energy sources, alternate energy sources. Land resources: Land as a resource,

land degradation, Soil erosion – case studies - Role of an individual in conservation of natural resources.

UNIT II - Ecosystems and Biodiversity :

Ecosystem: Concept of an ecosystem. – Complete and incomplete ecosystem - Structure and functions of an ecosystem - Ecological succession. - Food chains, food webs -Structure and functional features of the following ecosystem: a. Forest ecosystem b. Grassland ecosystem c. Desert ecosystem, d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) **Biodiversity**: introduction of biodiversity, Bio-geographical classification of India - Value of biodiversity- Biodiversity at global, National and local levels - Hot-spots of biodiversity - Threats to biodiversity - Endangered and endemic species of India – Conservation of biodiversity

UNIT III - Environmental Pollution and Applications of Remote Sensing / GIS on Environment

Definition, Cause, effects and control measures of: Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution - Solid waste Management: Causes, effects and control measures of municipal and industrial wastes - Climate change, global warming, acid rain, ozone layer depletion -Case Studies - Role of an individual in prevention of pollution - Pollution case studies. – Green technology and its concept, role of green technology in controlling environmental problems.

UNIT IV - Social issues and EIA :

Sustainable development -water conservation: Cloud Seeding (Artificial rain making system), rainwater harvesting, watershed management - Disaster management: floods, earthquake, cyclone and landslides - Environment Protection Act. - Air (Prevention and Control of Pollution) Act. - Water (Prevention and control of Pollution) Act - Wildlife Protection Act - Forest Conservation Act

EIA: introduction to E.I.A.-definition of E.I.A and E.I.S – scope and objectives of E.I.A.- methods of E.I.A –CEIA, REIA, MOEF, CPCB, SPCB – Importance of E.I.A in proposed Projects / Industry /

Developmental activity - Remote sensing / GIS: Introduction of remote sensing / GIS, definition of remote sensing, applications of the remote sensing on environment (site selection, land use/land cover pattern, water/air/soil quality models, a criteria of environmental information systems)

UNIT V - Environmental Sanitation :

Food sanitation: food and drugs Act, food preservations, food borne diseases-Milk sanitation: tests for milk, pasteurization of the milk - water borne diseases-air borne diseases-viral diseases (HIV/AIDS, SARS, bird-flu, anthrax)-maintenance of sanitary and hygienic conditions

Field Work/Environmental Visit: Visit to a local area to document environmental assets – river/ forest/ grassland / hill /mountain - Study of local environment - common plants, insects, birds - Study of simple ecosystems – pond, river, hill, slopes etc - Visits to industries, water treatment plants, effluent treatment plants

TEXT BOOKS :

1. Y. Anjaneyulu, "Introduction to Environmental Science", B S Publications, 2008.
2. Dr. M. Chandrasekhar, "A Text book of Environmental Studies", HI-TECH publications, 2006

REFERENCE BOOKS :

1. Dr. M. Anji Reddy, "A Text book of environmental science and Technology", B S Publications, 2008
2. Dr. K. Mukkanti, "A Text book of Environmental Studies", S.CHAND Company Ltd, 2009.
3. EHILRS and ST, "Text book of Municipal and Rural Sanitation", M.S Hill, 1998.
4. C. S. Rao, Wiley Eastern Ltd, "Environmental Pollution Control Engineering", New Age International Ltd, 2001
5. Dr. M. Anji Reddy, "Introduction to Remote Sensing", B S Publications, 2004.
6. Kurian Joseph and R.Nagendram, "Essentials of environmental studies", Pearson Education Pt Ltd, Delhi, 2007.
7. Sharma & Kour "Text book of Environmental pollution".
8. H.C Perkins "Text book of Air Pollution".

I Year B.Tech. ECE I - Semester

L	T	P	To	C
2	-	-	2	-

PROFESSIONAL ETHICS, VALUES AND HUMAN RIGHTS

Course description and Objectives :

- *To create an awareness on Engineering Ethics and Human Values.*
- *To instill Moral and Social Values and Loyalty*
- *To appreciate the workplace rights of Others, responsibilities and Safety of others.*

Course Outcomes:

Upon successful completion of this course, students should be able to:

CO1: Understand routine information and factual articles in the news papers and understand general instructions, notifications, announcements, monologues and conversations.

CO2: UNDERSTAND functional English to speak and express themselves in everyday social contexts.

CO3: Applying sentence structures and word collocations to produce simple and accurate sentences and create short compositions.

CO4: Analyse complex reading and listening materials.

UNIT I - Human Values :

Morals, Values and Ethics – Integrity – Work Ethic – Service Learning – Civic Virtue – Respect for Others – Living Peacefully – Caring – Sharing – Honesty – Courage – Valuing Time – Co-operation – Commitment – Empathy – Self-Confidence – Character – Spirituality.

UNIT II - Engineering Ethics & Engineering as social experimentation :

Engineering Ethics : Variety of moral issues – types of inquiry moral dilemmas – moral autonomy – The problems of Many Hands – Kohlburg's theory – Gilligan's theory Impediments to Responsible Action.

Engineering as social experimentation - Codes of ethics - a balanced outlook on law - the challenger case study.

UNIT III - Engineer's Responsibility for Safety :

Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis – Reducing Risk – The Government Regulator's Approach to Risk - Chernobyl Case Studies and Bhopal.

UNIT IV - Workplace Rights and Responsibilities & Work Environment :

Workplace Rights and Responsibilities : Engineers and Managers. Oganizational complaint procedures. Government agencies. Resolving Employee concerns. Limits on acceptable behaviour in large corporation.

Work Environment : Ethical and legal considerations, Organizational responses to offensive behaviour and harassment. Ethics in a Global Context.

UNIT V - Global Issues :

Multinational Corporations – Business Ethics - Environmental Ethics – Computer Ethics - Role in Technological Development – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Honesty – Moral Leadership – Sample Code of Conduct.

TEXT BOOKS :

1. Mike Martin and Roland Schinzinger, "Ethics in Engineering", McGraw Hill, New York, 2005.

REFERENCE BOOKS :

1. Prof. (Col) P S Bajaj and Dr. Raj Agrawal, "Business Ethics – An Indian Perspective", Biztantra, New Delhi, 2004
2. Charles E Harris, Michael S. Protchard and Michael J Rabins, "Engineering Ethics – Concepts and Cases", Wadsworth Thompson Learning, United States, 2000 (Indian Reprint now available)
3. Engineering Ethics-An industrial Perspective, Gail Dawn Baura
4. Charles E Harris, Michael S Pritchard and Michael J Rabins, "Engineering Ethics – Concepts and Cases", Thompson Learning, 2000.
5. Charles E Harris, Michael S Pritchard and Michael J Rabins, "Engineering Ethics – Concepts and Cases", Thompson Learning, 2000.
6. PSR Murthy, "Indian Culture Values and Professional Ethics", BS Publications
7. Edmund G Seebauer and Robert L Barry, "Fundamentals of Ethics for Scientists and Engineers", Oxford University Press, Oxford, 2001.

I Year B.Tech. ECE I - Semester	L	T	P	To	C
	-	-	3	3	2

FUNDAMENTALS OF ELECTRICAL ENGG. LAB

Course description and Objectives :

To understand basic electrical elements, electrical energy its consumption and measurement. To develop practical knowledge on electrical machines, electronic devices and circuits

Out Comes :

Upon successful completion of this course, students should be able to:

CO1: Able to realize characteristics of electrical elements.

CO2: Able to analyze given simple ac and dc networks.

CO3: Able to work on different electrical machines.

CO4: Able to reflect the knwledge of electronic devices to verify experimentally.

List of Experiments

1. Familiarization with basic components such as Resistors, Capacitors, Diodes, Transistors
2. Familiarization with basic electrical measuring instruments
3. Verification of ohm's law
4. Verification of KVL and KCL
5. Calculation of power factor in simple RL and RC circuits
6. Magnetization characteristic of a D.C. self excited generator
7. Measurement of power and energy.
8. Measurement of transformation ratio of single phase transformer.
9. Measurement of Power, Power factor of 3-phase induction motor.
10. Characteristics of PN junction diode.
11. Characteristics of Zener diode.
12. Operation of Full wave Rectifier
13. Operation of half wave Rectifier
14. Study and Working of fluorescent lamp
15. voltmeter-ammeter method.

Note : Any 10 of above experiments are to be conducted.

I Year B.Tech. ECE I - Semester

L	T	P	To	C
-	-	3	3	2

ENGINEERING CHEMISTRY LAB

Course description and Objectives :

This lab is intended to make the students enlighten with the theoretical concepts of chemistry. Instrumental techniques are useful for characterization of materials for future engineers.

Students may have to take up any 10 experiments from the following experiments.

Course Outcomes:

Upon successful completion of this course, students should be able to:

CO1: To enable the students to analyse the amount of dissolved salts in terms of hardness in potable water.

CO2: To determine the Alkalinity in water used especially in industries.

CO3: To determine the percentage purity of the given samples using titrimetry.

CO4: To impart knowledge on synthetic aspects of polymers used as insulators.

Volumetric Analysis:

1. Determination of total Alkalinity of water
2. Determination of Percentage purity of Washing soda
3. Determination of Fe(II) by Dichrometry
4. Determination of Percentage of available chlorine in Bleaching powder
5. Determination of chlorides by Argentometry
6. Determination of Total hardness of water

Preparations:

7. Preparation of Bakelite
8. Preparation Of Urea- Formaldehyde Resin

Instrumental methods of Analysis:

9. Determination of Viscosity of a Lubricating oil
10. Determination of Strength of acid by conductometry
11. Determination of Mn^{+7} by Colorimetry
12. Demonstration of UV-Visible Spectrophotometer with Ferrothiocyanate

REFERENCE BOOKS:

1. Vogel's Text book of qualitative Chemical Analysis J.Mendham, R.C Denney, J.D. Bares, M.Thomas & B. Siva Sankar, Pearson Publications – Volume I (2009).
2. Experiments in Applied Chemistry by Dr.Sunita Rattan. S.K. Kataria & Sons publications,2008.

I Year B.Tech. ECE I - Semester

L	T	P	To	C
1	-	3	4	3

ENGINEERING GRAPHICS

Course description and Objectives :

To familiarize students with the conventional concept of engineering drawing and application through AutoCAD.

Course Outcomes:

After completion of this course, student will be able to prepare plan and elevation of any pictorial view either conventional or through AutoCAD.

UNIT - I

Introduction to Engineering drawing: Introduction to Engineering Drawing – Types of lines, lettering, dimensioning Construction of polygon & Conics. (Ellipse, Parabola & Hyperbola by general method)

UNIT - II

Orthographic Projections: Principle of projection-Planes of projections.

Projections of points:

Projection of straight lines: Inclined to one plane and both the planes.

Projections of planes: Simple planes, Planes inclined to reference planes.

UNIT - III

Projections & Sections of solids – projections of prisms – cylinders – cones - pyramids – solid axis inclined to one plane, simple sections- prism, cylinder, pyramid and cone. AutoCAD Fundamentals.

UNIT - IV

Isometric projections: Isometric drawing of simple objects through AutoCAD

UNIT - V

Orthographic projections: Conversion of Pictorial view into orthographic view using AUtoCAD and Conventional.

TEXT BOOKS :

1. N.D.Bhatt, "Engineering Drawing", 49th ed., Charotar Publication, 2007.
2. K. Venugopal, "Engineering Drawing through Auto CAD", 1st ed., New Age Publication, 2008.

REFERENCE BOOKS :

1. Jhole, "Engineering Drawing", 2nd ed., Tata McGraw Hill, 2008.
2. K.L. Narayana, "Engineering drawing" 2nd ed., Scitech Publications, 2008.

I Year B.Tech. ECE II - Semester

L	T	P	To	C
4	-	-	4	4

ENGINEERING MATHEMATICS - II

Course description and Objectives :

Without mathematics not a single day of an engineer will pass! All the topics of this course are relevant to all branches of engineering. In real life, many quantities are dependent on more than one quantity. Hence study of functions of several variables is crucial. In this course, we study partial differentiation, partial differential equations, multiple integrals all involving functions of two variables. We also study Fourier series and Z-transformations and difference equations.

Course Outcomes:

Upon successful completion of this course, students should be able to:

CO1: The students will understand Partial Differential Equations.

CO2: They will be able to apply Fourier series in solving problems.

CO3: They can apply Z – transforms to solve difference and vector calculus.

CO4: The student will enable solve multiple integral.

UNIT I - Partial Differential Equations :

Formation of Partial Differential Equations, Linear (Lagrange) Equations, Method of multipliers, Non-linear partial differential equations (Types), Charpit's method.

Second order linear equations, classifications, Solution by method of separation of variables.

UNIT II - Fourier Series :

Periodic functions, Fourier series, Dirichlet's conditions, Determination of Fourier coefficients, Discontinuous functions, even and odd functions, Half-range series, Functions having arbitrary period.

UNIT III - Z-transformations & Applications :

Z-transformations : Sequences, Z-transformation, Properties, Inverse Z-transformation, Multiplication and division by k, Initial and final value theorems, Convolution, Determination of inverse Z-transformation.

Applications : Solutions of difference equations using Z-transformations.

UNIT IV - Multiple Integrals :

Double integrals, Evaluation, Evaluation in Polar coordinates, Change of order of integration, Change of variables, Applications to Area in Cartesian coordinates and polar coordinates.

Triple integrals, Fundamentals, Evaluation of triple integrals.

UNIT V - Vector Differentiation and Integration

Vector Function, Differentiation, Scalor and Vector point function, Gradient, Normal, Divergence, Directional Derivate, Curl, Vector identities.

Line Integral, Surface Integral, Volume integral, Green's theorem, Stoke's theorem, Gauss theorem of divergence (without proofs).

TEXT BOOKS :

1. *H. K. Dass* and *Er. Rajnish Verma*, Higher Engineering Mathematics, S. Chand & Co., New Delhi, 2011.
2. *B.S. Grewal*, "Higher Engineering Mathematics", 40th edition, Khanna Publishers, 2009.

REFERENCE BOOKS :

1. *B.V. Ramana*, "Higher Engineering Mathematics", 3rd Edition, Tata McGraw-Hill Publishing Co, 2008.
2. *R K Jain, S R K Iyengar*, "Advanced Engineering Mathematics", 2nd Edition, Narosa Publishing House.
3. *Erwin Kreyszig*, "Advanced Engineering Mathematics", 8th Edition, John Wiley & Sons (Asia) Pvt. Ltd. 2001.

I Year B.Tech. ECE II - Semester

L	T	P	To	C
4	-	-	4	4

ENGINEERING PHYSICS

Course description and Objectives :

There is a symbiotic relation between physics and engineering. Broadly speaking, engineering is mainly applied physics. Recent technical developments have been the result of joint efforts of physicists and engineers. A proper study of physics is therefore indispensable for an engineering student to excel in his field. The purpose of this course is to present the principles and concepts of physics as relevant to an engineer.

Course Outcomes:

Upon successful completion of this course, students should be able to:

CO1: Apply the concepts of Physical Optics in view of engineering applications.

CO2: Evaluate Ultrasonic wave velocity in liquids and solids and to remain acquainted with the applications of Ultrasonic waves in various fields.

CO3: Apply the principles of quantum mechanics to learn the dynamics of free electrons in metal.

CO4: Analyze the wavelengths of Laser for suitable applications in the field of industry, medicine and communication and to foster the knowledge on optical fibers to realize fiber optic communication and fiber optic sensors including nanameterials.

UNIT I - Physical Optics

Interference – Types - Interference in thin films (Reflection) – Newton's Rings – Michelson's Interferometer, Fabry-perot interferomenter – Applications.

Diffraction – Fraunhoffer Diffraction at single slit – Diffraction grating Polarization – Production of plane polarized light – Nicol prism – Optical activity – photo elasticity.

UNIT II - Ultrasonics & NDT

Ultrasonics : Introduction – production of ultrasonic waves – piezoelectric method – Properties of ultrasonic waves – Types of ultrasonic waves – Determination of Velocity of ultrasonic waves in solids and liquids – Applications.

NDT : Introduction - Types – Theory and practice of Ultrasonic Testing – Ultrasonic Testing Systems – Ultrasonic Testing Methods – X-Ray Radiography.

UNIT - III Quantum Mechanics & Free electron theory of metals

Quantum Mechanics : Matter waves - Schroedinger's time independent wave equation - Physical significance of the wave function - Particle in one dimensional potential well – tunneling phenomenon.

Free electron theory of metals : Introduction – Classical free electron theory – Electrical conductivity of metal – Fermi - Dirac distribution function and its variation with temperature – Quantum free electron theory.

UNIT IV - Lasers & Fiber Optics:

Lasers: Characteristics of Laser light – Spontaneous and Stimulated emission of radiation – Low power and High power lasers, He-Ne Laser – CO_2 Laser – Nd-Yag laser - Applications of Lasers, Holography and Applications

Fiber Optics: Principle of optical fiber - materials – Numerical Aperture – Types of fibers – Dispersion and Attenuation in optical fibers – Optical sensors – Optical fiber communication system.

UNIT V - Solar Energy & NanoScience and Technology

Solar Energy : Solar radiation – Photovoltaic effect – solar cells – Efficiency of solar cell – Solar thermal energy conversion systems.

NanoScience & Technology : Introduction to nano meterials – Basic principles of nanoscience & Technology – Fabrication of nanomaterials – Physical & Chemical properties of nanomaterials – Applications of nanotechnology.

TEXT BOOKS :

1. M.R.Srinivasan, "Physics for Engineers" New Age International, 2002-2003.
2. M.N. Avadhanulu & P.G. Kshirasagar, "Engineering Physics", 1st edition, S. Chand & Company Ltd, 1992.

REFERENCE BOOKS :

1. Halliday, Resnic and Walker, "Fundamentals of Physics", 6th edition, John Willey publishers, 2003.
2. Grawfor F.S., Berkley Physics courses, "Waves and Oscillations", Volume III McGraw Hill, 1992.
3. V. Raghavan, "Materials Science and Engineering", 5th edition, Prentice-Hall India, 2004.
4. S.O.Pillai, "Solid State Physics", 6th edition, New Age International Publications, Revised, 2005.
5. V.Rajendran, "Engineering Physics", 1st edition, TMH Publications, 2010.

I Year B.Tech. ECE II - Semester

L	T	P	To	C
4	-	-	4	4

ENGINEERING MECHANICS

Course description and Objectives :

The course aims to impart the knowledge to understand the forces and their reactions on various static and dynamic conditions.

Course Outcomes:

Upon successful completion of this course, students should be able to:

CO1: Use scalar and vector analytical techniques for analyzing forces for statically determinate structures.

CO2: Solve the engineering problems in case of equilibrium conditions and to calculate the reaction forces of various supports of different structures.

CO3: Determine the centroid, centre of gravity and moment of inertia of various surfaces and solids.

CO4: Solve the problems involving dry friction and kinematics and kinetics of particles to the analysis of simple, practical problems.

UNIT I - Basic Concepts and Principles of Statics :

Introduction to Engineering Mechanics, Scalar and Vector quantities, Forces, Characteristics of a force, Definitions and examples of various types of force systems, Law of transmissibility, Definition of resultant, Composition and resolution of forces, Moment of a force, Principles of moments of force, Couples, characteristics of a couple, Transformations of a couple, Resultants of Force Systems, Possible resultants of different types of force systems, Resultant of a concurrent coplanar force system, Resultant of a non concurrent coplanar force system

UNIT II - Equilibrium of Rigid Bodies

Free body diagrams, Types of supports and their reactions, requirements of stable equilibrium, Equations of equilibrium of a concurrent coplanar force system, Equilibrium of Bodies acted on by two or three forces, Equilibrium of bodies acted on by non-concurrent coplanar force system

UNIT III - Properties of Surfaces and Solids :

Centroid and Center of Gravity: Centre of gravity of parallel forces in a plane, centroids and center of gravity of composite bodies, Distributed Loads on Beams.

Moments of Inertia: Definition, Parallel axis theorem and perpendicular axis theorem for areas, Polar Moment of inertia, Second moment of area by integration, Radius of gyration of areas, Moments of inertia of composite areas.

UNIT IV - Friction :

Nature of friction, Laws of friction, Coefficient of friction, Angle of friction, Cone of friction, Types of Friction - Sliding Friction, Rolling Friction, Belt Friction, Ladder Friction, Wedge friction.

UNIT V - Kinematics and Kinetics :

Absolute Motion: Introduction, Recapitulation of basic terminology of mechanics, Displacement, Velocity and acceleration their relationship, Rectilinear motion of a particle

Relative Motion: Introduction to kinematics of relative motion, Relative displacement, Relative velocity

Kinetics: Introduction to Kinetics, Force, Mass and Acceleration, Newton's Laws of motion, Equation of motion for a particle, D Alembert's principle, Rectilinear translation of a rigid body, Work done by a force, Work done by a force system, Energy, Potential energy, Kinetic energy, Principle of Work and kinetic energy, Conservation of energy, Linear impulse, Linear momentum, Principle of linear impulse and linear momentum, Conservation of linear momentum.

TEXT BOOKS :

1. J. L. Meriam, L. G. Kraige, "Engineering Mechanics: Dynamics", 7th ed., John wiley & sons, 2012
2. A. K. Tayal, "Engineering Mechanics", Umesh Publications, 2005.

REFERENCE BOOKS :

1. L. Singer - Harper, "Engineering Mechanics", 3rd ed., Fedinand . , Collins, 1975.
2. Timoshenko & Young, "Engineering Mechanics", 4th ed., Tata McGraw Hill, New Delhi, 2007.
3. S. S. Bhavakati & J. G. Rajasekharappa, "Engineering Mechanics", 3nd ed., New Age International Publications, New Delhi, 2008.

I Year B.Tech. ECE II - Semester

L	T	P	To	C
3	2	-	5	5

TECHNICAL ENGLISH COMMUNICATION

ourse description and Objectives :

To introduce students to the specific use of language for the purposes of Technical Communication which would be an essential prerequisite for success in the areas of writing and speech. The teaching efforts in this course will be directed towards making students develop their technical and non-technical writing abilities using the fundamental principles that apply to the correct use of the English language free of grammatical and other related errors.

Course Outcomes:

Students shall achieve the ability to write and demonstrate college-level proficiency in the following:

CO1: Understand and apply the rules of grammar to speak in technical context.

CO2: Strengthen reading and listening comprehension skills to follow academic discussions in the engineering context.

CO3: Develop appropriate vocabulary for carrying out academic writing tasks.

CO4: Attain adequate proficiency to participate in the classroom discussions and make simple presentations.

UNIT - I

- Text : Environmental Consciousness (Climate Change – Green Cover – Pollution)
- Grammar : Articles – Prepositions – Sentence Types and Construction
- Vocabulary : Root – Prefixes - Suffixes
- Composition : Paragraph Writing (Descriptive & Narrative)
- Lab Practice : Introduction to Phonetics (Organs of Speech; Consonants, Vowels & Diphthongs; Syllable, Stress & Intonation)

UNIT - II

- Text : Emerging Technologies (Solar Power – Cloud Computing – Nanotechnology)
- Grammar : Time and Tense (Present-Past-Future; Helping Verbs; Modals)
- Vocabulary : Synonyms – Antonyms
- Composition : Note-making
- Lab Practice : Grammar Practice (Speaking of past, present & future)

UNIT - III

- Text : Energy (Renewable and Non-renewable Sources – Alternative Sources – Conservation – Nuclear Energy)
- Grammar : Subject-Verb Agreement - Sentence Construction (Characteristics of Technical Writing)
- Vocabulary : Idioms & Phrases
- Composition : Summarizing
- Lab Practice : Situational Conversations – Role-Plays (Introducing; Greeting; Enquiring; Informing; Requesting; Inviting)

UNIT - IV

- Text : Engineering Ethics (Challenger Disaster – Biotechnology – Genetic Engineering – Protection from Natural Calamities)
- Grammar : Sentence Transformation (Degrees, Voice, Speech & Synthesis)
- Vocabulary : Phrasal Verbs
- Composition : Letter Writing (Informal)
- Lab Practice : Situational Conversations – Role-Plays (Emotions; Directions; Descriptions; Agreements; Refusals; Suggestions)

UNIT - V

- Text : Travel and Tourism (Advantages and Disadvantages of Travel-Tourism – Atithi Devo bhava – Tourism in India)
- Grammar : Common Errors
- Vocabulary : One-word Substitutes
- Composition : Letter Writing (Formal)
- Lab Practice : Group Discussions

TEXT BOOKS :

Mindscapes - English for Technologists and Engineers, Orient Black Swan, 2012.

REFERENCE BOOKS :

1. V. R. Narayana Swamy***, "Strengthen Your Writing",*** 1st edition, Orient Longman, 2003.
2. Thomas Elliott Berry***, "The Most Common Mistakes in English Usage",*** 1st edition, Tata McGraw Hill, 2004.
3. T. Balasubramanyam, ***A Textbook of English Phonetics for Indian Students***, Macmillan Ltd., 2000.
4. Sasikumar.V and P.V. Dhamija,. ***Spoken English: A Self-Learning Guide to Conversation Practice,*** 34th Reprint, Tata McGraw Hill, New Delhi, 1993.
5. Margaret M Maison, **"Examine your English",** 1st edition**,** Orient Longman, 1999.
6. Ashraf Rizwi, "***Technical English Communication***", Tata McGraw Hill, Latest Edition.

I Year B.Tech. ECE II - Semester	L	T	P	To	C
	5	-	-	5	5

PROBLEM SOLVING AND COMPUTER PROGRAMMING

Course description and Objectives :

Aim of this course is to introduce the techniques of problem solving and concepts of programming language to the students. Because of its popularity and suitability to develop different types of applications, 'C' language has become the de-facto programming language to engineers. A comprehensive introduction of C language is offered through this course to enable the students to write diversified programs.

Course Outcomes:

Upon successful completion of this course, students should be able to:

CO1: Able to understand the basic terminology used in computer programming.
CO2: Able to write, compile and debug programs in C language.
CO3: Use different data types in a computer program and design programs in volving decision structures, loops and functions.
CO4: Able to understand the allocation of dynamic memory using pointers, arrays, structure and file system.

UNIT I - Fundamentals of computers

Basic functional units and discrete components of a computer, computer networks, networking components, Binary representation of integers and real numbers, ASCII, EBCDIC, Unicode, Generations of computer languages.

UNIT II - Problem Solving Steps and Basic of C Language

Problem understanding, Formulating a mathematical model, Development of an algorithm, Representation of an algorithm, Flow chart and Pseudo code, Coding, Testing and Debugging, Comments, Processor statement, Function header statement, Variable declaration statement and Executable statement, C Character Set, constants, identifiers, operators, punctuations, keywords, Basic data types, modifiers, identifiers, variables, C scopes, type qualifiers, storage class specifiers, variable initializations, constants, reading and writing characters, formatted I/O.

UNIT III – Preliminaries of C

Assignment, arithmetic , relational, logical, bitwise, ternary, address, indirection, sizeof, dot, arrow, and parentheses operators, Expressions Precedence of operators and associatively, Category of Statements, Selection, Iteration, jump, label, expression and block, Function declaration, prototype, definition, calling by value and address, standard library functions and recursive functions.

UNIT IV - Arrays and Pointers

Declaration, initialization, reading, writing, accessing and passing as a parameter to functions, Multidimensional arrays and String functions, pointer expressions, pointer and arrays, multiple indirection, initializing pointers, pointer to functions, Dynamic memory allocation functions.

UNIT V - Structures and File Processing

declaration, initialization and accessing, array of structures and passing structures to functions, structure pointers, arrays and structures within structures, unions, bit-fields, typedef and enumerations, I/O and processing operations on text and binary files. pre-processor directives.

TEXT BOOKS :

1. Reema Thareja, “Introduction to C Programming”, Oxford University Press, India, 2013
2. Herbert Schildt, C: “The Complete Reference”, 4th Edition, Tata McGraw-Hill, 2000.

REFERENCE BOOKS :

1. E. Balagurusamy, “ Programming in ANSI C”, 4TH Edition, Tata McGraw- Hill, 2008.
2. R Ravichandran and T Jeyapoovan, “ Computer Programming with C”, Soni Graphics, India, 2014.

I Year B.Tech. ECE II - Semester	**L**	**T**	**P**	**To**	**C**
	2	**-**	**-**	**2**	**-**

NETWORK SECURITY

Course description and Objectives :

This Course focuses towards the introduction of System, Information and Network security using various methodologies. It also focuses on the practical aspects that have been used to provide e_mail and web security.

Course Outcomes:

Upon successful completion of this course, students should be able to:

CO1: Understand the Importance of Information Security.

CO2: Know the ways to protect the information.

CO3: Understand the Firewall importance.

CO4: Understand the need of Virtual Private Networks and network security.

UNIT I - History of security :

History of security – Physical security, communications security, emissions security, computer security, network security and information security. Security process - Anti-virus software, access controls, firewalls, smart cards, biometrics, intrusion detection, policy management, vulnerability scanning, encryption, physical security mechanisms.

UNIT II - Access attacks

Snooping, eavesdropping, interception; Modification attacks - Changes, insertion and deletion; Denial of service attacks- Denial of access to information, applications, systems and communication; Repudiation attacks - Masquerading and denying an event. Hacking - Hacker motivation, historical hacking techniques, IP spoofing and malicious code.

UNIT - III

Confidentiality of files, information in transmission and traffic flow, integrity, availability and accountability; Integrity of files and information during transmission; Availability - backups, failover and disaster recovery; Accountability – identification and authentication, and audit.

UNIT - IV

Concepts of firewalls, Application layer and packet filtering firewalls; Virtual Private Networks.

UNIT - V

Basic encryption concepts, Private Key encryption standards-DES, triple DES and AES. Public key encryption – RSA. Concepts of digital signatures.

TEXT BOOKS :

1. Eric Maiwald, Fundamentals of Network security, Dreamtech Press, 2007.

REFERENCE BOOKS :

1. William Stallings, “Cryptography and Network security”, 4th edition, Pearson Education, 2010.

I Year B.Tech. ECE II - Semester

L	T	P	To	C
-	-	3	3	2

COMPUTER PROGRAMMING LAB

Course description and Objectives :

To familiarize the students in preparation of documents and presentations with office automation tools. A comprehensive problem solving skills through C language is offered to enable the students to write diversified solutions using this language.

Course Outcomes:

Upon successful completion of this course, students should be able to:

CO1: Able to write, compile and debug programs in C language.

CO2: Able to formulate problems and implement algorithms in C.

CO3: Able to effectively choose programming components that efficiently solve computing problems in real-world

CO4: Development of C programs that are understandable, debuggable, maintainable and more likely to work correctly in the first attempt.

1. Write A Program to find simple Interest, compound interest
2. Write A Program to covert given temperature from C to F & F to C
3. Write A Program to check Entered number is positive or zero or Negative
4. Write A Program to print given year is Leap year or not
5. Write A Program to do arithmetic operations using switch
6. Write A Program to find biggest among 3 Numbers
7. Write A Program to print grade of a student for 5 sub avg>70(A), 60-70(B), 50-60(C),<50(F)
8. Write A Program to find Roots fo Quadratic Equation
9. Write A Program to find sum of individual digits of a given number
10. Write A Program to check whether the given number is PALINDRAM or not
11. Write A Program to check whether the given number is PERFECT or not
12. Write A Program to check whether the given number is PRIME or not

13. Write A Program to check whether the given number is ARMSTRONG or not
14. Write A Program to check whether the given number is STRONG or not
15. Write A Program to find sum of Natural Numbers
16. Write A Program to print the following triangle
    1
    2 3
    4 5 6
    7 8 9 10 etc.........
17. C Progrm to find Factorial of Given number using Recursive and Non Recursive Functions.
18. Write A Program to print Fibonacci Series upto given limit using recursive, Non recursive
19. Write program in C for determining the minimum and maximum and sum of elements of an array of 'n' elements and searching for a given element.
20. C Program for computing range, mean and standard deviation of a given numeric dataset.
21. Write A Program in C for performing addition, subtraction, multiplication and transpose operations on matrices.
22. Write program to perform the following string operations on the given string. a) string length b) string copy c) string concatenation d) string comparison e) reverse string f) sub string
23. Write A Program to read student record (no, name, marks1, marks2, marks3, marks4, marks5, calculate average and Grade) and display the student record.
24. Write A Program to do arithmetic operations using pointers.
25. Write A Program to create two data files and copy the content of these two data files as a single file in another new file?

I Year B.Tech. ECE II - Semester

L	T	P	To	C
-	-	3	3	2

WORKSHOP PRACTICE

Course description and Objectives :

To provide the hands on experience to the students on basic workshop skills.

Course Outcomes:

Upon successful completion of this course, students should be able to:

CO1: Students will be able to identify various tools connected to all the trades.

CO2: Students will be able to learn how to use various tools

CO3: Understand joining of metals.

CO4: Make metal joints and sheet metal work.

Trades for exercises:

1. Carpentry:
2. Fitting
3. Tin Smithy & Black smithy4. House wiring
5. Foundry & Welding (Demonstration)
6. Machine shop & CNC (Demonstration)
7. IT Workshop
8. Study of discrete components of computer and networking (1 session)
9. Demonstration of assembling a computer, disk partitioning and installation of system and application software. installation of modem etc. (2 sessions)

Note: In each trade, the students has to perform at least two jobs

TEXT BOOKS :

1. S.K. Hazra Choudhury, Elements of workshop Technology, 11th Edition, Media Promoters, 1997
2. Gopal, T.V., Kumar, T., and Murali, G., A first course on workshop practice – Theory, Practice and Work Book, Suma Publications, Chennai, 2005.
3. Venkatachalapathy, V. S., First year Engineering Workshop Practice, Ramalinga Publications, Madurai, 1999.

12. Solar Cell
13. Seebeck effect

REFERENCE BOOKS:

1. Vogel's Text book of qualitative Chemical Analysis J.Mendham, R.C Denney, J.D. Bares, M.Thomas & B. Siva Sankar, Pearson Publications – Volume I (2009).

I Year B.Tech. ECE II - Semester	L	T	P	To	C
	-	-	3	3	2

ENGINEERING PHYSICS LAB

Course description and Objectives :

This lab is intended to make the students realize the theoretical concepts of physics having hands on experience in conducting the following experiments. Students may have to take up any 10 experiments from each section.

Course Outcomes:

Upon successful completion of this course, students should be able to:

CO1: Students realize concept of resonance of sound by conducting the experiment of Sonometer Melde's experiment and volume generator.

CO2: The students understand the concepts of light by conducting the experiments of dispersion of light, diffraction of light, optical fibers and lasers.

CO3: The students acquire the knowledge of magnetic field theory, thermal energy and elastic properties by conducting the experiments of field along the axis of circular coil, Lee's experiment, Seebeck effect and Torsional pendulum.

CO4: The students understand the basics and application of the semiconducotrs by using solar cells, energy bandgap of semiconductor, hall effect.

PHYSICS LAB

1. Verification of laws of transverse vibrations in stretched string - Sonometer
2. Melde's Experiment - Transverse and Longitudinal modes.
3. Determination of Rigidity modulus of a material in the form of a wire - Torsional pendulum
4. Dispersive power of the material of a Prism - Spectrometer
5. Determination of wavelength of a monochromatic light source - Diffraction Grating.
6. Field along the axis of a circular coil – stewart Gee's apparatus.
7. Volume Resonator.
8. Band gap of semiconductor
9. Hall coefficient
10. Thermal conductivity of bad conductor Lee's method
11. Optical Fiber – Determination of numerical aperture

VFSTR UNIVERSITY

II Year - B.Tech
SYLLABUS

I SEM & II SEM

II Year B.Tech. ECE I - Semester	L	T	P	To	C
	3	1	-	4	4

HS215 COMPLEX VARIABLES AND SPECIAL FUNCTIONS

Course Description &Objectives:

The aim of this course is to introduce complex functions and their applications. Students learn about analytical functions, complex integration, classification of singularities etc. They would also learn conformal mappings. Some special functions and their applications will also be introduced.

Course Outcomes:

Upon successful completion of this course, students should be able to:

CO1: Understand the concepts of complex functions, analyticity and apply the same to evaluate flow parameters and velocity potential.

CO2: Understand the concepts of complex integration and series of complex terms and their convergence.

CO3; Identify singular points, find residues and use them in evaluation of real integrals.

CO4: Understand the transformation of complex functions and also learn special functions and their application.

UNIT I - Analytic Functions :

Complex numbers, properties, (Brief discussion), Functions of complex variables, Limit and Continuity, Differentiability, Analytic functions, Cauchy – Riemann equations (without proof), Cauchy – Riemann equations in polar form (without proof), Orthogonal Curve, Harmonic functions, Conjugate harmonic functions, Constructions of conjugate harmonic functions, Milne Thomson method, Applications (Flow problems, Velocity potential etc.).

UNIT II - Complex Integration :

Line integral, properties of counter integrals, Cauchy's Integral theorem, Cauchy Integral formula and its generalization, Applications. Convergence of series of complex terms, power series, region and radius of convergence, Taylor series, Maclaurin series and Laurent series.

UNIT III - Poles and Residues :

Singularity, Classification of Singularities, Pole at infinity. Zeros of analytic function, Residue of a pole, Residue at infinity, Residue theorem, Method of finding residues, Residue integrals, Evaluation of real definite integrals by contour integration. Integration a round unit circle, of the type $\int_{\theta}^{2\pi} f(\cos\theta, \sin\theta) d\theta$, of type $\int_{\theta}^{2\pi} \frac{p(x)}{q(x)} dx (p(x), q(x))$ polynomials, integration on using rectangular contours, integration by indentation (functions having pole on-X axis).

UNIT IV - Conformal Functions :

Definition, conformal mapping by elementary functions, mapping $w=z^2$, transformations $w=e^z$, w=sin z, w=cos z, Joukvoski's transformation, Bilinear transformation.

UNIT V - Special Functions

Gamma function, Beta function, Properties, Relation between Beta and Gamma functions, Application: Evaluation of integrals using Beta and Gamma functions.

Introduction series solutions of differential equations with variable coefficients, Bessel function and its properties.

TEXT BOOKS :

1. H.K.Das and Er.Rajnish Verma, Higher Engineering Mathematics, S.Chand & Co., New Delhi, 2011.
2. B.S.Grewal, "Higher Engineering Mathematics", 40th edition, Khanna Publishers, 2009.

REFERENCE BOOKS :

1. B.V.Ramana, "Higher Engineering Mathematics", 3rd Edition, Tata Mc Graw Hill Publishing Co., 2008.
2. R.K.Jain, SBK Iyengar, "Advanced Engineering Mathematics", 2nd Edition, Narosa Publishing House.

II Year B.Tech. ECE I - Semester	L	T	P	To	C
	3	1	-	4	4

EC217 NETWORK THEORY

Course Description &Objectives:

The course covers the concept of circuit elements, lumped circuits, circuit laws and to analyse simple DC circuits with the help of circuit reduction theorems like Thevenin and Norton equivalents theorems and also to study the transient response of series and parallel A.C. circuits and also to learn the concepts of concepts of Two-port Network theory.

Course Outcomes:

Upon successful completion of this course, students should be able to:

CO1: Understand and apply Kirchhoff's voltage & current laws and theorems to linear circuits.

CO2: Analyze the transient response of networks for different inputs.

CO3: Understand and analyze the steady state response of RLC circuits.

CO4: Analyze the two port network parameters.

UNIT I- Introduction of Circuit Elements :

Ideal, Practical and dependent sources and their V-I characteristics,Source transformation, Voltage and Current division; V-I characteristics of Passive elements and their series / parallel combination; Energy stored in Inductors and Capacitors, Kirchhoff's Voltage law and Kirchhoff's Current law; Mesh and Nodal analysis,Star and delta conversions.

UNIT II-Sinusoidal Steady State Analysis & Resonance :

Instantaneous, Peak, Average and RMS values ofperiodic waveforms; Crest factor, Form factor; j notation and concept of pharos. Response of R, L, C series and parallel combination circuits to sinusoidal excitation, calculation of active and reactive powers.Resonance: Series and parallel resonance circuits, concept of band width and Q factor.

UNIT III - Network Transient Analysis :

Transient response of R-L, R-C, R-L-C circuits (Series and parallel combinations) for D.C and sinusoidal excitations – initial conditions – time domain and Laplace transform methods of solutions.

UNIT IV - Network Theorems :

Superposition theorem, Thevenin's and Norton's theorems, Reciprocity,Compensation, Maximum power transfer theorems, Millman's theorem, Application of theorems to DC and AC circuits.

UNIT - V Two port Network Parameters & Graph Theory: Definitions :

Introduction to Two port networks, Open circuit impedance, Short circuit admittance (Y),Transmission, Inverse transmission, Hybrid and inverse hybrid parameters, Relation between parameter sets, Interconnection of two port networks. – Graph – Tree, Basic Tie-set and Basic cut set matrices for planar networks –Loop and Nodal methods of analysis of Networks with independent and dependent voltage and current sources - Duality & Dual networks.

TEXT BOOKS :

1. William H. Hayt, Jack E. Kemmerly and Steven M. Durbin, "Engineering Circuit Analysis", 6th ed.,Tata McGraw-Hill, 2007.
2. A Sudhakar and Shyammohan S Palli, "Circuits & Networks: Analysis and Synthesis", 3rd ed., Tata McGraw-Hill , 2007.

REFERENCE BOOKS :

1. Syed A. Nasar, "Electric Circuits", Tata McGraw-Hill, Schaum's Series, 1988.
2. Franklin F.Kuo, "Network Analysis and Synthesis", 2nd ed., John Wiley & Sons, 2003
3. MahmoodNahvi and Joseph Edminister, "Electric Circuits",4th ed., Schaum's Outline series, Tata McGraw-Hill, 2004

II Year B.Tech. ECE I - Semester

L	T	P	To	C
4	-	-	4	4

EC219 ELECTRONIC DEVICES AND CIRCUITS

Course Description &Objectives:

This course presents the actual concepts of the electronic devices, junction diodes, bipolar transistors and field-effect transistors based on semiconductor physics models in order to meet a given system specification.The main objective of this course is to study the basic concepts and characteristics of the electronic devices and circuits. As a whole, it outlines some ways of thinking about analog circuits and design of various real circuits such as rectifiers, filters and amplifiers.

Course Outcomes:

Upon *successful completion of this course, students should be able to:*

CO1: Outline the semiconductor devices with the help of characteristics.

CO2: Illustrate the characteristics of Amplifier Circuits employing BJT and FET devices.

CO3: Analyze half wave and full wave rectifiers with and without filters.

CO4: Compare the working of BJTs and FETs under various biasing conditions.

UNIT I - P-N Junction Diode&Special Purpose Diodes :

P-N Junction Diode -Formation of PN junction. Energy Band diagram of PN junction diode, - Volt-Ampere characteristics of Open circuited, Forward and Reverse Biased P N Junction, Diode equation, Temperature dependence on V–I characteristic, Diode Resistances and capacitances. Special Purpose Diodes - Breakdown Mechanisms in Semi Conductor Diodes, Zener diode characteristics, Use of Zener diode as simple voltage regulator, Principle of operation and Characteristics of Tunnel Diode (With help of Energy band diagram) and Varactor Diode, Principle of Operation of SCR,LED and photodiode.

UNIT II - Diode Applications&Clipping and clamping circuits :

Diode Applications-Rectifiers: The P-N junction diode as a rectifier - A Half Wave Rectifier, Full Wave Rectifier and Bridge Rectifier, Harmonic components in a rectifier circuit, Comparison of various filters Inductor Filter, Capacitor Filter, L- section Filter, ð- section Filter in terms of ripple factor. A simple regulated power supply circuit (using zener diode). Clipping and clamping circuits: Elementary diode clippers, clipping at two independent levels, transfer characteristics of clippers, operation of elementary clamping circuits.

UNIT III - Bipolar Junction Transistor (BJT)&Transistor Biasing And Thermal:

StabilizationBipolar Junction Transistor (BJT): Construction, Principle of Operation of PNP and NPN transistors, Characteristics of transistor in common emitter, common Base and Common collector configurations.

Transistor Biasing And Thermal Stabilization - DC & AC load lines, Operating point, types of transistor Biasing, Stabilization against variations in V_{BE}, â and $I_{co,}$ stability factors, Bias Compensation using Diodes and Transistors.

UNIT IV - Junction Field Effect Transistor :

Junction Field Effect Transistor-Construction, Symbol and Principle of Operation of JFET, Pinch-Off Voltage, JFET Characteristics, Biasing of FET, Comparison of BJT and FET, MOSFET characteristics (Enhancement and depletion mode)

UNIT V - Single Stage Amplifiers- BJT amplifiers & FET amplifiers :

Single Stage Amplifiers- BJT amplifiers: Transistor as an amplifier, two port network representation and h parameter model of a transistor, Analysis of CE Small signal low frequency Transistor model- Expressions for voltage gain, current gain, Input impedance and Output impedance using h-parameters. Comparison of Transistor Amplifier configurations in terms of A_i, R_i, A_V, R_o.

FET amplifiers: FET Small Signal Model, Analysis of FET amplifiers (CS, CD and CG configurations) at low frequencies, Expressions for voltage gain, Input impedance and Output impedance. Concept of Gain Band Width Product.

VFSTR UNIVERSITY

TEXT BOOKS:

1. J.Millman and CC Halkias,"Electronic Devices and Circuits", 2nd ed.,Tata McGraw-Hill, 2007.
2. S.Salivahanan, "Electronic Devices and Circuits" 5th ed.,Tata McGraw-Hill, 2010.

REFERENCE BOOKS :

1. R.L.Boylestad and LovisNashelsky , "Electronic Devices and Circuits Theory", 10th ed., Pearson Education, 2010.
2. N.N.Bhargava, "Basic Electronics and Linear Circuits", 1st ed.,Tata McGraw-Hill, 2009.
3. Sedra A.S. and K.C. Smith, "Micro Electronic Circuits", 5th ed.,Oxford University Press,2006.

II Year B.Tech. ECE I - Semester

L	T	P	To	C
3	1	-	4	4

EC221 SIGNALS AND SYSTEMS

Course Description & Objectives:

This course is an introduction to the basic concepts and theory of analog signal processing. In this course signals & systems, the concepts associated with continuous-time signals and systems are focused. The objective of this course is to provide understanding of the fundamental properties of linear systems, linear systems tools, especially transform analysis and convolution, to analyze and predict the behavior of linear systems.

Course Outcomes:

Upon successful completion of this course, students should be able to:

CO1: Explain the basic signals and their representation using Fourier series.

CO2: Apply the concept of transform techniques, convolution and correlation for continuous time signals.

CO3: Evaluate the step, impulse and system response of a LTI System to arbitrary inputs.

CO4: Elaborate the sampling theorem for discretization and reconstruction.

UNIT I - Introduction & Fourier series Representation of Periodic Signals :

Introduction to signals and systems. Basic signals, classification and operations. Vectors vs Signals, Orthogonal functions, Representation of signals using orthogonal functions, Mean square error. Representation of Fourier series, Continuous time periodic signals, properties of Fourier series, Dirichlet's conditions, Trigonometric Fourier series , Exponential Fourier series and Complex Fourier spectrum.

UNIT II - Fourier Transforms & Laplace Transforms :

Deriving Fourier transform from Fourier series, Fourier transform of arbitrary signal, Fourier transform of standard signals, Fourier transform of periodic signals, properties of Fourier transforms, Fourier transforms involving impulse function and Signum function, Introduction to Hilbert Transform.

Review of Laplace transforms, Partial fraction expansion, Inverse Laplace transform, Concept of region of convergence (ROC) for Laplace transforms, constraints on ROC for various classes of signals, Properties of L.T's, relation between L.T and F.T. of a signal. Laplace transform of certain signals using waveform synthesis.

UNIT III - LTI Systems & Analysis :

Classification of Systems, Linear Time Invariant (LTI) System, Impulse Response, Step Response, response of a LTI system to arbitrary inputs, Transfer function of a LTI system. Filter characteristics of linear systems. Distortion less transmission, Signal bandwidth, System bandwidth, Ideal LPF, HPF and BPF characteristics, Causality and Paley-Wiener criterion for physical realization, relationship between bandwidth and rise time.

UNIT IV - Convolution & Correlation of Signals :

Concept of convolution in time domain and frequency domain, Graphical representation of Convolution, Convolution property of Fourier transforms. Cross correlation and auto correlation of functions, properties of correlation function, Energy density spectrum, Parseval's theorem, Power density spectrum, Relation between auto correlation function and power spectral density. Relation between convolution and correlation, Detection of periodic signals in the presence of noise by correlation, Extraction of signal from noise by filtering.

UNIT V - Sampling :

Sampling theorem: Graphical and analytical proof for Band Limited Signals, Impulse sampling, Natural and Flat Top Sampling, Reconstruction of signal from its samples, effect of under sampling- Aliasing, Introduction to Band Pass sampling.

TEXT BOOKS :

1. A.V. Oppenheim, A.S. Willsky and S.H. Nawab, "Signals and Systems", 2nd ed.,Prentice Hall of India, 1997.
2. B.P.Lathi, "Linear Systems and Signals", 2nd ed., Oxford University Press, 2009

REFERENCE BOOKS :

1. B.P. Lathi, "Signals,Systems & Communications", John Wiley, 2005.
2. Simon Haykin and Van Veen,Wiley, "An Introduction to Signals & Systems", 2nd ed., 2002.
3. John Alan Stuller, "An Introduction to Signals & Systems" Thomson, Indian ed., 2007.
4. H PHsu "Signals & Systems", 2nd ed., Tata McGraw-Hill Schaum's Outlines, 1995.

II Year B.Tech. ECE I - Semester

L	T	P	To	C
4	-	-	4	4

CS231 DATA STRUCTURES USING C++

Course Description & Objectives:

In this course, we will explore several fundamental algorithms and data structures in computer science, and learn to implement them in C. Some of the data structures we will encounter include linked lists, stacks, queues, trees, heaps, hash tables, and graphs. We will study and analyze algorithms for searching, traversing trees, hashing, manipulating priority queues, sorting, finding shortest paths in graphs, and much more. The basic idea of this course is to help you understand many of the fundamental data structures of computer science

Course Outcomes:

Upon successful completion of this course, students should be able to:

CO1: Define, understand, differentiate the Object Oriented concepts and C++ Programming concepts.

CO2: Apply object oriented concepts on real time scenarios.

CO3: Understand the organization of several ADTs and the manipulation (searching, insertion, deletion, traversing) of data stored in various data structures.

CO4: Analyze the efficiency of using different data structures and choose the efficient data structure for solving a given problem.

UNIT I - C++ Class Overview :

Concepts of OOP, Class Definition, Objects, Class Members, Access Control, Class Scope, Constructors and destructors, passing objects to functions, return objects, Inline functions, static class members, this pointer, friend functions, dynamic memory allocation and de-allocation (new and delete), exception handling.

UNIT II - Overloading :

Function Over Loading, Operator Overloading, Generic Programming- Function and class templates, Inheritance basics, base and derived classes, inheritance types, base class access control, runtime polymorphism using virtual functions, abstract classes.

UNIT III - Data structures :

The list ADT, Stack ADT, Queue ADT, array representation and operations, linked list representation and operations, doubly linked list representation and its operations and its applications.

UNIT IV - Search trees :

Basic terminology of trees, Binary trees, Binary tree traversal, binary search trees Definition, ADT implementation and Operations , AVL Trees , definition, implementation and its Operations.

Graphs: Basic terminology, representations of graphs, graph search methods DFS, BFS and its applications.

UNIT V - Searching :

linear search ,binary search. Sorting: Bubble sort , insertion sort, quick sort ,radix sort ,merge sort. Hashing: Open addressing-linear probing, quadratic probing, double hashing, rehashing.

TEXT BOOKS :

1. Data structures, Algorithms and Applications in C++, S. Sahni , University Press (India) Pvt. Ltd, 2nd edition, Universities Press Orient Longman Pvt. Ltd.
2. Data structures and Algorithm Analysis in C++, Mark Allen Weiss, Pearson Education. Ltd., Second Edition.

REFERENCE BOOK :

1. Data structures and algorithms in C++, 3rd Edition, Adam Drozdek, Thomson
2. Data structures using C and C++, Langsam, Augenstein and Tanenbaum, PHI.
3. Problem solving with C++, The OOP, Fourth edition, W.Savitch, Pearson education.
4. Data structures and Algorithms in C++, Michael T. Goodrich , R.Tamassia and Mount, Wiley student edition, John Wiley and Sons.
5. C++ How To Program (currently in its 4th edition) by Deitel and Deitel...
6. Data Structures through C++ by E. Balagurusamy.

II Year B.Tech. ECE I - Semester

L	T	P	To	C
-	-	-	1	1

SR002 SEMINAR

Course Outcomes:

Upon successful completion of this course, students should be able to:

CO1: Carry out literature survey in the latest areas of chosen domain.

CO2: Prepare the report with the required contents, in the stipulated format.

CO3: Present the detailed study performed on the chosen topic and answer the queries raised.

II Year B.Tech. ECE I - Semester

L	T	P	To	C
-	-	3	3	2

EC207 ELECTRONIC DEVICES AND CIRCUITS LAB

Course Description & Objectives:

This lab provides a platform to understand practically the concepts learned in Electronic Devices and Circuits subject. With the help of this lab the student will verify the characteristics of various devices like PN diode, zener diode, BJT, FET, SCR & UJT and will be able to observe the frequency response of different amplifiers.

Course Outcomes:

Upon successful completion of this lab course, students should be able to:

CO1: Analyze and verify the V-I characteristics of various semiconductor devices like PN diode, Zener diode, BJT, JFET.

CO2: Apply the concepts of basic electronic devices to design various circuits such as rectifiers and amplifiers.

List of Experiments

1. PN Junction diode characteristics
2. Zener diode characteristics
3. Half wave Rectifier with and without filter
4. Center tapped Full wave Rectifier with and without filter
5. Bridge Rectifier with and without filter
6. Transistor CB characteristics (Input and Output)
7. Transistor CE characteristics (Input and Output)
8. Transistor CC characteristics (Input and Output)
9. FET characteristics
10. SCR characteristics.
11. UJT characteristics
12. CE Amplifier

13. CC Amplifier (Emitter Follower).
14. FET amplifier (Common Source)

Note: Any *twelve* of the above experiments.

TEXT BOOK:

1. Millman**,** " Electronic Devices and Circuits" TMH publications.

II Year B.Tech. ECE I - Semester

L	T	P	To	C
-	-	3	3	2

EC209 SIGNALS & SYSTEMS LAB

Course Description & Objectives:

This lab course provides a collection of hands-on Experimental exercises via simulation using MATLAB to get understanding of frequency and time domain analysis of linear dynamic systems and corresponding signals and sampling of band pass signals.

Course Outcomes:

Upon successful completion of this lab course, students should be able to:

CO1: Representation of various continuous and discrete time signals.

CO2. Analyze and demonstrate the applications of signals and systems.

LIST OF EXPERIMENTS :

1. Introduction to MATLAB
2. Vectors and Matrices generation and operations on it
3. Generation and plotting of Trigonometric and exponential functions
4. Standard Signal Generation (Impulse, Step, Ramp & Sinc)
5. Operations on signals (Folding, Shifting and Scaling)
6. Periodic and Non-periodic signal generation.
7. Analysis of periodic signals
8. Analysis of Non-periodic signals
9. Analysis of transfer function
10. System Analysis by using poles and zeroes
11. Sampling theorem verification
12. System Response
13. Convolution of Continuous signals
14. Correlation of Continuous signals

Note: Any *twelve* of the above experiments.

VFSTR UNIVERSITY

II Year B.Tech. ECE I - Semester

L	T	P	To	C
-	-	3	3	2

HS217 SOFT SKILLS LAB

Course Description & Objectives:

The Soft Skills Laboratory course equips students with required skills such as interpersonal skills, communication skills, leadership skills etc. It aims at training undergraduate students on employability skills to win in the job interviews and building confidence to handle professional tasks.

Course Outcomes:

Upon successful completion of this lab course, students should be able to:

CO1: Ability to introspect on individual strengths and weaknesses, and emerge as a balanced personality with improved self-awareness and self-worth for their future.

CO2: Ability to prepare a resume and gain the confidence to communicate effectively.

CO3: Possess the interpersonal skills to conduct himself/herself effectively in everyday professional and social contexts.

CO4: Ability to adopt professionalism into daily activities.

UNIT I - Personality Development Skills :

a) Role of language in Personality – How language reflects, impacts personality – Using gender-neutral language in MNCs – being culturally sensitive.

Activity – Appraising each other – Worksheets related to the above

b) Career Planning- job vs. career- goal setting- SWOT analysis- planning and prioritization - four quadrant time management system - time management – self-management – stress-management.

Activity: Setting a SMART goal - SWOT analysis of the self – Writing a Statement of Purpose (SOP).

c) Effective Resume-Writing: structure and presentation - planning and defining the career objective - projecting one's strengths and skill-sets – summarizing - formats and styles - covering letter.

Activity: Resume preparation –writing a covering letter.

UNIT II - Language Skills :

b) Functional English - Formal/informal context – purpose - interpersonal dynamics - ideation –content organization - initiating a conversation – responding appropriately - right body language.

Activity - Role play in different situations, - self-introduction - social background (family, home town etc.,) - role model - my future - likes/ dislikes (movies, persons, places, food, music etc.,) - a mini project on functional English.

b) Vocabulary-Building: Etymology of words - word roots - prefixes & suffixes - synonyms & antonyms- collocations - one-word substitutes – analogies - idioms and phrases - contextual guessing of unfamiliar words – task-oriented learning (100 words). Activity: Flash cards (200 words) – vocabulary exercises with hand-outs.

UNIT III - Communication Skills :

a) Group Discussion: Articulation and flow of oral presentation - dynamics of group discussion – intervention – summarizing - voice modulation – content generation – Key Word Approach (KWA) – Social, Political, Economic, Legal and Technical Approach (SPELT) – View Point of Affected Part (VAP) - language relevance - fluency and coherence. Activity: Mock sessions on four types of GD topics.

b) Facing Interviews: Interview process - understanding employer expectations - pre-interview planning - opening strategies - answering strategies – stress-based interviews - tele-interviews, video interviews- frequently asked questions (FAQs). Activity: Writing responses to FAQs - mock interviews.

UNIT IV - Comprehensive Skills :

a) Reading Comprehension: Reading as a skill- techniques for speed reading- skimming- scanning- appreciating stylistics - impediments for speed reading - eye fixation - sub-vocalisation - critical reading - reading based on purpose - reading for information - reading for inference - understanding tone.

Activity: Reading comprehension exercises with texts drawn from subject areas. (Hand-outs)

b) Listening Comprehension: Listening as skill - different types of listening - hidden data of communication - active listening - top-down approach - bottom-up approach.

Activity: Following different accents (Indian, British, American) listening comprehension exercises with audio and video excerpts.

UNIT V - Analytical Skills :

a) Data Commentary: Deductive & inductive reasoning - data interpretation - tables & charts - bar charts - pie charts - line graphs - ratios & proportions – percentages - coding and decoding - reasoning by analogy - artificial language etc.,

b) Analytical Thinking: Statement and Conclusion - Data Sufficiency - Statement and Argument - Statement and Assumption - Logical Deduction - Logical Problems. Activity: Exercises with handouts.

REFERENCE BOOKS:

1. Edward Holffman, Ace the Corporate Personality, McGraw Hill,2001
2. Adrian Furnham, Personality and Intelligence at Work, Psychology Press, 2008.
3. John Adair Kegan Page, “Leadership for Innovation” 1st edition, Kogan, 2007.
4. M.Ashraf Rizvi, “Effective Technical Communication”, 1st edition, Tata McGraw Hill, 2005.
5. Krishna Mohan & NP Singh , “Speaking English Effectively” 1st edition, Macmillan, 2008.
6. Soft Skills Material of Infosys Under the Academic Initiative of Campus Connect
7. K.R. Lakshminarayana & T. Murugavel, “Managing Soft Skills”, Scitech Publications. 2009
8. Dr. S.P. Dhanvel, English and Soft Skills, Orient Blackswan, 2011
9. Rajiv K. Mishra, Personality Development-, Rupa & Co. 2004.
10. R.S.Agarwal, Quantitative Aptitude, S. Chand& Co. Latest edition.
11. R.S.Agarwal, Verbal & Non-verbal Reasoning, S. Chand& Co. Latest edition.

II Year B.Tech. ECE II - Semester

L	T	P	To	C
3	1	-	4	4

EC224 PROBABILITY THEORY & STOCHASTIC PROCESSES

Course Description & Objectives:

This course is helpful to understand how to quantify randomly varying parameters that is mostly prevalent in real life situations, that finds applications in noise measurements in analog, digital and wireless communications. The students learn probability theory and random variables, how to deal with multiple random variables, conditional expectation, independence of random variables, analysis of random process and applications to the signal processing in the communication system

Course outcomes:

Upon successful completion of this course, students should be able to:

CO1: Understand the basics of probability, sample space, events and apply them to real life problems.

CO2: Distinguish probability density and distribution functions and calculate various moments for single and multiple random variables.

CO3: Check whether a given random process is ergodic and/or wide sense stationary.

CO4: Analyse the response of linear systems to random inputs.

UNIT I - Probability Theory :

Introduction to probability, Joint Probability, Conditional Probability, Total Probability, Bayes' Theorem, Bernoulli trails and Independent Events.

UNIT II - The Random Variable and operations on Random variables :

Definition of a Random Variable, Conditions for a Function to be a Random Variable, classifications of Random Variables, Density and Distribution functions, Properties of Random variables, Binomial, Poisson, Uniform, Gaussian, Exponential, Rayleigh, Conditional Distribution, Methods of defining Conditioning Event, Conditional Density and Distribution functions, Properties.

Introduction, Expected Value of a Random Variable, Function of a Random Variable, Moments about the Origin, Central Moments, Variance, Chebychev's Inequality, Characteristic Function, Moment Generating Function, Monotonic Transformations for a Continuous and Discrete Random Variables.

UNIT III - Multiple random variables and Operations on multiple random variables :

Vector Random Variables, Joint Distribution Function and its Properties, Marginal Distribution Functions, Conditional Distribution and Density, Statistical Independence, Sum of Two Random Variables, Central Limit Theorem.

Expected Value of a Function of Random Variables: Joint Moments about the Origin, Joint Central Moments, Joint Characteristic Functions, and Jointly Gaussian Random Variables: Two Random Variables case, N Random Variable case, Properties, Transformations of Multiple Random Variables, Linear Transformations of Gaussian Random Variables.

UNIT IV - Random processes :

Temporal Characteristics: The Random Process Concept, Classification of Processes, Distribution and Density Functions, concept of Stationary and statistical Independence .Wide Sense Stationary, Time Averages and Ergodicity, Autocorrelation Function and Its Properties, Cross Correlation Function and Its Properties, Gaussian Random Processes, Poisson Random Process. Relation between power spectral density and autocorrelation.

UNIT V - Linear Systems with Random Inputs :

Random Signal Response of Linear Systems: System Response – Convolution, Mean and Mean-squared Value of System Response, autocorrelation Function of Response, Cross-Correlation Functions of Input and Output, Spectral Characteristics of System Response: Power Density Spectrum of Response, Cross-Power Density Spectrums of Input and Output. Modeling of Noise Sources: Resistive (Thermal) Noise Source, Arbitrary Noise

Sources, Effective Noise Temperature, Average Noise Figures, Average Noise Figure of cascaded networks.

TEXT BOOKS :

1. Peyton Z. Peebles, "Probability, Random Variables & Random Signal Principles", 4th ed., Tata McGraw-Hill, 2001.
2. Athanasios Papoulis and S. Unnikrishnan Pillai, "Probability, Random Variables and Stochastic Processes", 4th ed.,PHI, 2002.
3. Y.Mallikarjuna Reddy,"Probability Theory and Stochastic Process" 4th ed. Universities press.

REFERENCE BOOKS :

1. R.P. Singh and S.D. Sapre, "Communication Systems Analog & Digital", 2nd ed.,Tata McGrah Hill , 2009.
2. Henry Stark and John W. Woods, "Probability and Random Processes with Application to Signal Processing ", 3rd ed.,Pearson Education, 2009.
3. S.P. Eugene Xavier, "Statistical Theory of Communication ", 1st ed.,New Age Publications,2003.
4. George R. Cooper, Clave D. MC Gillem, "Probability Methods of Signal and System Analysis" 3rd ed.,Oxford, 1999.

II Year B.Tech. ECE II - Semester	L	T	P	To	C
	4	-	-	4	4

EC226 ELECTRONIC CIRCUIT ANALYSIS

Course Description and Objectives:

This course covers important concepts like study of feedback concepts (both positive and negative) analysis. Further, analysis of various amplifiers like single stage, multistage amplifiers and Frequency response are also discussed. In later units, design concepts of large signal (power) amplifiers, Tuned amplifiers and Time base generator circuits are emphasized.

Course Outcomes:

Upon successful completion of this course, students should be able to:

CO1: Analyze the negative feedback amplifier circuits and oscillators.

CO2: Understand the working of tuned and power amplifiers.

CO3: Investigate the frequency response of multi stage and high frequency amplifiers.

CO4: Understand the time base generators.

UNIT – I Feedback amplifiers & oscillators :

Concept and types of feedback, effects of negative feedback, Different topologies with their parameter analysis.

Barkhausen's crieterion for oscillations, frequency of oscillations for Hartley, Colpitts, RC phase shift,Wein bridge and Crystal oscillators.

UNIT – II Multi stage amplifiers :

Methods of Inter Stage Coupling, n – Stage Cascaded Amplifier, Miller's Theorem, Frequency Effects, Amplifier Analysis, High Input Impedance, Transistor Circuits. Cascode – CE-CC Amplifiers, Two Stage RC Coupled JFET amplifier (CS).

UNIT – III Frequency response of an amplifier :

Transistor at High Frequencies, Hybrid-Pi Common Emitter Transistor Model, Determination of Hybrid- Pi Conductances and capacitances in terms of low frequency h-parameters, Frequency response of BJT Amplifiers and FET Amplifiers.

UNIT – IV Power amplifiers & tuned amplifiers :

Classifcation of Power Amplifiers, Operation and Efficiency of Class A,Class B, Class C and Class D Amplifiers,

Concept and types of Tuned Amplifiers, Single Tuned Capacitive Coupled Amplifier, Double Tuned Amplifier, Application of Tuned Amplifiers. Stagger Tuning, Stability Considerations.

UNITV - Time base generators :

General features of a time base signal, methods of generating time base waveform, Miller and Bootstrap time base generators – basic principles, Transistor miller time base generator, Transistor Bootstrap time base generator, Current time base generators.

TEXT BOOKS:

1. J. Millman and C.C. Halkias, “Integrated Electronics”, 1st ed., Tata McGraw-Hill , 2009.
2. A. Anand Kumar, “Pulse and Digital Circuits”, 2nd ed., PHI, 2009.

REFERENCE BOOKS:

1. Robert L. Boylestad and Louis Nashelsky, “Electronic Devices and Circuits Theory” – 9th ed.,Pearson/Prentice Hall, 2006.
2. Sedra A.S. and K.C. Smith, “Micro Electronic Circuits”, 5th ed., Oxford University Press, 2006.
3. M.H. Rashid, “Micro Electronic Circuits: Analysis and Design”, 1st ed.,Thomson PWS Publ., 1999.
4. Donald A. Neaman, “Electronic Circuit Analysis and Design”, 3rd ed.,Tata McGraw-Hill, 2009.

II Year B.Tech. ECE II - Semester	L	T	P	To	C
	3	1	-	4	4

EC228 DIGITAL ELECTRONICS

Course Description &Objectives:

To introduce the concepts and techniques associated with the number systems and codes and minimize the logical expressions using Boolean postulates. To design various combinational and sequential circuits and provide with anSufficient Number of applications for the techniques and mathematics used in this course.

Course Outcomes:

Upon successful completion of this course, students should be able to:

CO1: Apply the Boolean algebra knowledge of mathematics to analyze combinational and sequential digital electronic circuits using K-map and QM technique.

CO2: Classify the different combinational circuits for the given specifications/ constraints.

CO3: Analyse the sequential circuits for the given specifications/constraints.

CO4: Compare the characteristics of logic families for implementing combinational & sequential circuits.

UNIT I - Number Systems and Boolean Algebra :

Review of number systems, Conversions, Arithmetic operations, Binary codes: parity code, hamming code, Fundamental concepts of Boolean algebra, Basic theorems and properties, canonical and standard forms, logic gates , Algebraic simplification and realization with basic gates and universal gates.

UNIT II - Minimization of Switching Functions :

Minimization of Switching Functions, Map method, prime implicants, don’t care combinations, minimal SOP and POS forms, Tabular method, prime implicant chart.

UNIT III-Combinational Logic Design :

Design using conventional Logic gates, Encoder, Decoder, Multiplexer, Demultiplexer, Parity bit generator, code converters, (Designing with gates along with mention of IC numbers), Basic PLDs : PAL, PLA, ROM, PROM

UNIT IV-Sequential Logic Design :

Classification of sequential circuits, Latches, Flip-Flops: SR, JK, T, D; triggering and Excitation tables, Design of Sequential circuits: Shift Registers, counters, FSM, Sequence Detectors.

UNIT V-Logic Families :

Introduction to logic families, CMOS logic, Bipolar logic, Transistor logic, TTL families, CMOS/TTL interfacing, low voltage CMOS logic and interfacing, Emitter coupled logic, Comparison of logic families

TEXT BOOKS:

1 Morris Mano, “Digital Logic & Computer Design”, 1st ed., Pearson, 2005.

2 John F walkerly, Digital Design Principles and Practices, 3rd ed., PHI/ Pearson Education, 2005.

REFERENCES:

1. John M. Yarbrough, “Digital Logic Applications and Design”,1sted.,Thomson Publications, 2006.
2. Fletcher, “An Engineering Approach To Digital Design” , 1st ed.,Prentice Hall of India. 2009.
3. R.P.Jain, Modern Digital Electronics, 3 ed., Tata McGraw–Hill publishing company limited, New Delhi, 2003.
4. D. Roy Chowdhury, “Linear Integrated Circuits”, 2nd ed., New Age International(p)Ltd, , 2003.

II Year B.Tech. ECE II - Semester

L	T	P	To	C
4	-	-	4	4

EC230 ANALOG COMMUNICATIONS

Course Description & Objectives:

The course considers analog communications. In this course we will introduce some of the basic mathematical concepts that will allow us to think in the two “domains” of communications, the time domain and the frequency domain. We will cover the basic types of analog modulation (AM, FM, and phase modulation) from both a mathematical description and from a block-diagram system approach.

Course Outcomes:

Upon successful completion of this course, students should be able to:

CO1: Outline different amplitude modulation techniques.

CO2: Analyze performance of different types of Angle Modulation techniques for a given set of parameters.

CO3: Explain the transmitter and receiver types required for given applications.

CO4: Examine the calculation of SNR in different modulation techniques.

UNIT I - Introduction to Communication System :

Introduction to communication system, Need for modulation, Frequency Division Multiplexing, Amplitude Modulation: Definition, Time domain and frequency domain description, single tone modulation, power relations in AM waves, Generation of AM waves: square law Modulator, switching modulator, Detection of AM Waves: Square law detector, Envelope detector.

UNIT II – DSB-SC, SSB-SC, VSB-SC Modulations :

DSB SC Modulation: Time domain and Frequency domain description, Generation of DSBSC Waves: Balanced Modulators, Ring Modulator, Detection of DSBSC Waves: Coherent detection, COSTAS Loop.

SSB Modulation: Time domain description, Frequency domain description, Generation of SSB Waves: Frequency discrimination method, Phase discrimination method, Demodulation of SSB Waves,
VSB Modulation: Frequency description, Time domain description, Generation of VSB Modulated wave, Envelope detection of a VSB Wave plus Carrier, Comparison of AM Techniques, Applications of different AM Systems.

UNIT III - Angle Modulation Systems :

Angle Modulation, Phase and Frequency Modulation and their Relationships, Phase and Frequency Deviation, Spectrum envelope of FM Signal, Narrow Band FM and Wide Band FM, Transmission Bandwidth, Generations of FM Waves: Indirect and direct methods, Detection of FM Waves: Balanced Frequency discriminator, Foster seely discriminator, PLL demodulator.

UNIT IV - Radio Transmitters And Receivers :

Radio Transmitters: Classification of Radio Transmitters, AM Transmitters and FM Transmitters: Variable reactance type and phase modulated type,
Radio receivers: Radio receiver Types: TRF Receiver, super heterodyne receivers, FM Receivers. Comparison of AM & FM Receivers.

UNIT V - NOISE :

Noise in Analog communication System, Noise in DSB& SSB System Noise in AM System, Noise in Angle Modulation System, Threshold effect in Angle Modulation System, Pre-emphasis & de-emphasis.

TEXTBOOKS:

1. Principles of Communication Systems - Simon Haykin, John Wiley, 2nd Ed,
2. Radio Engineering – G.K.Mithal, Khanna Publishers, 1985.

REFERENCE BOOKS:

1. Principles of Communication Systems – H Taub & D. Schilling, Gautam Sahe, TMH, 2007 3rd Edition.
2. Fundamentals of Communication Systems - John G. Proakis, Masond, Salehi PEA, 2006.
3. Communication Systems Second Edition – R.P. Singh, SP Sapre, TMH, 2007.
4. Communication Systems – B.P. Lathi, BS Publication, 2006.
5. Electronics & Communication System – George Kennedy and Bernard Davis, TMH 2004.

II Year B.Tech. ECE II - Semester

L	T	P	To	C
3	1	-	4	4

EC232 ELECTRO MAGNETIC FIELD THEORY

Course description & objectives:

To lay the foundations of electromagnetism and its practice in modern communications such as wireless, guided wave principles. To provide the basic skills required to understand, develop, and design various engineering applications involving electromagnetic fields.

Course outcomes:

Upon successful completion of this course, students should be able to:

CO1: Apply vector calculus to different electrostatic field scenarios.

CO2: Familiarize the Magneto static fields in different engineering situations.

CO3: Analyze Maxwell's equations in different forms (differential and integral) and apply them to diverse engineering problems.

CO4: Examine the phenomena of wave propagation in different media and its interfaces and understand its applications in microwave engineering.

UNIT I - ELECTROSTATIC FIELDS-I :

Review of Coordinate Systems and Vector analysis, Coulomb's Law, Electric Field Intensity, Field due to a continuous volume charge distribution, Field of a line charge, Field of a sheet charge, Electric Flux Density, Gauss's Law, Applications of Gauss's Law, Divergence, Maxwell's First Equation (Electrostatics), Energy and potential in a moving charge in an Electric Field, The Line Integral, Potential Difference and Potential, Potential Field of a point Charge, Potential Field of a System of Charges, Potential Gradient, The Dipole, Energy Density in the Electric Field.

UNIT II - ELECTROSTATIC FIELDS-II :

Current and Current Density, Continuity of Current, Metallic Conductors, Conductor Properties and Boundary Conditions, Method of Images, Nature of Dielectric Materials, Boundary Conditions for Perfect Dielectric Materials,

Capacitance, Parallel Plate Capacitor, Capacitance of a Two-Wire Line, Poisson's and Laplace's Equations, Uniqueness Theorem.

UNIT III - MAGNETOSTATIC FIELDS :

Biot-Savart Law, Ampere's Circuital Law, Magnetic Flux and Magnetic Flux Density, Scalar and Vector Magnetic Potentials, Force on a Moving Charge, Force on a Differential Current element, Force between Differential Current elements, Force and Torque on a Closed Circuit, Nature of Magnetic Materials, Magnetization and Permeability, Magnetic Boundary Conditions, Potential Energy and Forces on Magnetic Materials, Self Inductance and Mutual Inductance.

UNIT IV - MAXWELL'S EQUATIONS AND WAVE PROPAGATION :

Faraday's Law, Displacement Current, Maxwell's Equations in Point Form, Maxwell's Equations in Integral Form, Retarded Potentials, Wave Propagation in Free Space, Wave Propagation in Dielectrics, Poynting Vector and Power Considerations, Propagation in Good Conductors, Skin Depth, Phase Velocity, Wave Polarization.

UNIT V - WAVE CHARACTERISTICS :

Reflection of Uniform Plane Waves at Normal Incidence, Standing Wave Ratio, Wave Reflection from Multiple Interfaces, Plane Wave Propagation in General Directions, Plane Wave Reflection at Oblique Incidence Angles, Wave Propagation in Dispersive Media.

TEXT BOOKS:

1. William H. Hayt and John A. Buck, "Engineering Electromagnetics" 6th ed., Tata Mcgraw-Hill, 2001.

REFERENCE BOOKS:

1. Matthew N.O. Sadiku, "Elements of Electromagnetics" – 3rd ed., Oxford Univ. Press, 2001.
2. E.C.Jordan and K.G. Balmain, "Electromagnetic Waves and Radiating System"2nd ed, PHI, 2000.
3. John D Kraus, "Electromagnetics" 4th ed., Mcgraw-Hill.
4. Gottapu sasibhushanarao. " Electromagnetic Field Theory and Transmission Lines" Wiley.

II Year B.Tech. ECE II - Semester

L	T	P	To	C
-	-	-	1	1

SR003 SEMINAR

Course Outcomes:

Upon successful completion of this course, students should be able to:

CO1: Carry out literature survey in the latest areas of chosen domain.

CO2: Prepare the report with the required contents, in the stipulated format.

CO3: Present the detailed study performed on the chosen topic and answer the queries raised.

II Year B.Tech. ECE II - Semester

L	T	P	To	C
-	-	3	3	2

EC234 ELECTRONICS CIRCUIT ANALYSIS LAB

Course Description and Objectives:

This course covers important concepts like study of feedback concepts (both positive and negative) analysis. Further, analysis of various amplifiers like single stage, multistage amplifiers and Frequency response are also discussed. In later units, design concepts of large signal (power) amplifiers, Tuned amplifiers and Time base generator circuits are emphasized.

Course Outcomes:

Upon successful completion of this lab course, students should be able to:

CO1: Analyze and design common electronic circuits such as amplifiers and oscillators.

CO2: Verify the functionality and performance of the electronic circuits through simulations and experimentation.

LIST OF EXPERIMENTS

1. Frequency response of Common Emitter amplifier without and with feedback (Current series feedback amplifier)
2. Two Stage RC Coupled Amplifier
3. Current shunt feedback Amplifier
4. Cascade Amplifier
5. Wien Bridge Oscillator using Transistors
6. RC Phase Shift Oscillator using Transistors
7. Hartley Oscillator
8. Colpitts Oscillator
9. Class A Power Amplifier (Transformer less)
10. Class B Complementary Symmetry Amplifier
11. High Frequency Common base (BJT) / Common gate(JFET) Amplifier.
12. Class A Power Amplifier (Transformer less)

13. Class B Complementary Symmetry Power Amplifier
14. Single Tuned Voltage Amplifier
15. Current Sweep generator
16. Voltage Sweep generator

Note: Any *twelve* of the above experiments.

II Year B.Tech. ECE II - Semester	**L**	**T**	**P**	**To**	**C**
	-	-	3	3	2

EC236 ANALOG COMMUNICATIONS LAB

Course Description & Objectives:

The course consists analog communications lab in practice, time domain and the frequency domain. We will cover the basic types of analog modulation (AM, FM, and phase modulation…) from both Simulink and equipment based.

Course Outcomes:

Upon successful completion of this lab course, students should be able to:

CO1: Analyze and design different analog modulation techniques.

CO2. Experiment on different types of analog communication systems using simulations and hardware implementations.

LIST OF EXPERIMENTS

1. Amplitude Modulation And Demodulation
2. DSB SC
3. SSB SC
4. Synchronous Detector
5. Frequency Modulation
6. Pre-Emphasis And De-Emphasis
7. Verification Of Sampling Theorem
8. Phase Locked Loop
9. Squelch Circuit
10. Diode Detector Characteristics
11. Design Of Mixer
12. AGC Characteristics/ Radio Receiver Measurements- Sensitivity, Fidelity & Selectivity
13. Frequency Division Multiplexing

SIMULINK BASED

1. AM
2. DSBSC
3. SSBSC
4. FM

Note: Any *twelve* of the above experiments.

II Year B.Tech. ECE II - Semester

L	T	P	To	C
-	-	3	3	2

HS304 PROFESSIONAL COMMUNICATION LAB

Course description and Objectives:

The Professional Communication exposes students to conventions of corporate communication and documentation procedures involved in the day-to-day functioning of the business world. The course is aimed at improving written communication skills of undergraduate students and preparing them to meet professional challenges in the work spheres. Writing and Personality are not two exclusive spheres of influence and this course will work on the relationship between professional writing and a personality that is able to meet the goals of an organization in creative and innovative ways.

Course outcomes:

Upon successful completion of this lab course, students should be able to:

CO1: Ability to communicate effectively both in their academic as well as professional environment.

CO2: Clear grasp on the register of business language.

CO3: Possess the ability to write business reports and proposals clearly and precisely to succeed in their future.

CO4: Potentiality to make effective presentations and participate in formal meetings.

UNIT I-Mechanics of writing

- Elements of Technical Writing : Sentence structure - reducing verbosity - arranging ideas logically – building coherence - paragraph level and document level - topic sentence - cohesive devices – transitionals – paraphrasing – précis-writing.
- Mechanics of Writing: Stylistic elements – the rapporteur- the purpose- the reader (audience) -elementary rules of grammar- choice of diction - elementary principles of composition - matters of form – punctuation - conventions of business communication -language and tone - weak links in business correspondence - ethical concerns in business writing

UNIT II- Business Report Writing

- Parts of the Report: Writing an abstract - features of a good abstract – approach - compare and contrast - cause and effect.

Types of Technical Reports : Drafting a technical proposal - formal and informal proposals - factual reports, feasibility reports, survey reports – parts of a report - title page –declaration – acknowledgements – table of contents - abstract – introduction – conclusion – citations – references - appendices - oral reports and presentations

UNIT III- Business Letter Writing

- Letter-Writing - Formal and informal letters - structure of formal letters - expressions of salutations, introductory and concluding paragraphs - different types of letters - sales letter - complaint letter - adjustment letter - letter to the editor - covering letter - claim letter – letter of condolence.

UNIT IV- Business E- writing

- E-mail – nature and scope - e-mail etiquette – Common Errors in composing e-mails –
- Quotations - Inviting quotations - sending quotations –placing orders
- Office Communication - agenda - notice - circular
- Effective Resume-Writing: Structure and presentation - defining career objective - projecting one's strengths and skill-sets
- Summarizing - formats and styles - covering letter.

UNIT V -Business visual presentations

- Business Proposals: Drafting business proposals - calculating profit and loss-averages - ratios and proportions – partnership - simple interest - compound interest - calculating volumes and areas
- course of action - cause and effect- theme detection - making judgments -logical deductions - analyzing arguments – syllogisms - Venn diagrams - matching definitions -verbal reasoning - numerical reasoning - working out justifications.

Reference Books:

1. Strunk , William, Jr.*The Elements of Style*, Fourth Edition,
2. Rozakis, Laurie, Ph.D, (2003). *English Grammar for the Utterly Confused*, McGraw-Hill
3. Sharma. C. (1978) *Business Correspondence & Report Writing*, Tata McGraw-Hill
4. Kirkman, John. *Good Style: Writing for science & technology*, Routledge Study Guides, second edition.
5. Monippally, Matthukutty. M. 2001. *Business Communication Strategies*. 11th Reprint. Tata McGraw-Hill. New Delhi

VFSTR UNIVERSITY

III Year - B.Tech
SYLLABUS

I SEM & II SEM

III Year B.Tech. ECE I - Semester

L	T	P	To	C
4	-	-	4	4

EC317 LINEAR IC'S AND APPLICATIONS

Course Description & Objectives:

This subject introduces the theoretical & circuit aspects of Opamp, timer and OTAs, which are the backbone for the basics of linear integrated circuits and to understand the various linear and non-linear applications of opamp.

Course Outcomes:

Upon successful completion of this course, students should be able to:

CO1: Understand the characteristics and specifications of operational amplifiers.

CO2: Analyze the applications of the operational amplifiers.

CO3: Design various filters and regulators.

CO4: Understand the operation and applications of phase locked loop and voltage controlled oscillators.

UNIT I - Fundamentals of Linear ICs :

Differential DC amplifier, common mode analysis, differential mode analysis, CMRR, Constant current source in place of RE, design of a differential DC amplifier using bipolar transistors. 741 operational amplifier, ideal and practical characteristics, Inverting and Non-inverting configurations, summing amplifier, difference amplifier.

UNIT II - Application of operational amplifiers :

Opamp as instrumentation amplifier, integrator and lossy integrator, as differentiator and practical differentiator, logarithmic amplifier, astable multivibrator, monostable multivibrator, comparators and Schmitt trigger, RC phase shift and wien bridge oscillators.

UNIT III - Active filters and Regulators :

Application of op-amp as active filter, Butterworth first and second order filters, low pass, high pass, band pass and band reject filters, design of practical filters. 3-terminal regulators, LM723 regulator.

UNIT IV - TIMER & PLL :

Functional diagram of 555 timer, timer as astable and monostable multivibrators, Timer as FSK generator, Voltage Controlled Oscillator (VCO), Phase Lock Loop (PLL), Capture range, Lock range, PLL 565 and applications.

UNIT V - Data converter & Operational Transconductance Amplifier (OTA):

Weighted resistor DAC, R-2R ladder DAC, Inverted R-2R ladder DAC, Parallel comparator ADC, Successive approximation ADC and Dual slope ADC, characteristics of A/D and D/A converters. Basic configuration of an OTA, OTA applications: OTA as Oscillators.

TEXT BOOKS :

1. D. Roy Choudhury, "Linear Integrated Circuits", 4th ed., New Age International(p)Ltd, , 2003.
2. Ramakant A. Gayakwad, "Op-amps and Linear Integrated Circuits", 3rd ed., PHI, 2001

REFERENCE BOOKS :

1. Tahira Parveen, "Operational Transconductance Amplifier and Analog Integrated Circuits " , I K International Publishing House Pvt. Ltd .,2010
2. G.B.Clayton, Operational Amplifiers, Butterworth, 1971.
3. Sergio Franco, "Design with Operational Amplifiers & Analog Integrated Circuits", McGraw Hill,1988.
4. Millman, "Micro Electronics", McGraw Hill, 1988.

III Year B.Tech. ECE I - Semester	L	T	P	To	C
	4	-	-	4	4

EC319 MICROPROCESSOR AND MICROCONTROLLERS

Course Description & Objectives:

This course introduces basic architecture and operation of microprocessor and microcontroller to the student. The course objective is to study the architecture and addressing modes of 8086/8051 and to know the importance of different peripheral devices and their interfacing to 8086.

Course Outcome:

Upon successful completion of this course, students should be able to:

CO1: Explain the architectures of 8086 microprocessors and 8051 micro controllers.

CO2: Outline hardware features and interfacing of memory with 8086.

CO3: Apply the concept of various communication interfaces to 8086.

CO4: Analyse the inbuilt components of 8051.

UNIT I - Introduction to 8086 microprocessor :

Evolution of microprocessors, 8086 microprocessor, architecture, register model, memory segmentation, physical address generation, addressing modes, instruction set, Interrupts of 8086, Interrupt vector table.

UNIT II - Hardware features of 8086 :

Pin diagram of 8086, multiplexed ADD/DATA and ADD/STATUS buses, control bus, minimum and maximum modes, Memory READ/WRITE and I/O READ/WRITE machine cycles, machine cycle with WAIT states. Physical Memory organization & memory interfacing to 8086.

UNIT III - I/O Interfacing Comparing I/O mapped I/O and memory mapped I/O. 8255 PPI :

Architecture, Modes of operation and Interfacing to 8086. A/D and D/A converter interfacing. 8259 PIC: Architecture, Initialization and operation of 8259, Interfacing of 8259 to 8086. Introduction to Serial Data Communication: Types of serial data transfers & serial data transmission modes. 8251 USART: Architecture, Interfacing of 8251 to 8086.

UNIT IV - Introduction to 8051 Microcontroller :

Comparing microprocessors and microcontrollers, 8051 Micro controller Architecture, Signal Description of 8051, memory organization, Addressing modes of 8051, Instruction set, Assembly language program examples in 8051.

UNIT V - 8051 Microcontroller Hardware :

Parallel Ports in 8051, External Memory interfacing with 8051, 8051 Timers, 8051 Serial ports, 8051 Interrupts. Introduction to ARM7TD

TEXT BOOKS :

1. Douglas V.Hall, “Microprocessors & Interfacing”, 2nd ed., TMH, 2003.
2. Kenneth J. Ayala, “8051 Microcontrollers”, Cengage Learning, 2008.

REFERENCE BOOKS :

1. A K Ray and K M Bhurchandi, “Advanced Microprocessors & Peripherals”, 2nd ed., TMH, 2006.
2. Raj Kamal, “Microcontroller architecture, programming, Interfacing and System Design”, Pearson Education, 2005
3. The 8051 Microcontroller and Embedded Systems using Assembly and C – Muhammad Ali Mazidi, Janice Gillispie Mazidi, Rolin D. McKinlay, 2nd Edition, Pearson Education, 2008.
4. Barry B.Brey: Intel Microprocessor Architecture, Programming and Interfacing- 8086/8088, 80186, 80286, 80386 and 80486,PHI,1995.

III Year B.Tech. ECE I - Semester	L	T	P	To	C
	4	-	-	4	4

EC321 DIGITAL COMMUNICATIONS

Course Description & Objectives:

This course gives students deep knowledge in digital communication systems at the theoretical & practical level. This subject introduces the fundamental concepts of digital communication system, theoretical aspects of digital modulation techniques, source coding and Error-control coding.

Course Outcomes:

Upon successful completion of this course, students should be able to:

CO1: Relate the model of digital communication system and its performance.

CO2: Show the performance of digital modulation techniques.

CO3: Explain the concepts of information theory and source coding.

CO4: Apply error control coding techniques for efficient communication.

UNIT I - Introduction to Digital Communications, Sampling & Pulse Analog Modulation :

Introduction to Digital Communications- Elements of digital communication systems, advantages of digital communication systems. Sampling - Process, Types, Sampling Theorem for low frequency and band pass signals. Pulse Analog Modulation-Introduction to Pulse Amplitude Modulation (PAM), Pulse Width Modulation (PWM) and Pulse Position Modulation (PPM), Time Division Multiplexing.

UNIT II - Pulse Digital Modulations :

Pulse Code Modulation - Elements of PCM, Sampling, Quantization Process, Uniform and Non-uniform Quantization (companding), Quantization error, SNR, encoding, Different formats of encoding, T1-system, Differential PCM systems (DPCM). Delta Modulation, draw backs of DM, Adaptive Delta Modulation, comparison of PCM and DM systems.

UNIT III - Digital Modulation Techniques & Optimal Reception of Digital Signal

Digital Modulation Techniques - Introduction, ASK, FSK, PSK, DPSK, QPSK, M-ary ASK, M-ary FSK, M-ary PSK. Optimal Reception of Digital Signal - Base band signal receiver, optimum filter, matched filter.

UNIT IV - Information Theory & Source Coding :

Information Theory - Discrete messages, concept of amount of information and its properties. Average information Entropy and its properties. Information rate, Basics of Channel, Concept of Mutual information and its properties. Source Coding - Introduction, Advantages, Shannon's theorem, Shannon-Fano coding, Huffman coding, efficiency calculations, channel capacity, capacity of a Gaussian channel, bandwidth –S/N trade off.

UNIT V - Error Control Coding :

Linear Block codes- Introduction, Error detection and error correction capabilities of linear block codes, single error correcting hamming codes. Binary cyclic codes- encoding, syndrome calculation, Error detection and Error correction capabilities of cyclic codes, BCH codes. Convolution Codes-Introduction, encoding of convolution codes, Code tree, trellis diagram, decoding using Viterbi algorithm.

TEXT BOOKS :

1. Simon Haykin, Digital communications, JohnWiley, 2005
2. H. Taub and D. Schilling, Principles of Communication Systems, TMH, 2003

REFERENCE BOOKS :

1. John Proakis, "Digital Communications", TMH, 1983.
2. R.P.Singh & Sapre, "Communication Systems Analog & Digital", TMH, 2004.
3. Sam Shanmugam, Digital and Analog Communication Systems JohnWiley, 2005.
4. B.P.Lathi, "Modern Analog and Digital Communication", 3rd ed., Oxford reprint, B.S.Publications.

III Year B.Tech. ECE I - Semester

L	T	P	To	C
4	-	-	4	4

EC323 TRANSMISSION LINES AND WAVE GUIDES

Course Description & Objectives

Review of network filters, attenuator, static electric and magnetic fields and applications, Maxwell's equations, transmission lines, propagation and reflection of plane waves, Introduction to guided waves. To become familiar with propagation of signals through lines & Understand signal propagation at Radio frequencies and analyze the Rectangular and circular waveguide

Course outcomes

Upon successful completion of this course, students should be able to:

CO1: Analyze and design the Network filters.

CO2: Understand and analyze the attenuators.

CO3: Understand and analyze the transmission lines.

CO4: Analyze the waveguides.

UNIT I - Network filters and attenuators :

Network function, driving point and transfer impedances and their properties, Poles and zeros of network function. Filter networks, Classification of filters-constant K filters, m-derived filters, band pass filter and band stop filter. Attenuators - T-type attenuator, Pi-type attenuator, lattice attenuator, Bridged T-attenuator, L-type attenuator.

UNIT II - Transmission lines – I :

Introduction, Lumped & Distributed Circuit elements, Transit Time Effect, Transmission line equations, Types of Transmission Lines, Complex Propagation Constant & Characteristic Impedance of Transmission Line, Travelling Waves, Formation of Standing Waves on a Line, Voltage Reflection Co-efficient and its Relation to Load Impedance, Impedance at any Point on the Line, Loss - less and Low - loss Transmission Lines, Voltage Standing

Wave Ratio, Return Loss & Reflection Co-efficient.

UNIT III - Transmission lines – II :

Power Transfer on Transmission Line, Complex Impedance (Z) & Reflection co-efficient planes, Constant Resistance Circles, Constant Reactance Circles, Smith Chart, Constant VSWR Circles, VSWR on the line, Analysis of Transmission Line in terms of Admittances, Admittance Smith chart, Applications of Transmission Lines — Measurement of Unknown Impedance, Transmission Line as a Circuit Element, Transmission Lines as Resonant Circuits, Impedance Matching, Single-Stub Matching Technique, Double-Stub Matching Technique.

UNIT IV - Wave guides -I :

Introduction to Rectangular Waveguides, Solutions of field Equations in Rectangular Co-ordinates, TE_{mn} & TM_{mn} Modes in Rectangular Waveguides, impossibility of TEM waves in Rectangular wave guides, Waveguide Parameters — Cut-off wavelength, Guide wavelength, Free space Wavelength, Phase velocity, Group velocity, Dominant and Degenerated Modes, Power Transmission and Power losses in Rectangular Waveguides.

UNIT V - Wave guides –II :

Introduction to Circular waveguides, solutions of a field equations in cylindrical coordinates, TE_{mn} & TM_{mn} Modes in Circular Waveguides, Waveguide Parameters — Cut-off wavelength, Guide wavelength, Free space Wavelength, Phase velocity, Group velocity, Dominant and Degenerated Modes, Power Transmission and Power losses in Circular Waveguides.

TEXT BOOKS :

1. Sudhakar & Shyammohan “Circuits and Networks Analysis and synthesis” 4th Edition, McGraw-Hill.
2. Samuel Y. Liao “Microwave Devices and Circuits” 3rd Edition, Pearson Education, Inc.

REFERENCE BOOKS :

1. Umesh Sinha, “Transmission lines and Networks”, Sathya Prakasham Publishers, 1997.
2. M. Kulkarni “Microwave and Radar Engineering” 3rd Edition, Umesh Publications.
3. Frankline F.Kuo, “Network Analysis and Synthesis”, Wiley Eastern ed., 1996.
4. M.E. Van Valkenburg, “Network Analysis”, 3rd edition, PHI, 2008.
5. John. D. Ryder, “Network lines and fields”, 2nd edition, PHI Learning, 2005.
6. R.E. Collin, Foundations for Microwave Engineering, 2nd edition, McGraw-Hill, 1993.

III Year B.Tech. ECE I - Semester

L	T	P	To	C
4	-	-	4	4

CS315 OPERATING SYSTEMS (Elective-I)

Course Description & Objective:

In this course students should understand how the operating system effectively manages system resources.

Course Outcomes:

Upon successful completion of this course, students should be able to:

CO1: Understand the fundamental concepts of operating system such as processes and scheduling.

CO2: Analyse various synchronisation problems in operating systems.

CO3: Understand the deadlock occurrence and avoidance methods in operating system.

CO4: Apply the concepts of paging, segmentation and various file management schemes in OS.

UNIT I - Introduction :

What Operating System do, Operating System structure. Process Concept: Overview, Process scheduling, Operations on process, Inter process communication. Process Scheduling: Scheduling Criteria, Scheduling Algorithms, Multiple-Processor Scheduling, Case Study: Process scheduling in Linux.

UNIT II - Process Synchronization :

The Critical-Section Problem, Peterson's Solution, Synchronization Hardware, Semaphores, Monitors, Classical problems of synchronization, Case Study : Process Synchronization in Linux.

UNIT III - Deadlocks :

Deadlock Characterization, Methods of Handling Deadlocks, Deadlock prevention, Deadlock avoidance, Deadlock Detection and Recovery.

UNIT IV - Memory Management :

Continuous memory allocation, paging, structure of the page table, segmentation, demand paging, page replacement algorithms.

UNIT V - File System :

File Concept, Access Methods, Directory Structure, File System Mounting, File Sharing, Protection, File-System Structure, File System Implementation, Directory Implementation, Allocation Methods, Free Space Management.

Secondary-Storage Structure: Overview of Mass-Storage Structure, Disk Structure, Disk Scheduling, RAID Structure.

TEXT BOOK :

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, "Operating System Principles", 7th edition, John Wiley & Sons Inc, 2006.

REFERENCE BOOKS :

1. William Stallings, "Operating Systems – Operating System: Internals and Design Principles", 6th edition, , Prentice Hall, 2005.
2. Andrew S Tanenbaum ,"Modern Operating Systems", 3rd edition, , Prentice Hall, 2007.

III Year B.Tech. ECE I - Semester

L	T	P	To	C
4	-	-	4	4

CS223 OBJECT ORIENTED PROGRAMMING THROUGH JAVA (Elective-I)

Course description and Objectives:

On Completion of this course, the student will be able to understand fundamentals of object- oriented programming in Java, including defining classes, invoking methods, using class libraries. Have the ability to write a computer program to solve specified problems. Be able to use the Java SDK environment to create, debug and run simple Java programs.

Course Outcomes:

Upon successful completion of this course, students should be able to:

CO1: Apply object oriented concepts on real time scenarios.

CO2: Understand Exception handling and multithreading mechanisms to create efficient software applications.

CO3: Utilize modern tools and AWT framework to create java applications to solve real world problems.

CO4: Design and develop GUI based applications using applets and swings for internet and system based applications.

UNIT I - Introduction, Classes and Objects :

Creation of Java, Importance of Java to Internet, Byte code, Java buzzwords, OOP Principles- Encapsulation, Inheritance and Polymorphism, Data types, Variables, Declaring variables, Dynamic initialization, Scope and life time of variables, Arrays, Operators, Control statements, Type conversion and casting, Compiling and running of simple Java program, Concepts of classes and objects Class fundamentals – Declaring objects, Assigning object reference variables, Introducing methods, Constructors, Usage of static with data and methods, Usage of final with data, Access control, this key word, Garbage

VFSTR UNIVERSITY

collection, Overloading methods and constructors, Call by value, Recursion, Nested classes and Inner classes, Exploring the String class.

UNIT II - Inheritance, Packages and Interfaces :

Basic concepts, Member access rules, Usage of super key word, Forms of inheritance, Method overriding, Abstract classes, Dynamic method dispatch, Using final with inheritance, the Object class. Defining, Creating and Accessing a Package, Understanding CLASSPATH, Importing packages, Differences between classes and interfaces, Defining an interface, Implementing interface, Applying interfaces, Variables in interface and Extending interfaces.

UNIT III - Exception Handling, Multithreading :

Concepts of Exception handling, Types of exceptions, Usage of try, Catch, Throw, Throws and Finally keywords, Built-in exceptions, Creating own exception Sub classes, Concepts of Multithreading, Differences between process and thread, Thread life cycle, Creating multiple threads using Thread class, Runnable interface, Synchronization, Thread priorities, Inter thread communication, Daemon threads, deadlocks, Thread groups.

UNIT IV - Applets & Event Handling & AWT Controls :

Applets: Applet Class, Applet Architecture, Applet Skeleton - Applet Initialization and Termination, Overriding update(), Simple Applet, Display Methods, Requesting Repainting – A simple banner Applet, Using The Status Window, The HTML APPLET Tag, Passing parameters to Applets, Applet Context and show Document. Event Handling & AWT Controls: Event sources, Event classes – ActionEvent, AdjustmentEvent, ComponentEvent, Container Event, Focus Event, InputEvent, ItemEvent, KeyEvent and MouseEvent, Delegation event model, Event Listeners, Handling mouse and Keyboard events, Adapter classes.

UNIT V - AWT & Swing :

AWT: Concepts of components, Container, Panel, Window, Frame, Canvas, Font class, Color class and Graphics. AWT Controls : Buttons, Labels, Text fields, Text area, Check boxes, Check box groups, Lists, Choice, Scrollbars, Menus, Layout Managers - Flow, Border, Grid, Card and Grid bag. Swing: JApplet, JFrame and JComponent, Icons and Labels, Handling threading issues, Text fields, Buttons – The JButton class, Check boxes, Radio buttons, Combo boxes, Tabbed Panes, Scroll Panes, Trees, and Tables.

TEXT BOOKS :

1. Herbert Schildt, “The Complete Reference Java J2SE”, 7th ed., TMH Publishing Company Ltd, New Delhi, 2008.
2. Joe Wiggles worth and Paula McMillan, “Java Programming Advanced Topics”, 3rd ed., TMH, 2009.

REFERENCE BOOKS :

1. Cay Horstmann, “Big Java”, 2nd ed., John Wiley and Sons, 2006.

III Year B.Tech. ECE I - Semester	L	T	P	To	C
	4	-	-	4	4

EC325 DIGITAL IC APPLICATIONS (Elective-I)

Course Description & Objectives:

Familiarization of Digital Logic families and Design of combinational and sequential circuits using digital ICs.To investigate the static and dynamic characteristics of popular MOS and bipolar logic families, with emphasis on CMOS and TTL technologies.

Course Outcomes:

Upon successful completion of this course, students should be able to:

CO1: Analyze the behaviour of CMOS Logic Families.

CO2: Model high level designs with standard ICs.

CO3: Represent the combinational and sequential circuits using digital ICs.

CO4: Understand the different memories, internal structure and timings.

UNIT I-CMOS LOGIC :

Introduction to logic families, CMOS logic, CMOS steady state electrical behavior, CMOS dynamic electrical behavior, CMOS logic families.

UNIT II-BIPOLAR LOGIC AND INTERFACING :

Bipolar logic, Transistor logic, TTL families, CMOS/TTL interfacing, low voltage CMOS logic and interfacing, Emitter coupled logic, Comparison of logic families, Familiarity with standard 74XX and CMOS 40XX series ICs – Specifications..

UNIT III-COMBINATIONAL LOGIC DESIGN :

Decoders, encoders, three state devices, multiplexers and demultiplexers, Code Converters, EX-OR gates and parity circuits,Comparators, adders &subtractors, ALUs, Combinational multipliers.

UNIT IV-SEQUENTIAL LOGIC DESIGN :

Latches and flip -flops, PLDs, counters, shift register, and synchronous design methodology, impediments to synchronous design.

UNIT V-MEMORIES :

ROMs:Internal structure, 2D -decoding commercial types, timing and applications. Static RAM: Internal structure, SRAM timing, standard SRAMS, synchronous SRAMS. Dynamic RAM: Internal structure, timing, synchronous DRAMs. Familiarity with Component Data Sheets – Cypress CY6116, CY7C1006, Specifications.

TEXT BOOKS :

1. Digital Design Principles & Practices John F. Wakerly, PHI/Pearson Education Asia, 3rd Ed., 2005.
2. Digital Fundamentals-Floyd and Jain,Pearson Education,8th Edition,2008.

REFERENCE BOOKS :

1. Modern Digital Electronics-RP Jain – 4/e- TMH,2010.
2. Introduction to Logic Design – Alan B. Marcovitz,TMH, 2nd Edition,2005.
3. Digital Logic and Computer Design By Mano, Pearson Education.
4. Cypress Semiconductors Data Book(Download from website).
5. Digital Integrated Circuits- A Design Perspective By Jan M.Rabaey,AnanthaChandrakasan,BorivojeNikolic,Pearson Education,2005.

III Year B.Tech. ECE I - Semester	L	T	P	To	C
	-	-	-	1	1

SR004 SEMINAR

Course Outcomes:

Upon successful completion of this course, students should be able to:

CO1: Carry out literature survey in the latest areas of chosen domain.

CO2: Prepare the report with the required contents, in the stipulated format.

CO3: Present the detailed study performed on the chosen topic and answer the queries raised.

III Year B.Tech. ECE I - Semester

L	T	P	To	C
0	0	3	3	2

EC327 IC APPLICATIONS LAB

Course Description and Objectives:

The main aim of this lab is to teach the linear and non-linear applications of operational amplifiers (741). Students are made familiar with theory and applications of 555 timers. Students are made to Design combinational logic circuits using digital ICs.

Course Outcomes:

Upon successful completion of this lab course, students should be able to:

CO1: Analyze and design common electronic circuits using linear ICs.

CO2: Experiment on various types of filters and regulators using operational amplifiers.

PART – A : Linear IC Applications :

1. IC 741 OP AMP Applications – Inverting amplifier, non inverting amplifier and voltage follower.
2. IC 741 OP AMP as adder and subtractor.
3. Opamp as Integrator.
4. Opamp as Differentiator.
5. Active Filters – LPF, HPF (first order).
6. Function Generator using 741 OP AMP.
7. IC 741 opamp as D/A Converter.
8. IC 555 Timer as Astable Multivibrator.
9. IC 555 Timer as Monostable Multivibrator.

PART – B: Digital IC Applications

10. Study of Basic Digital IC's. (Verification of truth table for 7408, 7432, 7486, 7404,7402, 7400).
11. Implementation of Boolean Functions, Adder/ Subtractor circuits using gates.
12. Code converters: Gray to Binary and Binary to Gray.
13. Design and Implementation of JK FF, RS FF, D Flip-flops using gates.
14. Design and Implementation of 4:1 multiplexer .

TEXT BOOKS :

1. Ramakant A. Gayakwad, "Op-amps and Linear Integrated Circuits", 3rd ed., PHI, 2001
2. Digital Design Principles & Practices, John F. Wakerly, PHI/Pearson Education Asia, 3rd Ed., 2005.

III Year B.Tech. ECE I - Semester

L	T	P	To	C
0	0	3	3	2

EC329 MICROPROCESSORS & INTERFACING LAB

Course Description &objectives:

This course introduces the assembly language programming of 8086 and also gives a practical training of interfacing the peripheral devices with the microprocessor. The course objective is to introduce the basic concepts of microprocessor and to develop in students the assembly language programming skills and real time applications of Microprocessors.

Course outcomes:

Upon successful completion of this lab course, students should be able to:

CO1: Develop applications based on different processors and controllers.

CO2. Experiment to interface various peripherals to 8051.

I. Microprocessor 8086 :

1. Introduction to Debug/MASM/TASM.
2. Arithmetic operations: Multi-byte Addition, Subtraction, Multiplication, Division.
3. Logical operations: Converting packed BCD to ASCII and ASCII to packed BCD.
4. Finding Arithmetic mean of given numbers.
5. Finding Sum of Squares, Cubes of given numbers.
6. Searching for Minimum, Maximum of given numbers.
7. Sorting given string in Ascending, Descending order.
8. Reading, Displaying of characters.
9. String operations: Moving, Reversing, Comparing, Scanning strings.

VFSTR UNIVERSITY

II. Interfacing :

1. Programmable Peripheral Interface-8255.
2. Interfacing DAC: to generate Square, Triangular, Ramp, and Staircase waves.
3. Interfacing ADC: to convert analog signal to digital.
4. 8279-Keyboard/ Display interface.
5. Interfacing 8259-Programmable Interrupt Controller.
6. Interfacing a Stepper motor.
7. Interfacing Elevator simulator.
8. Traffic control simulator interface.
9. Serial data transfer using USART-8251 interface

TEXT BOOK :

1. A K Ray and K M Bhurchandi, “Advanced Microprocessors & Peripherals”, 2nd ed., TMH, 2006.

III Year B.Tech. ECE I - Semester

L	T	P	To	C
0	0	3	3	2

EC331 DIGITAL COMMUNICATIONS LAB

Course Description & Objectives:

This course gives students deep knowledge in digital communication systems at the practical level. This lab focuses the fundamental concepts on TDM, Pulse modulations, digital modulation techniques, source coding techniques and Error-control coding techniques.

Course Outcomes:

Upon successful completion of this lab course, students should be able to:

CO1: Analyze and design different digital modulation and demodulation systems.

CO2: Experiment on different types of digital communication systems using simulations and hardware for a given application / problem statement.

LIST OF EXPERIMENTS

I. Hard Ware

1. Time Division Multiplexing
2. PAM
3. PPM and PWM
4. Pulse Code Modulation
5. Delta Modulation
6. Amplitude Shift Keying
7. Frequency Shift Keying
8. Phase Shift Keying
9. Differential Phase Shift Keying
10. Quadrature Phase Shift Keying

II. Soft Ware

(i) MATLAB

1. Implementing Convolutional Encoder/Decoder using MATLAB.
2. Implementing Viterbi Algorithm using MATLAB.

(ii) SIMULINK

1. PAM
2. QAM
3. FSK
4. PSK
5. DPSK
6. QPSK

Any twelve experiments

TEXT BOOK :

1. Simon Haykin, Digital communications, JohnWiley, 2005.

III Year B.Tech. ECE II - Semester

L	T	P	To	C
4	-	-	4	4

EE219 LINEAR CONTROL SYSTEMS

Course Description &Objectives:

This course is to explore the modeling of linear dynamic systems via differential equations and transfer functions utilizing input-output representations; analysis of control systems in the time and frequency domains and using transfer function and state-space methods.

Course Outcome:

Upon successful completion of this course, students should be able to:

CO1: Apply mathematical modeling to the physical systems/electrical systems.

CO2: Analyse the response of the open and closed loop systems in time domain.

CO3: Investigate the stability of a given control system by using RH criteria, Root locus, Bode plot and Nyquist plot.

CO4: Understand the lag, lead and lead-lag compensators and PID controllers.

UNIT I - Introduction & Mathematical Models of Physical Systems :

Introduction: Concepts of Control Systems - Open Loop and closed loop control systems and their differences - Different examples of control systems - Clasification of control systems. Mathematical Models of Physical Systems: Differentical equations - transfer functions and block diagram representation of systems considering electrical systems as examples Block diagram algebra -Representation by Signal flow graph - reduction using Mason's gain formula - translational and rotational mechanical systems

UNIT II - Feed-Back Characteristics & Elements of Control Systems :

Feed-Back Characteristics : What is Feedback? Effects of feedback - reduction of parameter variations by use of feedback-Control over system dynamics - by the use of feedback.

Elements of Control Systems : DC Servo motor - AC Servo motor - Synchro transmitter and Receiver.

UNIT III - Time Response Analysis & Concepts of stability :

Time Response Analysis : Standard test signals - Time response of first order systems - Characteristic Equation of Feedback control systems, Transient response of second order systems - Time domain specifications - Steady state response - Steady state errors and error constant

Concepts of stability : The concept of stability, Routh stability criterion

UNIT IV - Root Locus Technique & Frequency Response Analysis :

Root Locus Technique: The root locus concept - construction of root loci Frequency Response Analysis: Introduction, Frequency domain specifications - Bode diagrams - Determination of Frequency domain specifications from the Bode Diagram - Phase margin and Gain margin - Stability Analysis from Bode Plots. Polar Plots, Nyquist Plots and Nyquist stability criterion

UNIT V - Design and Compensation Technique & State Space Analysis of Continuous Systems :

Design and Compensation Technique : Introduction and Preliminary design considerations - Lead, Lag, Lead-lag. PID controller. State Space Analysis of Continuous Systems : Concepts of state, state variables and state model, derivation of state models from block diagrams, Diagonalization - Solving the Time Invariant state Equations - State Transition Matrix.

TEXT BOOKS :

1. I. J. Nagrath and M. Gopal, "Control Systems Engineering", 2nd ed.,New Age International (P) Limited, 2010.
2. Katsuhiko Ogata, "Modern Control Engineering", 3rd ed.,Prentice Hall of India Pvt. Ltd., 1998.

REFERENCE BOOKS :

1. B. C. Kuo, "Automatic Control Systems", 8th ed., John wiley and son's, 2003.
2. John wiley, "Control Systems Engg"., 3rd ed.,NISE, 2000.

III Year B.Tech. ECE II - Semester

L	T	P	To	C
4	-	-	4	4

EC320 VLSI DESIGN

CourseDescription & Objectives:

To introduce students to basic concepts of digital VLSI chip design using the simpler VLSI technology and CMOS devices and manufacturing technology. To Introduce CMOS logic gates and their layout design Combinational (e.g., arithmetic) and sequential circuit.

Course Outcomes:

Upon successful completion of this course, students should be able to:

CO1: Explain different models of HDL.

CO2: Outline the fabrication process of different MOS technologies.

CO3: Analyse the operation and Electrical behaviour of MOS transistors.

CO4: Design VLSI circuits and Layouts of MOS circuits using Lambda based design rules and sub-systems using various logic methods.

UNIT I - Hardware Description Language :

The VHDL Hardware Description Language: Design flow, program structure, types and constants,Functions and procedures, libraries and packages.

The VHDL Design Elements: Structural design elements, data flow design elements, behavioral design elements,

UNIT II - Mos Technology :

Introduction : State of art of different technology, Introduction to IC Technology – MOS, PMOS, NMOS, CMOS &BiCMOS technologies-Oxidation, Lithography, Diffusion, Ion implantation, Metallization, Encapsulation processes, N-MOS, C-MOS fabrication.

UNIT III - Basic Electrical Properties :

MOS Transistor, operation, I_{ds}-V_{ds} relationships, MOS transistor parameters: threshold Voltage, gm, gds, figure of merit (w_o); Pass transistor, NMOS Inverter, Various pull ups, CMOS Inverter , Zpu/Zpd with and without pass transistor, Bi-CMOS Inverters.

UNIT IV - VLSI Circuit Design Processes :

VLSI Design Flow, MOS Layers, Stick Diagrams, Layouts and Design Rules for NMOS, CMOS and BICMOS circuits, CMOS inverters and gates. The delay unit, Inverter delays, Driving capacitive loads, Propagation delays, wiring capacitances, Introduction to scaling.

UNIT V - Subsystem Design :

Adders-Carry ripple adder, carry propagate adder, Multipliers-Array Multiplier, Booth encoding,Latches,Flip Flops; Simulation, Synthesis, Design Capture Tools, Design For Testability, Alternate gate circuits-Pseudo-nMOS, Dynamic CMOS, CMOS Domino Logic and Cascaded Voltage Switch Logic (CVSL),Standard cell, Seaofgates, FPGA.

TEXT BOOKS :

1. Kamran Eshraghian, EshraghianDougles and A. Pucknell, Essentials of VLSI circuits and systems, PHI, 2005 ed.,
2. Weste and Eshraghian, Principles of CMOS VLSI Design , Pearson Education, 1999.

REFERENCE BOOKS :

1. John f walkerly, digital design principles and practices, 3rd ed., phi/pearson education, 2005.
2. J.Bhasker, vhdl primer, 3rd ed., pearsonedn / phi.
3. S.M. SZE, "VLSI Technology" , 2nd ed., TMH, 2003
4. Wayne Wolf, "Modern VLSI Design", 3rd ed., Pearson Education, 1997

III Year B.Tech. ECE II - Semester

L	T	P	To	C
4	-	-	4	4

EC322 ANTENNAS AND WAVE PROPAGATION

Course Description & Objectives:

Students will be introduced to antennas, their principle of operation, analysis and their applications. The course provides introduce the student to wave propagation over ground, through troposphere and ionosphere, propagation effects in radio frequencies.

Course Outcomes:

Upon successful completion of this course, students should be able to:

CO1: Apply the concepts and properties of Electro-Magnetism to obtain parameters of antennas.

CO2: Analyze the different array techniques to improve directivity.

CO3: Determine the antenna characteristics for various applications.

CO4: Examine the characteristics of radiowaves and their propagation in the atmosphere.

UNIT I - Antenna Fundamentals-I :

Radiation Mechanism-Single wire, 2 wire and dipoles. Current Distribution on a thin wire antenna, Antenna Parameters-Radiation Patterns, Patterns in principal planes, Radiation pattern lobes, Beam Area, ,Beam Efficiency, Beam widths, Radiation Intensity, Radiation density, Directivity, Gain and Resolution, Radiation efficiency, Reciprocity, Input impedance.

UNIT II - Antenna Fundamentals-II :

Isotropic Antenna, Directional Antenna, Omni directional patterns, Radiation Resistance of dipole antenna, Antenna Apertures, Aperture Efficiency, Relation between maximum effective aperture and directivity, Effective height ,Field regions, Antenna polarization, PLF, FRIIS transmission equation.

UNIT III - Antenna Arrays :

Analysis of uniformly spaced arrays with uniform and non-uniform excitation amplitudes, Principle of multiplication of patterns, Effect of earth on vertical patterns, Binomial array, Basic principle of Dolph- Tschebyscheff array.

UNIT IV - Characteristics of Typical Antennas ;

Folded Dipole, Loop antenna, Yagi-Uda array, Helical antenna, Log-periodic antenna, Pyramidal and conical Horn antenna, Parabolic reflector antennas - Paraboloid and Parabolic cylinder, Cassegrain system of reflectors, Basic principles of slot antennas and micro strip antennas, Concept and benefits of smart antennas.

UNIT V - Radio Wave Propagation :

Ground wave Propagation, Earth constants, Space wave Propagation, Effect of curvature of an Ideal Earth, Variations of Field strength with height in space-wave Propagation, Atmospheric effects in space wave Propagation, Radio-Horizon, Duct Propagation, Extended-range Propagation resulting from Tropospehreic Scattering, Ionospheric Propagation, Gyro frequency, Refraction and reflection of Sky Waves by the Ionosphere, Critical Frequency, Skip Distance, Maximum Usable Frequency.

TEXT BOOKS :

1. Constantain A Balanis, “Antanna Theory: Analysis and Design”, Harper and Row Publishers, 2002.
2. K.D.Prasad, Satya Prakasan, “Antenna and Wave Propagation”, Tech India Publications, New Delhi, 2001.

REFERENCE BOOKS :

1. Constantain A Balanis “Introduction to Smart antennas” Morgan& Claypool Publishers
2. J.D.Kraus, and Ronald J Marhefka, “Antennas and Wave propagation”, TMH, 2014.
3. G.S.N.Raju, “Antennas and Wave Propagation”, Pearson Publication, Singapore.
4. F.E.Terman, “Electronic and Radio Engineering”, Mc Graw Hill, 1985.

III Year B.Tech. ECE II - Semester

L	T	P	To	C
4	-	-	4	4

EC324 COMPUTER ARCHITECTURE & ORGANIZATION

Course Description & Objectives:

The course covers the basic principles of computer organization, operation and performance. It also deals with peripheral devices, and memory management. The course discusses the role of pipelining and multiple functional units in processor design..

Course Outcomes:

Upon successful completion of this course, students should be able to:

CO1: *Understand the basic components and functions of a digital computer.*

CO2: *Apply the concepts of arithmetical, logical and control units for CPU.*

CO3: *Apply the concepts of interfacing of I/O devices and memory with CPU.*

CO4: *Understand the concepts like parallel processing, pipelining and multiprocessors.*

UNIT I - Overview & The Computer System :

Introduction**: -**Organization and architecture. Computer Evaluation**: -** Brief history of computers. A Top-Level View of Computer Function and Interconnection**: –** Computer components, Computer function, Inter connection structure, Bus Inter connection, PCI.

UNIT II - The Central Processing Unit :

Computer Arithmetic**: -** Arithmetic and logic unit, Integer representation, Integer arithmetic, floating point representation & arithmetic. Instruction sets**: -** Machine instruction characteristics, types of operands, types of operations, addressing modes and instruction formats. CPU Structure and Function**: -** Processor organization, register organization, Stack organization and instruction cycle. Control Unit operation**: -** Micro operations, control of the

Processor, Hardwired implementation. Micro programmed control**: -** Basic concepts

UNIT III - Memory :

Internal memory**: -** computer system memory overview, semiconductor main memory, cache memory. External memory**: -** Magnetic disk, RAID, magnetic tapes.

UNIT IV - Input / Output :

External devices, I/O modules, programmed I/O, Interrupt driven I/O, DMA, I/O channels & Processors.

UNIT V - Pipeline, Vector Processing & Multiprocessors :

Pipeline, Vector Processing**: -** Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline Vector Processing, Array Processors. Multiprocessors**:** - Characteristics of Multiprocessors, Interconnection Structures, Interprocessor Arbitration. InterProcessor Communication and Synchronization, Cache Coherence.

TEXT BOOKS:

1. William Stallings, “Computer Organization and Architecture”, 7th ed., Pearson/ PHI, 2007.
2. M.Moris Mano, “Computer Systems Architecture”, 3rd ed., Pearson/PHI, 1993.

REFERENCE BOOKS:

1. Carl Hamacher , Zvonko Vranesic, Safwat Zaky, “Computer Organization”, 5th ed.

III Year B.Tech. ECE II - Semester

L	T	P	To	C
4	-	-	4	4

EC326 OPTICAL COMMUNICTIONS
(Dept. Elective - II)

Course Description & Objectives:

This course illustrates basic optical laws, definitions and optical link design methods and Expound optical sources, detectors and connectors. It is to expose the students to the basics of signal propagation through optical fibers, fiber impairments, components and devices and system design.

Course Outcomes:

Upon successful completion of the course, students will be able to:

CO1: Understand the basic optical communication system, optic theories and materials.

CO2: Understand and apply the optical laws in fundamental propagation mode.

CO3: Analyse the efficiencies of various optical sources, connectors and detectors.

CO4: Evaluate link power budget and rise time budget.

UNIT I - Overview of optical fiber communication :

The general system, advantages of optical fiber communications. Fiber Materials, Optical fiber wave guides- Introduction, Ray theory transmission, Total Internal Reflection, Acceptance angle, Numerical Aperture, Skew rays. Cylindrical fibers- Modes, V_{number}, Mode coupling, Step Index fibers, Graded Index fibers.

UNIT II - Signal Degradation in Optical Fibers :

Signal distortion in optical fibers- Attenuation, Absorption, Scattering and Bending losses, Core and Cladding losses. Information capacity determination, Group delay, Types of Dispersion - Material dispersion, Wave-

guide dispersion, Polarization mode dispersion, Intermodal dispersion. Overall fiber dispersion in Multi mode and Single mode fibers, Pulse broadening.

UNIT III - Optical Fiber Connectors :

Connector types, Single mode fiber connectors, Connector return loss, Fiber Splicing- Splicing techniques, Splicing single mode fibers. Fiber alignment and joint loss-, single mode fiber joints.

UNIT IV - Optical Sources :

LEDs, Structures, Materials, Quantum efficiency, Power, Modulation, Power bandwidth product. Injection Laser Diodes- Modes, Threshold conditions, External quantum efficiency, Laser diode rate equations.

UNIT V - Optical Detectors & System Design :

Optical detectors- Physical principles of PIN and APD, Comparison of Photo detectors. Fundamental receiver operation, Digital signal transmission, error sources, Receiver configuration, Digital receiver performance, Quantum limit, Analog receivers. Optical system design —Considerations, Component choice, Multiplexing. Point-to- point links, System considerations, Link power budget. Rise time budget.

TEXT BOOKS :

1. Gerd Keiser, " Optical Fiber Communications", 3rd ed., Mc Graw-Hill International , 2000.
2. John M. Senior, "Optical Fiber Communications" ,2nd ed., PHI, 2002.

REFERENCE BOOKS :

1. S.C.Gupta, "Text Book on Optical FiberCommunication and its Applications", PHI, 2005.
2. Govind P. Agarwal, "Fiber Optic Communication Systems", 3rd ed,, John Wiley, 2004.
3. Joseph C. Palais, "Fiber Optic Communications", 4th ed., Pearson Education, 2004.

III Year B.Tech. ECE II - Semester

L	T	P	To	C
4	-	-	4	4

EC328 EMBEDDED SYSTEMS (Dept.Elective-II)

Course Description &objectives:

About 99 percent of all computers today are embedded – they are found in cell phones, game consoles, digital cameras, cars, airplanes, medical equipment, home appliances, robots, etcetera. The market for embedded systems is enormous, and the industry's demand for high-skilled experts in these areas is constantly increasing. The course objective is to develop an understanding of the technologies behind the embedded computing systems such as technology capabilities and limitations of the hardware, software components and design methodologies

Course Outcomes:

Upon successful completion of this course, students should be able to:

CO1: Understand the fundamentals of embedded computing system.

CO2: Understand and analyze the fundamental architectural features of 8051 and its on-chip peripherals.

CO3: Apply the concepts of various components in real time operating system.

CO4: Understand the advance processors and protocols to design a given system.

UNIT I - Embedded Computing :

Introduction, Complex Systems and Microprocessor, The Embedded System Design Process, Formalisms for System Design, Design Examples.

UNIT II - The 8051 Architecture :

Introduction, 8051 Micro controller Hardware, Input/Output Ports and Circuits,External Memory, Counter and Timers, Serial data Input/Output, Interrupts. The Assembly Language Programming Process, Programming Tools and Techniques, Programming the 8051.

UNIT III - Applications :

Interfacing with Keyboards, Displays, D/A and A/D Conversions, Multiple Interrupts, Serial Data Communication.

UNIT IV - Introduction to Real – Time Operating Systems :

Tasks and Task States, Tasks and Data, Semaphores, and Shared Data; Message Queues, Mailboxes and Pipes, Timer Functions, Events, Memory Management, Interrupt Routines in an RTOS Environment, Getting Embedded Software into the Target System; Debugging Techniques: Testing on Host Machine, Using Laboratory Tools, An Example System.

UNIT V - Introduction to advanced architectures :

ARM and SHARC, Processor and memory organization and Instruction level parallelism; Networked embedded systems: Bus protocols, I2C bus and CAN bus; Internet- Enabled Systems, Design Example-Elevator Controller.

TEXT BOOKS:

1. Wayne Wolf, "Computers as Components", Elsevier, 2008.
2. Kenneth J.Ayala, "The 8051 Microcontroller", 3rd ed., Thomson, 2005.

REFERENCE BOOKS :

1. David E. Simon, "An Embedded Software Primer", Pearson Education, 1999.
2. Labrosse, "Embedding system building blocks", CMP publishers, 2000.
3. Raj Kamal, "Embedded Systems", TMH, 2008.
4. Ajay V Deshmukhi, "Micro Controllers", TMH, 2005.
5. Frank Vahid, Tony Givargis, "Embedded System Design", John Wiley, 1999.
6. Raj kamal, "Microcontrollers", Pearson Education, 2005.

III Year B.Tech. ECE II - Semester

L	T	P	To	C
4	-	-	4	4

EC330 ELECTROMAGNETIC INTERFERENCE AND COMPATIBILITY
(Dept.Elective-II)

Course Description &objectives:

The course provides basic information on the different electromagnetic Interference problems occurring in Intersystem and their possible mitigation techniques in Electronic design. The course objective is to understand EMI sources, EMI problems and their solutions at PCB level, and also to understand sub system level design and to measure the emission, immunity level from different systems to couple with the prescribed EMC standards.

Course Outcome:

Upon successful completion of this course, students should be able to:

CO1: Diagnose and solve basic electromagnetic compatibility problems.

CO2: Design electronic systems that function without errors or problems related to electromagnetic compatibility.

CO3: Design the Cable routing & connection and understand the Interconnection Techniques

CO4: Design high speed Printed Circuit board with minimum interference and EMI free system.

UNIT I- EMI/EMC Concepts

Definition of EMI and EMC with examples, Classification of EMI/EMC - CE, RE, CS, RS, Units of Parameters, Sources of EMI, EMI coupling modes - CM and DM, ESD Phenomena and effects, Transient phenomena and suppression.

UNIT II- EMI Measurements

Basic principles of RE, CE, RS and CS measurements, EMI measuring instruments- Antennas, LISN, Feed through capacitor, current probe, EMC analyzer and detection t6echnique open area site, shielded anechoic chamber, TEM cell.

UNIT III - EMC Standards and Regulations

National and Intentional standardizing organizations- FCC, CISPR, ANSI, DOD, IEC, CENEEC, FCC CE and RE standards, CISPR, CE and RE Standards, IEC/EN, CS standards, Frequency assignment - spectrum conversation.

UNIT IV- EMI Control Methods and Fixes

Shielding, Grounding, Bonding, Filtering, EMI gasket, Isolation transformer, opto isolator.

UNIT V- EMC Design and Interconnection Techniques

Cable routing and connection, Component selection and mounting, PCB design- Trace routing, Impedance control, decoupling, Zoning and grounding.

TEXT BOOKS :

1. Prasad Kodali.V, "Engineering Electromagnetic Compatibility" S.Chand&Co, New Delhi, 2000
2. Clayton R.Paul, "Introduction to Electromagnetic compatibility", Wiley & Sons, 1992

REFERENCES BOOKS :

1. Keiser, "Principles of Electromagnetic Compatibility", 3rd ed., , Artech House
2. Electromagnetic Interference and Compatibility IMPACT series, IIT – Delhi, Modules 1 – 9.
3. Henry W.Ott.,"Noise Reduction Techniques in Electronic Systems", A Wiley Inter Science Publications, John Wiley and Sons, Newyork, 1988.
4. Bemhard Keiser, "Principles of Electromagnetic Compatibility", 3rd Ed, Artech house, Norwood, 1986.

III Year B.Tech. ECE II - Semester

L	T	P	To	C
-	-	-	1	1

SR005 SEMINAR

Course Outcomes:

Upon successful completion of this course, students should be able to:

CO1: Carry out literature survey in the latest areas of chosen domain.

CO2: Prepare the report with the required contents, in the stipulated format.

CO3: Present the detailed study performed on the chosen topic and answer the queries raised.

III Year B.Tech. ECE II - Semester

L	T	P	To	C
0	0	3	3	2

CS 344 Data Structures Laboratory using C++ Laboratory

Course Description & Objectives:

The main objective of this course is to provide an introduction to basic data structures and manipulating them, by using C++ programming language. The evaluation of the data structure needs of particular problems. The design and implementation of C++ programs by using basic data structures.

Course Outcomes:

Upon successful completion of this lab course, students should be able to:

CO1: Develop several ADTs using C++.

CO2: Apply the appropriate data structure for given problem.

List of programs

1. C++ Program to Implement Stack using arrays.
2. C++ Program to Implement Queue using arrays.
3. C++ Program to Implement Circular Queue using arrays.
4. C++ Program to Implement Priority Queue using arrays.
5. C++ Program to Implement Stack using Linked List.
6. C++ Program to Implement Queue using Linked List.
7. C++ Program to Implement Bubble sort.
8. C++ Program to Implement Merge sort.
9. C++ Program to Implement Quick sort.
10. C++ Program to Implement Linear Search and binary Search.
11. C++ Program to Implement Binary search Tree ADT for.

(a) Insertion (b) Deletion (c) Find_min (d) Find_max

(e) Find operations (f) Height of tree.

TEXT BOOK :

1. Data structures, Algorithms and Applications in C++, S. Sahni , University Press (India) Pvt. Ltd, 2nd edition, Universities Press Orient Longman Pvt. Ltd.

III Year B.Tech. ECE II - Semester

L	T	P	To	C
0	0	3	3	2

EC332 VLSI DESIGN LAB

Course*Description &*Objective:

*Apply the concepts of basic combinational logic circuits, sequential circuit elements, and programmable logic in the laboratory setting.To develop familiarity and confidence with designing, building and testing digital circuits, including the use of CAD tools.*Behavioral, register- transfer, logic, and physical-level structured VLSI design using CAD tools and hardware description languages

Course Outcomes:

Upon successful completion of this lab course, students should be able to:

CO1: Synthesize the digital circuits with hardware description language.

CO2: Design and simulate VLSI circuits using MOS transistors at schematic level.

List of Experiments:

E-CAD Programs:

1. HDL Code to realize all the logic gates.
2. Design of 2-to-4 decoder.
3. Design of 8-to-3 encoder (without and with priority).
4. Design of 8-to-1 multiplexer.
5. Design of 4 bit Binary to Gray code converter.
6. Design of Multiplexer/ Demultiplexer.
7. Design of comparator.
8. Design of Full Adder using 3 modeling styles.
9. Design of Full Subtractor using 3 modeling styles.
10. Design of Flip Flops: SR, D, JK,T.
11. Design of 4-bit binary, BCD Counters.

Circuit design:

1. CMOS Inverter.
2. CMOS NOR/NAND gates.
3. CMOS XOR/XNOR gates.
4. CMOS OR/NOR gates.
5. CMOS Multiplexer.

TEXT BOOK :

1. John f walkerly, digital design principles and practices, 3rd ed., phi/ pearson education, 2005.

VFSTR UNIVERSITY

III Year B.Tech. ECE II - Semester

L	T	P	To	C
-	-	3	3	2

EC334 MINI PROJECT

Course Outcomes:

Upon successful completion of this course, students should be able to:

CO1: Understand the concept and technology of chosen mini project.

CO2: Design and develop the required hardware and software modules of the identified mini project.

CO3: Prepare the report with the required contents, in the stipulated format.

CO4: Present and discuss on the details of project design and implementation.

IV Year B.Tech. ECE I - Semester

L	T	P	To	C
3	1	-	4	4

EC401 MICROWAVE & RADAR ENGINEERING

Objective of the Course :

To Understand the principles and working of Microwave Devices and Microwave communication concepts.

UNIT – I

Introduction: Microwave Frequencies, Microwave Devices, Microwave Systems, Microwave Units of Measure.

Microwave Components: Microwave Hybrid Circuits - Waveguide Tees E-plane or Series tee, H-plane or shunt Tee, Magic Tees(Hybrid Tees), Tee junction parameters, fields and currents in Tee junctions, Applications of magic Tee, Directional couplers, Faraday Rotation In Ferrite Devics- Guyrators,Circulators, Isolators.

UNIT – II

Microwave Linear Beam Tubes (O TYPE): Limitations of Conventional tubes at Microwave frequencies, Klystron: Velocity modulation process, bunching process, output power and beam loading, Multicavity Klystron amplifiers: Beam current density, output current and output power of two cavity Klystron, Reflex Klystron: Velocity modulation, Power output and efficiency.

UNIT – III

Microwave Cross Field Tubes (M TYPE): Magnetron Oscillators: Cylindrical Magnetron, CFA and BWO (Qualitative analysis only).

Microwave Solid-State Devices: Transferred Electron Devices: GUNN-EFFECT Diodes, RWH Theory, Modes of operations.

UNIT – IV

Microwave Measurements: Components of Microwave Bench Set-Up, Detection of Microwaves, Microwave power measurement, Impedance measurements, Attenuation Measurement, VSWR measurement, Frequency measurement.

UNIT – V

INTRODUCTION TO RADAR ENGINEERING: Pulse radar, radar equation, receiver noise, SNR, integration of radar pulses, PRF range ambiguities, Doppler effect, CW radar, FM CW radar, MTI radar, delay line cancellers, frequency response of delay line cancellers, MTI improvement factor, tracking radar systems, different types.

TEXT BOOKS:

1. M. Kulkarni, "Micro Wave and Radar Engineering", Umesh Publications, 1998.
2. Samuel Y Liao, "Microwave Devices and Circuits", 3rd ed., Pearson Education, 2003.
3. Merrill I. Skolnik, "Introduction to Radar Systems", 2nd ed.,McGraw-Hill, 1981.

REFERENCE BOOKS:

1. Herbert J. Reich, J.G. Skalnik, P.F. Ordung and H.L. Krauss,, "Microwave Principles", CBS Publishers and Distributors, New Delhi, 2004.
2. John Wiley, R.E. Collin, "Foundations for Microwave Engineering", 2nd ed., IEEE Press, 2002.
3. M.L. Sisodia and G.S.Raghuvanshi, Wiley Eastern Ltd., "Microwave Circuits and Passive Devices", New Age International Publishers Ltd., 1995.
4. Peter A. Rizzi, "Microwave Engineering Passive Circuits", PHI, 1999.
5. R. Chatterjee, Affiliated East, "Elements of Microwave Engineering", West Press Pvt. Ltd., New Delhi,1988.

IV Year B.Tech. ECE	I - Semester	L	T	P	To	C
		3	1	-	4	4

EC403 TRANSMISSION LINES AND NETWORKS

Objective of the Course:

- *To become familiar with propagation of signals through lines*
- *Understand signal propagation at Radio frequencies*
- *Understand radio propagation in guided systems*
- *To become familiar with resonators*

UNIT - I

Time and Frequency Domain Analysis: Network elements- Network function- driving point and transfer impedances and their properties- Poles and zeros of network function, Time domain response for pole-zero plot. Immittance – loci

of RLC networks – frequency response of RLC networks- frequency response from pole-zero plots. Synthesis of one port networks- synthesis of RL, RC, LC by Foster and Cauer method.

UNIT - II

Network Filters: Classification of filters - characteristic impedance in the pass band and stop band, constant K filters - m-derived filters – BPF and BSF. Insertion loss and reflection factor- Attenuators – Equalizer - T section and Pi section filters – Twin T networks, Bridged T and lattice networks.

UNIT - III

Transmission Line Theory: Transmission line equation – Primary and secondary constants - Infinite line- attenuation and phase constants- skin effect- wavelength- velocity of propagation- group velocity. Waveform distortion- distortion less transmission linetelephone cable- inductance loading of telephone cables. Open and short circuit lines.

UNIT - IV

Transmission Line at Radio Frequencies: Line with any termination- Input impedance, input impedance of a lossless line, Reflection coefficient- Standing wave ratio. Ultra high frequency lines- Characteristics impedance, SWR, Smith chart- applications of smith chart- Quarter wave transformer-Stub matching- Single and double.

UNIT - V

Wave Guides: Rectangular wave guides: Introduction, application of Maxwell's equations to the rectangular waveguide, TE_{mn} & TM_{mn} modes in rectangular wave guides, impossibility of TEM waves in wave guides, attenuation of TE & TM modes. Circular waveguides: Introduction, Bessel's equation and Bessel functions, solution of a field equations, using cylindrical coordinates.

TEXT BOOKS:

1. Umesh Sinha, "Transmission lines and Networks", Sathya Prakasham Publishers, 1997.
2. M.E. Van Valkenburg, "Network Analysis", 3rd ed., , PHI, 2008.
3. John. D. Ryder, "Network lines and fields", 2nd ed., PHI Learning, 2005.
4. U.A Bakshi & A.V. Bakshi,"Transmission lines and waveguides", Technical publications, 2006.

REFERENCE BOOK:

1. Frankline F.Kuo, "Network Analysis and Synthesis", Wiley Eastern ed., 1996.

IV Year B.Tech. ECE	I - Semester	L	T	P	To
		3	1	-	4

EC405 ELECTRONIC MEASUREMENTS & INSTRUMENTATION

Objective of the Course :

To introduceto the students the operation of various electronic Instruments which are used to measure the electronic parameters

UNIT - I

Electro Mechanical instruments and their characteristics: Static characteristics, Dynamic Characteristics. Errors: Gross error, systematic error, Random error, limiting error, Probable error.

Electro Mechancial Instruments: Suspension galvanometer, PMMC mechanism, DC Ammeters, DC Volt meters, Ohmmeter, multi range ohmmeter calibration of DC instruments.

AC meters: Electro dynamometer, Rectifier meter, Thermo instruments Watthourmeter, power measurement using dynamometers, power factor measurements, instrument transformers.

UNIT - II

AC & DC Bridges

DC Bridges: Wheat stone bridge, Kelvin's double bridge.

AC Bridges: Measurement of inductance : Maxwell's bridge, Anderson bridge, Measurement of capacitance: Schearing Bridge, Hays Bridge, Measurement of frequency: Wein's Bridge, Errors and precautions in using bridges. Q-meter.

UNIT - III

Signal Generators and Signal Analysis:

Signal Generator: Sinewave Generator., Sweep Generator, Pulse and Square Wave Generator, Frequency Synthesized Generator, Function Generator.

Wave Analyzers: Harmonic Distortion Analyzer, FT spectrum analyzer, applications.

UNIT - IV

Display Devices and Recorders:

Display Devices: CRO Principles and operation and its applications, dual beam,

al trace oscilloscope, LCD, LED, Plasma displays.

corders: Types of recorders, Stript chart recorders, XY recorders, Magnetic pe recorders.

NIT - V

nsors & Transducers: Classification of Transducers, stain guages, otoelectric transducers, capacitive, inductive transducers, LVDT ermoelectric transducers, load cell, light and proximity sensors, data aquisition systems.

EXT BOOKS :

1. A.D. Helfrick and W.D. Cooper, "Modern Electronic Instrumen-tation and Measurement Techniques" 5th ed., PHI, 2002.
2. R.K. Rajput, "Electronic Measurements and Instrumentation", 2nd ed., S. Chand, 2009.
3. A.K. Sawhany, "Electrical and Electronics Measurements & Instrumentation", Dhanpath Roy & Co, 2005

EFERENCES BOOKS :

1. David A. Bell, "Electronic Instrumentation & Measurements", 2nd ed., PHI, 2003.
2. Robert A.Witte, "Electronic Test Instruments, Analog and Digital Measurements", 2nd ed., Pearson ed., 2004.
3. K. Lal Kishore, "Electronic Measurements & Instrumentations", Pearson edision, 2005.

IV Year B.Tech. ECE	I - Semester	L	T	P	To	C
		3	1	-	4	4

EC407 DIGITAL IMAGE PROCESSING
(Dept. Elective - I)

Objective of the Course :

To Introduce to students the analytical tools and methods, which are currently used in digital image processing as applied to image information for human viewing. Students will learn to apply these tools in the laboratory in image restoration, enhancement, compression and segmentation.

UNIT - I

Digital Image Fundamentals: Elements of visual perception, Image sensing and acquisition, Image sampling and quantization Basic relationship between pixels, Basic geometric transformations, Introduction to Fourier Transform and DFT, Properties of 2D Fourier Transform, FFT Separable Image Transforms, Walsh, Hadamard, Discrete Cosine Transform, Haar Transform, Slant Transform and Hotelling Transform.

UNIT - II

Enhancement: Spatial Domain methods, Basic grey level transformation, Histogram equalization, Image subtraction, Image averaging, Spatial filtering: Smoothing, sharpening filters, Laplacian filters, Frequency domain filters: Smoothing, Sharpening filters, Homomorphic filtering.

UNIT - III

Restoration: Model of Image Degradation/restoration process, Noise models, Inverse filtering, Least mean square filtering, Constrained least square filtering, Blind image restoration, Pseudo inverse, Singular value decomposition.

UNIT - IV

Compression: Fundamentals of image compression, Image compression models, lossless compression, Variable length coding, LZW coding, Bit plane coding, predictive coding, DPCM.Lossy Compression: Transform coding, Wavelet coding, Basics of Image compression standards: JPEG, MPEG, Basics of Vector quantization.

UNIT - V

Segmentation: Detection of discontinuities, Thresholding , Region Based segmentation.

TEXT BOOKS :

1. Rafael C Gonzalez, Richard E Woods , "Digital Image Processing", 2nd ed., Pearson Education, 2003
2. A.K. Jain, "Fundamentals of Digital Image Processing", PHI.

REFERENCE BOOKS :

1. Millman Sonka, Vaclav hlavac, Roger Boyle, "Image Processing Analysis and Machine Vision", Thompson Learning (1999).
2. Chanda Dutta Majumdar, "Digital Image Processing and Applications", Prentice Hall of India, 2000.
3. Rafael C Gonzalez, "Digital Image Processing using MATLAB".

		L	T	P	To	C
IV Year B.Tech. ECE	I - Semester	3	1	-	4	4

EC409 TV ENGINEERING
(Dept. Elective - I)

Objective of the Course :

To introduce to the students the technologies and working mechanism of Monochrome and Color Television, TV Transmitters and Receivers.

UNIT - I

Introduction: TV transmitter and receivers, synchronization.

Television Pictures: Geometric form and aspect ratio, image continuity, interlaced scanning, picture resolution.

Composite video signal: Horizontal and vertical sync details, scanning details

UNIT - II

TV Cameras and Standards: Camera tube types, Vidicon, Silicon Diode Array Vidicon,Plumbicon **PICTURE TUBES:** Monochromatic Picture tube, Electrostatic focusing, Beam deflection, picture tube characteristics and specifications.

TV Signal Transmission and Propagation: Picture signal transmission, positive and negative modulation, VSB transmission, sound signal transmission, TV signal propagation, interference, TV broadcast channels, TV transmission Antennas,yagi-uda antenna.

TV Standards: American 525 line B&W TV system, 625-line monochrome system.

UNIT - III

Monochrome TV Receiver: RF tuner, IF subsystem, video detector, video amplifier, sound section, sync separation and processing, noise in sync pulses, separation of frame and line sync pulses, AFC,AGC, keyed AGC,Noise canceller circuits.

UNIT - IV

Colour Telivision: Perception of Brightness & colours, Additive color mixing, video signals for colours,luminance signal, colour difference signals, compatibility, colour TV camera.

Colour Picture Tubes: Delta gun colour picture tube, Precision in line colour picture tube , Trinitron colour picture tube Encoding of colour difference signals, Frequency interleaving, colour burst signal.

UNIT- V

Encoders and Decoders: PAL Encoder, PAL-D Colour Receiver, NTSC Encoder, NTSC colour receiver, Digital Satellite TV.

TEXT BOOKS :

1. R.R. Gulati, "Modern Television Practice Principles,Technology and Service", New Age International Publication, 2002.
2. R.R. Gulati, "Monochrome and Colour TV", New Age International Publication, 2002.

REFERENCE BOOKS :

1. S.P. Bali, "Colour Television Theory and Practice", TMH, 1994.
2. A.M. Dhake, "Television and Video Engineering", 2nd ed.,
3. B. Grob and C.E. Herndon, "Basic Television and Video Systems", McGraw Hill, 1999.

IV Year B.Tech . ECE	I - Semester	L	T	P	To	C
		3	1	-	4	4

EC411 SATELLITE COMMUNICATIONS
(Dept. Elective - I)

Objective of the Course :

The course aim s to introduce students to aspects of satellite communications

UNIT - I

Introduction: Origin of Satellite Communications, Historical Back-ground, Basic Concepts of Satellite Communications, Frequency allocations for Satellite Services, Applications, Future Trends of Satellite Communications.

Orbital Mechanics and Launchers: Orbital Mechanics, Look Angle determination, Orbital perturbations, Orbit determination, launches and launch vehicles, Orbital effects in communication systems performance.

UNIT - II

Satellite Subsystems: Attitude and orbit control system, telemetry, tracking, Command and monitoring, power systems, communication subsystems, Satellite antenna Equipment reliability and Space qualification.

UNIT - III

Satellite Link Desing: Basic transmission theory, system noise temperature and G/T ratio, Design of down links, up link design, Design of satellite links for specified C/N, System design example.

UNIT - IV

Multiple Access: Frequency division multiple access (FDMA) Intermodulation, Calculation of C/N. Time division Multiple Access (TDMA) Frame structure, Examples. Satellite Switched TDMA Onboard processing, DAMA, Code Division Multiple access (CDMA),Spread spectrum transmission and reception.

UNIT - V

Low Earth Orbit and Geo-Stationary Satellite Systems: Orbit consideration, coverage and frequency considerations, Delay & Throughput considerations, System considerations, Operational NGSO constellation Designs

Satellite Navigation & The Global Positioning System: Radio and Satellite Navigation, GPS Position Location principles, GPS Receivers and codes, Satellite signal acquisition, GPS Navigation Message, GPS signal levels, GPS receiver operation, GPS C/A code accuracy, Differential GPS.

TEXT BOOKS :

1. Timothy Pratt, Charles Bostian and Jeremy Allnutt, WSE, "Satellite Communications", 2nd ed., Wiley Publications, 2003.
2. M. Richharia, "Satellite Communications : Design Principles", 2nd ed., BS Publications, 2003.

REFERENCE BOOKS :

1. Dennis Roddy, "Satellite Communications", 2nd ed., McGraw Hill, 1996.
2. Wilbur L. Pritchard, Robert A Nelson and Henri G.Suyderhoud, "Satellite Communications Engineering", 2nd ed., Pearson Publications, 2003

IV Year B.Tech. ECE I - Semester

L	T	P	To	C
3	1	-	4	4

EC413 CELLULAR & MOBILE COMMUNICATIONS
(Dept. Elective - I)

Objective of the Course :

Students through this course will get an understanding the working of different cellular mobile system.

UNIT - I

Introduction to Cellular Mobile System: Digital Cellular systems. Second Generation (2G) Cellular Networks, 2.5G wireless networks, 3G mobile networks AMPS and ETACS,GSM, CDMA, PACS, USDC, GSC, DECT, CT standards. Performance criteria, trunking efficiency, uniqueness of mobile radio environment, operation of cellular systems, planning of a cellular systems, Hexagonal shaped cells,Analog and

Elements of Cellular Radio System Design : General description of the problem, concept of frequency channels, Adjacent channel intereference Co-channel Interference Reduction Factor, desired C/I from a normal case in a omni directional Antenna system, Cell splitting, consideration of the components of Cellular system.

UNIT - II

Interference: Introduction to Co-Channel Interference, real time Co-Channel interference, design of omni directional and directional Antenna system, Antenna parameters and their effects, diversity receiver, non-co-channel interference-different types.

UNIT – III

Frequency Management and Channel Assignment: Numbering and grouping, setup access and paging channels, channel assignment, fixed channel assignment, non-fixed channel assignment.

Handoff, different types of handoffs and their characteristics, vehicle locating methods, dropped call rates and their evaluation, coverage hole filler, Narrow beam concept.

UNIT - IV

Multiple Access Techniques for Wireless Communication : Introduction, FDMA, TDMA, Spread Spectrum, Multiple access, SDMA, Packet radio, Packet radio protocols, CSMA protocols, Reservation protocols

UNIT - V

Cordless systems, Wireless local loop, IEEe 802.16 fixed broadband wireless access standard, Mobile IP, Wireless application protocol.Infrared LANs, Spread spectrum LANs, Narrowband microwave LANs, IEEE 802 Protocol architecture, IEEE 802.11 Architecture and services, IEEE 802.11 Medium access control, IEEE 802.11 Physical layer.

Bluetooth overview, Radio specification, Baseband specification, Link manager specification, Logical link control and adaptation protocol. Zigbee, Wi-max, WIFI.

TEXT BOOKS :

1. W.C.Y. Lee, "Mobile Cellular Telecommunications", 2nd ed., McGraw Hill, 2006.
2. Theodore. S. Rapport, "Wireless Communications", 2nd ed., Pearson education, 2002.

REFERENCE BOOKS :

1. R Blake, "Wireless Communication Technology", Thompson Asia Pvt. Ltd., 2004.
2. Jon W. Mark and Weihua Zhqung, "Wireless Communication and Networking", PHI, 2005.
3. W C Y Lee, "Cellular & Mobile Communications", McGraw Hill, 2005.

IV Year B.Tech. ECE I - Semester

L	T	P	To	C
3	1	-	4	4

EC415 MICROCONTROLLERS & APPLICTIONS
(Dept. Elective - II)

Objective of the Course :

The object of this course is to give students a strong foundation in micro controllers to use them for different real time applications.

UNIT - I

Introduction to Microcontrollers: Introduction to Micro Controllers, Comparison of Micro Processor and Micro Controllers, Classification of Microcontrollers, Resources of Microcontrollers.

UNIT - II

8051 Microcontrollers: on board RAM, Special Function Register and Addressing modes of 8051, Interrupts of 8051, Interfacing external memory to 8051. Timers/Counters of 8051, Serial Communication with 8051, Serial mode of 8051, Example programs.

UNIT - III

Real Time Control:

Timers: Programmable timers in the MCUs- Free running counter and real time clock.

Interrupts: Interrupt handling structure of an MCU-interrupt latency and interrupt deadline.

UNIT - IV

16-bit Microcontrollers: Hardware-memory map of Intel 80196 family of micro controllers, I/O ports-Programmable timers and high-speed output and input captures-interrupts.

UNIT - V

ARM7TDMI: ARM Architecture, Registers, and Programming model, addressing modes, ARM/Thumb Instruction Set. Assembly Language Programming applications.

TEXT BOOKS :

1. Kenneth. Ayala, "The 8051 Microcontroller", Cengage Learning, 2008
2. .Raj Kamal, "Microcontroller architecture, programming, Interfacing and System Design", Pearson Education, 2005

REFERENCE BOOKS :

1. Mazidi and Mazidi, "The 8051 Microcontroller and Embedded Systems", PHI, 2000.

IV B.Tech. ECE I - Semester

L	T	P	To	C
3	1	-	4	4

EC417 DIGITAL DESIGN THROUGH VERILOG
(Dept. Elective - II)

Objective of the Course :

To introduce to students the basic language constructs of Verilog-HDL so that the student can be ready to design digital circuits required for ICs.

UNIT - I

Introduction to Verilog: Verilog as HDL, Levels of Design Description, Concurrency, Simulation and Synthesis, Functional Verification, System Tasks, Programming Language Interface (PLI), Module, Simulation and Synthesis with Test Benches.

Language Constructs and Conventions: Introduction, Keywords, Identifiers, White Space Characters, Comments, Numbers, Strings, Logic Values, Strengths, Data Types, Scalars and Vectors, Parameters, Memory, Operators, System Tasks, Exercises.

UNIT - II

Gate Level Modeling: Introduction, AND Gate Primitive, Module Structure, Other Gate Primitives, Illustrative Examples, Tri-State Gates, Array of Instances of Primitives, Additional Examples, Design of Flip-flops with Gate Primitives, Delays, Strengths and Contention Resolution, Net Types, Design of Basic Circuits, Exercises.

UNIT - III

Behavioral Modeling: Introduction, Operations and Assignments, Functional Bifurcation, *Initial* Construct, *Always* Construct, Examples, Assignments with Delays, *Wait* construct, Multiple Always Blocks, Designs at Behavioral Level, Blocking and Non-blocking Assignments, The *case* statement, Simulation Flow. *if* and *if-else* constructs, *assign-deassign* construct, *repeat* construct, *for* loop, the *disable* construct, *while* loop, *forever* loop, parallel blocks, *force-release* construct, Event.

UNIT - IV

Modeling at Data Flow Level: Introduction, Continuous Assignment Structures, Delays and Continuous Assignments, Assignment to Vectors, Operators.

Switch Level Modeling: Introduction, Basic Transistor Switches, CMOS chap10

Switch, Bi-directional Gates, Time Delays with Switch Primitives, Instantiations with Strengths and Delays, Strength Contention with Trireg Nets, Exercises.

UNIT - V

chap11

System Tasks, Functions, and Compiler Directives: Introduction, Parameters, Path Delays, Module Parameters, System Tasks and Functions, File-Based Tasks and Functions, Compiler Directives, Hierarchical Access, General Observations, Exercises.

Functions, Tasks, and User-Defined Primitives: Introduction, Function, Tasks, User- Defined Primitives (UDP), FSM Design (Moore and Mealy Machines).

Chap9

TEXT BOOKS :

1. T.R. Padmanabhan and B. Bala Tripura Sundari, Design through Verilog HDL – WSE, 2004 IEEE Press.

REFERENCE BOOKS :

1. Stephen. Brown and Zvonko Vranesic, "Fundamentals of Logic Design with Verilog" – TMH, 2005.
2. Michael D. Ciletti, "Advanced Digital Design with Verilog HDL" – PHI, 2005.

IV Year B.Tech. ECE	I - Semester	L	T	P	To	C
		3	1	-	4	4

EC419 DSP PROCESSORS & ARCHITECTURE
(Dept. Elective - II)

Objective of the Course :

Through this students will learn the hardware architectures used in Digital Signal Processing and the variables affecting it.

UNIT - I

Introduction to Digital Signal Processing: Introduction, A Digital signal-processing system, The sampling process, Discrete time sequences.Review of Discrete Fourier Transform (DFT) and Fast Fourier Transform (FFT), linear time-invariant systems, Digital filters, Decimation and interpolation.

Computational Accuracy in DSP Implementations: Number formats for

signals and coefficients in DSP systems, Dynamic Range and Precision, Sources of error in DSP implementations, A/D Conversion errors, DSP Computational errors, D/A Conversion Errors, Compensating filter.

UNIT - II

Architectures for Programmable DSP Devices: Basic Architectural features, DSP Computational Building Blocks, Bus Architecture and Memory, Data Addressing Capabilities, Address Generation Unit, Programmability and Program Execution, Speed Issues,Features for External interfacing.

UNIT - III

Execution Control and Pipelining: Hardware looping, Interrupts, Stacks, Relative Branch support, Pipelining and Performance, Pipeline Depth,Interlocking, Branching effects, Interrupt effects, Pipeline Programming models.

UNIT - IV

Programmable Digital Signal Processors: Commercial Digital signal-processing Devices, Data Addressing modes of TMS320C54XX DSPs, Memory space , Program Control, instructions and Programming, On-Chip Peripherals, Interrupts ,Pipeline Operation.

UNIT - V

Interfacing Memory and I/O Peripherals to Progammable DSP Devices: Memory space organization, External bus interfacing signals, Memory interface, Parallel I/O interface,Programmed I/O, Interrupts and I/O, Direct memory access (DMA).A Multichannel buffered serial port (McBSP), McBSP Programming, a CODEC interface circuit, CODEC programming, A CODEC-DSP interface example.

TEXT BOOKS :

1. Avtar Singh and S. Srinivasan, "Digital Signal Processing", Thomson Publications, 2004.
2. Lapsley et al. "DSP Processor Fundamentals, Architectures&Features" S. Chand & Co, 2000.

REFERENCE BOOKS :

1. B. Venkata Ramani and M. Bhaskar, "Digital Signal Processors, Architecture, Programming and Applications", TMH, 2004.
2. Jonatham Stein, "Digital Signal Processing", John Wiley, 2005.

IV Year B.Tech. ECE I - Semester

L	T	P	To	C
3	1	-	4	4

EC421 EMBEDDED SYSTEMS
(Dept. Elective - II)

Objective of the Course :

The embedded system concepts will give the basic knowledge of embedded design and system on chip, its interrupt handling and writing the device drivers for the system.

UNIT - I

Embedded Computing: Introduction, Complex Systems and Microprocessor, The Embedded System Design Process, Formalisms for System Design, Design Examples.

UNIT - II

The 8051 Architecture: Introduction, 8051 Micro controller Hardware, Input/Output Ports and Circuits, External Memory, Counter and Timers, Serial data Input/Output, Interrupts. The Assembly Language Programming Process, Programming Tools and Techniques, Programming the 8051.

UNIT - III

Applications: interfacing with Keyboards, Displays, D/A and A/D Conversions, Multiple Interrupts, Serial Data Communication.

UNIT - IV

Introduction to Real – Time Operating Systems: Tasks and Task States, Tasks and Data, Semaphores, and Shared Data; Message Queues, Mailboxes and Pipes, Timer Functions, Events, Memory Management, Interrupt Routines in an RTOS Environment. Software, Getting Embedded Software into the Target System; Debugging Techniques: Testing on Host Machine, Using Laboratory Tools, An Example System.

UNIT - V

Introduction to advanced architectures: ARM and SHARC, Processor and memory organization and Instruction level parallelism; Networked embedded systems: Bus protocols, I2C bus and CAN bus; Internet-Enabled Systems, Design Example-Elevator Controller.

TEXT BOOKS :

1. Wayne Wolf, "Computers as Components", Elsevier, 2008.
2. Kenneth J.Ayala, "The 8051 Microcontroller", 3rd ed., Thomson, 2005.
3. David E. Simon, "An Embedded Software Primer", Pearson Education, 1999.

REFERENCE BOOKS :

1. Labrosse, "Embedding system building blocks", CMP publishers, 2000.
2. Raj Kamal, "Embedded Systems", TMH, 2008.
3. Ajay V Deshmukhi, "Micro Controllers", TMH, 2005.
4. Frank Vahid, Tony Givargis, "Embedded System Design", John Wiley, 1999.
5. Raj kamal, "Microcontrollers", Pearson Education, 2005.

IV Year B.Tech. ECE I - Semester

L	T	P	To	C
-	-	3	3	2

EC423 MICROWAVE & OPTICAL COMMUNICATION LAB

Objective of the Course :

The lab course will give a practical exposure to students to learn the characteristics of Microwave and optical Devices.

1. Microwave:

1. To verify the relationship between free space wavelength, Guide Wavelength and Cut-off wavelength.
2. Measurement of Low and High VSWR using Microwave bench.
3. Radiation pattern of rectangular wave-guide.
4. Radiation pattern of twisted wave-guide.
5. Attenuation measurement.
6. Wave-guide parameters measurement.
7. Scattering parameters of circulator.
8. Scattering parameters of magic Tee.
9. Measurement of coupling factor and directivity of directional coupler.
10. Mode characteristics of reflex klystron.
11. Characteristics of Gunn Oscillator.

2. Optical Communications:

1. Characteristics of laser diode.
2. Study of numerical aperture of optical fiber.
3. Study of losses in optical fiber.
4. Study of characteristics of fiber optic LED and Photo detector.

TEXT BOOKS:

1. M. Kulakarni, "Microwaves and Radar Engineering".
2. Samuel Y. LIAO, "Microwave Devices and Circuits".
3. Keiser, "Optical communication", 2nd ed.,
4. Seniar, "Fiber Optic communication", 2nd ed.,

IV Year B.Tech. ECE	I - Semester	L	T	P	To	C
		-	-	3	3	2

EC425 INSTRUMENTATION LAB

Objective of the Course :

The lab course will give a practical exposure to students to learn the characteristics of Microwave and optical Devices.

Section - A

1. Measurement of displacement using LVDT.
2. Measurement of distance using LDR.
3. Measurement of temperature using R.T.D.
4. Measurement of temperature using Thermocouple.
5. Measurement of pressure using Strain Guage.
6. Measurement of pressure using Piezo-Electric Pick up.
7. Measurement of distance using Capacitive Pick up.
8. Measurement of distance using Inductive Pick up.
9. Measurement of speed of DC Motor using Magnetic Pick up.
10. Measurement of speed of DC Motor using Photo Electric Pick up.

Section - B

1. Temparature(pressure,light intensity) data acquisition system and tranport over ETHERNET
2. Parameter measurment using HART ,CAN, GPIB & PROFIBUSES.

IV Year B.Tech. ECE	I - Semester	L	T	P	To	C
		-	-	2	2	2

EC427 PROJECT - I

B.Tech Project - I

The evaluation details of Project - I are given in section 4.3 in Rules and Regulations.

I Year B.Tech. EEE I - Semester

L	T	P	To	C
4	-	-	4	4

HS111 ENGINEERING MATHEMATICS - I

Course Description & Objectives:

Without mathematics not a single day of an engineer will pass! All the topics of this course are relevant to all branches of engineering. Differential equations are used in various places. Laplace transformations are used, for example, for conversion of domains, from time domain to frequency domain. These are also used to solve ordinary differential equations. When data is given at only a finite points, we use numerical methods for find the approximate values of functions, also to solve differential equations approximately etc. Maxima, minima of a function has got many applications.

Course Outcomes:

- Solve ordinary differential equations.
- Apply Laplace transform to solve ordinary differential equations.
- Apply numerical methods for finding the approximate values of functions
- Understand algebra of matrices
- Solve partial differentiations.

UNIT I - Ordinary Differential Equations & Differential Equations of Second Order:

Differential Equations of First Order: Definiton, Order and degree of a differential equation, Formation of differential equations, Solution of a differential equation, Differential equations of first order and first degree : variables separable, Homogenous equations, Linear equations, Exact differential equations.

Differential Equations of Second Order: Linear differential equations of second order with constant coefficients, Methods for finding the complementary functions and particular integral, General method of finding the particular integral of any function.

UNIT II - Applications of Differential Equations and Laplace Transformations:

Applications of Differential Equations : Newton's law of cooling, Natural law of growth, Orthogonal trajectiories.

Laplace transformations: Definition, Properties, Convolution theorem, Inverse Laplace transformation, Solving differential equations using Laplace Transformation.

UNIT III - Numerical Methods:
Taylor's Method, Picard Method, Euler Method, Modified Euler Method, Runga-Kutta Methods.
Interpolation by Lagrange and Newton methods.

UNIT IV - Matrices:
Rank of a matrix, finding rank of a matrix using Echelon form, Normal form, triangular form, PAQ form, inverse of a matrixEigen values, Eigen vectors, properties, Cayley-Hamilton theorem (without proofs), Diagonalisation of a matrix.
Solving System of equations (Gauss-Siedal method only)

UNIT V - Maxima and Minima & Jacobians:
Maxima and Minima: Review of partial differentiation: Partial derivatives, Partial derivatives of higher order, Homogeneous function, Euler's theorem, Total differential coefficient,
Maxima and Minima of a function of two variables, Conditions for extreme values, Lagrange method of undetermined multipliers.
Jacobians : Definition, Properties, Jacobian of implicit functions, Partial derivaties of Implicit functions using Jacobian.

TEXT BOOKS:
1. *H. K. Dass* and *Er. Rajnish Verma*, Higher Engineering Mathematics, S. Chand & Co., New Delhi, 2011.
2. *B.S. Grewal*, "Higher Engineering Mathematics", 40th edition, Khanna Publishers, 2009.

REFERENCE BOOKS:
1. *B.V. Ramana*, "Higher Engineering Mathematics", 3rd Edition, Tata McGraw-Hill Publishing Co, 2008.
2. *R K Jain, S R K Iyengar*, "Advanced Engineering Mathematics", 2nd Edition, Narosa Publishing House.
3. *Erwin Kreyszig*, "Advanced Engineering Mathematics", 8th Edition, John Wiley & Sons (Asia) Pvt. Ltd. 2001.

I Year B.Tech. EEE I - Semester

L	T	P	To	C
4	-	-	4	4

HS113 ENGINEERING PHYSICS

Course Description & Objectives:

There is a symbiotic relation between physics and engineering. Broadly speaking, engineering is mainly applied physics. Recent technical developments have been the result of joint efforts of physicists and engineers. A proper study of physics is therefore indispensable for an engineering student to excel in his field. The purpose of this course is to present the principles and concepts of physics as relevant to an engineer.

Course Outcomes:

The students will be made to get acquainted to the following learning outcomes:

- Concepts of Physical optics, devices and applications.
- Ultrasonic waves, production, applications in NDT.
- Introduction to Quantum mechanics in relevance to that of modernphysics.
- Exposure to latest inventions like lasers, fibers and applications.
- Insight into nano technology and applications, solar energy to combatenergy crisis.

UNIT I - Physical Optics:

Interference – Types - Interference in thin films (Reflection) – Newton's Rings – Michelson's Interferometer, Fabry-perot interferomenter – Applications.

Diffraction – Fraunhoffer Diffraction at single slit – Diffraction grating

Polarization – Production of plane polarized light – Nicol prism – Optical activity – photo elasticity.

UNIT II - Ultrasonics & NDT:

Ultrasonics: Introduction – production of ultrasonic waves – piezoelectric method – Properties of ultrasonic waves – Types of ultrasonic waves – Determination of Velocity of ultrasonic waves in solids and liquids – Applications.

NDT: Introduction - Types – Theory and practice of Ultrasonic Testing – Ultrasonic Testing Systems – Ultrasonic Testing Methods – X-Ray Radiography.

UNIT III - Quantum Mechanics & Free electron theory of metals:

Quantum Mechanics: Matter waves - Schroedinger's time independent wave equation - Physical significance of the wave function - Particle in one dimensional potential well – tunneling phenomenon.

Free electron theory of metals: Introduction – Classical free electron theory – Electrical conductivity of metal – Fermi - Dirac distribution function and its variation with temperature – Quantum free electron theory.

UNIT IV - Lasers & Fiber Optics:

Lasers: Characteristics of Laser light – Spontaneous and Stimulated emission of radiation – Low power and High power lasers, He-Ne Laser – CO_2 Laser – Nd-Yag laser - Applications of Lasers, Holography and Applications.

Fiber Optics: Principle of optical fiber - materials – Numerical Aperture – Types of fibers – Dispersion and Attenuation in optical fibers – Optical sensors – Optical fiber communication system.

UNIT V - Solar Energy & NanoScience and Technology:

Solar Energy: Solar radiation – Photovoltaic effect – solar cells – Efficiency of solar cell – Solar thermal energy conversion systems.

NanoScience & Technology: Introduction to nano meterials – Basic principles of nanoscience & Technology – Fabrication of nanomaterials – Physical & Chemical properties of nanomaterials – Applications of nanotechnology.

TEXT BOOKS :

1. M.R.Srinivasan, "Physics for Engineers" New Age International, 2002-2003.
2. M.N. Avadhanulu & P.G. Kshirasagar, "Engineering Physics", 1st edition, S. Chand & Company Ltd, 1992.

REFERENCE BOOKS :

1. Halliday, Resnic and Walker, "Fundamentals of Physics", 6th edition, John Willey publishers, 2003.
2. Grawfor F.S., Berkley Physics courses, "Waves and Oscillations", Volume III McGraw Hill, 1992.
3. V. Raghavan, "Materials Science and Engineering", 5th edition, Prentice-Hall India, 2004.
4. S.O.Pillai, "Solid State Physics", 6th edition, New Age International Publications, Revised, 2005.
5. V.Rajendran, "Engineering Physics", 1st edition, TMH Publications, 2010.

I Year B.Tech. EEE I - Semester	L	T	P	To	C
	4	-	-	4	4

ME101 ENGINEERING MECHANICS

Course Description & Objectives:
The course aims to impart the knowledge to understand the forces and their reactions on various static and dynamic conditions.

Course Outcomes:
- Use scalar and vector analytical techniques for analyzing forces for statically determinate structures.
- Solve the engineering problems in case of equilibrium conditions and to calculate the reaction forces of various supports of different structures.
- Determine the centroid, centre of gravity and moment of inertia of various surfaces and solids.
- Solve the problems involving dry friction.
- Apply fundamental concepts of kinematics and kinetics of particles to the analysis of simple, practical problems.

UNIT I - Basic Concepts and Principles of Statics:
Introduction to Engineering Mechanics, Scalar and Vector quantities, Forces, Characteristics of a force, Definitions and examples of various types of force systems, Law of transmissibility, Definition of resultant, Composition and resolution of forces, Moment of a force, Principles of moments of force, Couples, characteristics of a couple, Transformations of a couple, Resultants of Force Systems, Possible resultants of different types of force systems, Resultant of a concurrent coplanar force system, Resultant of a non concurrent coplanar force system.

UNIT II - Equilibrium of Rigid Bodies:
Free body diagrams, Types of supports and their reactions, requirements of stable equilibrium, Equations of equilibrium of a concurrent coplanar force system, Equilibrium of Bodies acted on by two or three forces, Equilibrium of bodies acted on by non-concurrent coplanar force system.

UNIT III - Properties of Surfaces and Solids:
Centroid and Center of Gravity: Centre of gravity of parallel forces in a plane, centroids and center of gravity of composite bodies, Distributed Loads on Beams.

Moments of Inertia: Definition, Parallel axis theorem and perpendicular axis theorem for areas, Polar Moment of inertia, Second moment of area by integration, Radius of gyration of areas, Moments of inertia of composite areas.

UNIT IV - Friction:

Nature of friction, Laws of friction, Coefficient of friction, Angle of friction, Cone of friction, Types of Friction - Sliding Friction, Rolling Friction, Belt Friction, Ladder Friction, Wedge friction.

UNIT V - Kinematics and Kinetics:

Absolute Motion: Introduction, Recapitulation of basic terminology of mechanics, Displacement, Velocity and acceleration their relationship, Rectilinear motion of a particle

Relative Motion: Introduction to kinematics of relative motion, Relative displacement, Relative velocity

Kinetics: Introduction to Kinetics, Force, Mass and Acceleration, Newton's Laws of motion, Equation of motion for a particle, D Alembert's principle, Rectilinear translation of a rigid body, Work done by a force, Work done by a force system, Energy, Potential energy, Kinetic energy, Principle of Work and kinetic energy, Conservation of energy, Linear impulse, Linear momentum, Principle of linear impulse and linear momentum, Conservation of linear momentum.

TEXT BOOKS:

1. J. L. Meriam, L. G. Kraige, "Engineering Mechanics: Dynamics", 7th ed., John wiley & sons, 2012
2. A. K. Tayal, "Engineering Mechanics", Umesh Publications, 2005.

REFERENCE BOOKS:

1. L. Singer - Harper, "Engineering Mechanics", 3rd ed., Fedinand . , Collins, 1975.
2. Timoshenko & Young, "Engineering Mechanics", 4th ed., Tata McGraw Hill, New Delhi, 2007.
3. S. S. Bhavakati & J. G. Rajasekharappa, "Engineering Mechanics", 3nd ed., New Age International Publications, New Delhi, 2008.

I Year B.Tech. EEE I - Semester

L	T	P	To	C
4	-	-	4	4

CS101 PROBLEM SOLVING AND COMPUTER PROGRAMMING

Course Description & Objectives:

Aim of this course is to introduce the techniques of problem solving and concepts of programming language to the students. Because of its popularity and suitability to develop different types of applications, 'C' language has become the de-facto programming language to engineers. A comprehensive introduction of C language is offered through this course to enable the students to write diversified programs.

Course Outcomes:

On Completion of this course student should be able to

- Able to understand the basic terminology used in computer programming.
- Able to write, compile and debug programs in C language.
- Use different data types in a computer program and design programsinvolving decision structures, loops and functions.
- Able to understand the allocation of dynamic memory using pointers.
- Use different data types to create/update basic data files.

UNIT I - Fundamentals of computers:

Basic functional units and discrete components of a computer, computer networks, networking components, Binary representation of integers and real numbers, ASCII, EBCDIC, Unicode, Generations of computer languages.

UNIT II - Problem Solving Steps and Basic of C Language:

Problem understanding, Formulating a mathematical model, Development of an algorithm, Representation of an algorithm, Flow chart and Pseudo code, Coding, Testing and Debugging, Comments, Processor statement, Function header statement, Variable declaration statement and Executable statement, C Character Set, constants, identifiers, operators, punctuations, keywords, Basic data types, modifiers, identifiers, variables, C scopes, type qualifiers, storage class specifiers, variable initializations, constants, reading and writing characters, formatted I/O.

UNIT III – Preliminaries of C:

Assignment, arithmetic , relational, logical, bitwise, ternary, address, indirection, sizeof, dot, arrow, and parentheses operators, Expressions Precedence of operators and associatively, Category of Statements, Selection, Iteration, jump, label, expression and block, Function declaration, prototype, definition, calling by value and address, standard library functions and recursive functions.

UNIT IV - Arrays and Pointers:

Declaration, initialization, reading, writing, accessing and passing as a parameter to functions, Multidimensional arrays and String functions, pointer expressions, pointer and arrays, multiple indirection, initializing pointers, pointer to functions, Dynamic memory allocation functions.

UNIT V - Structures and File Processing:

declaration, initialization and accessing, array of structures and passing structures to functions, structure pointers, arrays and structures within structures, unions, bit-fields, typedef and enumerations, I/O and processing operations on text and binary files. pre-processor directives.

TEXT BOOKS :

1. Reema Thareja, “Introduction to C Programming”, Oxford University Press, India, 2013
2. Herbert Schildt, C: “The Complete Reference”, 4th Edition, Tata McGraw-Hill, 2000.

REFERENCE BOOKS :

1. E. Balagurusamy, “ Programming in ANSI C”, 4TH Edition, Tata McGraw- Hill, 2008.
2. R Ravichandran and T Jeyapoovan, “ Computer Programming with C”, Soni Graphics, India, 2014.

I Year B.Tech. EEE I - Semester	L	T	P	To	C
	2	-	-	2	-

CS105 NETWORK SECURITY

Course Description & Objectives:

This Course focuses towards the introduction of System, Information and Network security using various methodologies. It also focuses on the practical aspects that have been used to provide e_mail and web security.

Course Outcomes:

On Completion of this course student should be able to

- Understand the Importance of Information Security.
- Know the ways to protect the information.
- Understand the Firewall importance.
- Understand the need of Virtual Private Networks.
- Understand the concepts of data encryption.

UNIT I - History of security :

History of security – Physical security, communications security, emissions security, computer security, network security and information security. Security process - Anti-virus software, access controls, firewalls, smart cards, biometrics, intrusion detection, policy management, vulnerability scanning, encryption, physical security mechanisms.

UNIT II - Access attacks:

Snooping, eavesdropping, interception; Modification attacks - Changes, insertion and deletion; Denial of service attacks- Denial of access to information, applications, systems and communication; Repudiation attacks - Masquerading and denying an event. Hacking - Hacker motivation, historical hacking techniques, IP spoofing and malicious code.

UNIT III -

Confidentiality of files, information in transmission and traffic flow, integrity, availability and accountability; Integrity of files and information during transmission; Availability - backups, failover and disaster recovery; Accountability – identification and authentication, and audit.

UNIT IV -

Concepts of firewalls, Application layer and packet filtering firewalls; Virtual Private Networks.

UNIT V -

Basic encryption concepts, Private Key encryption standards-DES, triple DES and AES. Public key encryption – RSA. Concepts of digital signatures.

TEXT BOOK:

1. Eric Maiwald, Fundamentals of Network security, Dreamtech Press, 2007.

REFERENCE BOOK:

1. William Stallings, "Cryptography and Network security", 4th edition, Pearson Education, 2010.

I Year B.Tech. EEE I - Semester

L	T	P	To	C
3	2	-	5	5

HS114 TECHNICAL ENGLISH COMMUNICATION

Course Description & Objectives:

To introduce students to the specific use of language for the purposes of Technical Communication which would be an essential prerequisite for success in the areas of writing and speech. The teaching efforts in this course will be directed towards making students develop their technical and non-technical writing abilities using the fundamental principles that apply to the correct use of the English language free of grammatical and other related errors.

Course Outcomes:

Students shall achieve the ability to write and demonstrate college-level proficiency in the following:

- Understand and apply the rules of grammar to speak in technical context.
- Strengthen reading and listening comprehension skills to follow academic discussions in the engineering context.
- Develop appropriate vocabulary for carrying out academic writing tasks.
- Attain adequate proficiency to participate in the classroom discussions and make simple presentations.
- Understand and apply the mechanics of writing to produce simple texts for academic purpose.

UNIT - I

- Text : Environmental Consciousness (Climate Change – Green Cover – Pollution)
- Grammar : Articles – Prepositions – Sentence Types and Construction
- Vocabulary : Root – Prefixes - Suffixes
- Composition : Paragraph Writing (Descriptive & Narrative)
- Lab Practice : Introduction to Phonetics (Organs of Speech; Consonants, Vowels & Diphthongs; Syllable, Stress & Intonation)

UNIT - II

- Text : Emerging Technologies
  (Solar Power – Cloud Computing – Nanotechnology)
- Grammar : Time and Tense (Present-Past-Future; Helping Verbs; Modals)
- Vocabulary : Synonyms – Antonyms
- Composition : Note-making
- Lab Practice : Grammar Practice (Speaking of past, present & future)

UNIT - III

- Text : Energy
  (Renewable and Non-renewable Sources – Alternative Sources – Conservation – Nuclear Energy)
- Grammar : Subject-Verb Agreement - Sentence Construction (Characteristics of Technical Writing)
- Vocabulary : Idioms & Phrases
- Composition : Summarizing
- Lab Practice : Situational Conversations – Role-Plays (Introducing; Greeting; Enquiring; Informing; Requesting; Inviting)

UNIT - IV

- Text : Engineering Ethics
  (Challenger Disaster – Biotechnology – Genetic Engineering – Protection from Natural Calamities)
- Grammar : Sentence Transformation (Degrees, Voice, Speech & Synthesis)
- Vocabulary : Phrasal Verbs
- Composition : Letter Writing (Informal)
- Lab Practice : Situational Conversations – Role-Plays (Emotions; Directions; Descriptions; Agreements; Refusals; Suggestions)

UNIT - V

- Text : Travel and Tourism
  (Advantages and Disadvantages of Travel-Tourism – Atithi Devo bhava – Tourism in India)
- Grammar : Common Errors
- Vocabulary : One-word Substitutes
- Composition : Letter Writing (Formal)
- Lab Practice : Group Discussions

TEXT BOOK:

Mindscapes - English for Technologists and Engineers, Orient Black Swan, 2012.

REFERENCE BOOKS:

1. V. R. Narayana Swamy, *"Strengthen Your Writing",* 1st edition, Orient Longman, 2003.
2. Thomas Elliott Berry, *"The Most Common Mistakes in English Usage",* 1st edition, Tata McGraw Hill, 2004.
3. T. Balasubramanyam, *A Textbook of English Phonetics for Indian Students*, Macmillan Ltd., 2000.
4. Sasikumar.V and P.V. Dhamija,. *Spoken English: A Self-Learning Guide to Conversation Practice,* 34th Reprint, Tata McGraw Hill, New Delhi, 1993.
5. Margaret M Maison, "Examine your English", 1st edition, Orient Longman, 1999.
6. Ashraf Rizwi, "*Technical English Communication*", Tata McGraw Hill, Latest Edition.

I Year B.Tech. EEE I - Semester

L	T	P	To	C
-	-	3	3	2

HS120 ENGINEERING PHYSICS LAB

Course Description & Objectives:

This lab is intended to make the students realize the theoretical concepts of physics having hands on experience in conducting the following experiments. Students may have to take up any 10 experiments from each section.

Course Outcomes:

- Understand the concept of resonance of sound by conducting the experiment of Sonometer Melde's experiment and volume generator.
- Understand the concepts of light by conducting the experiments of dispersion of light, diffraction of light, optical fibers and lasers.
- Demonstrate magnetic field theory, thermal energy and elastic properties by conducting the experiments of field along the axis of circular coil, Lee's experiment, Seebeck effect and Torsional pendulum.
- Analyze the basics and application of the semiconducotrs by using solar cells, energy bandgap of semiconductor, hall effect

PHYSICS LAB

1. Verification of laws of transverse vibrations in stretched string - Sonometer
2. Melde's Experiment - Transverse and Longitudinal modes.
3. Determination of Rigidity modulus of a material in the form of a wire - Torsional pendulum
4. Dispersive power of the material of a Prism - Spectrometer
5. Determination of wavelength of a monochromatic light source - Diffraction Grating.
6. Field along the axis of a circular coil – stewart Gee's apparatus.
7. Volume Resonator.
8. Band gap of semiconductor
9. Hall coefficient
10. Thermal conductivity of bad conductor Lee's method
11. Optical Fiber – Determination of numerical aperture
12. Solar Cell
13. Seebeck effect.

REFERENCE BOOKS:

1. Vogel's Text book of qualitative Chemical Analysis J.Mendham, R.C Denney, J.D. Bares, M.Thomas & B. Siva Sankar, Pearson Publications – Volume I (2009).

I Year B.Tech. EEE I - Semester

L	T	P	To	C
-	-	3	3	2

CS107 COMPUTER PROGRAMMING LAB

Course Description & Objectives:

To familiarize the students in preparation of documents and presentations with office automation tools. A comprehensive problem solving skills through C language is offered to enable the students to write diversified solutions using this language.

Course Outcomes:

- Able to write, compile and debug programs in C language.
- Able to formulate problems and implement algorithms in C.
- Able to effectively choose programming components that efficiently solve computing problems in real-world
- Write A Program to find simple Interest, compound interest
- Development of C programs that are understandable, debug gable, maintainable and more likely to work correctly in the first attempt.

1. Write A Program to find simple Interest, compound interest
2. Write A Program to covert given temperature from C to F & F to C
3. Write A Program to check Entered number is positive or zero or Negative
4. Write A Program to print given year is Leap year or not
5. Write A Program to do arithmetic operations using switch
6. Write A Program to find biggest among 3 Numbers
7. Write A Program to print grade of a student for 5 sub avg>70(A), 60-70(B), 50-60(C),<50(F)
8. Write A Program to find Roots fo Quadratic Equation
9. Write A Program to find sum of individual digits of a given number
10. Write A Program to check whether the given number is PALINDRAM or not
11. Write A Program to check whether the given number is PERFECT or not
12. Write A Program to check whether the given number is PRIME or not

13. Write A Program to check whether the given number is ARMSTRONG or not
14. Write A Program to check whether the given number is STRONG or not
15. Write A Program to find sum of Natural Numbers
16. Write A Program to print the following triangle

```
            1
          2   3
        4   5   6
      7   8   9   10  etc……….
```

17. C Progrm to find Factorial of Given number using Recursive and Non Recursive Functions.
18. Write A Program to print Fibonacci Series upto given limit using recursive, Non recursive
19. Write program in C for determining the minimum and maximum and sum of elements of an array of 'n' elements and searching for a given element.
20. C Program for computing range, mean and standard deviation of a given numeric dataset.
21. Write A Program in C for performing addition, subtraction, multiplication and transpose operations on matrices.
22. Write program to perform the following string operations on the given string. a) string length b) string copy c) string concatenation d) string comparison e) reverse string f) sub string
23. Write A Program to read student record (no, name, marks1, marks2, marks3, marks4, marks5, calculate average and Grade) and display the student record.
24. Write A Program to do arithmetic operations using pointers.
25. Write A Program to create two data files and copy the content of these two data files as a single file in another new file?

I Year B.Tech. EEE I - Semester

L	T	P	To	C
-	-	3	3	2

ME105 WORKSHOP PRACTICE

Course Description & Objectives:

To provide the hands on experience to the students on basic workshop skills.

Course Outcomes:

After completion of this course,

- Students will be able to identify various tools connected to all the trades.
- Students will be able to learn how to use various tools
- Understand joining of metals.
- Make metal joints and sheet metal work.
- Make metal tools like knives, needles, swords, arrows etc.

Trades for exercises:

1. Carpentry
2. Fitting
3. Tin Smithy & Black smithy4. House wiring
5. Foundry & Welding (Demonstration)
6. Machine shop & CNC (Demonstration)
7. IT Workshop
8. Study of discrete components of computer and networking (1 session)
9. Demonstration of assembling a computer, disk partitioning and installation of system and application software. installation of modem etc. (2 sessions)

Note: In each trade, the students has to perform at least two jobs.

TEXT BOOKS:

1. S.K. Hazra Choudhury, Elements of workshop Technology, 11th Edition, Media Promoters, 1997
2. Gopal, T.V., Kumar, T., and Murali, G., A first course on workshop practice – Theory, Practice and Work Book, Suma Publications, Chennai, 2005.
3. Venkatachalapathy, V. S., First year Engineering Workshop Practice, Ramalinga Publications, Madurai, 1999.

I Year B.Tech. EEE II - Semester

L	T	P	To	C
4	-	-	4	4

HS115 ENGINEERING MATHEMATICS - II

Course Description & Objectives:

Without mathematics not a single day of an engineer will pass! All the topics of this course are relevant to all branches of engineering. In real life, many quantities are dependent on more than one quantity. Hence study of functions of several variables is crucial. In this course, we study partial differentiation, partial differential equations, multiple integrals all involving functions of two variables. We also study Fourier series and Z-transformations and difference equations.

Course Outcomes:

- Solve Partial Differential Equations.
- Apply Fourier series to solve problems.
- Apply Z – transforms to solve difference equations
- Understand calculus of vector.
- Solve multiple integral

UNIT I - Partial Differential Equations:

Formation of Partial Differential Equations, Linear (Lagrange) Equations, Method of multipliers, Non-linear partial differential equations (Types), Charpit's method.

Second order linear equations, classifications, Solution by method of separation of variables.

UNIT II - Fourier Series:

Periodic functions, Fourier series, Dirichlet's conditions, Determination of Fourier coefficients, Discontinuous functions, even and odd functions, Half-range series, Functions having arbitrary period.

UNIT III - Z-transformations & Applications:

Z-transformations : Sequences, Z-transformation, Properties, Inverse Z-transformation, Multiplication and division by k, Initial and final value theorems, Convolution, Determination of inverse Z-transformation.

Applications : Solutions of difference equations using Z-transformations.

UNIT IV - Multiple Integrals:

Double integrals, Evaluation, Evaluation in Polar coordinates, Change of order of integration, Change of variables, Applications to Area in Cartesian coordinates and polar coordinates.

Triple integrals, Fundamentals, Evaluation of triple integrals.

UNIT V - Vector Differentiation and Integration:

Vector Function, Differentiation, Scalor and Vector point function, Gradient, Normal, Divergence, Directional Derivate, Curl, Vector identities.

Line Integral, Surface Integral, Volume integral, Green's theorem, Stoke's theorem, Gauss theorem of divergence (without proofs).

TEXT BOOKS:

1. *H. K. Dass* and *Er. Rajnish Verma*, Higher Engineering Mathematics, S. Chand & Co., New Delhi, 2011.
2. *B.S. Grewal*, "Higher Engineering Mathematics", 40th edition, Khanna Publishers, 2009.

REFERENCE BOOKS:

1. *B.V. Ramana*, "Higher Engineering Mathematics", 3rd Edition, Tata McGraw-Hill Publishing Co, 2008.
2. *R K Jain, S R K Iyengar*, "Advanced Engineering Mathematics", 2nd Edition, Narosa Publishing House.
3. *Erwin Kreyszig*, "Advanced Engineering Mathematics", 8th Edition, John Wiley & Sons (Asia) Pvt. Ltd. 2001.

I Year B.Tech. EEE II - Semester

L	T	P	To	C
4	-	-	4	4

HS117 ENGINEERING CHEMISTRY

Course Description & Objectives:

Chemistry is the backbone in designing and understanding the nature and properties of various engineering materials. Currently, the electronics and computer engineers are waiting for suitable polymers for using miniature super computers. So this subject develops fundamental knowledge about new engineering materials and their significance in technical fields and industrial sectors. Water is an essential element for the existence of human, plant and animal lives, besides that it has greater industrial applications. The knowledge about water is the basic requirement for a professional student. Characterization of materials with instrumental techniques is essential for engineers.

Course Outcomes:

- Differentiate between soft and hard water. Understand the disadvantagesof using hard water domestically and industrially. Select and apply suitablesoftening methods (Soda-lime, zeolite, ion-exchange methods, etc.) tosoften the hard water for industrial and domestic applications.
- Acquaintance of primary and secondary cells, Hydrogen-Oxygen andMethanol fuel cells, dry and wet corrosions, corrosion controlling methods.
- Acquaintance of the properties and engineering applications of Ceramics,Refractories, Glasses, Cement, Abrasives, Lubricants.
- Acquaintance of Preparation, properties and applications of different polymers (Polyethylene, PVC, Tefflon, Bakelite, Urea-Formaldehyde, Silicones, Rubber – Vulcanization, Synthetic Rubbers-(Buna-S, Buna-N,Neoprene); treatment of membranes.
- Acquaintance of various spectroscopic methods (UV-visible / IR), Beer-Lambert's Law, qualitative and quantitative analysis, block diagrams of UV and IR spectrophotometers.

UNIT I - Water Technology :

Introduction-Hardness of water-Determination of hardness by EDTA-Disadvantages of hard water-Scales & Sludges-Caustic embrittlement-Boiler corrosion-Priming & Foaming, WHO, BIS Standards of water-Softening Methods- Lime Soda process, Zeolite process, Ion Exchange process - Desalination of brackish water-Reverse osmosis, Electro dialysis.

UNIT II - Electrochemical cells and AND Corrosion:

Electrochemical cells: primary cell-(Dry or lecalanche cell), Secondary cell-(Lead-acid storage cell, Lithium ion battery), Hydrogen-Oxygen Fuel cell, Methanol fuel cell.

Corrosion: Introduction-Dry corrosion (chemical)-Wet corrosion (electrochemical)-Mechanism of wet corrosion-Bimetallic corrosion-Concentration cell corrosion-Factors influencing corrosion-Corrosion control methods- Cathodic protection and Electroplating.

UNIT III - Engineering Materials :

Properties and engineering applications of Ceramics, Refractories, Glasses, Cement,Abrasives, Lubricants.

UNIT IV - Polymers :

Introduction –Types of polymerization-Preparation, properties and applications of Polyethylene, PVC, Tefflon, Bakelite, UreaFormaldehyde, Silicones, Rubber – Vulcanization, Synthetic Rubbers - (Buna-S, Buna-N, Neoprene). Elementary treatment of Membranes.

UNIT V - Instrumental Techniques :

Interaction of radiation with matter,UV-Visible Spectroscopy-Beer –Lambert's law ,Qualitative and Quantitative Analysis,Block diagram of UV-Visible Spectrophotometer.IRSpectroscopy-Types of Vibrations,Identification of functional groups,Block diagram of IR Spectrophotometer.

TEXT BOOKS:

1. P.C Jain and Monica Jain, "Engineering Chemistry", 15th edition, Dhanpat Rai Publications 2009.
2. Gurudeep Raj and Chatwal Anand, "Instrumental Methods of Analysis", 5th edition, Himalaya Publications, 2007.

REFERENCE BOOKS:

1. S.S.Dara, "Text book of Engineering Chemistry" 1st edition, S. Chand Publications, 2009.
2. C.V. Agarwal, C.P. Murthy, A.Naidu, "Chemistry of Engineering materials", 9th edition, BSP Publications, 2008.
3. M.R. Senapati, "Advanced Engineering Chemistry" 2nd edition, Lakshmi Publications, 2006
4. H.W. Wilard and Demerit, "Instrumental methods of Analysis", 7th edition, CBS Publications, 1986.

I Year B.Tech. EEE II - Semester

L	T	P	To	C
3	-	-	3	3

HS118 ENVIRONMENTAL STUDIES

Course Description & Objectives:

The objective of this course is to heighten on awareness of nature and its importance to students
and make them understand the need to make judicious use of all natural resources for long team sustenance of life on this planet.

Course Outcomes:

- Understand the importance of natural resources and integrate technical "field" knowledge with analytical skills to prevent natural resources depletion
- UNDERSTAND to maintain healthy diverse ecosystems and work together to conserve biodiversity
- Understand and Take immediate measures to control the Pollution
- Adopt Eco friendly technology
- Create and Maintenance of hygienic conditions

UNIT I - Environment and Natural Resources :

Environment: Definition, Scope and Importance – Need for Public Awareness

Natural Resources: Renewable and non-renewable resources – Natural resources and associated problems – Forest Resources: Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources: Use and over utilization of surface and ground water – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources - Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity–Energy resources: renewable and non-renewable energy sources, alternate energy sources. Land resources: Land as a resource, land degradation, Soil erosion – case studies - Role of an individual in conservation of natural resources.

UNIT II - Ecosystems and Biodiversity :

Ecosystem: Concept of an ecosystem – Complete and incomplete ecosystem - Structure and functions of an ecosystem - Ecological succession. - Food chains, food webs -Structure and functional features of the following ecosystem: a. Forest ecosystem b. Grassland ecosystem c. Desert ecosystem, d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Biodiversity: introduction of biodiversity, Bio-geographical classification of India - Value of biodiversity- Biodiversity at global, National and local levels - Hot-spots of biodiversity - Threats to biodiversity - Endangered and endemic species of India – Conservation of biodiversity.

UNIT III - Environmental Pollution and Applications of Remote Sensing / GIS on Environment:

Definition, Cause, effects and control measures of: Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution - Solid waste Management: Causes, effects and control measures of municipal and industrial wastes - Climate change, global warming, acid rain, ozone layer depletion -Case Studies - Role of an individual in prevention of pollution - Pollution case studies. – Green technology and its concept, role of green technology in controlling environmental problems.

UNIT IV - Social issues and EIA:

Sustainable development -water conservation: Cloud Seeding (Artificial rain making system), rainwater harvesting, watershed management - Disaster management: floods, earthquake, cyclone and landslides - Environment Protection Act. - Air (Prevention and Control of Pollution) Act. - Water (Prevention and control of Pollution) Act - Wildlife Protection Act - Forest Conservation Act

EIA: introduction to E.I.A.-definition of E.I.A and E.I.S – scope and objectives of E.I.A.- methods of E.I.A –CEIA, REIA, MOEF, CPCB, SPCB – Importance of E.I.A in proposed Projects / Industry /

Developmental activity - Remote sensing / GIS: Introduction of remote sensing / GIS, definition of remote sensing, applications of the remote sensing on environment (site selection, land use/land cover pattern, water/air/soil quality models, a criteria of environmental information systems)

UNIT V - Environmental Sanitation :

Food sanitation: food and drugs Act, food preservations, food borne diseases-Milk sanitation: tests for milk, pasteurization of the milk - water borne diseases-air borne diseases-viral diseases (HIV/AIDS, SARS, bird-flu, anthrax)-maintenance of sanitary and hygienic conditions

Field Work/Environmental Visit: Visit to a local area to document environmental assets – river/ forest/ grassland / hill /mountain - Study of local environment - common plants, insects, birds - Study of simple ecosystems – pond, river, hill, slopes etc - Visits to industries, water treatment plants, effluent treatment plants.

TEXT BOOKS:

1. Y. Anjaneyulu, “Introduction to Environmental Science”, B S Publications, 2008.
2. Dr. M. Chandrasekhar, “A Text book of Environmental Studies”, HI-TECH publications, 2006

REFERENCE BOOKS:

1. Dr. M. Anji Reddy, “A Text book of environmental science and Technology”, B S Publications, 2008
2. Dr. K. Mukkanti, “A Text book of Environmental Studies”, S.CHAND Company Ltd, 2009.
3. EHILRS and ST, “Text book of Municipal and Rural Sanitation”, M.S Hill, 1998.
4. C. S. Rao, Wiley Eastern Ltd, “Environmental Pollution Control Engineering”, New Age International Ltd, 2001
5. Dr. M. Anji Reddy, “Introduction to Remote Sensing”, B S Publications, 2004.
6. Kurian Joseph and R.Nagendram, “Essentials of environmental studies”, Pearson Education Pt Ltd, Delhi, 2007.
7. Sharma & Kour “Text book of Environmental pollution”.
8. H.C Perkins “Text book of Air Pollution”.

I Year B.Tech. EEE II - Semester	L	T	P	To	C
	2	-	-	2	-

HS119 PROFESSIONAL ETHICS, VALUES AND HUMAN RIGHTS

Course Description & Objectives:

To create an awareness on Engineering Ethics and Human Values. To instill Moral and Social Values and Loyalty. To appreciate the workplace rights of Others, responsibilities and Safety of others.

Course Outcomes:

The course will enable the students to attain the following:

- Understand routine information and factual articles in the news papers and understand general instructions, notifications, announcements, monologues and conversations.
- UNDERSTAND functional English to speak and express themselves in everyday social contexts.
- Applying sentence structures and word collocations to produce simple and accurate sentences and create short compositions.
- Analyse complex reading and listening materials
- Infer to evaluate the intentions of the writers and speakers.

UNIT I - Human Values :

Morals, Values and Ethics – Integrity – Work Ethic – Service Learning – Civic Virtue – Respect for Others – Living Peacefully – Caring – Sharing – Honesty – Courage – Valuing Time – Co-operation – Commitment – Empathy – Self-Confidence – Character – Spirituality.

UNIT II - Engineering Ethics & **Engineering as social experimentation :**

Engineering Ethics : Variety of moral issues – types of inquiry moral dilemmas – moral autonomy – The problems of Many Hands – Kohlburg’s theory – Gilligan’s theory Impediments to Responsible Action.

Engineering as social experimentation - Codes of ethics - a balanced outlook on law - the challenger case study.

UNIT III - Engineer’s Responsibility for Safety :

Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis – Reducing Risk – The Government Regulator’s Approach to Risk - Chernobyl Case Studies and Bhopal.

UNIT IV - Workplace Rights and Responsibilities & Work Environment :

Workplace Rights and Responsibilities : Engineers and Managers. Oganizational complaint procedures. Government agencies. Resolving Employee concerns. Limits on acceptable behaviour in large corporation.

Work Environment : Ethical and legal considerations, Organizational responses to offensive behaviour and harassment. Ethics in a Global Context.

UNIT V - Global Issues :

Multinational Corporations – Business Ethics - Environmental Ethics – Computer Ethics - Role in Technological Development – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Honesty – Moral Leadership – Sample Code of Conduct.

TEXT BOOKS:

1. Mike Martin and Roland Schinzinger, “Ethics in Engineering”, McGraw Hill, New York, 2005.

REFERENCE BOOKS:

1. Prof. (Col) P S Bajaj and Dr. Raj Agrawal, “Business Ethics – An Indian Perspective”, Biztantra, New Delhi, 2004
2. Charles E Harris, Michael S. Protchard and Michael J Rabins, “Engineering Ethics – Concepts and Cases”, Wadsworth Thompson Learning, United States, 2000 (Indian Reprint now available)
3. Engineering Ethics-An industrial Perspective, Gail Dawn Baura
4. Charles E Harris, Michael S Pritchard and Michael J Rabins, “Engineering Ethics – Concepts and Cases”, Thompson Learning, 2000.
5. Charles E Harris, Michael S Pritchard and Michael J Rabins, “Engineering Ethics – Concepts and Cases”, Thompson Learning, 2000.
6. PSR Murthy, “Indian Culture Values and Professional Ethics”, BS Publications
7. Edmund G Seebauer and Robert L Barry, “Fundamentals of Ethics for Scientists and Engineers”, Oxford University Press, Oxford, 2001.

I Year B.Tech. EEE II - Semester

L	T	P	To	C
4	-	-	4	4

HS122 ENGINEERING MATERIALS

Course Description & Objectives:

The course will help students to learn about the elementary relationships between structure and properties of materials how materials can be classified. It also reveals the engineering applications of metals, alloys, semi conductors and magnetic materials and relation between properties and engineering applications.

Course Outcomes:

The students will be made to get acquainted to the following learning outcomes:

- Understand the fundamentals related to bonding in solids, Crystal systems and their structural features, phase equilibria and their relevance in MaterialsScience
- To attain knowledge over the Mechanical properties of solids and factors affecting such properties
- Classification of solids based on band theory, sources of resistivity in metals, semi conductors transport mechanism and applications.
- Classification of magnetic materials, hysteresis, ferrites and applications
- To gain knowledge in Super conductors, classification and their applications. Dielectricmaterials, types of polarization and new engineering materials and theirusefulness.

UNIT I - Bonding in Solids & Crystallography:

Bonding in Solids: Inter atomic forces – Types of bonds – Primary & Secondary bonded materials and their properties – Cohesive energy.

Crystallography: Introduction – classification of Crystal systems – SC, BCC & FCC structures –Miller indices of planes & directions – Separation between successive planes – X-ray diffraction – Bragg's Law – Powder method – Crystal imperfection – Point and line imperfections – Grain boundaries**.**

UNIT II - Phase Equilibria & Mechanical Properties:

Phase Equilibria: Gibb's phase rule & terms involved – Reduced phase rule - Two component systems–invariant reactions – Eutectic system & Iron – Carbon system - Lever rule.

Mechanical Properties : Introduction – mechanical properties of materials – Stress-Strain relations of various solids – Elastic moduli- deformations in solids- Fracture – Creep- Fatigue – Factors affecting mechanical properties of materials.

UNIT III - Conducting Materials & Semiconductors :

Conducting Materials: Introduction – Classification of solids based on the band models - Relaxation time and electrical conductivity of a metal – Collision time & mean free path – Sources of resistivity of metals.

Semiconductors: Introduction – Generation & recombination – Intrinsic semiconductors – Extrinsic semiconductors – Drift and diffusion (Qualitative treatment) – Einstein relation – Hall effect – Direct and Indirect band gap.

UNIT IV - Magnetic Properties & Superconductivity:

Magnetic Properties: Introduction – Origin of magnetic moment – Classification of magnetic materials – Domain theory of ferromagnetism – Hysteresis curve - Soft and hard magnetic materials – Ferrites and their applications.

Superconductivity – Introduction - Meissner Effect – Types of superconductors – High Temperature superconductors – Applications.

UNIT V - Dielectrics & Functional materials:

Dielectrics : Introduction – Dielectric polarization – Internal electric field – Clausius – Mossotti relation – Ferro and Piezo electricity - Electrets – Applications.

Functional materials: Introduction – Metallic glasses – Biomaterials – Composites – Metal matrix composites - Fiber reinforced plastics – Conducting polymers - shape memory alloys – smart materials.

TEXT BOOKS:

1. V. Raghavan, “Materials Science and Engineering”, 3 rd ed., PHI, 1996.
2. Lawrence H. Van Vlack, “Element s of Materials Science and Engineering”, 6th ed., Wesley Publication, 1989.

REFERENCE BOOKS:

1. Arumugam. M “Material Science” Anuradha Technical Book Publishers, Kumbakonam.K, 1997.
2. Manas Chandra, “Science of Engineering Materials”, Vol 1-3, Mc - Millian Company of India, Delhi.
3. Pillai, S.O, “Solid State Physics”, New Age International, 1998.
4. William F. Smith, “Principles of Materials Science and Engineering”, MGH, Publishers, 1988.
5. Structure and Properties of Materials – John Wulff – Wiley Eastern Ltd.

I Year B.Tech. EEE II - Semester

L	T	P	To	C
4	-	-	4	4

EE108 NETWORK THEORY - I

Course Description & Objectives:

To understand the basic electrical network analysis techniques, theorems in analyzing DC and AC circuits and various coupled circuits. To understand the concepts of three phase circuits.

Course Outcomes:

- Analyze the resistive circuits with independent sources and find its solution.
- Familiarize the concepts of electromagnetism and capacitance.
- Solve the single phase AC using different methods.
- Solve complex electrical networks by applying fundamental network theorems.
- Analyze three phase AC circuits and illustrate series and parallel resonant circuits.

UNIT I - Circuit Terminology :

Atomic Theory Review-Electric Charge, Voltage, Current, Energy and Power-Types of Electrical sources-Dependent and Independent- Ohm's Law-Resistance parameter, Temperature effects, Kirchhoff's laws-Series, Parallel and Series parallel circuits-Source Transformation.

UNIT II - Magnetic Circuits and Capacitance :

Electromagnetic Induction**,** magneto motive force, reluctance, flux and flux density, concept of Self Inductance and Mutual Inductance, Coefficient of coupling-Series, Parallel and Series parallel magnetic circuits-with and without air gap, Fringing effect, Concept of Capacitance, effects, energy stored, Series, Parallel and Series parallel circuits.

UNIT III - AC Fundamentals:

Introduction-Generation of AC Voltages-terminology in AC circuits-calculation of form factor and peak factor for different alternating waveforms-Phasor representation-R, L and C circuits with sinusoidal excitation-Impedance concept-Simple Series, Parallel and Series parallel combinations-Power and power factor in AC circuits-Delta-Wye Transformations.

UNIT IV - Circuit Analysis and Network Theorems :

Analysis of dc and ac circuits by Mesh and Nodal Analysis, Superposition, Thevenin's and Norton's, Reciprocity, Compensation, Maximum Power transfer, Tellegan's and Millman's theorems for both dc and ac circuits

UNIT V - Resonance & Three Phase Systems:

Series and Parallel Resonance-different combinations-Quality Factor, Bandwidth, Selectivity of different circuits.

Three phase Voltage generation-Wye and Delta Connections-Relationships between line and phase quantities-Balanced and Unbalanced systems-Power in three phase circuits.

TEXT BOOKS:

1. A.Chakrabarti, "Circuit Theory Analysis & Synthesis, 4th ed., Dhanpat Rai & co, 2005
2. W.H.Hayt and J.E.Kimmerly & Steven.M.Durbin "Engineering circuit analysis" 6th ed., Tata Mc Graw Hill, 2009.

REFERENCE BOOKS:

1. Joseph Edminister & Mahmood Nahvi, "Electric circuits",3rd & 4th ed., Schaum's, Tata McGraw Hill, 2009.
2. Vanvalkenberg, "Network analysis", 3rd ed.,Prentice Hall of India, 2009.
3. David K. Cheng, "Analysis of Linear systems" 1st ed., Narosa Pub, 2002.

I Year B.Tech. EEE II - Semester

L	T	P	To	C
1	-	3	4	3

ME103 ENGINEERING GRAPHICS

Course Description & Objectives:

To familiarize students with the conventional concept of engineering drawing and application through AutoCAD.

Course Outcomes:

- Communicate the ideas and thoughts to other in the form of pictures.
- Apply the drawing skills while drawing engineering objects
- Implement the concept of quadrant system in drawing practice.
- Develop different engineering objects using drawing tools.
- Sketch simple objects and their pictorial views using AutoCAD

UNIT - I

Introduction to Engineering drawing: Introduction to Engineering Drawing – Types of lines, lettering, dimensioning Construction of polygon & Conics. (Ellipse, Parabola & Hyperbola by general method).

UNIT - II

Orthographic Projections: Principle of projection-Planes of projections.
Projections of points:
Projection of straight lines: Inclined to one plane and both the planes.
Projections of planes: Simple planes, Planes inclined to reference planes.

UNIT - III

Projections & Sections of solids – projections of prisms – cylinders – cones - pyramids – solid axis inclined to one plane, simple sections- prism, cylinder, pyramid and cone. AutoCAD Fundamentals.

UNIT - IV

Isometric projections: Isometric drawing of simple objects through AutoCAD.

UNIT - V

Orthographic projections: Conversion of Pictorial view into orthographic view using AUtoCAD and Conventional.

TEXT BOOKS :

1. N.D.Bhatt, “Engineering Drawing”, 49th ed., Charotar Publication, 2007.
2. K. Venugopal, “Engineering Drawing through Auto CAD”, 1st ed., New Age Publication, 2008.

REFERENCE BOOKS :

1. Jhole, “Engineering Drawing”, 2nd ed., Tata McGraw Hill, 2008.
2. K.L. Narayana, “Engineering drawing” 2nd ed., Scitech Publications, 2008.

I Year B.Tech. EEE II - Semester

L	T	P	To	C
-	-	3	3	2

HS121 ENGINEERING CHEMISTRY LAB

Course Description & Objectives:

This lab is intended to make the students enlighten with the theoretical concepts of chemistry. Instrumental techniques are useful for characterization of materials for future engineers. Students may have to take up any 10 experiments from the following experiments.

Course Outcomes:

- To enable the students to analyse the amount of dissolved salts in terms of hardness in potable water.
- To determine the Alkalinity in water used especially in industries.
- To determine the percentage purity of the given samples using titrimetry.
- To impart knowledge on synthetic aspects of polymers used as insulators.
- To apply the principle of basic instrumental techniques and analyse test sample using conduct meter and spectrophotometer.

Volumetric Analysis:

1. Determination of total Alkalinity of water
2. Determination of Percentage purity of Washing soda
3. Determination of Fe(II) by Dichrometry
4. Determination of Percentage of available chlorine in Bleaching powder
5. Determination of chlorides by Argentometry
6. Determination of Total hardness of water

Preparations:

7. Preparation of Bakelite
8. Preparation Of Urea- Formaldehyde Resin

Instrumental methods of Analysis:

9. Determination of Viscosity of a Lubricating oil
10. Determination of Strength of acid by conductometry
11. Determination of Mn^{+7} by Colorimetry
12. Demonstration of UV-Visible Spectrophotometer with Ferrothiocyanate

REFERENCE BOOKS:

1. Vogel's Text book of qualitative Chemical Analysis J.Mendham, R.C Denney, J.D. Bares, M.Thomas & B. Siva Sankar, Pearson Publications – Volume I (2009).
2. Experiments in Applied Chemistry by Dr.Sunita Rattan. S.K. Kataria & Sons publications,2008.

I Year B.Tech. EEE II - Semester

L	T	P	To	C
-	-	3	3	2

EE110 NETWORK THEORY - I LAB

Course Description & Objectives:

This course enables response of Electrical Circuit by applying fundamental techniques, theorems and to observe response of electrical circuits for different inputs.

Course Outcomes:

- Analyze the resistive circuits with independent sources
- Familiarize the concepts of electromagnetism
- Analyze the single phase AC circuits
- Experimentally verify the network theorems.
- Analyze the concept of resonance in AC circuits

List of Experiments:

1. Familiarization with Electronic components such as Resistors, Capacitors, Diodes, Transistors etc.
2. Familiarization with electrical devices and measuring equipment like DC power supply, Multimeter, Voltmeter etc.
3. Verification of ohm’s law
4. Verification of KVL and KCL
5. Finding of mutual inductance for 2/3 inductive coils connected in series and parallel
6. Familiarization of source transformation techniques
7. Determination of Average and R.M.S. Values – sinusoidal waveform.
8. Determination of impedance - series RC circuit-Analysis
9. Determination of impedance - series RL circuits-Analysis

10. Locus Diagrams of RL and RC Series Circuits
11. Series and Parallel Resonance
12. Determination of Self, Mutual Inductances and Coefficient of coupling
13. Measurement of Active Power for Star connected balanced load
14. Measurement of Reactive Power for balanced load (Star / Delta)
15. Measurement of 3-phase Power by two Wattmeter Method for balanced and unbalanced load (Star / Delta)

Note : Any 10 of above experiments are to be conducted.

VFSTR UNIVERSITY

II Year - B.Tech

SYLLABUS

I SEM & II SEM

II Year B.Tech. EEE I - Semester	L	T	P	To	C
	4	-	-	4	4

HS215 COMPLEX VARIABLES AND SPECIAL FUNCTIONS

Course Description & Objectives:

The aim of this course is to introduce complex functions and their applications. Students learn about analytical functions, complex integration, classification of singularities etc. They would also learn conformal mappings. Some special functions and their applications will also be introduced.

Course Outcomes:

At the end of the course student will be able to

- understand the concepts of complex functions, analyticity and apply the same to evaluate flow parameters and velocity potential
- understand the concepts of complex integration and series of complex terms and their convergence
- identify singular points, find residues and use them in evaluation of real integrals
- understand the transformation of complex functions and also learn special functions and their applications

UNIT I - Analytic Functions:

Complex numbers, properties, (Brief discussion), Functions of complex variables, Limit and Continuity, Differentiability, Analytic functions, Cauchy – Riemann equations (without proof), Cauchy – Riemann equations in polar form (without proof), Orthogonal Curve, Harmonic functions, Conjugate harmonic functions, Constructions of conjugate harmonic functions, Milne Thomson method, Applications (Flow problems, Velocity potential etc.).

UNIT II - Complex Integration:

Line integral, properties of counter integrals, Cauchy's Integral theorem, Cauchy Integral formula and its generalization, Applications.

Convergence of series of complex terms, power series, region and radius of convergence, Taylor series, Maclaurin series and Laurent series.

UNIT III - Poles and Residues:

Singularity, Classification of Singularities, Pole at infinity. Zeros of analytic function, Residue of a pole, Residue at infinity, Residue theorem, Method of finding residues, Residue integrals, Evaluation of real definite integrals by contour integration. Integration a round unit circle, of the type $\int_{\theta}^{2\pi} f(\cos\theta, \sin\theta)d$, of type $\int_{\theta}^{2\pi} \frac{p(x)}{q(x)} dx\left(p(x),\right.$ polynomials, integration on using rectangular contours, integration by indentation (functions having pole on-X axis).

UNIT IV - Conformal Functions:

Definition, conformal mapping by elementary functions, mapping $w=z^2$, transformations $w=e^z$, w=sin z, w=cos z, Joukvoski's transformation, Bilinear transformation.

UNIT V - Special Functions:

Gamma function, Beta function, Properties, Relation between Beta and Gamma functions, Application: Evaluation of integrals using Beta and Gamma functions.

Introduction series solutions of differential equations with variable coefficients, Bessel function and its properties.

TEXT BOOKS:

1. H.K.Das and Er.Rajnish Verma, Higher Engineering Mathematics, S.Chand & Co., New Delhi, 2011.
2. B.S.Grewal, "Higher Engineering Mathematics", 40th edition, Khanna Publishers, 2009.

REFERENCE BOOKS:

1. B.V.Ramana, "Higher Engineering Mathematics", 3rd Edition, Tata Mc Graw Hill Publishing Co., 2008.
2. R.K.Jain, SBK Iyengar, "Advanced Engineering Mathematics", 2nd Edition, Narosa Publishing House.

II Year B.Tech. EEE I - Semester

L	T	P	To	C
4	-	-	4	4

EE211 NETWORK THEORY-II

Course Description & Objectives:

Through this course the students will learn, advanced concepts in Circuit analysis which are applicable in solving unusual electric and electronic circuits.

Course Outcomes:

- Understand the concept of graph theory to network topology.
- Analyze two port networks and coupled circuits.
- Determine steady state and transient responses of series and parallel circuits.
- Apply Fourier transforms to analyze electrical circuits.
- Design Filters and attenuators.

UNIT I - Network Topology :

Definitions-graph, planar and non-planar, connected and oriented graph, sub graph, path, tree & tree branches, co-tree and links, formation of fundamental tie-set and cut-set matrices. Duality and dual networks.

UNIT II - Two port networks & Coupled Circuits:

Two port networks : Open circuit (impedance), short circuit (admittance), transmission (ABCD) and inverse transmission, hybrid and inverse hybrid parameters, interrelation between them. inter connection of 2-port networks. **Coupled Circuits:** Concept of mutual coupling-Energy considerations-Calculation of equivalent inductance in complex coupled circuit-Coupled Impedance-Linear transformer-Ideal transformer considerations.

UNIT III - Transients :

Initial value and final value theorems in Laplace Transforms; Response of simple R - L, R - C and R - L - C series and parallel circuits subjected to dc and sinusoidal excitations using differential equation approach and Laplace Transform method with initial conditions; time constant of R - L, R - C, series and parallel R – L - C circuits. Response of RL, RC, RLC circuits for impulse and pulse excitations using Laplace Transform method. Convolution integral - applications.

UNIT IV - Fourier Series and Fourier Transform Representation :
Introduction, Trigonometric form of Fourier series, Exponential form of Fourier series, Wave symmetry, Fourier integrals and transforms, Fourier transform of a periodic function , Properties of Fourier Transform, Parseval's theorem , Fourier transform of some common signals, Fourier transform relationship with LaplaceTransform. Applications of fourier series and fourier transform representation-Introduction, Effective value and average values of non sinusoidal periodic waves, currents, Power Factor, Effects of harmonics, Application in Circuit Analysis, Circuit Analysis using Fourier Series.

UNIT V - Filters and Attenuators & Network Synthesis:
Filters and Attenuators: Classical filters-Classification-Filter specifications-Lowpass, Highpass, Bandpass, Bandreject, and all pass filters-types in m derived filters-Attenuators-L,T,ð, Bridged types of Attenuators-Problems
Network Synthesis: Concept of Synthesis-Positive Real Functions-Frequency response-Synthesis of reactive networks by Foster and Cauer methods-Problems

TEXT BOOKS:

1. F.F.Kuo, "Network analysis & Synthesis"2nd ed., John Willy, 2005.
2. A.Chakrabarti, "Circuit Theory Analysis & Synthesis, 4th ed., Dhanpat Rai & co, 2005

REFERENCE BOOKS:

1. W.H.Hayt and J.E.Kimmerly & Steven.M.Durbin "Engineering circuit analysis" 6th ed., Tata Mc Graw Hill, 2009.
2. Vanvalkenberg, "Network analysis", 3rd ed.,Prentice Hall of India, 2009.
3. David K. Cheng, "Analysis of Linear systems" 1st ed., Narosa Pub, 2002.
4. Joseph Edminister & Mahmood Nahvi, "Electric circuits",3rd & 4th ed., Schaum's, Tata McGraw Hill, 2009.

II Year B.Tech. EEE I - Semester

L	T	P	To	C
4	-	-	4	4

EE213 ELECTROMAGNETIC FIELDS & TRANSMISSION LINES

Course Description & Objectives:

To expose the students to the fundamentals of electromagnetic fields and their applications in Electrical Engineering. To impart knowledge on Concepts of electrostatics, electrical potential, energy density and their applications, Concepts of magneto statics, magnetic flux density, scalar and vector potential and its applications.

Course Outcomes:

- Apply various coordinate systems and vector calculus principles to electric and magnetic fields
- Understand the characteristics, properties of Static Electric fields and their applications
- Demonstrate the characteristics, properties of Magneto static fields and their applications
- Understand Faraday's Law and Maxwell's Equation to Electromagnetic fields and wave propagation in different media
- Explain the characteristics of transmission lines used for Electromagnetic Wave propagation.

UNIT I - Co-ordinate systems and Vector Calculus :

Coordinate systems and transformation: Cartesian coordinates, circular cylindrical coordinates, spherical coordinates Vector calculus: Differential length, area and volume, line surface and volume integrals, del operator, gradient of a scalar, divergence of a vector and divergence theorem, curl of a vector and Stoke's theorem, Laplacian of a scalar.

UNIT II - Electrostatics :

Electrostatic fields, Coulombs law and field intensity, Electric field due to charge distribution, Electric flux density, Gauss's Law, Electric dipole and flux lines, energy density in electrostatic fields. Polarization in dielectrics, dielectric constants, continuity equation and relaxation time. Boundary conditions: Electrostatic boundary value problems. Poission's and Laplace's equations, general procedures for soling Poission's or Laplace's equations, capacitors -capacitance.

UNIT III - Magneto statics :

Magneto-static fields, Biot-Savart's Law, Ampere's circuit law, application of ampere's law, magnetic flux density, magnetic scalar and vector potential. Magnetic forces: Forces due to magnetic field, magnetic torque and moment, a magnetic dipole, magnetization in materials, magnetic boundary conditions, inductors and inductances, magnetic energy.

UNIT IV - Maxwell's Equations & Faraday's Law & Waves and applications:

Maxwell's Equations & Faraday's Law: Maxwell's equation, Faraday's Law, transformer and motional electromotive forces, displacement current, Maxwell's equation in final form.

Waves and applications : Electromagnetic wave propagation: Wave propagation in lossy dielectrics, plane waves in lossless dielectrics, plane wave in free space, plane waves in good conductors, power and the pointing vector, reflection of a plane wave in a normal incidence.

UNIT V - Transmission lines :

Transmission line parameters, Transmission line equations, input impedance, standing wave ratio and power, The Smith chart, some applications of transmission lines.

TEXT BOOKS:

1. William H. Hayt & John. A. Buck, "Engineering Electromagnetics", 7th ed., Mc. Graw- Hill Companies, 2005.
2. Sadiku, 'Elements of Electromagnetics', 2nd ed., Oxford University Press, 1995.

REFERENCE BOOKS:

1. John.D.Kraus, "Electromagnetics", 4 th ed., McGraw Hill book Co., New York, 1991
2. Joseph. A. Edminister, "Theory and Problems of Electromagnetics", 2 nd ed., Schaum Series, Tata McGraw Hill, 1993.
3. S. Kamakshaiah, "Electromagnetic Fields", 1st ed., Right publishers, 2007.

II Year B.Tech. EEE I - Semester

L	T	P	To	C
4	-	-	4	4

EE215 DC MACHINES

Course Description & Objectives:

This subject deals with construction, operation and characteristics of D.C Machines, speed control techniques and their applications . It also gives the detailed study of Testing techniques of several D.C machines.

Course Outcomes:

- Understand construction and operating principle of DC Generator
- Classify different types of DC generator with sketches and understand the concept of armature reaction in DC generator.
- Describe performance characteristic of different types of DC Generators and parallel operation of DC generators.
- Develop the speed control of a DC motor.
- Carry out different testing methods to determine the efficiency of DC machines.

UNIT I - Construction & Operation of D.C. Generators :

D.C. Generators – Principle of operation – Action of commutator – constructional features – armature windings – lap and wave windings – simplex and multiplex windings – use of laminated armature – E. M.F Equation – Problems.

UNIT II - Types of D.C. Generators and Armature Reaction :

Methods of Excitation – separately excited and self excited generators – build-up of E.M.F - critical field resistance and critical speed - causes for failure to self excite and remedial measures. Armature reaction – Cross magnetizing and de-magnetizing AT/pole – compensating winding – commutation – reactance voltage – methods of improving commutation.

UNIT III - Characteristics and Parallel Operation of D.C. Generators :

Load characteristics of shunt, series and compound generators, parallel operation of D.C. shunt and series generators – use of equalizer bar and cross connection of field windings, load sharing.

UNIT IV - Types of D.C. Motors and Speed Control Techniques :

D.C Motors – Principle of operation – Back E.M.F. - Torque equation – characteristics and application of shunt, series and compound motors, Speed control of d.c. Motors: Armature voltage and field flux control, Ward-Leonard system, Motor starters (3 point and 4 point starters).

UNIT V - Testing of D.C. Machines :

Testing of d.c. machines: Losses – Constant & Variable losses – calculation of efficiency – condition for maximum efficiency. Methods of Testing – direct, indirect and regenerative testing – brake test – Swinburne's test – Hopkinson's test – Field's test – Retardation test – separation of stray losses in a d.c. motor test.

TEXT BOOKS:

1. P.S. Bimbra., "Electrical Machinery", 7th ed., Khanna Publishers, 2004.
2. I.J. Nagrath & D.P. Kothari, "Electric Machines", 3rd ed., Tata Mc Graw – Hill Publishers, 2004.

REFERENCE BOOKS:

1. S. Kamakshaiah, "Electromechanics – I (D.C. Machines)",1st ed., Right Publishers, 2005.
2. A.E. Clayton & Hancock, "Performance and Design of D.C Machines",3rd ed., BPB Publishers, 2004.
3. A.E. Fritzgerald, C. Kingsley & S. Umans, "Electric Machinary", 6th ed., Mc Graw-Hill Companies, 2006
4. R. D. Begamudre, "Electromechanical Energy Conversion with Dynamics of Machines", 2nd ed., New Age International (P) Ltd. Publishers, 2003.
5. M. V. Deshpande, "Electric Machines", 1st ed., Wheeler Publishing, 2000.
6. S.K. Battacharya, "Electrical Machines", 2nd ed., Tata Mc Graw-Hill Companies, 2006.

II Year B.Tech. EEE I - Semester

L	T	P	To	C
4	-	-	4	4

EC219 ELECTRONIC DEVICES AND CIRCUITS

Course Description & Objectives:

The purpose of this course is to give students a strong foundation in the field of electronic devices. The subject may enhance the students to have a thorough knowledge of the characteristics of electronic devices and help them to analyze and design any real time applications.

Course Outcomes:

Upon successful completion of this course, students should be able to:

- Understand operation of semiconductor devices through energy band diagrams.
- Analyze the characteristics of various semiconductor devices.
- Differentiate between bipolar and uni polar conduction.
- Understand the usefulness of semiconductor devices in circuit making.
- Develop simple electronic circuits for various applications.

UNIT I - Semiconductor Diodes :

Intrinsic and extrinsic semi conductors with their energy band diagrams, mass action law, formation of pn junction diode, pn-diode working under forward and reverse bias, current components & V-I characteristics of diode, diode equation, temperature dependence of V-I characteristics, energy band diagram of diode, transition and diffusion capacitances, specifications of diodes, breakdowns in diodes, zener diode, tunnel diode, varacter diode, LED, photo diode and LCD.

UNIT II - Rectifiers, Filters and Regulators :

Basic building blocks of linear mode power supply,derivations of ripple factor, efficiency, TUF, peak factor, form factor, percentage regulation & PIV of Half Wave Rectifier, Centre-tapped Full Wave Rectifier and Bridge rectifier. Circuit operation and derivation of ripple factor for L, C, LC and CLC filters, simple zener regulator.

UNIT III - Transistors :

BJT: Formation of PNP and NPN transistors, transistor current components, transistor as an amplifier, CB, CE and CC configurations with their parameters comparision;

FET: working principles and characteristics of JFET, MOSFET; Characteristics and applications of UJT and SCR.

UNIT IV - Transistor Biasing (BJT & FET):

DC load line, AC load line and selection of operating point, need for biasing, various biasing techniques: fixed bias, collector to base bias and self bias with stability factors. Various compensation circuits, thermal runaway and thermal stability.

UNIT V - Single Stage Amplifiers :

BJT amplifiers: Small signal low frequency transistor amplifier circuits: h-parameter representation of a transistor, Analysis of single stage transistor amplifier using h-parameters: voltage gain, current gain, Input impedance and Output impedance. Comparison of transistor configurations in terms of A^{-}_{i} , R_i , A_V , R_o, Frequency response of Common Emitter Amplifier, Common Base Amplifier, Common Collector Amplifier.

FET amplifiers: FET amplifiers at low frequencies, CS / CD / CG configurations at low frequencies, Gain Band Width Product.

TEXT BOOKS:

1. J.Millman and CC Halkias, "Electronic Devices and Circuits", 2nd ed., Tata McGraw-Hill, , 2007.
2. S.Salivahanan, "Electronic Devices and Circuits" , 5th ed.,Tata McGraw-Hill, 2010.

REFERENCE BOOKS :

1. R.L.Boylestad and Lovis Nashelsky, "Electronic Devices and Circuits Theory", 10th ed., Pearson Education, 2010.
2. N.N.Bhargava, "Basic Electronics and Linear Circuits", 1st ed.,Tata McGraw-Hill, 2009.
3. Sedra A.S. and K.C. Smith, "Micro Electronic Circuits", 5th ed., Oxford University Press, 2006.

II Year B.Tech. EEE I - Semester

L	T	P	To	C
-	-	3	3	2

EC207 ELECTRONIC DEVICES & CIRCUITS LAB

Course Description & Objectives:

To verify practically, the fundamental characteristics of Electronic Devices

To study experimentally the characteristics of diodes, BJT's and FET's

To verify practically, the frequency response of various amplifiers.

Course Outcomes:

- Understand the operation of solid state devices.
- Analyze the semiconductor devices by utilizing the characteristics curves.
- Describe the functioning of various semiconductor devices, including several types of diodes (conventional, Zener etc.), Bipolar Junction Transistors and Field Effect Transistors.
- Design the basic circuits like DC biasing circuits, small signal ac circuits with emphasis on single stage amplifiers.
- Design half and full wave rectifiers for required output voltages and measures.

List of Experiments :

1. PN Junction diode characteristics
   i) Forward bias ii) Reverse bias.
2. Zener diode characteristics
3. Half wave Rectifier with and without filter
4. Center tapped Full wave Rectifier with and without filter
5. Bridge Rectifier with and without filter
6. Transistor CB characteristics (Input and Output)
7. Transistor CE characteristics (Input and Output)
8. Transistor CC characteristics (Input and Output)
9. FET characteristics
10. SCR characteristics.
11. UJT characteristics
12. CE Amplifier
13. CC Amplifier (Emitter Follower).
14. FET amplifier (Common Source)

Note : Any *twelve* of the above experiments.

II Year B.Tech. EEE I - Semester

L	T	P	To	C
-	-	1	1	1

SR002 SEMINAR

Course Description & Objectives:

In this course the student is expected to develop speaking and discussion skills in basic engineering problems, develop internet research skills and build confidence to use English for oral communicative purpose.

Course Outcomes:

- Collect information about emerging technologies /market demands/ current trends.
- Organize & Analyze information about emerging technologies /market demands/current trends
- Exhibit effective communication skills, stage courage, and confidence.
- Demonstrate intrapersonal skills
- Prepare a well-organized report employing elements of technical writing and critical thinking

II Year B.Tech. EEE I - Semester

L	T	P	To	C
-	-	3	3	2

EE217 NETWORK THEORY-II LAB

Course Description & Objectives:

The main aim is to provide hands-on experience to the students so that they are able to put theoretical concepts to practice.

Course Outcomes:

- *Able to reflect the knowledge of network theorems to verify experimentally.*
- *The ability to conduct experiments to determine electrical parameters like active power, reactive power, using Watt meters.*
- *Able to determine the two port network parameters for a given network.*

List of Experiments :

1. Verification of Thevenin's and Norton's Theorem
2. Verification of Super-position and Maximum Power Transfer Theorem
3. Verification of Reciprocity and Compensation Theorem
4. Verification of Millman's and Tellegen's Theorem
5. Verification of Series and Parallel Resonance
6. Verification of Locus Diagrams in simple RL & RC circuits
7. Determination of Z and Y Parameters in a Two-Port Network
8. Determination of h and ABCD Parameters in a Two-Port Network
9. Measurement of Active Power in Star and Delta Connected Balanced loads
10. Measurement of Reactive Power in Star and Delta Connected Balanced loads
11. Measurement of Active power by 2-wattmeter method for unbalanced loads
12. Determination of Time-Response in simple series RL and RC networks

Note: Any 10 of the above experiments.

II Year B.Tech. EEE I - Semester

L	T	P	To	C
-	-	3	3	2

EE219 BASIC SIMULATION LAB

Course Description & Objectives:

To simulate various electrical circuits. To verify several theorems, and techniques used for solving electrical circuits. To observe response of electrical circuits for different inputs.

Course Outcomes:

- Understand the fundamentals and programming knowledge in PSPICE and solving basic electrical circuits.
- Solve, Simulate and Analyse basic Electrical and Electronics Circuits and Applications by writing Ohm's law, KCL and KVL Equations and Programs.
- Analyze the Transient & Steady State Performance of the electrical systems.
- Solve the electrical circuits using different theorems by using simulation programming.
- Obtain the two port parameters by using simulation.

List of Experiments :

1. PSPICE Simulation of DC Circuits
2. PSPICE Simulation of DC Transient response
3. PSPICE Simulation of Mesh Analysis
4. PSPICE Simulation of Nodal Analysis
5. Verification of Thevenin's Theorem by using PSPICE Simulation
6. Transient response of a series RLC circuit for step input, sinusoidal input and ramp input.
7. Verify super position theorem in AC circuits
8. Verify Thevenin's theorem in AC circuits
9. Verify maximum power transfer theorem in AC circuits
10. Obtain Z,Y parameters of given electrical network

II Year B.Tech. EEE II - Semester

L	T	P	To	C
4	-	-	4	4

EE212 A C MACHINES – I

Course Description & Objectives:

To impart knowledge on Constructional details, principle of operation and performance of transformers and induction motors, which are the major parts of industrial drives.

Course Outcomes:

- Describe the construction and working of single phase transformer.
- Analyze the OC and SC tests on transformer to predetermine the regulation, losses and efficiency of single phase transformer
- Identify the Auto transformer and three phase transformer connections.
- Understand the working principle, power flow at various stages of conversion process and it's representation in equivalent circuit diagram of three phase inductions motor
- Analyze the performance of three phase induction motors and understand various speed control methods.

UNIT I - Single-phase transformers:

Types - Constructional features and principle of operation- concept of ideal transformer under no load & loaded conditions— minimization of eddy current and hysterisis losses- its equivalent circuit-Practical transformer rating & its equivalent circuit-Regulation – definition & importance- derivation of expression.

UNIT II - Performance and equivalent circuit analysis of single phase transformers:

Losses & efficiency, condition for maximum efficiency-All-day efficiency-effect of variation of frequency and supply voltage on iron losses-O.C & S.C. tests and determination of equivalent circuit parameters - Sumpner's test - Predetermination of efficiency and regulation - separation of losses test - parallel operation with equal and unequal voltage ratios - Autotransformer – principle of operation & relative advantages & disadvantages over a two winding transformer.

UNIT III - Three phase transformers:

Constructional details- different connections and phasor groups-excitation phenomena-unbalanced operation of three phase transformers-Open delta or V connection-Three phase to two phase conversion (Scott Connection)-Tap changing transformers-problems.

UNIT IV - Three Phase induction motor:

Elementary balanced 3-phase distributed winding & production of revolving magnetic field; comment on its strength, speed and direction of rotation. Constructional features and principle of operation; types of induction motors; definition of slip and its importance; relation between stator & rotor frequencies-Per phase equivalent circuit; relation between air gap power, rotor copper losses and mechanical power developed.

UNIT V - Starting and speed control of 3-phase Induction Motor :

Expression for electromagnetic torque developed.- expressions for maximum torque and starting torque - torque slip characteristic - torque-slip characteristics for supply voltage, rotor resistance and frequency variation-phasor diagram - crawling and cogging. Basic principles of starting induction motor- direct on line, reactor, autotransformer, star-delta and rotor resistance starters – methods of speed control – stator voltage control-Variable frequency control-Rotor resistance control-change of poles and methods of consequent poles - cascaded connection - injection of an emf into rotor circuit - induction generator - principle of operation - Circle Diagram.

TEXT BOOKS:

1. P.S.Bimbra, "Electrical Machines:, 7th ed., Khanna Pubs., 2007.
2. I.J Nagrath & D.P Kothari, "Electric Machines", 3rd ed., Tata Mc Graw Hill, 2009.

REFERENCE BOOKS:

1. P.S.Bimbra,"Generalized theory of Electrical Machines", 5th ed., Khanna Pubs., 2009.
2. S.K.Bhattacharya, "Electrical Machines", 2nd ed., Tata Mc Graw Hill, 2007.
3. M.G Say, "Performance and Design of A.C Machines", 3rd ed., BPB Publishers, 2002.
4. A.E.Fitzgerald, C Kingsley and S Umans, "Electric Machinery", 6th ed., McGraw Hill, 2006.

II Year B.Tech. EEE II - Semester

L	T	P	To	C
4	-	-	4	4

EE214 POWER SYSTEMS – I

Course Description & Objectives:

This course introduces an overview of various electric power generating stations, different types of electric power distributors and substations. This course also enables economic aspects of power generation.

Course Outcomes:

- Explore different components and their functioning in hydro, thermal and nuclear power plants.
- Understand D.C and A.C Distribution systems.
- Identify the different components and busbar schemes in a substation.
- Apply power factor and voltage control methods to power system problems
- Analyze the economic aspects of power generation and tariff schemes.

UNIT I - Generating Stations :

Hydro power stations : Layout of Hydro power stations –Brief description of HPS components : reservoir, dam, spillways penstock, surge tank,draft tube, governors.

Thermal Power Stations: Line diagram of Thermal Power Station (TPS) showing paths of coal, steam, water, air, ash and flue gasses.- Brief description of TPS components: Economizers, Boilers, Super heaters, Turbines, Condensers, Chimney and Cooling towers.

Nuclear Power Stations :

Nuclear Fission and Chain reaction : Nuclear fuels.- Principle of operation of Nuclear reactor.-Reactor Components: Moderators, Control rods, Reflectors and Coolants.- Radiation hazards: Shielding and Safety precautions.- Types of Nuclear reactors and brief description of PWR, BWR and FBR.

UNIT II - Distribution Systems :

D.C. Distribution Systems : Classification of Distribution Systems - Comparison of DC vs AC Distribution Systems- Requirements and Design features of Distribution Systems- Voltage Drop Calculations (Numerical Problems) in D.C Distributors for the following cases: Radial D.C Distributor fed one end and at the both the ends (equal/unequal Voltages) and Ring Main Distributor.

A.C. Distribution Systems : Voltage Drop Calculations (Numerical Problems) in A.C. Distributors for the following cases: Power Factors referred to receiving end voltage and with respect to respective load voltages.

UNIT III - Substations :

Classification of substations : Indoor & Outdoor substations: Substations layout showing the location of all the substation equipment. Bus bar arrangements in the Sub-Stations: Simple arrangements like single bus bar, sectionalized single bus bar, main and transfer bus bar system with relevant diagrams.

UNIT IV - Power factor and Reactive Power Control :

Power factor and Voltage Control : Causes of low p.f -Methods of Improving p.f - static Capacitors, synchronous condensers phase advancer -Most economical p.f. for constant KW load and constant KVA type loads, Numerical Problems.

Dependency of Voltage on Reactive Power flow : Methods of Voltage Control - Shunt Capacitors, Series Capacitors, Synchronous Capacitors, Tap changing and Booster Transformers.

UNIT V - Economics of Power Generation :

Economics of Power Generation : Load curve, load duration and integrated load duration curves-load, demand, diversity, capacity, utilization and plant use factors- Numerical Problems.

Tariff Methods: Costs of Generation and their division into Fixed, Semi-fixed and Running Costs. Desirable Characteristics of a Tariff Method -Tariff Methods: Flat Rate, Block-Rate, two-part, three –part, and power factor tariff methods and Numerical Problems

TEXT BOOKS :

1. M.L.Soni, P.V.Gupta,U.S.Bhatnagar and A.Chakraborti, “A Text Book on Power System Engineering”, 1st ed., Dhanpat Rai & Co. Pvt. Ltd., 2007.
2. V.K Mehta and Rohit Mehta, “Principles of Power Systems”, 1st ed., S.Chand & Company Ltd., New Delhi, 2009.

REFERENCE BOOKS :

1. M.V. Deshpande, “Elements of Power Station design and practice”, 3rd ed., Wheeler Publishing, 1999.
2. C.L.Wadhwa, “Electrical Power Systems”, 4th ed., New age International (P) Limited, 2008.
3. S.N.Singh., “Electrical Power Generation”, 2nd ed., Transmission and Distribution PHI, 2010.

II Year B.Tech. EEE II - Semester

L	T	P	To	C
4	-	-	4	4

EE216 ELECTRICAL MEASUREMENTS & INSTRUMENTATION

Course Description & Objectives:

Electrical measurements course introduces the basic principles of all measuring instruments. It also deals with the measurement of RLC parameters, voltage, current, Power factor, power, energy and Digital Instruments, Oscilloscope, Transducers.

Course Outcomes:

- Understand operating principles of electrical measuring instruments.
- Compare the performance of MC, MI and Dynamometer types of measuring instruments, Energy meters and CRO.
- Determine the circuit parameters using AC and DC bridges.
- Compute the errors in CTs and PTs.
- Elucidate the concepts of digital voltmeters and transducers used for electric measurements.

UNIT I - Analog Electro Mechanical Instruments :

Introduction- Classification of Instruments– essential features of Indicating instruments – Ammeters and Voltmeters – PMMC, moving iron type instruments –deflecting torque and control torque – Errors and compensations, extension of range using shunts and series resistance. Electrostatic Voltmeters-Types – Extension of range of E.S. Voltmeters.

UNIT II - Instrument Transformers and P.F. Meters :

CT and PT – Ratio and phase angle errors – design considerations Types of P.F. Meters – dynamometer and moving iron type – 1-ph and 3-ph meters – resonance type and Weston type frequency meters – synchro scopes.

UNIT III - Measurement of Power and Energy :

Single phase dynamometer wattmeter, LPF and UPF, deflecting and control torques – Extension of range of wattmeter using instrument transformers. –

Measurement of active and reactive powers in balanced and unbalanced systems, Single phase induction type energy meter – driving and braking torques –errors and compensations – testing by phantom loading, Trivector, Maximum demand meters.

UNIT IV - Measurement of Resistance, Inductance and Capacitance :

Method of measuring low, medium and high resistance – Carey Foster's bridge, Kelvin's double bridge, loss of charge method, D.C. crompton's potentiometer ,Measurement of inductance, Quality Factor - Maxwell's bridge, Hay's bridge, Anderson's bridge, Owen's bridge, Measurement of capacitance and loss angle - Desauty bridge. Wien's bridge – Schering Bridge, A.C. Potentiometers.

UNIT V - Electronic Measurements :

Digital Instruments: Principle of operation of DVM s –display devices LEDs and LCDs Oscilloscope: Basic operation – deflection mechanism –time base circuits -vertical amplifiers -alternate and chop modes -applications. Transducers: Principles - LVDT -Thermister - Thermo couple - Strain Guage.

TEXT BOOKS:

1. E.W. Golding and F.C. Widdis, "Electrical Measurements and measuring Instruments" 5th ed., Wheeler Publishing, 1999.
2. A.K.Sawhney & Puneet Sawhney, "Electrical & Electronic Measurement & Instruments" 18th ed.,Dhanpat Rai & Co., Pvt. Ltd., 2010.

REFERENCE BOOKS:

1. Reissland, M.U, "Electrical Measurements: Fundamentals, Concepts, Applications" 1st ed., New Age International (P) Ltd. Publishers, 2010.
2. J.B. Gupta, "Electronic and Electrical Measurements and Instrumentation", 12th ed., S.K. Katharia, 2006.

II Year B.Tech. EEE II - Semester

L	T	P	To	C
4	-	-	4	4

EC220 ANALOG ELECTRONICS

Course Description & Objectives:

The purpose of this course is to introduce students to the basics of biasing transistor circuits, wave shaping circuit using transistor & analyzing different electronic circuits.(large signal amplifiers,), Multi vibrators, voltage & current Time Base generators with pulse signals. At the end of this course the students will learn and apply

- *Basic working & design of wave shaping circuits*
- *Time response of various signals like ramp, pulse*
- *Behavior of time base, current base signal generators*

Course Outcomes:

- Compare different amplitude modulation techniques. (unit 1 and 2)
- Analyze performance of different types of Angle modulation Techniques for a given set of parameters.(Unit-3)
- Identify the transmitter and receiver types required for a given applications. (unit-4)
- Familiarize the calculation of SNR in different modulation techniques. (unit-5)

UNIT I - Switching Devices & Filters :

Linear Wave shaping : High pass, low pass RC circuits, their response for sinusoidal, step, pulse, square and ramp inputs. RC network as differentiator and integrator,

Switching Characteristics of Devices : Diode as a switch, piecewise linear diode characteristics, Transistor as a switch, Design of transistor switch, transistor-switching times.

UNIT II - Non-Linear Wave Shaping :

Diode clippers, Transistor clippers, clipping at two independent levels, Transfer characteristics of clippers, Comparators, applications of voltage comparators, clamping operation, clamping circuits using diode with different inputs, Clamping circuit theorem, practical clamping circuits.

UNIT III - Multi vibrators :

Analysis & Design of Bistable (Symmetrical and Asymmetrical Triggering methods) , Monostable, Astable multi vibrators and schmitt trigger using transistors.

UNIT IV - Integrated Circuits & OP-AMP Applications :

Classification of Integrated circuits, basic information of Op-amp, ideal and practical Op-amp, internal circuits, Op-amp characteristics, DC and AC characteristics, features of 741 op-amp, modes of operation : inverting, non-inverting and differential. Basic application of Op-amp, V to I and I to V converters, sample & hold circuits, multipliers and dividers, Differentiators and Integrators, Comparators.

UNIT V - PLL & Converters :

Timers & Phase Locked Loops : Introduction to 555 timer, functional diagram, monostable and astable operations and applications, Schmitt

D/A and A/D Converters : Introduction, basic DAC techniques, weighted resistor DAC, R-2R ladder DAC, inverted R-2R DAC, and IC

1408 DAC, Different types of ADCs - parallel comparator type ADC, counter type ADC, successive approximation ADC and dual slope ADC. DAC and ADC specifications.

TEXT BOOKS :

1. J. Millman and H. Taub, “Pulse & Digital and Switching Waveforms” 2nd ed., Tata McGraw-Hill, 2008.
3. D. Roy Chowdhury, “Linear Integrated Circuits”, 2nd ed., ANew Age International (p) Ltd, 2003.

REFERENCE BOOKS :

1. David A. Bell, “Solid State Pulse circuits”, 4th ed., PHI, 2009.
2. Ramakanth A. Gayakwad, “Op-Amps & Linear ICs”, 4th ed., Prentice Hall of India, 2009.
3. A. Anand Kumar, “Pulse and Digital Circuits”, 2nd ed., PHI, 2009.

II Year B.Tech. EEE II - Semester

L	T	P	To	C
4	-	-	4	4

CS218 DATA STRUCTURES

Course Description & Objectives:

The main objective of this course is to provide an introduction to basic data structures and manipulating them, by using C programming language.

The course specifically has the following objectives :

(1) The fundamental design and implementation of basic data structures.

(2) The evaluation of the data structure needs of particular problems;

(3) The design and implementation of C programs by using basic data structures.

Course Outcomes:

Upon successful completion of this course, students should be able to:

- *Define, understand, differentiate the Object Oriented concepts and C++ Programming concepts.*
- *Apply object oriented concepts on real time scenarios.*
- *Understand the organization of several ADTs and the manipulation (searching, insertion, deletion, traversing) of data stored in various data structures.*
- *Analyze the efficiency of using different data structures and choose the efficient data structure for solving a given problem*

UNIT I -

Introduction – Data, Data type, Data Structures – Primitive and Non-primitive, Storage structures – Sequential and linked storage representations, File structures, Abstract Data Type (ADT). Overview of Structures-arrays, operations on arrays(retrieval of an element, search an element, insertion deletion of an element), manipulations on arrays such as finding the sum of elements of an array, adding two arrays, and reversing an array. Maximum sub sequence problem, Multi dimensional arrays.

UNIT II - Linked Lists :

Types of Linked Lists Singly Linked List, Doubly Linked List, Circular Linked List. Operations on linked lists-insertion, deletion, traversing forward/reverse order. Multi lists, Applications of Linked Lists.

UNIT III -

Stacks – ADT, array and linked representations, Implementation and their applications. Queues – ADT, array and linked representations, Implementation of linear, circular and doubly-ended queues, and their applications.

UNIT IV -

Preliminaries – Binary Tree – ADT, array and linked representations, Binary tree properties, tree traversal, Implementation, Expression trees. The Search Tree ADT – Binary Search Trees, Implementation. AVL Trees – Single Rotations, Double rotations.

UNIT V -

Graphs – ADT, definitions and properties, modeling problems as graphs, representation – adjacency matrix and adjacency list, basic graph traversals – breath first search and depth first search. Applications of graphs

TEXT BOOKS :

1. Richard F.Gilberg, Behrouz A. Forouzan, Data Structures - A Pseudo code Approach with C, Second Edition, Cengage Learning.
2. Y. Langsam, M.J.Augeustein and A.M.Tenenbaum, “Data Structures Using C”, Pearson Education Asia.

REFERENCE BOOKS :

1. Mark Allen Weiss, “Data Structures and Algorithm Analysis in C”, Second Edition, Pearson Education.
2. Sartaj Sahni, Data Structures, Algorithms and Applications in C++ , Universities Press, Second Edition, 2005
3. Jean Paul Tremblay and Paul G. Sorenson, An Introduction to Data Structures with Applications,Tata Mc-Graw Hill, Second Edition, 26th Reprint 2004
4. KRUSE, Data Structures and Programming Design-PHI

II Year B.Tech. EEE II - Semester	L	T	P	To	C
	-	-	1	1	1

SR003 SEMINAR

Course Description & Objectives:

In this course the student is expected to develop speaking and discussion skills in basic engineering problems, develop internet research skills and build confidence to use English for oral communicative purpose.

Course Outcomes:

- Collect information about emerging technologies /market demands/ current trends.
- Organize & Analyze information about emerging technologies /market demands/current trends
- Exhibit effective communication skills, stage courage, and confidence.
- Demonstrate intrapersonal skills
- Prepare a well-organized report employing elements of technical writing and critical thinking

II Year B.Tech. EEE II - Semester	**L**	**T**	**P**	**To**	**C**
	-	-	3	3	2

EE220 D.C. MACHINES LAB

Course Description & Objectives:

The student learns about the working and characteristics of D.C. Machines.

Course Outcomes:

- *Prepare theoretically and practically laboratory experiments*
- *Carry out laboratory experiments on electrical machines*
- *Present experiment results in a written report*
- *Analyze possible causes of discrepancy in comparison to theory.*

List of Experiments :

1. Magnetization characteristics of DC shunt generator. Determination of critical field resistance and critical speed.
2. Load test on DC shunt generator. Determination of characteristics.
3. Load test on DC series generator. Determination of characteristics.
4. Load test on DC compound generator. Determination of characteristics.
5. Hopkinson's test on DC shunt machines. Predetermination of efficiency.
6. Fields test on DC series machines. Determination of efficiency.
7. Swinburne's test on DC shunt motor and predetermination of efficiencies.
8. Brake test on DC compound motor. Determination of performance curves.
9. Brake test on DC shunt motor. Determination of performance curves.
10. Retardation test on DC shunt motor. Determination of losses at rated speed.
11. Separation of losses in DC shunt motor.
12. Speed control of D.C. shunt motor.

Note : Any 10 of above experiments are to be conducted.

II Year B.Tech. EEE II - Semester

L	T	P	TO	C
-	-	3	3	2

EC222 ANALOG ELECTRONCS LAB

Course Description & Objectives:

The students learn about wave shaping and OPamp applications.

Course Outcomes:

- *Students should be able to Analysis of given specifications/requirements*
- *Students should be able Design of the circuit to meet the specs*
- *Selection of components for the design*
- *Validation of the circuit.*

List of Experiments :

1. Linear wave shaping
2. Non-linear wave shaping – clippers
3. Non-linear wave shaping – clampers
4. Bistable multivibrator using Transistor
5. Monostable multivibrator using IC555
6. Astable multivibrator using IC555
7. Schmitt trigger
8. Gain of inverting and Non inverting opamps
9. Adder and subtractor using OP-AMPS
10. OPamp integrator and differentiator
11. Digital to Analog converter (R-2R ladder)

Note : Any 10 of above experiments are to be conducted.

II Year B.Tech. EEE II - Semester

L	T	P	TO	C
-	-	3	3	2

HS217 SOFT SKILLS LAB

Course Description & Objectives:

The Soft Skills Laboratory course is aimed at training undergraduate students and enabling them to acquire employability skills. Designed to impart work related skills, the course will help trainees develop interpersonal communication, leadership and team skills. It will give them the required competence and confidence to handle professional tasks.

Training Methodology:

The training methodology is designed to bring about changes in attitudes through experience-based learning. Activities in simulated environments such as role plays, group discussions, micro-presentations, audio-video clippings, case studies, psychometric tests etc., will provide students insights into their strengths and weaknesses.

Course Outcomes:

- Analyse the condition of workplace and develop formal communication skills
- Comprehend the working situation by teaming up and working group activities
- Apply the suitable language and speech pattern in a work place
- Enhance the ability of critical and lateral thinking while addressing the issues at any situation.

UNIT - I

a) Role of language in Personality – How language reflects, impacts personality – Using gender-neutral language in MNCs – being culturally sensitive.

Activity – Appraising each other – Worksheets related to the above

b) Career Planning- job vs. career- goal setting- SWOT analysis- planning and prioritization - four quadrant time management system - time management – self-management – stress-management.

Activity: Setting a SMART goal - SWOT analysis of the self – Writing a Statement of Purpose (SOP).

c) Effective Resume-Writing: structure and presentation - planning and defining the career objective - projecting one's strengths and skill-sets – summarizing - formats and styles - covering letter.

Activity: Resume preparation –writing a covering letter.

UNIT - II

a) Functional English - Formal/informal context – purpose - interpersonal dynamics - ideation –content organization - initiating a conversation – responding appropriately - right body language.

Activity - Role play in different situations, - self-introduction - social background (family, home town etc.,) - role model - my future - likes/dislikes (movies, persons, places, food, music etc.,) - a mini project on functional English.

b) Vocabulary-Building: Etymology of words - word roots - prefixes & suffixes - synonyms & antonyms- collocations - one-word substitutes – analogies - idioms and phrases - contextual guessing of unfamiliar words – task-oriented learning (100 words).

Activity: Flash cards (200 words) – vocabulary exercises with hand-outs.

UNIT - III

a) Group Discussion: Articulation and flow of oral presentation - dynamics of group discussion – intervention – summarizing - voice modulation – content generation – Key Word Approach (KWA) – Social, Political, Economic, Legal and Technical Approach (SPELT) – View Point of Affected Part (VAP) - language relevance - fluency and coherence.

Activity: Mock sessions on four types of GD topics.

b) Facing Interviews: Interview process - understanding employer expectations - pre-interview planning - opening strategies - answering strategies – stress-based interviews - tele-interviews, video interviews- frequently asked questions (FAQs).

Activity: Writing responses to FAQs - mock interviews.

UNIT - IV

a) Reading Comprehension: Reading as a skill- techniques for speed reading- skimming- scanning- appreciating stylistics - impediments for speed reading - eye fixation - sub-vocalisation - critical reading - reading based on purpose - reading for information - reading for inference -understanding tone.

Activity: Reading comprehension exercises with texts drawn from subject areas. (Hand-outs)

b) Listening Comprehension: Listening as skill - different types of listening - hidden data of communication - active listening - top-down approach - bottom-up approach.

Activity: Following different accents (Indian, British, American) listening comprehension exercises with audio and video excerpts.

UNIT - V

a) Data Commentary: Deductive & inductive reasoning - data interpretation - tables & charts - bar charts - pie charts - line graphs - ratios & proportions – percentages - coding and decoding - reasoning by analogy - artificial language etc.

b) Analytical Thinking: Statement and Conclusion - Data Sufficiency - Statement and Argument - Statement and Assumption - Logical Deduction - Logical Problems.

Activity: Exercises with handouts.

REFERENCE BOOKS :

1. *Edward Holffman,* ***Ace the Corporate Personality****, McGraw Hill,2001*
2. Adrian Furnham, ***Personality and Intelligence at Work***, Psychology Press, 2008.
3. John Adair Kegan Page, "***Leadership for Innovation"*** 1st edition, Kogan, 2007.
4. M.Ashraf Rizvi, "***Effective Technical Communication",*** 1st edition, Tata McGraw Hill, 2005.
5. Krishna Mohan & NP Singh , "***Speaking English Effectively"*** 1st edition, Macmillan, 2008.
6. ***Soft Skills Material*** of **Infosys** Under the Academic Initiative of Campus Connect
7. K.R. Lakshminarayana & T. Murugavel***, "Managing Soft Skills",*** Scitech Publications. 2009
8. Dr. S.P. Dhanvel***, English and Soft Skills,*** Orient Blackswan, 2011
9. Rajiv K. Mishra, ***Personality Development***-, Rupa & Co. 2004.
10. R.S.Agarwal, Quantitative Aptitude, S. Chand& Co. Latest edition.
11. R.S.Agarwal, Verbal & Non-verbal Reasoning, S. Chand& Co. Latest edition.

VFSTR UNIVERSITY

III Year - B.Tech
SYLLABUS

I SEM & II SEM

III Year B.Tech. EEE I - Semester

L	T	P	TO	C
4	-	-	4	4

EE313 A.C. MACHINES – II

Course Description & Objectives:

To understand the construction of Synchronous generators & motors and special machines. Develop the ability to use Synchronous generators and motors for various practical applications.

Course Outcomes:

- *Describe the principle of operation and construction of synchronous machines.*
- *Determine and compare voltage regulation of alternators by different methods.*
- *Examine the real problem happening in parallel operation of Alternators.*
- *Plot V and inverted V curves for different power factors and loadings and Plot the power circles of Synchronous motor.*
- *Identify the different features of synchronous & special machines*

UNIT I - Construction & Characteristics of Alternators :

Constructional features of Alternators : Types of alternators–revolving field type- rotating armature type – salient pole and non-salient pole field structure. Speed and frequency – cooling.

Armature windings: Single layer – double layer – full and fractional pitch windings – pitch factor, distribution factor, winding factor – expression for induced emf – Harmonics and their reduction.

Load characteristics: Voltage regulation – causes – effective resistance – leakage reactance – armature reaction – synchronous reactance – open circuit and short circuit tests – phasor diagrams.

UNIT II - Voltage Regulation and SC Characteristics :

Methods of predicting regulation : EMF and MMF methods – ZPF characteristic – Potier reactance – ASA method

Regulation of Salient pole generator : Slip test – direct and quadrature axes synchronous reactance – phasor diagrams – regulation.

Armature current oscillograms on sudden short circuit – determination of subtransient and transient reactances, (Xd”, Xd’).

UNIT III - Parallel Operation :

Parallel operation-methods of synchronization-circulating current – effect of change in excitation – effect of change in prime mover torque – influence of governors on load division between parallel units – Hunting of Alternators – synchronizing power.

UNIT IV - Analysis of Synchronous motors:

Synchronous motor : Principle of operation – phasor diagram– effects of changes of load and excitation on the phasor diagrams V - and inverted V-curves at constant power output - Hunting – damping – starting methods.

Mathematical analysis – Expression for power developed various conditions of maxima – stiffness of coupling – phasor diagrams of salient pole motor – expression for power developed-applications.

Graphical Analysis: Excitation circles – Power circles – construction – maximum and minimum conditions.

UNIT V - Special Machines :

Single phase induction motor: Constructional details – starting arrangements – performance curves and applications - equivalent circuit based on double revolving field theory determination of parameters.

A.C. Series motor – Characteristics – phasor diagram – compensated motor-commutation – interpoles – universal motors - applications.

Special Motors : Permanent magnet motors – stepper motors.

TEXT BOOKS:

1. P.S. Bimbhra, “Electrical Machinery”, 7th ed., Khanna publishers, 2007.
2. I.J. Nagrath and D.P. Kothari “Electrical Machines”, 3rd ed., Tata McGraw Hill, 2006.

REFERENCE BOOKS:

1. Alexander S.Langsdorf , “Theory of alternating current machinery”, 2nd ed., Tata MC Graw Hill, 2005.
2. M.G. Say, “Performance and design of alternating current machines” 3rd ed., CBS, 2002.
3. Charles I Hubert, “Electric Machines (Theory, operation, applications, adjustment and control)” 2nd ed., Pearson, 2009.

III Year B.Tech. EEE I - Semester

L	T	P	TO	C
4	-	-	4	4

EE315 POWER SYSTEMS – II

Course Description & Objectives:

To find the parameters, regulation and efficiency of different transmission lines. Study various types of insulators and various types of underground cables.

Course Outcomes:

- Compute the transmission line parameters and transposition of lines
- Analyze different transmission line parameters and performance.
- Describe the power system transients and different condition on transmission lines
- Classify the insulators and explain voltage distribution in a string of suspension.
- Explain UG cables and sag and tension calculations on lines.

UNIT I - Transmission Line Parameters :

Types of conductors - calculation of resistance for solid conductors - Calculation of inductance for single phase and three phase, single and double circuit lines, concept of GMR& GMD, symmetrical and asymmetrical conductor configuration with and without transposition, Numerical Problems. Calculation of capacitance for 2 wire and 3 wire systems, effect of ground on capacitance, capacitance Calculations for symmetrical and asymmetrical single and three phase, single and double circuit lines, Numerical Problems.

UNIT II - Performance of Short and Medium Length Transmission Lines:

Classification of Transmission Lines - Short, medium and long line and their model representations - Nominal-T, Nominal-Pie and A, B,C, D Constants for symmetrical & Asymmetrical Networks, Numerical Problems. Mathematical Solutions to estimate regulation and efficiency of all types of lines - Numerical Problems. Performance of Long Transmission Lines: Long Transmission Line-Rigorous Solution, evaluation of A,B,C,D Constants, Interpretation of the Long Line Equations, Incident, Reflected and Refracted Waves-Surge Impedance and SIL of Long Lines, Wave Length and Velocity of Propagation of Waves - Representation of Long Lines - Equivalent-T and Equivalent Pie network models (numerical problems).

UNIT III - Power System Transients:

Types of System Transients - Traveling or Propagation of Surges - Attenuation, Distortion, Reflection and Refraction Coefficients - Termination of lines with different types of conditions - Open Circuited Line, Short Circuited Line, T-Junction, Lumped Reactive Junctions (Numerical Problems). Bewley's Lattice Diagrams (for all the cases mentioned with numerical examples).

UNIT IV - Performance of Transmission lines and Insulators :

Various Factors Governing the Performance of Transmission line:

Skin and Proximity effects Description and effect on Resistance of Solid Conductors -Ferranti effect - Charging Current - Effect on Regulation of the Transmission Line, Shunt Compensation. Corona - Description of the phenomenon, factors affecting corona, critical voltages and power loss, Radio Interference.

Overhead Line Insulators: Types of Insulators, String efficiency and Methods for improvement, Numerical Problems - voltage distribution, calculation of string efficiency, Capacitance grading and Static Shielding.

UNIT V - Mechanical Design and UG Cables :

Sag and Tension Calculations : Sag and Tension Calculations with equal and unequal heights of towers, Effect of Wind and Ice on weight of Conductor, Numerical Problems - Stringing chart and sag template and its applications.

Underground Cables: Types of Cables, Construction, Types of Insulating materials, Calculations of Insulation resistance and stress in insulation, Numerical Problems. Capacitance of Single and 3-Core belted cables, Numerical Problems. Grading of Cables - Capacitance grading, Numerical Problems, Description of Inter-sheath grading.

TEXT BOOKS:

1. I.J.Nagarath and D.P Kothari, "Modern Power System Analysis" 3nd ed., Tata Mc Graw-Hill, 2008.
2. C.L.Wadhwa, "Electrical power systems", 4th ed., New Age International (P) Limited Publishers, 2008.

REFERENCE BOOKS:

1. John J Grainger William D Stevenson, "Power system Analysis", 1st ed., TMH Companies, 2005.
2. B.R.Gupta, "Power System Analysis and Design" 3rd ed., Wheeler Publishing, 1999.
3. Hadi Saadat, "Power System Analysis", 1st ed., TMH, 1999.

III Year B.Tech. EEE I - Semester

L	T	P	TO	C
4	-	-	4	4

EE317 POWER ELECTRONIC DEVICES AND CIRCUITS

Course Description & Objectives:

This course is to explore the theory and applications of power electronics systems for high efficiency, renewable and energy saving conversion systems. To know the characteristics of different power electronics switches, drivers and selection of components for different applications. To understanding of the switching behavior and design of power electronic converters.

Course Outcomes:

- Understand the differences between signal level and power level devices
- Analyse controlled rectifier circuits.
- Design of DC-DC converters for the given application.
- Investigate the operation of voltage source inverters.
- Analyse the operation of AC-AC converters

UNIT I - Power semiconductor devices:

Power MOSFET, IGBT, GTO their operation and V-I characteristics- Basic theory of operation of SCR - static characteristics - Two transistor analogy - turn on and turn off methods - firing circuits - Dynamic characteristics- Specifications and ratings - Series and Parallel operation – protection circuits- numerical problems.

UNIT II - Single-Phase Control Rectifiers:

Single phase converters - single pulse and two pulse- mid point and bridge connections with R and RL loads –Effect of source inductance - problems.

UNIT III - Three-Phase Control Rectifiers:

Three phase converters - three pulse and six pulse - mid point and bridge connections - effect of source inductance- Dual converters - Problems - performance factors.

Choppers - principle of operation - Classification - Time ratio control and current limit control strategies - step down chopper - Derivation of load voltage and currents with R, RL loads- Jones Chopper - step up chopper - problems.

UNIT IV - AC Voltage Controllers:

Integral cycle control - Single phase half wave- two SCR's in anti parallel - with R and RL loads - modes of operation of Triac - Triac with R and RL loads- numerical problems .

Cyclo converters - Single phase mid point and bridge- with R and RL loads- step up and step down cyclo converters.

UNIT V - Inverters - single phase inverter:

Basic series inverter –modified- Basic parallel inverter - bridge inverters – THD-current source inverter-voltage control techniques for inverters - pulse width modulation techniques -numerical problems.

TEXT BOOKS:

1. Dr.P.S.Bimbra, "Power Electronics" 4th ed., Khanna publishers, 2009.
2. M.D. Singh & K.B Khanchandani, "Power Electronics", 2nd ed., Tata MC Graw Hill, 2009.

REFERENCE BOOKS:

1. Vedam Subrahmanyam, "Power Electronics", 1st ed., New Age, 2001.
2. Ned mohan, "Power Electronics", 2nd ed., Wiley, 1995.
3. C.W Lander, "Power Electronics", 3rd ed., MCGraw Hill, 1993.
4. M.H.Rashid, "Power Electronics: Circuits, Devices and Applications", 3rd ed., Prentice Hall of India, 2009.

III Year B.Tech. EEE I - Semester

L	T	P	TO	C
4	-	-	4	4

EE319 LINEAR CONTROL SYSTEMS

Course Description & Objectives:

This course is to explore the modeling of linear dynamic systems via differential equations and transfer functions utilizing input-output representations; analysis of control systems in the time and frequency domains and using transfer function and state-space methods

Course Outcomes:

1. Formulate differential equations for electromechanical systems.
2. Describe the effects of feedback on control systems.
3. Apply mathematical techniques to perform time response analysis of a control system.
4. Analyse linear control systems for absolute stability and relative stability using Root Locus technique and frequency domain analysis.
5. Design controllers and compensators for the given system to achieve desired specifications.

UNIT I - Introduction to Control Systems :

Introduction: Concepts of Control Systems - Open Loop and closed loop control systems and their differences - Different examples of control systems - Clasification of control systems.

Mathematical Models of Physical Systems : Differentical equations - transfer functions and block diagram representation of systems considering electrical systems as examples Block diagram algebra -Representation by Signal flow graph - reduction using Mason's gain formula - translational and rotational mechanical systems.

UNIT II - Feed-Back Characteristics and Control Components :

Feed-Back Characteristics : What is Feedback? Effects of feedback - reduction of parameter variations by use of feedback-Control over system dynamics - by the use of feedback.

Elements of Control Systems : DC Servo motor - AC Servo motor - Synchro transmitter and Receiver.

UNIT III - Time Response Analysis & Stability :

Time Response Analysis : Standard test signals - Time response of first order systems - Characteristic Equation of Feedback control systems, Transient response of second order systems - Time domain specifications - Steady state response - Steady state errors and error constant.

Concepts of stability : The concept of stability, Routh stability criterion.

UNIT IV - RL Technique & Frequency Response Analysis :

Root Locus Technique : The root locus concept - construction of root loci.

Frequency Response Analysis : Introduction, Frequency domain specifications - Bode diagrams - Determination of Frequency domain specifications from the Bode Diagram - Phase margin and Gain margin - Stability Analysis from Bode Plots. Polar Plots, Nyquist Plots and Nyquist stability criterion

UNIT V - Design and Modern Control Systems :

Design and Compensation Technique : Introduction and Preliminary design considerations - Lead, Lag, Lead-lag. PID controller.

State Space Analysis of Continuous Systems : Concepts of state, state variables and state model, derivation of state models from block diagrams, Diagonalization - Solving the Time Invariant state Equations - State Transition Matrix.

TEXT BOOKS :

1. I. J. Nagrath and M. Gopal, “Control Systems Engineering”, 2nd ed., New Age International (P) Limited, 2010.
2. Katsuhiko Ogata, “Modern Control Engineering”, 3rd ed.,Prentice Hall of India Pvt. Ltd., 1998.

REFERENCE BOOKS :

1. B. C. Kuo, “Automatic Control Systems”, 8th ed., John wiley and son’s, 2003.
2. John wiley, “Control Systems Engg”., 3rd ed., NISE, 2000.

III Year B.Tech. EEE I - Semester

L	T	P	TO	C
4	-	-	4	4

EE321 DIGITAL ELECTRONIC CIRCUITS (Dept. Elective - I)

Course Description & Objectives:

As part of this course, students: To introduce the concepts and techniques associated with the number systems and codes. To minimize the logical expressions using Boolean postulates. To design various combinational and sequential circuits. To provide with an Sufficient Number of applications for the techniques and mathematics used in this course.

Course Outcomes:

- Assimilate the philosophy of number systems and codes.
- Perceive the Boolean laws and postulates and implementation using logic gates.
- Design and implement Combinational logic circuits.
- Design and implement Sequential logic circuits.
- Expound the nomenclature and technology in the area of logic families and memory devices.

UNIT I - Number System :

Binary arithmetic (Addition, subtraction, multiplication, division), octal number system, hexadecimal number system, 1's and 2's complement. Signed numbers, EX-3, gray code alphanumeric code, EBCDIC, ASCII,, Error detection & correction, parity, 7- bit hamming

UNIT II - Logic gates and Minimization :

Basic gates, Universal gates, and their truth tables, postulates of Boolean algebra, De-Morgan's theorem Min term and Max term representation of logical function, Minimization using K-map- Don't care condition, Quinn Mc-clusky method for minimization.

UNIT III - Combinational Logic :

Half and full adders, parallel adder, subs tractor, decoder (BCD to Seven segment), Encoder, Multiplexer, Demultiplexer, parity generation & checking, Look ahead carry generator.

UNIT IV - Sequential Logic :

Sequential circuits, flip-flops (SR,D,T, JK, Master-slave), timing specifications, asynchronous and synchronous counters-up/down counters. Registers , serial in serial out shift registers.

UNIT V - Memory and Logic Families :

Memory: RAM, ROM,PROM, EPROM and Flash memory, Introduction to Cache memory

Logic Families: Logic levels, propagation delay time, power dissipation fan-out and fan-in, noise margin, Comparison of logic families and their characteristics. TTL (NAND, NOT, TOTEMPOLE), CMOS (NOR,NOT and NAND) integrated circuits .

TEXTBOOKS :

1. ZVI KOHAVI, " Switching and Finite Automata Theory",2nd ed. TMH,2009
2. Morris Mano, "Digital Logic & computer Deisgn",1st ed,Pearson

REFERENCES :

1. John M. Yarbrough, "Digital Logic Applications and Design",1st ed.,Thomson Publications, 2006.
2. Fletcher, "An Engineering Approach To Digital Design" , 1st ed.,Prentice Hall of India. 2009.
3. R.P.Jain, Modern Digital Electronics, 3 ed., Tata McGraw–Hill publishing company limited, New Delhi, 2003.
4. Thomas. L.Floyd, "Digital fundamentals",9th ed, Prentice Hall,2005
5. John F walkerly, Digital Design Principles and Practices, 3rd ed., PHI/ Pearson Education, 2005.

III Year B.Tech. EEE I - Semester	L	T	P	TO	C
	4	-	-	4	4

EC221 SIGNALS AND SYSTEMS
(Dept. Elective - I)

Course Description & Objectives:

This course is an introduction to the basic concepts and theory of analog signal processing. In this course signals & systems, the concepts associated with continuous-time signals and systems are focused.

The objective of this course is to provide understanding of the fundamental properties of linear systems, linear systems tools, especially transform analysis and convolution, to analyze and predict the behavior of linear systems.

Course Outcomes:

Upon successful completion of this course, students will be able to:

- Understand basic signals and their representation using Fourier series. (unit-1)
- Apply the concept of transform techniques, convolution and correlation for continuous time signals (unit-2 and 4)
- Evaluate the step, impulse and system response of a LTI System to arbitrary inputs. (Unit-3)
- Learn the fundamentals of sampling including the implications of sampling theorem. (unit-5)

UNIT I - Introduction & Fourier series Representation of Periodic Signals:
Introduction to signals and systems. Basic signals, classification and operations.

Vectors vs Signals, Orthogonal functions, Representation of signals using orthogonal functions, Mean square error. Representation of Fourier series, Continuous time periodic signals, properties of Fourier series, Dirichlet's conditions, Trigonometric Fourier series , Exponential Fourier series and Complex Fourier spectrum.

UNIT II - Fourier Transforms & Laplace Transforms :
Deriving Fourier transform from Fourier series, Fourier transform of arbitrary signal, Fourier transform of standard signals, Fourier transform of periodic signals, properties of Fourier transforms, Fourier transforms involving impulse function and Signum function, Introduction to Hilbert Transform.

Review of Laplace transforms, Partial fraction expansion, Inverse Laplace transform, Concept of region of convergence (ROC) for Laplace transforms, constraints on ROC for various classes of signals, Properties of L.T's, relation between L.T and F.T. of a signal. Laplace transform of certain signals using waveform synthesis.

UNIT III - LTI Systems & Analysis:
Classification of Systems, Linear Time Invariant (LTI) System, Impulse Response, Step Response, response of a LTI system to arbitrary inputs, Transfer function of a LTI system. Filter characteristics of linear systems. Distortion less transmission, Signal bandwidth, System bandwidth, Ideal LPF, HPF and BPF characteristics, Causality and Paley-Wiener criterion for physical realization, relationship between bandwidth and rise time.

UNIT IV - Convolution & Correlation of Signals :
Concept of convolution in time domain and frequency domain, Graphical representation of Convolution, Convolution property of Fourier transforms. Cross correlation and auto correlation of functions, properties of correlation function, Energy density spectrum, Parseval’s theorem, Power density spectrum, Relation between auto correlation function and power spectral density. Relation between convolution and correlation, Detection of periodic signals in the presence of noise by correlation, Extraction of signal from noise by filtering.

UNIT V - Sampling:
Sampling theorem: Graphical and analytical proof for Band Limited Signals, Impulse sampling, Natural and Flat Top Sampling, Reconstruction of signal from its samples, effect of under sampling- Aliasing, Introduction to Band Pass sampling.

TEXT BOOKS:

1. A.V. Oppenheim, A.S. Willsky and S.H. Nawab, “Signals and Systems”, 2nd ed.,Prentice Hall of India, 1997.
2. B.P.Lathi, “Linear Systems and Signals”, 2nd ed., Oxford University Press, 2009

REFERENCE BOOKS:

1. B.P. Lathi, “Signals,Systems & Communications”, John Wiley, 2005.
2. Simon Haykin and Van Veen,Wiley, “An Introduction to Signals & Systems”, 2nd ed., 2002.
3. John Alan Stuller, “An Introduction to Signals & Systems” Thomson, Indian ed., 2007.
4. H PHsu “Signals & Systems”, 2nd ed., Tata McGraw-Hill Schaum’s Outlines, 1995.

III Year B.Tech. EEE I - Semester

L	T	P	TO	C
4	-	-	4	4

EE323 ENERGY CONVERSION AND STORAGE TECHNOLOGIES
(Dept. Elective - I)

Course Description & Objectives:

Direct energy conversion systems. Need and necessity of energy storage systems and their desirable characteristics. To discuss on the working of a typical fuel cell, its types and to elaborate on its thermodynamics and kinetics. To detail on the various Hydrogen storage options

Course Outcomes:

- Analyse the basic concepts of energy storage system.
- Apply the energy storage systems in real time application.
- Design of suitable battery configuration.
- Examine various hydrogen storage options.
- Compare the electrical, mechanical and thermal energys storage systems.

UNIT I - Direct Conversion Of Thermal To Electrical Energy:

Thermoelectric Converters –Thermionic converters – MHD – Ferro electric converter – Nernst effect generator.

UNIT II - Chemical & Electromagnetic Energy To Electrical Energy:

Batteries – types – working – Cell capacity; Types & Specifications of Batteries; Charging & Discharging of Battery; Safe disposal of Batteries -performance governing parameters.

UNIT III - Energy Storage Systems:

Energy Storage Technologies - Mechanical energy, Electrical energy, Chemical energy, Thermal energy.

UNIT IV - Fuel Cells:

Basics – types – working – comparative analysis – thermodynamics and kinetics of fuel cell process –performance of fuel cell – applications - advantages and drawbacks - comparison on battery Vs fuel cell

UNIT V - Hydrogen Storage:

Hydrogen storage options – compressed gas – liquid hydrogen – Hydride – chemical Storage – Comparisons. Safety and management of hydrogen.

TEXT BOOKS:

1. Archie.W.Culp, Principles of Energy Conversion, McGraw-Hill Inc., 1991, Singapore.
2. Viswanathan, B and M Aulice Scibioh, Fuel Cells – Principles and Applications,Universities Press (2006).

REFERENCE BOOKS:

1. Kordesch, K and G.Simader, Fuel Cell and Their Applications, Wiley-Vch, Germany (1996).
2. Kettari, M.A.Direct Energy Conversion, Addison-Wesley Pub. Co. 1997.
3. Bent Sorensen (Sørensen), Hydrogen and Fuel Cells: Emerging Technologies and Applications, Elsevier, UK (2005).

III Year B.Tech. EEE   I - Semester

L	T	P	To	C
-	-	1	1	1

SR004 SEMINAR

Course Description & Objectives:

In this course students are expected to study specialized area by doing literature survey, understanding technical problems and arriving at a status report in that area. During the preparation of seminar, the student is expected to learn investigation techniques, study suitable research papers, understanding concepts, techniques, prevailing results etc., analyze it and present a seminar report.

Course Outcomes:

- Collect information about emerging technologies /market demands/ current trends.
- Organize & Analyze information about emerging technologies /market demands/current trends
- Exhibit effective communication skills, stage courage, and confidence.
- Demonstrate intrapersonal skills
- Prepare a well-organized report employing elements of technical writing and critical thinking

III Year B.Tech. EEE I - Semester

L	T	P	TO	C
-	-	3	3	2

EE325 A.C. MACHINES LAB

Course Description & Objectives:

To analyse the performance of 1-p and 3- p transformers by conducting various experiments. To analyse the performance of 1-p and 3- p Induction motors by conducting various experiments. To analyse the performance of 3- p Synchronous Machines by conducting various experiments.

Course Outcomes:

- *Test the transformer and find its performance.*
- *Perform parallel operation of transformers.*
- *Test the induction motors and find their performance.*
- *Test the Synchronous Machine and find its performance.*
- *Obtain the synchronous reactrance values for different synchronous machines.*

List of Experiments :

1. O.C. & S.C. Tests on Single phase Transformer
2. Sumpner's test on a pair of single phase transformers
3. Scott connection of transformers
4. No-load & Blocked rotor tests on three phase Induction motor
5. Regulation of a three –phase alternator by synchronous impedance & m.m.f. methods
6. V and Inverted V curves of a three—phase synchronous motor.
7. Equivalent Circuit of a single phase induction motor
8. Determination of Xd and Xq of a salient pole synchronous machine
9. Parallel operation of Single phase Transformers
10. Separation of core losses of a single phase transformer
11. Brake test on three phase Induction Motor
12. Regulation of three-phase alternator by Z.P.F. and A.S.A methods
13. Load Test on three-phase alternator
14. Heat run test on a bank of 3 Nos. of single phase Delta connected transformers
15. Measurement of sequence impedance of a three-phase alternator.

Note : Any 10 of above experiments are to be conducted.

III Year B.Tech. EEE I - Semester

L	T	P	TO	C
-	-	3	3	2

EE327 ELECTRICAL MEASUREMENTS & INSTRUMENTATION LAB

Course Description & Objectives:

The ability to conduct experiments to determine the constitutive parameters like resistance, inductance and capacitance using bridge methods. The ability to conduct experiments to determine electrical parameters like active power, reactive power, energy using Wattmeter and Energy meters and also to calibrate these instruments. The ability to calibrate meters with the available loads including Power factor meter at different load conditions. The ability to conduct experiments on Transducers like LVDT, strain gauge to find displacement and strain.

Course Outcomes:

- Understand the usage of various types of Analog and Digital meters.
- Examine and calibrate various Wattmeters using direct loading and phantom loading.
- Understand the methods of Measurement of Resistance, Inductance and Capacitance using AC & DC bridges.
- Determine the errors in Potential Transformers and Current Transformers
- Interpret measurement of 3 phase powers using various wattmeter connections.

List of Experiments:

1. Calibration and Testing of single phase energy Meter.
2. Calibration of dynamometer power factor meter.
3. Crompton D.C. Potentiometer – Calibration of PMMC ammeter \ and PMMC voltmeter.
4. Kelvin's double Bridge – Measurement of resistance – Determination of Tolerance.

5. Measurement of % ratio error and phase angle of given C.T. by comparison.
6. Schering bridge & Anderson bridge.
7. Measurement of 3 phase reactive power with single-phase wattmeter.
8. Measurement of parameters of a choke coil using 3 voltmeter and 3 ammeter methods.
9. Calibration LPF wattmeter – by Phantom testing.
10. Measurement of 3 phase power with single watt meter and 2 No’s of C.T.
11. C.T. testing using mutual Inductor – Measurement of % ratio error and phase angle of given C.T. by Null method.
12. Dielectric oil testing using H.T. testing Kit
13. LVDT and Stain gauge – characteristics and Calibration
14. Transformer turns ratio measurement using a.c. bridge.
15 A.C. Potentiometer – Polar form/Cartesian form – Calibration of AC Voltmeter, Parameters of Choke.

Note : Any 10 of above experiments are to be conducted.

III Year B.Tech. EEE   I - Semester

L	T	P	TO	C
1	-	2	3	2

HS304 PROFESSIONAL COMMUNICATION LAB

Course Description & Objectives:

The Professional Communication exposes students to conventions of corporate communication and documentation procedures involved in the day-to-day functioning of the business world. The course is aimed at improving written communication skills of undergraduate students and preparing them to meet professional challenges in the work spheres. Writing and Personality are not two exclusive spheres of influence and this course will work on the relationship between professional writing and a personality that is able to meet the goals of an organization in creative and innovative ways.

Training Methodology:

The methodology is designed to give hands-on practice to students in formal and informal report writing, structure and format of letters as well as other organization related work.

Course Outcomes:

- Analyze and ability to write business correspondence and reports and proposals clearly and precisely
- Communicate effectively both in their academic as well as professional environment
- Identify clear grasp on the register of business language and ethical communication in communication
- Distinguish the differences between formal and informal communication

Mechanics of writing

- Elements of Technical Writing : Sentence structure - reducing verbosity - arranging ideas logically – building coherence - paragraph level and document level - topic sentence - cohesive devices – transitionals – paraphrasing – précis-writing.
- Mechanics of Writing: Stylistic elements – the rapporteur- the purpose- the reader (audience) - elementary rules of grammar- choice of diction - elementary principles of composition - matters of form – punctuation - conventions of business communication -language and tone - weak links in business correspondence - ethical concerns in business writing.

Business Report Writing

- Parts of the Report: Writing an abstract - features of a good abstract – approach - compare and contrast - cause and effect.
- Types of Technical Reports : Drafting a technical proposal - formal and informal proposals - factual reports, feasibility reports, survey reports – parts of a report - title page –declaration – acknowledgements – table of contents - abstract – introduction – conclusion – citations – references - appendices - oral reports and presentations

Business Letter Writing

- Letter-Writing - Formal and informal letters - structure of formal letters - expressions of salutations, introductory and concluding paragraphs - different types of letters - sales letter - complaint letter - adjustment letter - letter to the editor - covering letter - claim letter – letter of condolence.

Business E- writing:

- E-mail – nature and scope - e-mail etiquette – Common Errors in composing e-mails – Quotations - Inviting quotations - sending quotations –placing orders Office Communication - agenda - notice - circular
- Effective Resume-Writing: Structure and presentation - defining career objective - projecting one's strengths and skill-sets
- Summarizing - formats and styles - covering letter.

Business visual presentations

- Business Proposals: Drafting business proposals - calculating profit and loss-averages - ratios and proportions – partnership - simple interest - compound interest - calculating volumes and areas
- course of action - cause and effect- theme detection - making judgments - logical deductions - analyzing arguments – syllogisms - Venn diagrams - matching definitions -verbal reasoning - numerical reasoning - working out justifications.

REFERENCE BOOKS:

- Strunk, William, Jr.*The Elements of Style*, Fourth Edition,
- Rozakis, Laurie, Ph.D, (2003). *English Grammar for the Utterly Confused*, McGraw-Hill
- Sharma. C. (1978) *Business Correspondence & Report Writing*, Tata McGraw-Hill
- Kirkman, John. *Good Style: Writing for science & technology*, Routledge Study Guides, Second Edition.
- Monippally, Matthukutty. M. 2001, *Business Communication Strategies*, 11th Reprint, Tata McGraw-Hill, New Delhi.

III Year B.Tech. EEE II - Semester

L	T	P	TO	C
4	-	-	4	4

EE316 MICROPROCESSOR ARCHITECTURE AND CONTROL

Course Description & Objectives:

To learn the fundamentals of 8086 architecture. To gain knowledge in interfacing devices. To learn the concepts microcontroller and their applications.

Course outcomes:

- Understand the 8086 microprocessor architecture and functional block diagram of 8086 microprocessor along with the pins.
- Apply the programmers model of 8086 with complete instruction set.
- Interface memory and I/O devices with 8255 Programmable peripheral Interface (PPI) to 8086 microprocessor and to analyze the 8259 PIC and 8257 DMA controller.
- Analyze the internal architecture and real time control of 8051 microcontroller.
- Interface the input and output devices like LCD, ADC, DAC, and sensor and stepper motor interface with 8051 microcontroller.

UNIT I - INTRODUCTION TO 16 BIT MICROPROCESSORS – H/W ARCHITECTURE:

8086 – Hardware Architecture, Memory, Registers, Pin diagram, Bus cycles, Maximum and Minimum mode operations and bus cycle, Interrupt processing.

UNIT II - 16 BIT MICROPROCESSOR INSTRUCTION SET AND ASSEMBLY LANGUAGE PROGRAMMING:

Programmer’s model of 8086: Assembler directives, instruction set - Data transfer group, Arithmetic group, logical group, control transfer group, miscellaneous instruction groups, programming. Introduction to Procedures and Macros.

UNIT III - MICROPROCESSOR PERIPHERAL INTERFACING - I:

Introduction to I/O Interfacing, Generation of I/O Ports, Programmable Peripheral Interface (PPI)-Intel 8255- Architecture, Modes, LED interfacing, D-to-A converter, A-to-D converter, stepper motor interfacing.

UNIT IV - INTERFACING II:

Programmable interrupt controller Interfacing(8259), Direct Memory Access Controller Interfacing(8257), USART Interfacing(8251).

UNIT V - 8 BIT MICROCONTROLLER- H/W ARCHITECTURE, INSTRUCTION SET AND PROGRAMMING:

Introduction to 8051 Micro-controller, Architecture, Memory organization, Special function registers, Port Operation, Memory Interfacing, I/O Interfacing, Programming 8051 resources, interrupts, Programmer's model of 8051, Operand types, Operand addressing, Data transfer instructions, Arithmetic instructions, Logic instructions, Control transfer instructions.

TEXTBOOKS:

1. Advanced Microprocessors and Peripherals - A. K. Ray and K.M. Bhurchandani, TMH, 2nd Edition 2006.
2. Microprocessors and Interfacing – Hall, TMH, 2nd Edition 2006.

REFERENCE BOOKS:

1. Micro Computer System 8086/8088 Family Architecture. Programming and Design - By Liu and GA Gibson, PHI, 2nd Edition 2008.
2. MicroProcessors and Microcontrollers, Krishna Kant, PHI, 2007.
3. The 8051 Microcontroller – Kenneth.J.Ayala, Cengage learning, 3rd Edition 2007.

III Year B.Tech. EEE II - Semester

L	T	P	TO	C
4	-	-	4	4

EE318 SWITCH GEAR AND PROTECTION

Course Description & Objectives:

To understand the need of protection of electric equipment and their protection schemes. To understand operations & characteristics of various electromagnetic and static relays. To understand the operations of various types of circuit breakers and their ratings. To understand the unit protection and over voltage protection of different apparatus in power system.

Course Outcomes:

- Apply quenching mechanisms used in air, oil, sf6 and Vacuum Circuit Breakers
- Design the Relay Settings for different types of relays.
- Analyze the Bus bar Protection and neutral grounding
- Design the Protection schemes for generator and transformer.
- Understand the causes of over voltages and analyze different types of lighting arresters

UNIT I - Introduction to Power System Protection & Circuit Breakers:

Introduction to Power System Protection: Importance and Requirements of Protective system - Overview of Switchgear equipments.

Circuit Breakers: Elementary principles of arc interruption, Recovery, Restricking Voltage - Restricking Phenomenon, Average and Max. RRRV, Numerical Problems. Current Chopping and Resistance Switching. CB ratings and Specifications, Auto reclosures.

Description and Operation of following types of circuit breakers: Minimum Oil Circuit breakers, Air Blast Circuit Breakers, Vacuum and SF6 circuit breakers.

UNIT II - Relays :

Electromagnetic and Static Relays : Principle of Operation and Construction of Attracted armature, Balanced Beam, induction Disc and Induction Cup relays.

Relays Classification: Instantaneous, DMT and IDMT types, Over current, Direction relays, Differential Relays and Percentage Differential Relays, Universal torque equation,

Distance Relays: Impedance, Reactance and Mho Characteristics of Distance Relays and Comparison.

Static Relays: Static Relays verses Electromagnetic Relays.

UNIT III - Fuses, and Grounding Practices:

Fuses: Desirable Characteristics of Fuse Elements, Important terms in Fuses, Types of Fuses, HRC fuse.

Feeder and Bus-Bar Protection : Protection of Lines: Over Current, Carrier Current and Three-zone distance relay protection using Impedance relays. Translay Relay. Protection of Bus bars – Differential protection.

Neutral Grounding : Grounded and Ungrounded Neutral Systems - Methods of Neutral Grounding: Solid, Resistance, Reactance - Arcing Grounds and Grounding Practices.

UNIT IV - Generator & Transformer Protection:

Generator Protection : Protection of generators against Stator faults, Rotor faults, and Abnormal Conditions. Restricted Earth fault and Inter-turn fault Protection. Numerical Problems on % Winding Unprotected.

Transformer Protection : Protection of transformers: Percentage Differential Protection, Numerical Problem on Design of CT s Ratio, Buchholtz relay.

UNIT V - Protection against over voltages :

Generation of Over Voltages in Power Systems - Protection against Lightning Over Voltages - Valve type and Zinc-Oxide Lighting Arresters. Insulation and Coordination -BIL, Impulse Ratio, Standard Impulse Test Wave, Volt-Time Characteristics and Insulation Co-ordination.

TEXT BOOKS:

1. Sunil S Rao, "Switchgear and Protection" 12th ed., Khanna Publlishers, 2007.
2. Badari Ram , "Power System Protection and Switchgear" 1st ed., D.N Viswakarma, TMH Publications, 2005.

REFERENCE BOOKS:

1. T S Madhav Rao, "Power System Protection : Static Relays", 2nd ed. Tata MC Graw-Hill, 2007.
2. CL Wadhwa, "Electrical Power Systems", 4th ed., New Age international (P) Limited, 2008.
3. Paithankar and S.R.Bhide., "Fundamentals of Power System Protection" 1st ed., Prentice Hall of India, 2007.

III Year B.Tech. EEE II - Semester

L	T	P	TO	C
4	-	-	4	4

MS310 MANAGERIAL ECONOMICS

Course Description & Objectives:

To make the student familiar with the basic concepts and principles of Business Economics. The course aims to develop student's capacity to analyze the economic environment in which business entities operate and understand how managerial decisions can vary under different constraints that each economic environment places on a manager's pursuit of it's goals, focusing on analyzing the functioning of markets and the economic behavior of firms and other economic agents.

Course Outcomes:

By the end of this course it is expected that the student will be able to:

- To understand the nature and scope of Managerial Economics and the role of demand analysis in managerial decision making.
- To interpret long-run, short-run production functions and companies cost analysis using cost output Relationship in the short-run and long-run:
- To design Competitive strategies like pricing, product differentiation etc. according to the market structure
- To estimate the profit or loss position of an organisation using brak-even analysis.
- To analyse the financial position of a company using ratios.

UNIT I - Nature & Scope of Managerial Economics:

Basic tools and techniques of Business Economics, Macro Economic Environment and Managerial decisions.

UNIT II - Demand Analysis:

Types of Demand, Demand determination Concept of Elasticity and measurement, Demand forecasting, Survey & Statistical methods.

UNIT III - Theory of Production:

Production function, Marginal rate of technical substitution, Iso-quants and Iso-costs, production function with one/two variable factors, Law of Variable Proportions, and Returns to Scale, internal and external economies.

UNIT IV - Cost Analysis:

Cost concepts, cost determinants, cost output relationship in the short and long run, Break-Even analysis.

UNIT V - Markets and price determination :

Features and types of different competitive situations – Perfect competition, Monopoly, Monopolistic competition and Oligopoly, pricing methods in practice.

TEXT BOOKS:

1. Gupta: Managerial Economics, 1/e TMH, 2005.
2. A.R.Arya Sri, Managerial Economics and Financial Analysis, TMH, 2/e, 2010.

REFERENCE BOOKS:

1. Dominic Salvatore, Managerial Economics, Thomson, 2/e, 2006.
2. Mote Paull, Managerial Economics, 1/e, TMH, 2004.

III Year B.Tech. EEE II - Semester	L	T	P	TO	C
	4	-	-	4	4

CS223 OBJECT ORIENTED PROGRAMMING THROUGH JAVA

Course description and Objectives:

On Completion of this course, the student will be able to understand fundamentals of object- oriented programming in Java, including defining classes, invoking methods, using class libraries. Have the ability to write a computer program to solve specified problems. Be able to use the Java SDK environment to create, debug and run simple Java programs.

Course Outcomes:

- Apply propositional logic, predicate logic and Boolean functions to formally express the mathematical properties.
- Analyze the basic mathematical objects such as sets, relations and functions to verify the mathematical properties.
- Construct solutions to solve different Graph problems includes Coloring, Searching and traversing.
- Construct solutions to solve different Graph problems includes Coloring, Searching and traversing.
- Implement pattern matching and string searching algorithms.

UNIT I - Introduction, Classes and Objects:

Creation of Java, Importance of Java to Internet, Byte code, Java buzzwords, OOP Principles- Encapsulation, Inheritance and Polymorphism, Data types, Variables, Declaring variables, Dynamic initialization, Scope and life time of variables, Arrays, Operators, Control statements, Type conversion and casting, Compiling and running of simple Java program, Concepts of classes and objects Class fundamentals – Declaring objects, Assigning object reference variables, Introducing methods, Constructors, Usage of static with data and methods, Usage of final with data, Access control, this key word, Garbage collection, Overloading methods and constructors, Call by value, Recursion, Nested classes and Inner classes, Exploring the String class.

UNIT II - Inheritance, Packages and Interfaces:

Basic concepts, Member access rules, Usage of super key word, Forms of inheritance, Method overriding, Abstract classes, Dynamic method dispatch, Using final with inheritance, the Object class. Defining, Creating and

Accessing a Package, Understanding CLASSPATH, Importing packages, Differences between classes and interfaces, Defining an interface, Implementing interface, Applying interfaces, Variables in interface and Extending interfaces.

UNIT III - Exception Handling, Multithreading:
Concepts of Exception handling, Types of exceptions, Usage of try, Catch, Throw, Throws and Finally keywords, Built-in exceptions, Creating own exception Sub classes, Concepts of Multithreading, Differences between process and thread, Thread life cycle, Creating multiple threads using Thread class, Runnable interface, Synchronization, Thread priorities, Inter thread communication, Daemon threads, deadlocks, Thread groups.

UNIT IV -

Applets -Applet Class, Applet Architecture, Applet Skeleton - Applet Initialization and Termination, Overriding update(), Simple Applet, Display Methods, Requesting Repainting - A simple banner Applet, Using The Status Window, The HTML APPLET Tag, Passing parameters to Applets, Applet Context and show Document.

Event Handling & AWT Controls: Event sources, Event classes – ActionEvent, AdjustmentEvent, ComponentEvent, Container Event, Focus Event, InputEvent, ItemEvent, KeyEvent and MouseEvent, Delegation event model, Event Listeners, Handling mouse and Keyboard events, Adapter classes.

UNIT - V
AWT: Concepts of components, Container, Panel, Window, Frame, Canvas, Font class, Color class and Graphics. AWT Controls : Buttons, Labels, Text fields, Text area, Check boxes, Check box groups, Lists, Choice, Scrollbars, Menus, Layout Managers - Flow, Border, Grid, Card and Grid bag.

Swing:JApplet, JFrame and JComponent, Icons and Labels, Handling threading issues, Text fields, Buttons–The JButton class, Check boxes, Radio buttons, Combo boxes, Tabbed Panes, Scroll Panes, Trees, and Tables.

TEXT BOOKS :
1.Herbert Schildt, “The Complete Reference Java J2SE”, 7th ed., TMH Publishing Company Ltd, New Delhi, 2008.

2.Joe Wiggles worth and Paula McMillan, “Java Programming Advanced Topics”, 3rd ed., TMH, 2009.

REFERENCE BOOK :
1. Cay Horstmann, “Big Java”, 2nd ed., John Wiley and Sons, 2006.

III Year B.Tech. EEE II - Semester

L	T	P	TO	C
4	-	-	4	4

EE320 HIGH VOLTAGE DC TRANSMISSION (Dept. Elective - II)

Course Description & Objectives:

To know importance, advantages and applications of HVDC over HVAC transmission system. To know the concepts of 6 pulse and 12 pulse converters and their characteristics. To know the principle of operation of DC Motors. To know the operation of DC link, constant current, constant extinction angle control and firing angle control methods. Able to know the parallel operation of HVDC and HVAC systems, operation MTDC systems. Able to know the converter faults in HVDC, over voltages, AC&DC filters design functions.

Course Outcomes:

- Compare EHV AC and HVDC system and to describe various types of DC links.
- Analyze Graetz circuit for rectifier and inverter mode of operation.
- Describe various methods for the control of HVDC systems.
- Apply the concepts of MTDC systems operation and stability analysis of interconnected systems.
- Competency in designing filters & describe various protection methods for HVDC systems.

UNIT I - Introduction to HVDC Transmission :

Introduction to AC and DC Transmission – application of DC Transmission – description of DC transmission – DC system components and their functions – modern trends in DC Transmission.

UNIT II - Analysis of Converter Circuits :

Pulse Number – Converter configuration – analysis of Graetz circuit – converter bridge characteristics – characteristics of 12 Pulse converter.

UNIT III - HVDC Controllers :

General principle of DC link control – converter control characteristics – system control hierarchy – firing angle control – current and extinction angle control – DC link power control – high level controllers.

UNIT IV - Inter Connected Systems :

Simulation of HVDC systems, Parallel operation of HVDC and AC systems, multi terminal DC systems. Stability of AC/DC interconnected systems Reactive Power requirement, types of forced commutation. Smoothing reactors - Functions, double commutation failure, consequent commutation failure - their prevention.

UNIT V - Filters and Protection :

Introduction to harmonics – generation of harmonics – design of AC filters – DC filters – carrier frequency and RI noise. Basics of protection – DC reactors – voltage and current oscillations – circuit breakers – over voltage protection – switching surges – lightning surges – lightning arresters for DC systems.

TEXT BOOKS:

1. Das Begamudre R, "The E H V A C Transmission" 3rd ed., New Age International, 2007.
2. S. Rao, "HVAC and DC Transmission", 3rd ed., Khanna Publishers, 2001.

REFERENCE BOOK:

1. Padiyar. K. R., "HVDC Power Transmission Systems", 2nd ed., New Age Publishers, 2010.

III Year B.Tech. EEE II - Semester

L	T	P	TO	C
4	-	-	4	4

EE322 AI TECHNIQUES IN ELECTRICAL ENGINEERING
(Dept. Elective - II)

Course Description & Objectives:

This course is to understand the fundamentals of fuzzy sets, fuzzy logic control systems and artificial neural networks based on biological neuron in electrical engineering. To study and understand the principle of Genetic Algorithms and its applications.

Course Outcomes:

- Understand the basic concepts of biological and artificial neurons and their networks.
- Design artificial neural networks using back propagation algorithm and associative memories.
- Compare classical and fuzzy set theory.
- Design fuzzy logic based electrical systems.
- Apply genetic algorithms for optimization problems in electrical engineering.

UNIT I - Fundamentals of Neural Networks :

Basic concepts of neural networks, Human Brain, Model of an artificial neuron, Neural network architectures, characteristics of neural networks, learning methods, taxonomy of neural network architectures. Broad application areas in Electrical Engineering.

UNIT II - BP Networks and Memories :

Backpropagation networks : Architecture of a Backpropagation network, backpropagation Learning, Illustration, Applications, Effect of tuning parameters of the backpropagation neural network, selection of various parameters in BPN.

Associative Memory : Autocorrelators, Heterocurrelators, BAM.

Application of Neural Networks in some basic problems of Electrical Engineering.

UNIT III - Classical & Fuzzy Sets:

Introduction to classical sets - properties, Operations and relations; Fuzzy sets, Membership, Uncertainty, Operations, properties, fuzzy relations, cardinalities, membership functions.

UNIT IV - Fuzzy Logic System Components:

Fuzzification, Membership value assignment, development of rule base and decision making system, Defuzzification to crisp sets, Defuzzification methods. Fuzzy logic applications: Fuzzy logic control and Fuzzy classification.

Application of Fuzzy logic in some basic problems of Electrical Engineering

UNIT V - Genetic Algorithms :

Fundamentals of Genetic Algorithms : Genetic algorithms : History, basic concepts, Creation of offsprings, working principle, Encoding, Fitness function, Reproduction.

Genetic Modeling : Inheritance operators, Cross over, Inversion and Deletion, Mutation Operator, Bit-wise Operators, Generational Cycle, Convergence

Application of GA in Power Systems and Power Electronics(Qualitative treatment only).

TEXT BOOKS:

1. Rajasekharan and Pai, “Neural Networks, Fuzzy logic, and Genetic algorithms: Synthesis and Applications”, 1st ed., Prentice Hall of India Publication, 2009.
2. Jacek M. Zurada, “Introduction to Artificial Neural Systems”, 1st ed., Jaico Publishing House, 2006.

REFERENCE BOOKS:

1. James A Freeman and Davis Skapura, “Neural Networks”, 1st ed., Pearson, 2008.
2. Simon Haykins, “Neural Networks”, 2nd ed., Pearson Education, 2009.
3. Bork Kosko, “Neural Networks and Fuzzy Logic System” 1st ed., Prentice Hall of India Publications, 2009.

III Year B.Tech. EEE II - Semester

L	T	P	TO	C
4	-	-	4	4

EE324 - EMBEDDED SYSTEMS IN ELECTRICAL ENGINEERING
(Dept. Elective - II)

Course Description & Objectives:

To learn and understand the characteristics of Embedded systems and its architectures. To understand the types of embedded architectures and its variants. To understand and use the CPU bus and its protocols. To understand the operation of real time operating systems. To learn the operation of control systems applications of electrical engineering and design the same.

Course Outcomes:

- Analyse various design issues regarding • Usage of on chip resources • Low power modes • Communication support.
- Design embedded systems using MSP430 series microcontrollers to suit market requirements.
- Solve engineering problems and arrive at solutions in designing embedded systems to support interconnectivity.
- Apply techniques, program skills, On-Chip resources to design networked embedded systems with an understanding of limitations.
- Reason out and practice professional engineering to deliver efficient and cost effective embedded based products to society.

UNIT I - Introduction to Embedded Systems :

Characteristics of Embedding Computing Applications-Concept of Real time Systems,-Challenges in Embedded System Design- Design Process-Requirements, Specifications, Architecture Design- Designing of Components and System Integration

UNIT II - Embedded System Architecture:

Instruction Set Architecture-CISC architecture [8051] and RISC instruction set architecture [ARM processors], DSP Processors, Harvard Architecture-PIC. Coprocessors and Hardware Accelerators, Processor Performance Enhancement-Pipelining, Super-scalar Execution, CPU Power Consumption, Memory System Architecture-, Caches, Virtual Memory, Memory management unit and address Translation.

UNIT III - Designing Embedded Computing Platform:

Designing with Processors-System Architecture, Hardware Design, Implementation-Development Environment, Debugging Techniques, Manufacturing and Testing. Design Using CPU Bus: Bus Protocols, Bus Organization, I/O Device Interfacing, Interfacing Protocols-GPIB, FIREWIRE, USB, Watchdog Timers. 133 EE-Engg&Tech-SRM-2013.

UNIT IV - Operating Systems:

Kernel Features: Real-time Kernels, Polled Loops System, Co-routines, Interruptdriven System, Multi-rate System, Processes and Threads, Context Switching, Cooperative Multi-tasking, Pre-emptive Multi-tasking. Scheduling-Rate-Monotonic Scheduling, Earliest-Deadline First Scheduling, Task Assignment, Fault-Tolerant Scheduling. Inter-process Communication-Real-time Memory Management: Stack Management, Dynamic Allocation-Evaluating and Optimizing Operating System Performance-Response.

UNIT V - Embedded Control Applications:

Open-loop and Closed Loop Control Systems-Application Examples-Washing Machine, Automotive Systems, Auto-focusing digital camera, Air-conditioner, Elevator Control System, ATM System.

TEXT BOOKS:

1. Raj Kamal, “*Embedded Systems*”, TMH,first edition, 2004.
2. David E. Simon, “*An Embedded Software Primer*”, Pearson Education, 1999.

REFERENCES BOOKS:

1. Wayne wolf, “*Computers as components*”, Morgan Kaufmann publishers, 2nd Edition, 2008.
2. Ayala. K.J. “*The 8051 Microcontroller*”, Penram International, 1991.
3. Dr. Prasad, “*Embedded Real Time System*”, Wiley Dreamtech, 2004.
4. Jean J.Labrosse, “*Embedded system building blocks*”, CMP books, 2nd Edition, 1999.
5. Arnold berger, “*Embedded system design*”, CMP books, 1st Edition, 2001.
6. Narayan and gong, “*Specifications and design”.*

III Year B.Tech. EEE II - Semester

L	T	P	To	C
-	-	1	1	1

SR005 TECHNICAL SEMINAR

Course Description & Objectives:

In this course student is expected to develop knowledge on an emerging field at the intersection of multi-disciplinary areas such as robotics, hybrid vehicles ect., and understandings the concepts , techniques, prevailing results etc., analyze it and present a seminar report.

Course Outcomes:

- Collect information about emerging technologies /market demands/ current trends.
- Organize & Analyze information about emerging technologies /market demands/current trends.
- Exhibit effective communication skills, stage courage, and confidence.
- Demonstrate intrapersonal skills.
- Prepare a well-organized report employing elements of technical writing and critical thinking.

III Year B.Tech. EEE II - Semester

L	T	P	TO	C
-	-	3	3	2

EE326 POWER ELECTRONICS LAB

Course Description & Objectives:

This course aims at obtaining characteristics of power electronic devices. To understand the commutation techniques used in power electronics circuits and to test different power electronics converters.

Course Outcomes:

- Able to Elucidate the basic operation of various power semi conductor devices and passive components.
- Able to analyze the performance of single phase AC voltage controller and AC voltage rectifier circuit with R and RL load.
- Able to analyze the performance of forced commutation circuits and Jones Chopper.
- Able to analyze the performance of Parallel and series inverter with R and RL load.
- Able to analyze the performance of of half controlled converter, Cyclo converter and Dual converter.

List of Experiments:

1. Study of Characteristics of SCR, MOSFET & IGBT
2. Gate firing circuits for SCR's
3. Single Phase AC Voltage Controller with R and RL Loads
4. Single Phase fully controlled bridge converter with R and RL loads
5. Forced Commutation circuits (Class A, Class B, Class C, Class D & Class E)
6. DC Jones chopper with R and RL Loads
7. Single Phase Parallel, inverter with R and RL loads
8. Single Phase Cycloconverter with R and RL loads
9. Single Phase Half controlled converter with R load
10. Three Phase half controlled bridge converter with R-load
11. Single Phase series inverter with R and RL loads
12. Single Phase Bridge converter with R and RL loads
13. Single Phase dual converter with RL loads

Note : Any 10 of above experiments are to be conducted.

III Year B.Tech. EEE II - Semester

L	T	P	TO	C
-	-	3	3	2

EE328 LINEAR CONTROL SYSTEMS LAB

Course Description & Objectives:

This course aims to familiarize with the modeling of dynamical systems and the characteristics of control components like ac servo motor, synchro and magnetic amplifier. To simulate and analyze the stability using MATLAB software and design the compensators.

Course Outcomes:

- Perform conversion of models between State Space and transfer function, time response analysis, stability analysis and error analysis of any LTI system using MATLAB.
- Design a PID controller for any LTI system using MATLAB.
- Experimentally verify the performance characteristics of Magnetic Amplifier, Synchros and AC Servo Motor.
- Analyze the Time Response of Second Order Systems, Temperature Control System and effect of PID controller.
- Program digital logic gates using PLC.

List of Experiments :

1. Time response of Second order system
2. Characteristics of Synchros
3. Programmable logic controller – Study and verification of truth tables of logic gates, simple Boolean expressions and application of speed control of motor.
4. Effect of feedback on DC servo motor
5. Transfer function of DC motor
6. Effect of P, PD, PI, PID Controller on a second order systems
7. Lag and lead compensation – Magnitude and phase plot

8. Transfer function of DC generator

9. Characteristics of magnetic amplifiers

10. Characteristics of AC servo motor

11. Linear system analysis (Time domain analysis, Error analysis) using MATLAB.

12. Design of PID controller and simulation using MATLAB

13. Stability analysis (Bode, Root Locus, Nyquist) of Linear Time Invariant system using MATLAB

14. State space model for classical transfer function using MATLAB – Verification.

Note : Any 10 of above experiments are to be conducted.

III Year B.Tech. EEE II - Semester

L	T	P	TO	C
-	-	3	3	2

EE330 MINI PROJECT

Course Description & Objectives:

To be able to apply some of the techniques/principles to do effective trouble-shooting, time planning for the project, inculcate hardware implementation skills by learning design tools and developing effective communication skill by delivering a seminar based on mini project.

Course Outcomes:

Upon completion of mini project the students will be able to:

- Demonstrate a through and systematic understanding of project contents.
- Understand methodologies and professional way of documentation and communication.
- Know the key stages in development of the project.
- Extend or use the idea in mini project for major project.

IV Year B.Tech. EEE I - Semester

L	T	P	TO	C
3	1	-	4	4

EE401 ELECTRIC DRIVES

Objective of the course:

This course is an extension of Power Electronics applications to AC and DC drives. Control of DC motor drives with single phase and three phase converters and choppers are given in detail. The control of AC motor drives with variable ffrequency converters and variable voltage are presented.

UNIT – I

Fundamentals of electric drives - block diagram of an electric drive - parts of electric drives - dynamics of electric drives - Fundamental torque equation, speed torque conventions and Multi-quadrant operation. Equivalent values of drive parameters, components of load torques, nature and classification of load torques, Load Equalization- control of electrical drives - closed loop control

UNIT- II

DC Drives - I : DC Motors and their performance, starting, speed control, constant torque and constant power control, single phase controlled rectifiers with motor loads - fully controlled and half controlled rectifier fed dc drives - continuous operation, three phase controlled rectifier fed dc drives- Three phase semi and fully controlled converter fed dc drives – Speed and Torque expressions – Speed – Torque characteristics – Problems.

UNIT – III

DC Drives - II : Four Quadrant operation of DC Drives – dual converter fed control, Electric Braking – Plugging, Dynamic and Regenerative Braking operations. – Closed loop operation of DC motor, Chopper fed DC Drives-Single quadrant, Two –quadrant and four quadrant chopper fed DC Drives – Continuous current operation– speed torque characteristics – Problems Three phase induction motor analysis and performance-starting, Braking speed control-variable frequency control from voltage source and from current source.

UNIT – IV

Induction Motor Drives : Various PWM methods. Slip power recovery, Rotor resistance control and their industrial applications.

UNIT – V

Synchronous Motor Drives : Operation from fixed frequency supply- variable frequency control - VSI and CSI fed drives- self-controlled synchronous motor drives employing cycloconverter.

TEXT BOOKS:

1. G opal K Dubey, "Fundamentals of Electric Drives", 2^{nd} ed., Narosa Publishing house, 2005.
2. MD Singh and K B Khanchandani, "Power Electronics", 2^{nd} ed., Tata – Mc Graw- Hill Publishing company, 2009.

REFERENCE BOOKS:

1. B K Bose, "Power Electronic Control of AC drives", 1^{st} ed., 2005.

IV Year B.Tech. EEE	**I - Semester**	**L**	**T**	**P**	**TO**	**C**
		3	1	-	4	4

EE403 POWER SYSTEM ANALYSIS

Objective of the course :

This course introduces formation of Z bus of a transmission line, power flow studies by various methods. It also deals with short circuit analysis and analysis of power system for steady state and transient stability.

UNIT - I

Review of graph theory, network incident matrices, formation of system Y-bus by inspection and by singular transformation. System Z-bus by building up algorithm. Formulation of power system power flow problem: types of buses, classification of variables, expressions for real and reactive power injections through Y-bus elements.

UNIT - II

Solution of a set of non-linear algebraic equations by Newton's method, convergence of solution, ill-conditioned set of equations. Solution of static power flow equations by Newton's method: Jacobian elements, linearised equations of power flow, optimal ordering of equations, triangular factors, solution by method of factors.

UNIT - III

Introduction to system security: contingency analysis. Fast-decoupled load-flow algorithm and its derivation from Newton's method, flow chart. Numerical solution of systems up to 3-buses. Introduction to system state estimation.

UNIT - IV

Fault studies: Reactances of synchronous machine under steady and transient conditions, transfer reactance of radial lines, symmetrical fault analysis using Z-bus. Fault level and circuit breaker capacity. Review of symmetrical components, Unsymmetrical fault analysis, zero sequence reactances as affected by transformer connections. Case studies on radial systems.

UNIT - V

IIntroduction to steady state, dynamic and transient stability of synchronous machine connected to infinite bus. Power angle curve. Swing equation. Small signal oscillations, synchronizing power coefficient.

Transient stability: equal area criterion, computation of swing curve by point-by-point solution, case studies, introduction to computation of swing curve by numerical methods.

TEXT BOOKS:

1. J. Grainger and WD Stevenson Jr, "Power System Analysis", 1st ed., TMH, 2005.
2. D.P. Kothari, I.J. Nagrath, "Modern Power System Analysis", 3rd ed., TMH, 2008.

REFERENCE BOOKS:

1. Hadi Saadat, "Power System Analysis", 1st ed., TMH, 1999.
2. O I Elgerd, "Electric Energy Systems Theory an introduction", 2nd ed., TMH, 2006.
3. P. Kundur, "Power System Stability and Control", 1st ed., MC Graw Hill, 2009.

IV Year B.Tech. EEE I - Semester

L	T	P	TO	C
3	1	-	4	4

EC302 DIGITAL SIGNAL PROCESSING

Objective of the Course :

The objective of the course is to Introduce the student the concepts and methods, which are used in digital signal processing. Students will learn algorithms used in digital signal processing, which can be implemented in laboratory by Matlab.

UNIT - I

Introduction: Review of Signals and Systems, linear shift invariant systems, stability, and causality. Linear constant coefficient difference equations. Frequency domain representation of discrete time signals and systems, Review of Z-Transform and properties, Discrete fourier representation of periodic sequences.

UNIT - II

Discrete Fourier Transform: Discrete Fourier transforms, Properties of DFT, linear convolution of sequences using DFT, Computation of DFT.

Fast Fourier Transform: Fast Fourier transforms (FFT) - Radix-2 decimation in time and decimation in frequency FFT Algorithms, Inverse FFT, Radix-4, Split Radix FFT algorithms, Overlap and add methods.

UNIT - III

IIR & FIR Filter Design: IIR System Function, Analog filter approximations – Butter worth and Chebyshev, Design of IIR Digital filters from analog filters, Analog-to- Digital transformations. FIR System function, Characteristics of FIR Digital Filters, frequency response. Design of FIR Digital Filters using Window Techniques, Frequency Sampling technique, Comparison of IIR & FIR filters.

UNIT - IV

Realization of Filters: Basic structure of IIR & FIR, Structures for FIR Systems, Direct form structure, cascade form structure, frequency sampling structure, structures for FIR systems, Direct form structure, signal flow graphs and transposed structures, cascade form structures, parallel form structures, Lattice and Lattice Ladder structures.

UNIT - V

Introduction to DSP Processors: Introduction to programmable DSPs: Multiplier and Multiplier Accumulator (MAC), Modified Bus Structures and Memory Access schemes in DSPs Multiple access memory, multiport memory, VLIW Architecture, Pipelining, Special addressing modes, On-Chip Peripherals. Architecture of TMS 320C6X- Introduction, Bus Structure, Central Arithmetic Logic Unit, Auxiliary Registrar, Index Registrar, Auxiliary Registger Compare Register, Block Move Address Register, Parallel Logic Unit,Memory mapped registers, program controller, Some flags in the status registers, On- chip registers, On-chip peripherals

TEXT BOOKS :

1. John G. Proakis, Dimitris G.Manolakis, “Digital Signal Processing, Principles, Algorithms, and Applications”, 3rd ed., Pearson Education / PHI, 2007.
2. A.V.Oppenheim and R.W. Schaffer, “Discrete Time Signal Processing”, 2nd ed., PHI, 2009.
3. Avtar Singh and S. Srinivasan, “Digital Signal Processing”, 1st ed., Thomson Publications, 2009.
4. B.Venkataramani, M.Bhaskar, “Digital Signal Processors – Architecture, Programming and Applications”, 1st ed., TATA McGraw Hill, 2009.

REFERENCE BOOKS :

1. Ramesh Babu, “Digital Signal Processing”, 2nd ed., Lakshmi Publishers, 2008.
2. M H Hayes, “Digital Signal Processing: Schaum’s Outlines”, 2nd ed., TATA McGraw Hill, 2009.
3. Alan V. Oppenheim, “Ronald W. Schafer, Digital Signal Processing”, 2nd ed., PHI Ed., 2009.
4. Salivahanan,Vallavaraj & Gnanapriya, “Digital Signal processing”, 1st ed., TMH, 2009.

IV Year B.Tech. EEE I - Semester

L	T	P	TO	C
3	1	-	4	4

EC306 MICROPROCESSOR & INTERFACING

Objective of the Course:

The course will give students an overview of the evolution of microprocessors. Earlier IBM PC and compatible computers used the Intel 8086 microprocessor. It is a 16-bit microprocessor. Its hardware, instructions, addressing modes, assembly language programming, interfacing memory and I/O devices, A/D and D/A converter interfacing, data acquisition and analysis, serial data communication aspects are covered in this course.

UNIT - I

Introduction to microprocessors: Evaluation of microprocessors, 8086 microprocessor, architecture, register model, physical address generation, instruction set classification, addressing modes, I/O addressing. Assembly language programs for arithmetic operations, logical operations, CALL-RET operations, Intra and inter segment calls, sorting and string operations. Interrupts of 8086, Interrupt vector table, explanation of interrupts.

UNIT - II

Hardware features of 8086: Pin diagram of 8086, multiplexed ADD/DATA and ADD/STATUS buses, control bus, minimum and maximum modes, Memory READ/WRITE and I/O READ/WRITE machine cycles, machine cycle with WAIT states. Memory organisation & interfacing

UNIT - III

Interfacing - I : 8255-PPI: Architecture, Modes of operation and Interfacing to 8086. Key board and Display Interfacing, A/D and D/A converter interfacing.

8254 - PIT: Architecture, Working,Interfacing with 8086, Generation of time delay.

8259 - PIC: Architecture, working, Interfacing with 8086..

UNIT - IV

Interfacing - II : Direct Memory Access (DMA): Architecture, Working, Interfacing with 8086.

Serial Data Communication: Fundamentals of Serial Data Communication, 8251 USART, Architecture, working, Interfacing with 8086, and USB.

UNIT - V

Introduction to Microcontroller: Differences between microprocessor and microcontrollers, 8051 architecture,Internal & External memory organization, Pin diagram, addressing modes, Instruction set and assembly language programming.

TEXT BOOKS:

1. Douglas V.Hall, "Microprocessors & Interfacing", 2nd ed., TMH, 2003.
2. AK Ray and KM Bhurchandi, "Advanced Microprocessors & Peripherals", 2nd ed., TMH, 2006.
3. Kenneth J. Ayala, "8051 Microcontrollers", 1st ed., Cengage Learning, 2010.

REFERENCE BOOKS:

1. Kenneth J. Ayala, "8086 Microprocessor Programming and Interfacing the PC", 1st ed., Cengage Learning, 2008.
2. Barry B. Brey, "The Intel Microprocessors", 6th ed., Pearson Education, 2003.

IV Year B.Tech. EEE	I - Semester	L	T	P	TO	C
		3	1	-	4	4

EE405 NON-CONVENTIONAL SOURCES OF ENERGY
(Dept. Elective – II)

Objective of the course :

It introduces solar energy its radiation, collection, storage and application. It also introduces the Wind energy, Biomass energy, Geothermal energy and ocean energy as alternative energy sources.

UNIT - I

Conventional Sources of Energy : Energy - Conventional, renewables, non-conventional and alternate sources of energy - Energy supply system in India. Coal and Coal technologies - Petroleum and natural gas - nuclear fuels and power plants - Hydro sources and power plants - Energy strategies - energy conservation - energy audit - cost of energy

UNIT - II

Solar Power : Application of Solar Energy - Various solar energy systems and their applications, radiations, solar spectra-latitude and longitude, Declination angle, solar window, cosine law, seasonal variations, daily variation, hour angle, calculation of angle of incidence, angstroms equation and constants, solar radiation data, daily global radiation calculations

UNIT - III

Wind Power : Wind energy - energy chains, application - historical background, merits and limitations, nature of wind, planetary and local day / night winds, wind energy quantum, variables and units used in calculations, wind power density Pw, Power calculations, power in wind, power by turbine, efficiency, kinetic energy, incoming velocity Vi, exit velocity Ve, Power, torque thrust calculations, velocity at different heights, site selection, Favourable wind speed range, wind energy wind velocity duration, energy pattern factor.

UNIT - IV

Biomass Energy : Biomass energy resources : Photosynthesis and origin of biomass energy, biomass energy resources, cultivated biomass resources, waste to biomass resources, Terms and definitions, Incineration, wood and wood waste, Harvesting super trees and energy forests, phyrolysis, Thermo chemical biomass conversion to energy, gasification, Anaerobic digestion, Fermentation, Gaseous fuel from biomass.

UNIT - V

Ocean & Tidal Energy : Ocean and Tidal energy conversion, Energy sources in ocean - Ocean tidal, wave and thermal energy, Ocean saline gradient concept, ocean currents, ocean chemical energy, ocean energy conversion routes, electrical and non electrical routes, Bipolar, mono polar HVDC cable transmission Advantages and merits of ocean energy technologies, limitation, preconditions for commercial installation. Tides - spring tide, neap tide, daily and monthly variation, Tidal range, Tidal Power, Types of tidal power plants, single basin & double basin schemes, main requirements in tidal power plants, energy storage, prospects of tidal power, economic factors.

TEXT BOOK:

1. Rao. S. & Pamlekar Dr.B.B. “Energy Technology” 2nd ed., Khanna Publishers, 1997.

REFERENCE BOOKS:

1. Rai G.D., “Non – Conventional Energy Sources”, 20th ed., Khanna Publishers, 2007.
2. Freris L. L., “Wind Energy Conversion”, 1st ed., Prentice Hall (UK) Ltd., 1990.

IV Year B.Tech. EEE I - Semester

L	T	P	TO	C
3	1	-	4	4

EE407 HIGH VOLTAGE ENGINEERING

(Dept. Elective – II)

Objective of the course :

This subject deals with the detailed analysis of Breakdown occur in gaseous, liquids and solid dielectrics. Information about generation and measurement of High voltage and current. In addition the High voltagetesting methods are also discussed.

UNIT - I

Introduction To High Voltage Technology & Applications : Electric Field Stresses, Gas / Vacuum as Insulator, Liquid Dielectrics, Solids and Composites, Surge voltages, their distribution and control, Applications of insulating materials in transformers, rotating machines, circuit breakers, cable power capacitors and bushings.

UNIT - II

Conduction and break down in gases, liquies & solid dielectrics : Gases as insulating media, Townsend's criteria of breakdown in gases, Break down in Electro negative gases ,Time lags for Break down ,Streamer Theory of Break down in Gases Paschen's law, pure and commercial liquids, breakdown in pure and commercial liquids. Intrinsic breakdown, electromechanical breakdown, thermal breakdown, Breakdown in composite dielectrics.

UNIT - III

Generation of high voltages & currents : Generation of High Direct Current Voltages, Generation of High alternating voltages, Generation of Impulse Voltages, Generation of Impulse currents, Tripping and control of impulse generators.

UNIT - IV

Measurement of High Voltages & Currents : Measurement of High Direct Current voltages, Measurement of High Voltages alternating and impulse, Measurement of High Currents-direct , alternating and Impulse, Oscilloscope for impulse voltage and current measurements.

UNIT - V

High Voltage Testing of Electrical Apparatus Measurement of D.C Resistivity, Measurement of Dielectric Constant and loss factor, Partial discharge measurements, Testing of Insulators and bushings, Testing of cables, Testing of Transformers, Radio Interference measurements.

TEXT BOOKS:

1. M.S.Naidu and V. Kamaraju, "High Voltage Engineering" 3rd ed., Tata MC Graw Hill Publications, 2009.
2. E.Kuffel, W.S.Zaengl, J.Kuffel by Elsevier, " High Voltage Engineering Fundamentals", 2nd ed., Elsevier, 2008.

REFERENCE BOOKS:

1. C.L.Wadhwa, "High Voltage Engineering" 3rd ed., New Age Internationals (P) Limited, 2010.
2. Ravindra Arora, Wolfgang Mosch, "High Voltage Insulation Engineering" 1st ed., New Age International (P) Limited, 2005.

IV Year B.Tech. EEE	**I - Semester**	**L**	**T**	**P**	**TO**	**C**
		3	1	-	4	4

EE409 POWER QUALITY

(Dept. Elective – II)

Objective of the Course:

Extensive use of power electronic devices in operation and control of electrical systems and apparatus is limiting the electrical power to poor quality resulting in voltage flicker, voltage unbalance, increased electrical losses and equipment failure. Design of power converters and associated machine drives must have as an objective the minimum distortion of wave form. This course introduces the basics of power quality assessment and control techniques.

UNIT - I

Over view of power Quality and quantity standards - IEC and IEEE definitions - voltage fluctuations-transients-unbalance-waveform distortion-power frequency variations.

UNIT - II

Voltage variations, Voltage sags and short interruptions – flicker-longer duration variations - sources – range and impact on sensitive circuits-standards – solutions and mitigations – equipment and techniques.

UNIT - III

Transients – origin and classifications – capacitor switching transient – lightning-load switching – impact on users – protection – mitigation.

UNIT - IV

Harmonics – sources – definitions & standards – impacts - calculation and simulation – harmonic power flow - mitigation and control techniques – filtering – passive and active.

UNIT - V

Power Quality conditioners – shunt and series compensators-DStatcom-Dynamic voltage restorer-unified power quality conditioners-case studies.

TEXT BOOKS:

1. Heydt, G.T., "Electric Power Quality", 2nd ed., Stars in a Circle Publications, Indiana, 1994.
2. Kamran Eshraghian, Eshraghian Dougles and A. Pucknell, "Essentials of VLSI circuits and systems", 1st ed., PHI, 2009.
3. Weste and Eshraghian, "Principles of CMOS VLSI Design", 2nd ed., Pearson Education, 2004.
4. John P. Uyemura, "Chip Design for Sub micron VLSI: CMOS Layout & Simulation", 1st ed., Thomson Learning, 2009.

REFERENCE BOOK:

1. S.M. SZE, "VLSI Technology", 2nd ed., TMH, 2003.

IV Year B.Tech. EEE	I - Semester	L	T	P	TO	C
		-	-	2	2	2

EE411 PROJECT - I

B.Tech Project - I

The evaluation details of Project - I are given in section 4.3 in Rules and Regulations.

IV Year B.Tech. EEE **I - Semester**

L	T	P	TO	C
-	-	3	3	2

EE413 SIMULATION OF ELECTRICAL SYSTEMS LAB

The following experiments are required to be conducted as compulsory experiments:

1. PSPICE Simulation of Transient and Parametric Analysis of RLC circuits to an input (i) Pulse (ii) Step and (iii) Sinusoidal signals.
2. Analysis of three phase circuit representing the generator transmission line and load. Plot three phase currents & neutral current using PSPICE.
3. PSPICE simulation of single-phase full converter using RLE loads and single phase AC voltage controller using RLE loads.
4. PSPICE simulation of DC Circuits (Thevenin's Equivalent, Transfer Function).
5. Linear system analysis (Time domain analysis, error analysis) using MATLAB.
6. Stability analysis (Bode, Root Locus, Nyquist) of Linear Time Invariant Systems using MATLAB.
7. Simulation of Dynamical Systems (Single area and two area Power Systems) using SIMULINK.
8. Circuit Analysis using MATLAB (Sim Power Systems Tools Box)
9. PSPICE simulation of Resonant pulse commutation circuit and Buck chopper
10. PSPICE simulation of single phase Inver with PWM control
11. Modelling of transformer and simulation of loss less transmission line in PSPICE.
12. PSPICE simulation of Op-Amp based Integrator & Differentiator circuits.

IV Year B.Tech. EEE   I - Semester

L	T	P	TO	C
-	-	3	3	2

EC312 MICROPROCESSORS & INTERFACING LAB

I. Microprocessor 8086:

1. Introduction to Debug/Masm/Tasm
2. Displaying a string of characters.
3. Arithmetic operations: Multi-byte addition/subtraction/multiplication/ Division.
4. Logical operations: Converting packed BCD to unpacked BCD and BCD to ASCII.
5. Searching for Minimum/ Maximum of given numbers.
6. Sorting given string in Ascending / Descending order.
7. Find Arithmetic mean of given numbers.
8. Find Sum of Squares/ Cubes of given numbers.
9. String operations: Moving/ Comparing/ Scanning.

II. Interfacing:

1. Programable Peripheral Interface-8255 interfacing
2. 8279-Keyboard/ Display interfacing.
3. Interfacing 8259-Programmable Interrupt Controller.
3. Interfacing DAC: to generate square/triangular/ramp waves.
4. Interfacing ADC: to convert analog signal to digital.
5. Interfacing a Stepper motor.
6. Interfacing Elevator simulator.
7. Trafic control simulator interface.
8. Serial data transfer using USART-8251 interface.

III. Micro controller 8051

1. Arithmetic, logical, swaps and exchange operations.
2. Reading and Writing on a parallel port.
3. Timer in different modes.
4. Serial communication implementation.

1. 8086 µP Kits, 8051µC Kits, PC.
2. Interfaces/peripheral subsystems
   i) 8259 PIC
   ii) 8279-KB/Display
   iii) 8255 PPI
   iv) 8251 USART
3. ADC Interface
4. DAC Interface
5. Traffic Controller Interface
6. Elevator Interface
7. Stepper motor Interface

**Any Twelve of the above experiments.

****Note: Equipment required for Laboratory:

IV Year B.Tech. EEE **II - Semester**

L	T	P	TO	C
3	1	-	4	4

EE402 NEURAL & FUZZY SYSTEMS

Objective of the Course:

This course introduces the basics of Neural Networks and essentials of Artificial Neural Networks with Single Layer and Multilayer Feed Forward Networks. Also deals with Associate Memories and introduces Fuzzy sets and Fuzzy Logic system components. The Neural Network and Fuzzy Network system application to Electrical Engineering is also presented. This subject is very important and useful for doing Project Work.

UNIT – I

Introduction to Neural Networks and Artificial Neural Networks: Introduction, Humans and Computers, Organization of the Brain, Biological Neuron, comparision of Biological and Artificial Neural networks, Biological Neuron Models: Hodgkin-Huxley Neuron Model, Integrate-and-Fire Neuron Model, Spiking Neuron Model, Artificial neuron models: McCulloch-Pitts Model, Perceptron Model Adaline Model and Madaline model. Characteristics of ANN Historical Developments, Potential Applications of ANN. Operations of Artificial Neuron, Types of Neuron Activation Function, ANN Architectures, Neural Dynamics (Activation and Synaptic), Learning Strategy (Supervised, Unsupervised, Reinforcement), Learning Rules, Types of Application.

UNIT – II

Single and Multiplayer Layer Feed Forward Neural Networks: Introduction, Perceptron Models: Discrete, Continuous and Multi-Category, linear minimum distance classifier, on parametric training. Training Algorithms: Discrete and Continuous Perceptron Networks, Perceptron Convergence theorem, Limitations of the Perceptron Model, Applications. Credit Assignment Problem, Generalized Delta Rule, Derivation of Back propagation (BP) Training, Summary of Back propagation Algorithm, Kolmogorov Theorem, Learning Difficulties and Improvements.

UNIT – III

Associative Memories: Paradigms of Associative Memory, Pattern Mathematics, Hebbian Learning, General Concepts of Associative Memory (Associative Matrix, Association Rules, Hamming Distance. The Linear Associator, Matrix Memories, Content Addressable Memory), Bi-directional

Associative Memory (BAM) Architecture, BAM Training Algorithms: Storage and Recall Algorithm, BAM Energy Function, Proof of BAM Stability Theorem Architecture of Hop field Network: Discrete and Continuous versions, Storage and Recall Algorithm, Stability Analysis, Capacity of the Hopfield Network Summary and Discussion of Instance/Memory Based Learning Algorithms, Applications.

UNIT – IV

Fuzzy Logic: Introduction to classical sets - properties, Operations and relations; Fuzzy sets, Membership, Uncertainty, Operations, properties, fuzzy relations, cardinalities, membership functions. Fuzzification, Membership value assignment, development of rule, Base and decision-making system, Defuzzification to crisp sets, Defuzzification methods.

UNIT - V

Applications: Neural network applications: Process identification, control, fault diagnosis and load forecasting. Fuzzy logic applications: Fuzzy logic control and Fuzzy classification.

TEXT BOOKS:

1. Rajasekharan and Pai, "Neural Networks, Fuzzy logic, and Genetic algorithms: Synthesis and Applications", 1st ed., Prentice Hall of India Publication, 2009.
2. Jacek M. Zurada, "Introduction to Artificial Neural Systems", 1st ed., Jaico Publishing House, 2006.

REFERENCE BOOKS:

1. James A Freeman and Davis Skapura, "Neural Networks", 1st ed., Pearson, 2008.
2. Simon Haykins, "Neural Networks", 2nd ed., Pearson Education, 2009.
3. C.Eliasmith and CH.Anderson, "Neural Engineering" 1st ed., Prentice Hall of India, 2009.
4. Bork Kosko, "Neural Networks and Fuzzy Logic System" 1st ed., Prentice Hall of India Publications, 2009.

IV Year B.Tech. EEE **II - Semester**

L	T	P	TO	C
3	1	-	4	4

EC304 VLSI

Objective of the Course :

To introduce to students the concepts of Advanced digital circuits designing and fabrication in the field of VLSI so as to make the student fit for semiconductor industry.

UNIT - I

Introduction : State of art of different technology, Introduction to IC Technology – MOS, PMOS, NMOS, CMOS & BiCMOS technologies-Oxidation, Lithography, Diffusion, Ion implantation, Metallization, Encapsulation, Probe testing, Integrated Resistors and Capacitors.

UNIT - II

Basic Electrical Properties: MOS Transistor, operation I_{ds}-V_{ds} relationships, MOS transistor parameters: threshold Voltage, gm, gds, figure of merit (w_o); Pass transistor, NMOS Inverter, Various pull ups, CMOS Inverter , Bi-CMOS Inverters.

UNIT - III

VLSI Circuit Design Proceeses: VLSI Design Flow, MOS Layers, Stick Diagrams, Layouts and Design Rules for NMOS, CMOS and BICMOS circuits. CMOS inveters and gates, introduction to scalling.

UNIT - IV

Gate Level and Subsystem Level Design: Logic Gates and Other complex gates, Switch logic, Alternate gate circuits, Driving large Capacitive Loads, Wiring Capacitances, Fan-in and fan-out, Choice of layers, Subsystem Design, Shifters, Adders, ALUs, Multipliers, Parity generators, Comparators, Zero/One Detectors, Counters, High Density Memory Elements.

UNIT - V

Semiconductor IC Design : Standard cell, Sea of gates, FPGA.
Synthesis and Testing: Simulation synthesis testing and design capture tools.

TEXT BOOKS:

1. Kamran Eshraghian, Eshraghian Dougles and A. Pucknell, Essentials of VLSI circuits and systems, PHI, 2005.

2. Weste and Eshraghian, Principles of CMOS VLSI Design , Pearson Education, 1999.
3. John P. Uyemura, Chip Design for Sub micron VLSI: CMOS Layout & Simulation, Thomson Learning.

REFERENCE BOOKS:

1. S.M. SZE, VLSI Technology , 2nd ed., TMH, 2003
2. Wayne Wolf, Modern VLSI Design, 3rd ed., Pearson Education, 1997.

IV Year B.Tech. EEE	II - Semester	L	T	P	TO	C
		3	1	-	4	4

EE404 UTILIZATION OF ELECTRICAL ENERGY
(Dept. Elective – III)

Objective of the course :

This subject deals with the fundamentals of illumination and its classification and the electric heating and welding. It gives the detailed study of all varieties of Electric drives and their application to electrical traction systems.

UNIT – I

Utilization and Control of Electric Drives : Introduction,Factors governing selection of Electric motors, Type of electric drives, starting and running characteristics, speed control, temperature rise, Choice of Rating of motor, Control devices for Industrial motors , Motors for particular services, load equalization.

UNIT – II

Electric Heating and Electric Welding : Introduction, Methods of Transfer of Heat, Classification of Electric Heating methods, resistance heating induction heating and dielectric heating. Electric welding, resistance and arc welding, electric welding equipment, comparison between A.C. and D.C. Welding.

UNIT – III

Illumination Engineering : Introduction, terms used in illumination, laws of illumination, polar curves, photometry, integrating sphere, sources of light, MV and SV lamps, tungsten filament lamps and fluorescent tubes, Basic principles of light control, Types of Lighting schemes ,flood lighting, Methods of Lighting Calculations.

UNIT – IV

Traction Systems : Introduction, Different systems of Traction, Systems of electric traction, Systems of track electrification. General features of traction motor, Operating characteristics of D.C Motors, Three Phase Induction motor methods of electric braking-plugging, Rheostatic braking and regenerative braking.

UNIT – V

Train movement and energy consumption : Mechanics of train movement. Typical Speed-time curves for different services – trapezoidal and quadrilateral speed time curves Calculations of tractive effort, power, specific energy consumption for given run, effect of varying acceleration and braking retardation, adhesive weight and braking retardation adhesive weight and coefficient of adhesion.

TEXT BOOKS:

1. E. Openshaw Taylor, "Utilisation of Electric Energy" 1st ed., Orient Longman, 2006.
2. Partab, "Art & Science of Utilization of electrical Energy" 3rd ed., Dhanpat Rai & Sons, 2006.

IV Year B.Tech. EEE	**II - Semester**	**L**	**T**	**P**	**TO**	**C**
		3	1	-	4	4

EE406 RELIABILITY ENGINEERING
(Dept. Elective – III)

Objective of the course:

Reliability Engineering subjects deals with basic probability theory and network modeling for the simple system and gives the evaluation techniques, frequency balance approaches. In last unit deals with Monte -Carlo simulation technique.

UNIT - I

Basic Probability Theory: Probability concepts, permutations and combinations, rules for combining probabilities, probability distributions, Binomial distribution and properties; effects of redundancy, partial output and unavailability.

UNIT - II

Network modeling of simple systems: Series, parallel and series-parallel systems, partially redundant and stand-by redundant systems; perfect and imperfect switching, complex systems: cut-set method, tie-set method and connection matrix techniques, multi-failure modes.

UNIT - III

Reliability Evaluation: General reliability functions and their evaluation, Poisson distribution, normal distribution, exponential distribution, Weibul distribution; stand-by systems and their reliability evaluation.

Markov chains: Stochastic Transitional Probability Matrix, probability evaluation of different states, continuous Markov process4es: state space diagrams, limiting state probabilities, repairable systems, MTTF evaluation, complex systems.

UNIT - IV

Frequency and duration techniques: Application to multi-state problems, frequency balance approach, two-stage repair and installation process, approximate system reliability evaluation.

UNIT - V

Monte-Carlo simulation: Concepts of simulation, random variables, simulation output, applications of Monte-Carlo technique, reliability and availability of repairable systems and stand-by systems.

TEXT BOOKS:

1. Roy Billington and Ronald N Allen, "Reliability Evaluation of Engineering Systems", 2nd ed., Springer International Edition, 2008.
2. Roy Billington and Ronald N Allen, "Reliability Evaluation of Power Systems", 2nd ed., Springer International Edition, 1996.

IV Year B.Tech. EEE **II - Semester**

L	T	P	TO	C
3	1	-	4	4

EE408 ELECTRICAL DISTRIBUTION SYSTEMS
(Dept. Elective – III)

Objective of the Course:

This subject deals with the elctrical distribution systems, feeders, substations, distribution system protection, power factor improvement and different voltage *control methods. A student can get a brief idea on operation of circuit breakers in protection of distribution systems in real life.*

UNIT – I

General Concepts : Introduction to distribution systems, Load modelling and characteristics. Coincidence factor, contribution factor loss factor. Relationship between the load factor and loss factor. Classification of loads (Residential, commercial, Agricultural and Industrial) and their characteristics.

Distribution Feeders : Design Considerations of Distribution Feeders: Radial and loop types of primary feeders, voltage levels, feeder loading; basic design practice of the secondary distribution system.

UNIT – II

Substations : Location of Substations: Rating of distribution substation, service area within primary feeders. Benefits derived through optimal location of substations.

System Analysis : Voltage drop and power-loss calculations: Derivation for voltage drop and power loss in lines, manual methods of solution for radial networks, three phase balanced primary lines.

UNIT –III

Protection : Objectives of distribution system protection, types of common faults and procedure for fault calculations. Protective Devices: Principle of operation of Fuses, Circuit Reclosures, line sectionalizes, and circuit breakers. **Coordination :** Coordination of Protective Devices: General coordination procedure.

UNIT – IV

Compensation for Power Factor Improvement : Capacitive compensation for power factor control. Different types of power capacitors, shunt and series capacitors, effect of shunt capacitors (Fixed and switched), Power factor correction, capacitor allocation. Economic justification. Procedure to determine the best capacitor location.

UNIT – V

Voltage Control : Equipment for voltage control, effect of series capacitors, effect of AVB/AVR, line drop compensation.

TEXT BOOKS:

1. Turan Gonen, “Electric Power Distribution system Engineering” 2nd ed., CRC Press, 2010.
2. A.S. Pabla, “Electric Power Distribution”, 4th ed., Tata Mc Graw-hill Publishing company, 1997.

IV Year B.Tech. EEE II - Semester

L	T	P	TO	C
-	-	10	10	10

EE410 PROJECT - II

B.Tech Project - II

The evaluation details of Project - II are given in section 4.3 in Rules and Regulations.

HS111 ENGINEERING MATHEMATICS - I

(For all branches except Biotechnology)

L	T	P	To	C
4	-	-	4	4

Course description and Objectives :

Without mathematics not a single day of an engineer will pass! All the topics of this course are relevant to all branches of engineering. Differential equations are used in various places. Laplace transformations are used, for example, for conversion of domains, from time domain to frequency domain. These are also used to solve ordinary differential equations. When data is given at only a finite points, we use numerical methods for find the approximate values of functions, also to solve differential equations approximately etc. Maxima, minima of a function has got many applications.

Course Outcomes:

- Students will understand that Mathematics which they learn can be used at different levels in their Engineering course irrespective of their branches.
- This course will help to sketch the graph of a differential equation and its direction mixing fields
- Laplace transform used to compute solutions of equations involving impulse functions
- They will be able to use Laplace transformations for conversion of domains from time domain to frequency domain.
- Differential Equations help them to find approximate values of function.
- They will be able to analyze and use them in different applications.
- Eigen values and Eigen vectors play a prominent role in the study of ordinary differential equations and in many applications of physical sciences.

UNIT I - Ordinary Differential Equations & Differential Equations of Second Order :

Differential Equations of First Order : Definiton, Order and degree of a differential equation, Formation of differential equations, Solution of a differential equation, Differential equations of first order and first degree : variables separable, Homogenous equations, Linear equations, Exact differential equations.

Differential Equations of Second Order : Linear differential equations of second order with constant coefficients, Methods for finding the complementary functions and particular integral, General method of finding the particular integral of any function.

UNIT II - Applications of Differential Equations and Laplace Transformations

Applications of Differential Equations : Newton's law of cooling, Natural law of growth, Orthogonal trajectiories**.**

Laplace transformations : Definition, Properties, Convolution theorem, Inverse Laplace transformation, Solving differential equations using Laplace Transformation.

UNIT III - Numerical Methods

Taylor's Method, Picard Method, Euler Method, Modified Euler Method, Runga-Kutta Methods.

Interpolation by Lagrange and Newton methods.

UNIT IV - Matrices

Rank of a matrix, finding rank of a matrix using Echelon form, Normal form, triangular form, PAQ form, inverse of a matrixEigen values, Eigen vectors, properties, Cayley-Hamilton theorem (without proofs), Diagonalisation of a matrix.

Solving System of equations (Gauss-Siedal method only)

UNIT V - Maxima and Minima & Jacobians

Maxima and Minima : Review of partial differentiation: Partial derivatives, Partial derivatives of higher order, Homogeneous function, Euler's theorem, Total differential coefficient,

Maxima and Minima of a function of two variables, Conditions for extreme values, Lagrange method of undetermined multipliers.

Jacobians : Definition, Properties, Jacobian of implicit functions, Partial derivaties of Implicit functions using Jacobian.

TEXT BOOKS :

1. *H. K. Dass* and *Er. Rajnish Verma*, Higher Engineering Mathematics, S. Chand & Co., New Delhi, 2011.
2. *B.S. Grewal*, "Higher Engineering Mathematics", 40th edition, Khanna Publishers, 2009.

REFERENCE BOOKS :

1. *B.V. Ramana*, "Higher Engineering Mathematics", 3rd Edition, Tata McGraw-Hill Publishing Co, 2008.
2. *R K Jain, S R K Iyengar*, "Advanced Engineering Mathematics", 2nd Edition, Narosa Publishing House.
3. *Erwin Kreyszig*, "Advanced Engineering Mathematics", 8th Edition, John Wiley & Sons (Asia) Pvt. Ltd. 2001.

HS113 ENGINEERING PHYSICS

L	T	P	To	C
4	-	-	4	4

Course description and Objectives :

There is a symbiotic relation between physics and engineering. Broadly speaking, engineering is mainly applied physics. Recent technical developments have been the result of joint efforts of physicists and engineers. A proper study of physics is therefore indispensable for an engineering student to excel in his field. The purpose of this course is to present the principles and concepts of physics as relevant to an engineer.

Course Outcomes:

The students will be made to get acquainted to the following learning outcomes:

- Concepts of Physical optics, devices and applications.
- Ultrasonic waves, production, applications in NDT.
- Introduction to Quantum mechanics in relevance to that of modern physics.
- Exposure to latest inventions like lasers, fibers and applications
- Insight into nano technology and applications, solar energy to combat energy crisis.

UNIT I - Physical Optics

Interference – Types - Interference in thin films (Reflection) – Newton's Rings – Michelson's Interferometer, Fabry-perot interferomenter – Applications.

Diffraction – Fraunhoffer Diffraction at single slit – Diffraction grating

Polarization – Production of plane polarized light – Nicol prism – Optical activity – photo elasticity.

UNIT II - Ultrasonics & NDT

Ultrasonics : Introduction – production of ultrasonic waves – piezoelectric method – Properties of ultrasonic waves – Types of ultrasonic waves – Determination of Velocity of ultrasonic waves in solids and liquids – Applications.

NDT : Introduction - Types – Theory and practice of Ultrasonic Testing – Ultrasonic Testing Systems – Ultrasonic Testing Methods – X-Ray Radiography.

UNIT - III Quantum Mechanics & Free electron theory of metals

Quantum Mechanics : Matter waves - Schroedinger's time independent wave equation - Physical significance of the wave function - Particle in one dimensional potential well – tunneling phenomenon.

Free electron theory of metals : Introduction – Classical free electron theory – Electrical conductivity of metal – Fermi - Dirac distribution function and its variation with temperature – Quantum free electron theory.

UNIT IV - Lasers & Fiber Optics:

Lasers: Characteristics of Laser light – Spontaneous and Stimulated emission of radiation – Low power and High power lasers, He-Ne Laser – CO_2 Laser – Nd-Yag laser - Applications of Lasers, Holography and Applications

Fiber Optics: Principle of optical fiber - materials – Numerical Aperture – Types of fibers – Dispersion and Attenuation in optical fibers – Optical sensors – Optical fiber communication system.

UNIT V - Solar Energy & NanoScience and Technology

Solar Energy : Solar radiation – Photovoltaic effect – solar cells – Efficiency of solar cell – Solar thermal energy conversion systems.

NanoScience & Technology : Introduction to nano meterials – Basic principles of nanoscience & Technology – Fabrication of nanomaterials – Physical & Chemical properties of nanomaterials – Applications of nanotechnology.

TEXT BOOKS :

1. M.R.Srinivasan, "Physics for Engineers" New Age International, 2002-2003.
2. M.N. Avadhanulu & P.G. Kshirasagar, "Engineering Physics", 1st edition, S. Chand & Company Ltd, 1992.

REFERENCE BOOKS :

1. Halliday, Resnic and Walker, "Fundamentals of Physics", 6th edition, John Willey publishers, 2003.
2. Grawfor F.S., Berkley Physics courses, "Waves and Oscillations", Volume III McGraw Hill, 1992.
3. V. Raghavan, "Materials Science and Engineering", 5th edition, Prentice-Hall India, 2004.
4. S.O.Pillai, "Solid State Physics", 6th edition, New Age International Publications, Revised, 2005.
5. V.Rajendran, "Engineering Physics", 1st edition, TMH Publications, 2010.

EE111 FUNDAMENTALS OF ELECTRICAL ENGINEERING

(For all branches except EEE)

L	T	P	To	C
4	-	-	4	4

Course description and Objectives :

To understand the basic concepts, laws, techniques in analyzing various DC and AC circuits and concepts in coupled circuits. Study of construction details, working of various electrical machines and Semiconductor Devices and operation

Course Outcomes:

- Able to explain the notation and components of electric circuits
- Able to analyze DC and single phase and three phase AC circuits using different methods and theorems
- Able to operate various electrical machines.
- Able to explain the concepts of Semiconductor Devices and operation

UNIT I - Fundamentals Of DC Circuits

Circuit Concepts: Concepts of network, Active and passive elements, voltage and current sources, concept of linearity and linear network, unilateral and bilateral elements, R, L and C as linear elements. Ohm's Law – Kirchhoff's Laws –application to simple series, parallel circuits, mesh and nodal analysis of simple resistive circuits.(simple numerical problems).

UNIT II - Fundamentals of A.C. Circuits:

Generation of A.C. voltage - frequency, average value, R.M.S. value, form factor, peak factor for sinusoidal only - phasor representation of alternating quantities. Analysis of simple series and parallel A.C. circuits-(simple numerical problems)

Balanced Three phase systems – relation between phase and line quantities of voltages and currents in star and delta connected systems (Elementary treatment only)

UNIT III - Fundamentals of Electromagnetism and Transformers:

Concepts of Magneto motive force, reluctance, flux and flux density , concept of Self Inductance and Mutual Inductance, Coefficient of coupling-only elementary treatment. (simple numerical problems).

Transformers: Principle of operation of single phase transformer – constructional features – EMF equation (simple numerical problems)

UNIT IV - Electrical Machines:

DC Machines: Constructional details of a D.C. Machine.

D.C. Generator – Principle of operation – EMF equation – types of D.C. generators (simple numerical problems)

D.C. Motor – Principle of operation – Torque equation – types of D.C. motors (simple numerical problems)

A.C Machines: Principle of operation of three phase induction motors – slip ring and squirrel cage motors – Torque equation derivation, Constructional details of synchronous machines.

UNIT V - Semiconductor Devices:

Classification of solids based on energy band theory - Intrinsic semiconductors - Extrinsic semiconductors - P type and N type semiconductors - P-N junction diode and its characteristics –Half and Full wave rectifiers- Zener diode and its characteristics - Voltage regulator. Bipolar junction transistor – Operation-Types- Applications.

TEXT BOOKS:

1. Mittle, V.N., "Basic Electrical Engineering", 2nd ed., TMH, New - Delhi, 1990.
2. V.K.Mehta,"Principles of Electrical Engineering and Electronics", 3rd ed., S. Chand Publications, New Delhi, 2010.

REFERENCE BOOKS:

1. Millman & Halkias, "Integrated Electronics", McGraw Hill, 1979.
2. A.K. Thereja & B.L. Thereja, "Electrical Technology", Vol. – II, S.Chand Publications, 2007.
3.. U.Bakshi & A.Bakshi, "Basic Electrical Engineering", 1st ed., Technical Publications, Pune, 2005.
4. U.Bakshi & A.Bakshi, "Basic Electrical Engineering", 1st ed., Technical Publications, Pune, 2005.

HS114 TECHNICAL ENGLISH COMMUNICATION

L	T	P	To	C
3	2	-	5	5

Course description and Objectives :

To introduce students to the specific use of language for the purposes of Technical Communication which would be an essential prerequisite for success in the areas of writing and speech. The teaching efforts in this course will be directed towards making students develop their technical and non-technical writing abilities using the fundamental principles that apply to the correct use of the English language free of grammatical and other related errors.

Course Outcomes:

Students shall achieve the ability to write and demonstrate college-level proficiency in the following:

- Clear and effective communication of meaning in speaking and writing.
- The ability to perform effectively the essential steps of the writing process (Note making, organizing, composing, revising, and editing).
- The ability to explain, develop, and criticize ideas effectively.
- Effective organization within the paragraph and the essay.
- Accuracy, variety, and clarity of sentences.
- Appropriate diction.
- Control of conventional mechanics (e.g., punctuation, spelling)

UNIT - I

- Text : Environmental Consciousness (Climate Change – Green Cover – Pollution)
- Grammar : Articles – Prepositions – Sentence Types and Construction
- Vocabulary : Root – Prefixes - Suffixes
- Composition : Paragraph Writing (Descriptive & Narrative)
- Lab Practice : Introduction to Phonetics (Organs of Speech; Consonants, Vowels & Diphthongs; Syllable, Stress & Intonation)

UNIT - II

- Text : Emerging Technologies
  (Solar Power – Cloud Computing – Nanotechnology)
- Grammar : Time and Tense (Present-Past-Future; Helping Verbs; Modals)
- Vocabulary : Synonyms – Antonyms
- Composition : Note-making
- Lab Practice : Grammar Practice (Speaking of past, present & future)

UNIT - III

- Text : Energy
  (Renewable and Non-renewable Sources – Alternative Sources – Conservation – Nuclear Energy)
- Grammar : Subject-Verb Agreement - Sentence Construction (Characteristics of Technical Writing)
- Vocabulary : Idioms & Phrases
- Composition : Summarizing
- Lab Practice : Situational Conversations – Role-Plays (Introducing; Greeting; Enquiring; Informing; Requesting; Inviting)

UNIT - IV

- Text : Engineering Ethics
  (Challenger Disaster – Biotechnology – Genetic Engineering – Protection from Natural Calamities)
- Grammar : Sentence Transformation (Degrees, Voice, Speech & Synthesis)
- Vocabulary : Phrasal Verbs
- Composition : Letter Writing (Informal)
- Lab Practice : Situational Conversations – Role-Plays (Emotions; Directions; Descriptions; Agreements; Refusals; Suggestions)

UNIT - V

- Text : Travel and Tourism
  (Advantages and Disadvantages of Travel-Tourism – Atithi Devo bhava – Tourism in India)
- Grammar : Common Errors
- Vocabulary : One-word Substitutes
- Composition : Letter Writing (Formal)
- Lab Practice : Group Discussions

TEXT BOOKS :

Mindscapes - English for Technologists and Engineers, Orient Black Swan, 2012.

REFERENCE BOOKS :

1. V. R. Narayana Swamy***, "Strengthen Your Writing",*** 1st edition, Orient Longman, 2003.
2. Thomas Elliott Berry***, "The Most Common Mistakes in English Usage",*** 1st edition, Tata McGraw Hill, 2004.
3. T. Balasubramanyam, ***A Textbook of English Phonetics for Indian Students***, Macmillan Ltd., 2000.
4. Sasikumar.V and P.V. Dhamija,. ***Spoken English: A Self-Learning Guide to Conversation Practice,*** 34th Reprint, Tata McGraw Hill, New Delhi, 1993.
5. Margaret M Maison, **"Examine your English",** 1st edition**,** Orient Longman, 1999.
6. Ashraf Rizwi, "***Technical English Communication***", Tata McGraw Hill, Latest Edition.

CS101 PROBLEM SOLVING AND COMPUTER PROGRAMMING

L	T	P	To	C
4	-	-	4	4

Course description and Objectives :

Aim of this course is to introduce the techniques of problem solving and concepts of programming language to the students. Because of its popularity and suitability to develop different types of applications, 'C' language has become the de-facto programming language to engineers. A comprehensive introduction of C language is offered through this course to enable the students to write diversified programs.

Course Outcomes:

On Completion of this course student should be able to

- Able to understand the basic terminology used in computer programming and to write, compile and debug programs in C language.
- Use different data types in a computer program and design programs involving decision structures, loops and functions.
- Able to understand the allocation of dynamic memory using pointers
- Use different data types to create/update basic data files.

UNIT I - Fundamentals of computers

Basic functional units and discrete components of a computer, computer networks, networking components, Binary representation of integers and real numbers, ASCII, EBCDIC, Unicode, Generations of computer languages.

UNIT II - Problem Solving Steps and Basic of C Language

Problem understanding, Formulating a mathematical model, Development of an algorithm, Representation of an algorithm, Flow chart and Pseudo code, Coding, Testing and Debugging, Comments, Processor statement, Function header statement, Variable declaration statement and Executable statement, C Character Set, constants, identifiers, operators, punctuations, keywords, Basic data types, modifiers, identifiers, variables, C scopes, type qualifiers, storage class specifiers, variable initializations, constants, reading and writing characters, formatted I/O.

UNIT III – Preliminaries of C

Assignment, arithmetic , relational, logical, bitwise, ternary, address, indirection, sizeof, dot, arrow, and parentheses operators, Expressions Precedence of operators and associatively, Category of Statements, Selection, Iteration, jump, label, expression and block, Function declaration, prototype, definition, calling by value and address, standard library functions and recursive functions.

UNIT IV - Arrays and Pointers

Declaration, initialization, reading, writing, accessing and passing as a parameter to functions, Multidimensional arrays and String functions, pointer expressions, pointer and arrays, multiple indirection, initializing pointers, pointer to functions, Dynamic memory allocation functions.

UNIT V - Structures and File Processing

declaration, initialization and accessing, array of structures and passing structures to functions, structure pointers, arrays and structures within structures, unions, bit-fields, typedef and enumerations, I/O and processing operations on text and binary files. pre-processor directives.

TEXT BOOKS :

1. Reema Thareja, “Introduction to C Programming”, Oxford University Press, India, 2013
2. Herbert Schildt, C: “The Complete Reference”, 4th Edition, Tata McGraw-Hill, 2000.

REFERENCE BOOKS :

1. E. Balagurusamy, “ Programming in ANSI C”, 4TH Edition, Tata McGraw- Hill, 2008.
2. R Ravichandran and T Jeyapoovan, “ Computer Programming with C”, Soni Graphics, India, 2014.

HS115 ENGINEERING MATHEMATICS - II

(For all branches except Biotechnology)

L	T	P	To	C
4	-	-	4	4

Course description and Objectives :

Without mathematics not a single day of an engineer will pass! All the topics of this course are relevant to all branches of engineering. In real life, many quantities are dependent on more than one quantity. Hence study of functions of several variables is crucial. In this course, we study partial differentiation, partial differential equations, multiple integrals all involving functions of two variables. We also study Fourier series and Z-transformations and difference equations.

Course Outcomes:

- The students will understand that many quantities are dependent on more than one quantity so they learn functions of several variables.
- They will be able to solve Partial Differential Equations, multiple integrals which are involving functions of two variables.
- They can apply Z – transforms to solve difference equations.
- They will be able to calculate areas and volumes.
- The student will enable to locate the maxima and minima of a function is an important task which arises often in applications of mathematics to problems in engineering and science.
- Vector differentiation and integration used to find the arc lengths and curvatures of space curves

UNIT I - Partial Differential Equations :

Formation of Partial Differential Equations, Linear (Lagrange) Equations, Method of multipliers, Non-linear partial differential equations (Types), Charpit's method.

Second order linear equations, classifications, Solution by method of separation of variables.

UNIT II - Fourier Series :

Periodic functions, Fourier series, Dirichlet's conditions, Determination of Fourier coefficients, Discontinuous functions, even and odd functions, Half-range series, Functions having arbitrary period.

UNIT III - Z-transformations & Applications :

Z-transformations : Sequences, Z-transformation, Properties, Inverse Z-transformation, Multiplication and division by k, Initial and final value theorems, Convolution, Determination of inverse Z-transformation.

Applications : Solutions of difference equations using Z-transformations.

UNIT IV - Multiple Integrals :

Double integrals, Evaluation, Evaluation in Polar coordinates, Change of order of integration, Change of variables, Applications to Area in Cartesian coordinates and polar coordinates.

Triple integrals, Fundamentals, Evaluation of triple integrals.

UNIT V - Vector Differentiation and Integration

Vector Function, Differentiation, Scalor and Vector point function, Gradient, Normal, Divergence, Directional Derivate, Curl, Vector identities.

Line Integral, Surface Integral, Volume integral, Green's theorem, Stoke's theorem, Gauss theorem of divergence (without proofs).

TEXT BOOKS :

1. *H. K. Dass* and *Er. Rajnish Verma*, Higher Engineering Mathematics, S. Chand & Co., New Delhi, 2011.
2. *B.S. Grewal*, "Higher Engineering Mathematics", 40th edition, Khanna Publishers, 2009.

REFERENCE BOOKS :

1. *B.V. Ramana*, "Higher Engineering Mathematics", 3rd Edition, Tata McGraw-Hill Publishing Co, 2008.
2. *R K Jain, S R K Iyengar*, "Advanced Engineering Mathematics", 2nd Edition, Narosa Publishing House.
3. *Erwin Kreyszig*, "Advanced Engineering Mathematics", 8th Edition, John Wiley & Sons (Asia) Pvt. Ltd. 2001.

HS117 ENGINEERING CHEMISTRY

L	T	P	To	C
4	-	-	4	4

Course description and Objectives :

Chemistry is the backbone in designing and understanding the nature and properties of various engineering materials. Currently, the electronics and computer engineers are waiting for suitable polymers for using miniature super computers. So this subject develops fundamental knowledge about new engineering materials and their significance in technical fields and industrial sectors. Water is an essential element for the existence of human, plant and animal lives, besides that it has greater industrial applications. The knowledge about water is the basic requirement for a professional student. Characterization of materials with instrumental techniques is essential for engineers.

Course Outcomes:

- Differentiate between soft and hard water. Understand the disadvantages of using hard water domestically and industrially. Select and apply suitable softening methods (Soda-lime, zeolite, ion-exchange methods, etc.) to soften the hard water for industrial and domestic applications.
- Acquaintance of primary and secondary cells, Hydrogen-Oxygen and Methanol fuel cells, dry and wet corrosions, corrosion controlling methods
- Acquaintance of the properties and engineering applications of Ceramics, Refractories, Glasses, Cement, Abrasives, Lubricants
- Acquaintance of Preparation, properties and applications of different polymers (Polyethylene, PVC, Tefflon, Bakelite,Urea-Formaldehyde, Silicones, Rubber – Vulcanization, Synthetic Rubbers-(Buna-S, Buna-N, Neoprene); treatment of membranes.
- Acquaintance of various spectroscopic methods (UV-visible / IR), Beer-Lambert's Law, qualitative and quantitative analysis, block diagrams of UV and IR spectrophotometers.

UNIT I - Water Technology :

Introduction-Hardness of water-Determination of hardness by EDTA-Disadvantages of hard water-Scales & Sludges-Caustic embrittlement-Boiler corrosion-Priming & Foaming, WHO, BIS Standards of water-Softening Methods- Lime Soda process, Zeolite process, Ion Exchange process - Desalination of brackish water-Reverse osmosis, Electro dialysis.

UNIT II - **Electrochemical cells and AND Corrosion:**

Electrochemical cells: primary cell-(Dry or lecalanche cell), Secondary cell-(Lead-acid storage cell, Lithium ion battery), Hydrogen-Oxygen Fuel cell, Methanol fuel cell.

Corrosion: Introduction-Dry corrosion (chemical)-Wet corrosion (electrochemical)-Mechanism of wet corrosion-Bimetallic corrosion-Concentration cell corrosion-Factors influencing corrosion-Corrosion control methods- Cathodic protection and Electroplating.

UNIT III - Engineering Materials :

Properties and engineering applications of Ceramics, Refractories, Glasses, Cement,Abrasives, Lubricants.

UNIT IV - Polymers :

Introduction –Types of polymerization-Preparation, properties and applications of Polyethylene, PVC, Tefflon, Bakelite, UreaFormaldehyde, Silicones, Rubber – Vulcanization, Synthetic Rubbers - (Buna-S, Buna-N, Neoprene). Elementary treatment of Membranes

UNIT V - Instrumental Techniques :

Interaction of radiation with matter,UV-Visible Spectroscopy-Beer –Lambert's law ,Qualitative and Quantitative Analysis,Block diagram of UV-Visible Spectrophotometer.IRSpectroscopy-Types of Vibrations,Identification of functional groups,Block diagram of IR Spectrophotometer**.**

TEXT BOOKS :

1. P.C Jain and Monica Jain, "Engineering Chemistry", 15th edition, Dhanpat Rai Publications 2009.
2. Gurudeep Raj and Chatwal Anand, "Instrumental Methods of Analysis", 5th edition, Himalaya Publications, 2007.

REFERENCE BOOKS :

1. S.S.Dara, "Text book of Engineering Chemistry" 1st edition, S. Chand Publications, 2009.
2. C.V. Agarwal, C.P. Murthy, A.Naidu, "Chemistry of Engineering materials", 9th edition, BSP Publications, 2008.
3. M.R. Senapati, "Advanced Engineering Chemistry" 2nd edition, Lakshmi Publications, 2006
4. H.W. Wilard and Demerit, "Instrumental methods of Analysis", 7th edition, CBS Publications, 1986.

CS103 DATA STRUCTURES

(For CSE, IT & ECM)

L	T	P	To	C
4	-	-	4	4

Course description and Objectives :

In this course, students will learn the basic skills and knowledge of the general-purpose data structures to solve computational problems. The main objective of this course is to provide an introduction to basic data structures and manipulating them, by using C programming language and the evaluation of the data structure needs of particular problems.

Course Outcomes:

Having successfully completed this course, the student will be able to:

- Apply advance C programming techniques such as pointers, dynamic memory allocation, structures to developing solutions for particular problems;
- Design and implement abstract data types such as linked list, stack, queue and tree by using C as the programming language using static or dynamic implementations;
- Evaluate and choose appropriate abstract data types to solve particular problems;
- Design and implement C programs that apply abstract data types.

UNIT I - LINEAR DATA STRUCTURES-ARRAYS

Introduction – Data, Data type, Data Structures – Primitive and Non-primitive, Storage structures – Sequential and linked storage representations, File structures, Abstract Data Type (ADT). Overview of Structures-arrays, operations on arrays(retrieval of an element, search an element, insertion deletion of an element), manipulations on arrays such as finding the sum of elements of an array, adding two arrays, and reversing an array. Maximum sub sequence problem, Multi dimensional arrays.

UNIT II - LINKED LISTS

Types of Linked Lists Singly Linked List, Doubly Linked List, Circular Linked List. Operations on linked lists-insertion, deletion, traversing forward/reverse order. Multi lists, Applications of Linked Lists.

UNIT III - STACKS AND QUEUES

Stacks – ADT, Array and Linked representations, Implementation and their applications. Queues – ADT, array and linked representations, Implementation of linear, circular and doubly-ended queues, and their applications.

UNIT IV - NON-LINEAR DATA STRUCTURES-TREES

Preliminaries –Binary Tree – ADT, array and linked representations, Binary tree properties, tree traversal, Implementation, Expression trees. The Search Tree ADT –Binary Search Trees, Implementation. AVL Trees – Single Rotations, Double rotations.

UNIT V - GRAPHS

Graphs – ADT, definitions and properties, modeling problems as graphs, representation – adjacency matrix and adjacency list, basic graph traversals – breath first search and depth first search. Applications of graphs.

TEXT BOOKS:

1. Richard F.Gilberg, Behrouz A. Forouzan, “Data Structures –A Pseudocode Approach with C”, 2nd Edition, Cengage Learning.

2. Y.Langsam, M.J.Augeustein and A.M.Tenenbaum, “Data Structures Using C”, Pearson Education Asia.

REFERENCE BOOKS:

1. Mark Allen Weiss, “Data Structures and Algorithm Analysis in C”, Second Edition, Pearson Education,1997
2. Sartaj Sahni, Data Structures, Algorithms and Applications in C++ , Universities Press, Second Edition, 2005
3. Jean Paul Tremblay and Paul G. Sorenson, An Introduction to Data Structures with Applications,Tata Mc-Graw Hill, Second Edition, 26th Reprint 2004
4. KRUSE, Data Structures and Programming Design-PHI

ME101 ENGINEERING MECHANICS

L	T	P	To	C
4	-	-	4	4

Course description and Objectives :

The course aims to impart the knowledge to understand the forces and their reactions on various static and dynamic conditions.

Course Outcomes:

- Use scalar and vector analytical techniques for analyzing forces in statically determinate structures.
- Solve the engineering problems in case of equilibrium conditions and to calculate the reaction forces of various supports of different structures.
- Determine the centroid, centre of gravity and moment of inertia of various surfaces and solids.
- Solve the problems involving dry friction.
- Apply fundamental concepts of kinematics and kinetics of particles to the analysis of simple, practicalproblems.

UNIT I - Basic Concepts and Principles of Statics :

Introduction to Engineering Mechanics, Scalar and Vector quantities, Forces, Characteristics of a force, Definitions and examples of various types of force systems, Law of transmissibility, Definition of resultant, Composition and resolution of forces, Moment of a force, Principles of moments of force, Couples, characteristics of a couple, Transformations of a couple, Resultants of Force Systems, Possible resultants of different types of force systems, Resultant of a concurrent coplanar force system, Resultant of a non concurrent coplanar force system

UNIT II - Equilibrium of Rigid Bodies

Free body diagrams, Types of supports and their reactions, requirements of stable equilibrium, Equations of equilibrium of a concurrent coplanar force system, Equilibrium of Bodies acted on by two or three forces, Equilibrium of bodies acted on by non-concurrent coplanar force system

UNIT III - Properties of Surfaces and Solids :

Centroid and Center of Gravity: Centre of gravity of parallel forces in a plane, centroids and center of gravity of composite bodies, Distributed Loads on Beams.

Moments of Inertia: Definition, Parallel axis theorem and perpendicular axis theorem for areas, Polar Moment of inertia, Second moment of area by

integration, Radius of gyration of areas, Moments of inertia of composite areas.

UNIT IV - Friction :

Nature of friction, Laws of friction, Coefficient of friction, Angle of friction, Cone of friction, Types of Friction - Sliding Friction, Rolling Friction, Belt Friction, Ladder Friction, Wedge friction.

UNIT V - Kinematics and Kinetics :

Absolute Motion: Introduction, Recapitulation of basic terminology of mechanics, Displacement, Velocity and acceleration their relationship, Rectilinear motion of a particle

Relative Motion: Introduction to kinematics of relative motion, Relative displacement, Relative velocity

Kinetics: Introduction to Kinetics, Force, Mass and Acceleration, Newton's Laws of motion, Equation of motion for a particle, D Alembert's principle, Rectilinear translation of a rigid body, Work done by a force, Work done by a force system, Energy, Potential energy, Kinetic energy, Principle of Work and kinetic energy, Conservation of energy, Linear impulse, Linear momentum, Principle of linear impulse and linear momentum, Conservation of linear momentum.

TEXT BOOKS :

1. J. L. Meriam, L. G. Kraige, "Engineering Mechanics: Dynamics", 7th ed., John wiley & sons, 2012
2. A. K. Tayal, "Engineering Mechanics", Umesh Publications, 2005.

REFERENCE BOOKS :

1. L. Singer - Harper, "Engineering Mechanics", 3rd ed., Fedinand . , Collins, 1975.
2. Timoshenko & Young, "Engineering Mechanics", 4th ed., Tata McGraw Hill, New Delhi, 2007.
3. S. S. Bhavakati & J. G. Rajasekharappa, "Engineering Mechanics", 3nd ed., New Age International Publications, New Delhi, 2008.

HS118 ENVIRONMENTAL STUDIES

L	T	P	To	C
4	-	-	4	4

Course description and Objectives :

The objective of this course is to heighten on awareness of nature and its importance to students

and make them understand the need to make judicious use of all natural resources for long team sustenance of life on this planet.

Course Outcomes:

- To provide Knowledge on importance of natural resources and integrate technical "field" knowledge with analytical skills to prevent natural resources depletion
- To maintain healthy and Diverse Ecosystems ,
- Work together to conserve the biodiversity
- Take immediate measures to control the Pollution
- Adopt Ecofriendly technology.
- Maintenance of hygienic conditions

UNIT I - Environment and Natural Resources :

Environment: Definition, Scope and Importance – Need for Public Awareness

Natural Resources: Renewable and non-renewable resources – Natural resources and associated problems – Forest Resources: Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources: Use and over utilization of surface and ground water – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources - Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity–Energy resources: renewable and non-renewable energy sources, alternate energy sources. Land resources: Land as a resource, land degradation, Soil erosion – case studies - Role of an individual in conservation of natural resources.

UNIT II - Ecosystems and Biodiversity :

Ecosystem: Concept of an ecosystem. – Complete and incomplete ecosystem - Structure and functions of an ecosystem - Ecological succession. - Food chains, food webs -Structure and functional features of the following ecosystem: a. Forest ecosystem b. Grassland ecosystem c. Desert ecosystem, d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) **Biodiversity**: introduction of biodiversity, Bio-geographical classification of India - Value of biodiversity- Biodiversity at global, National and local levels - Hot-spots of biodiversity - Threats to biodiversity - Endangered and endemic species of India – Conservation of biodiversity

UNIT III - Environmental Pollution and Applications of Remote Sensing / GIS on Environment

Definition, Cause, effects and control measures of: Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution - Solid waste Management: Causes, effects and control measures of municipal and industrial wastes - Climate change, global warming, acid rain, ozone layer depletion -Case Studies - Role of an individual in prevention of pollution - Pollution case studies. – Green technology and its concept, role of green technology in controlling environmental problems.

UNIT IV - Social issues and EIA :

Sustainable development -water conservation: Cloud Seeding (Artificial rain making system), rainwater harvesting, watershed management - Disaster management: floods, earthquake, cyclone and landslides - Environment Protection Act. - Air (Prevention and Control of Pollution) Act. - Water (Prevention and control of Pollution) Act - Wildlife Protection Act - Forest Conservation Act

EIA: introduction to E.I.A.-definition of E.I.A and E.I.S – scope and objectives of E.I.A.- methods of E.I.A –CEIA, REIA, MOEF, CPCB, SPCB – Importance of E.I.A in proposed Projects / Industry /

Developmental activity - Remote sensing / GIS: Introduction of remote sensing / GIS, definition of remote sensing, applications of the remote sensing on environment (site selection, land use/land cover pattern, water/air/soil quality models, a criteria of environmental information systems)

UNIT V - Environmental Sanitation :

Food sanitation: food and drugs Act, food preservations, food borne diseases- Milk sanitation: tests for milk, pasteurization of the milk - water borne diseases-

air borne diseases-viral diseases (HIV/AIDS, SARS, bird-flu, anthrax)-maintenance of sanitary and hygienic conditions

Field Work/Environmental Visit: Visit to a local area to document environmental assets – river/ forest/ grassland / hill /mountain - Study of local environment - common plants, insects, birds - Study of simple ecosystems – pond, river, hill, slopes etc - Visits to industries, water treatment plants, effluent treatment plants

TEXT BOOKS :

1. Y. Anjaneyulu, “Introduction to Environmental Science”, B S Publications, 2008.
2. Dr. M. Chandrasekhar, “A Text book of Environmental Studies”, HI-TECH publications, 2006

REFERENCE BOOKS :

1. Dr. M. Anji Reddy, “A Text book of environmental science and Technology”, B S Publications, 2008
2. Dr. K. Mukkanti, “A Text book of Environmental Studies”, S.CHAND Company Ltd, 2009.
3. EHILRS and ST, “Text book of Municipal and Rural Sanitation”, M.S Hill, 1998.
4. C. S. Rao, Wiley Eastern Ltd, “Environmental Pollution Control Engineering”, New Age International Ltd, 2001
5. Dr. M. Anji Reddy, “Introduction to Remote Sensing”, B S Publications, 2004.
6. Kurian Joseph and R.Nagendram, “Essentials of environmental studies”, Pearson Education Pt Ltd, Delhi, 2007.
7. Sharma & Kour “Text book of Environmental pollution”.
8. H.C Perkins “Text book of Air Pollution”.

CS105 NETWORK SECURITY

L	T	P	To	C
2	-	-	2	-

Course description and Objectives :

This Course focuses towards the introduction of System, Information and Network security using various methodologies. It also focuses on the practical aspects that have been used to provide e_mail and web security.

Course Outcomes:

On Completion of this course student should be able to

- understand the Importance of Information Security
- Know the ways to protect the information
- understand the Firewall importance
- understand the need of Virtual Private Networks.

UNIT I - History of security :

History of security – Physical security, communications security, emissions security, computer security, network security and information security. Security process - Anti-virus software, access controls, firewalls, smart cards, biometrics, intrusion detection, policy management, vulnerability scanning, encryption, physical security mechanisms.

UNIT II - Access attacks

Snooping, eavesdropping, interception; Modification attacks - Changes, insertion and deletion; Denial of service attacks- Denial of access to information, applications, systems and communication; Repudiation attacks - Masquerading and denying an event. Hacking - Hacker motivation, historical hacking techniques, IP spoofing and malicious code.

UNIT - III

Confidentiality of files, information in transmission and traffic flow, integrity, availability and accountability; Integrity of files and information during transmission; Availability - backups, failover and disaster recovery; Accountability – identification and authentication, and audit.

UNIT - IV

Concepts of firewalls, Application layer and packet filtering firewalls; Virtual Private Networks.

UNIT - V

Basic encryption concepts, Private Key encryption standards-DES, triple DES and AES. Public key encryption – RSA. Concepts of digital signatures.

TEXT BOOKS :

1. Eric Maiwald, Fundamentals of Network security, Dreamtech Press, 2007.

REFERENCE BOOKS :

1. William Stallings, “Cryptography and Network security”, 4th edition, Pearson Education, 2010.

HS119 PROFESSIONAL ETHICS, VALUES AND HUMAN RIGHTS

L	T	P	To	C
2	-	-	2	-

Course description and Objectives :

• *To create an awareness on Engineering Ethics and Human Values.*

• *To instill Moral and Social Values and Loyalty*

• *To appreciate the workplace rights of Others, responsibilities and Safety of others.*

Course Outcomes:

The course will enable the students to attain the following:

- an understanding of professional and ethical responsibility in workplace
- the broad education necessary to understand the impact of engineering solutions in a global and societal context
- a knowledge of contemporary issues related to human and professional interactions at workplace
- an engineer's life-long commitment to serve the disadvantaged

UNIT I - Human Values :

Morals, Values and Ethics – Integrity – Work Ethic – Service Learning – Civic Virtue – Respect for Others – Living Peacefully – Caring – Sharing – Honesty – Courage – Valuing Time – Co-operation – Commitment – Empathy – Self-Confidence – Character – Spirituality.

UNIT II - Engineering Ethics & **Engineering as social experimentation :**

Engineering Ethics : Variety of moral issues – types of inquiry moral dilemmas – moral autonomy – The problems of Many Hands – Kohlburg's theory – Gilligan's theory Impediments to Responsible Action.

Engineering as social experimentation - Codes of ethics - a balanced outlook on law - the challenger case study.

UNIT III - Engineer's Responsibility for Safety :

Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis – Reducing Risk – The Government Regulator's Approach to Risk - Chernobyl Case Studies and Bhopal.

UNIT IV - Workplace Rights and Responsibilities & Work Environment :

Workplace Rights and Responsibilities : Engineers and Managers. Oganizational complaint procedures. Government agencies. Resolving Employee concerns. Limits on acceptable behaviour in large corporation.

Work Environment : Ethical and legal considerations, Organizational responses to offensive behaviour and harassment. Ethics in a Global Context.

UNIT V - Global Issues :

Multinational Corporations – Business Ethics - Environmental Ethics – Computer Ethics - Role in Technological Development – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Honesty – Moral Leadership – Sample Code of Conduct.

TEXT BOOKS :

1. Mike Martin and Roland Schinzinger, “Ethics in Engineering”, McGraw Hill, New York, 2005.

REFERENCE BOOKS :

1. Prof. (Col) P S Bajaj and Dr. Raj Agrawal, “Business Ethics – An Indian Perspective”, Biztantra, New Delhi, 2004
2. Charles E Harris, Michael S. Protchard and Michael J Rabins, “Engineering Ethics – Concepts and Cases”, Wadsworth Thompson Learning, United States, 2000 (Indian Reprint now available)
3. Engineering Ethics-An industrial Perspective, Gail Dawn Baura
4. Charles E Harris, Michael S Pritchard and Michael J Rabins, “Engineering Ethics – Concepts and Cases”, Thompson Learning, 2000.
5. Charles E Harris, Michael S Pritchard and Michael J Rabins, “Engineering Ethics – Concepts and Cases”, Thompson Learning, 2000.
6. PSR Murthy, “Indian Culture Values and Professional Ethics”, BS Publications
7. Edmund G Seebauer and Robert L Barry, “Fundamentals of Ethics for Scientists and Engineers”, Oxford University Press, Oxford, 2001.

HS120 ENGINEERING PHYSICS LAB

L	T	P	To	C
-	-	3	3	2

Course description and Objectives :

This lab is intended to make the students realize the theoretical concepts of physics having hands on experience in conducting the following experiments. Students may have to take up any 10 experiments from each section.

Course Outcomes:

- Students realize concept of resonance of sound conducting the experiment of Sonometer Melde's experiment and volume generator.
- The students understand the concepts of light conducting the experiments of dispersion of light, diffraction of light, optical fibers and lasers.
- The students acquire the knowledge of magnetic field theory, thermal energy and elastic properties by conducting the experiments of field along the axis of circular coil, Lee's experiment, Seebeck effect and Torsional pendulum.

PHYSICS LAB

1. Verification of laws of transverse vibrations in stretched string - Sonometer
2. Melde's Experiment - Transverse and Longitudinal modes.
3. Determination of Rigidity modulus of a material in the form of a wire - Torsional pendulum
4. Dispersive power of the material of a Prism - Spectrometer
5. Determination of wavelength of a monochromatic light source - Diffraction Grating.
6. Field along the axis of a circular coil – stewart Gee's apparatus.
7. Volume Resonator.
8. Band gap of semiconductor
9. Hall coefficient
10. Thermal conductivity of bad conductor Lee's method
11. Optical Fiber – Determination of numerical aperture
12. Solar Cell
13. Seebeck effect

REFERENCE BOOKS:

1. Vogel's Text book of qualitative Chemical Analysis J.Mendham, R.C Denney, J.D. Bares, M.Thomas & B. Siva Sankar, Pearson Publications – Volume I (2009).

EE113 FUNDAMENTALS OF ELECTRICAL ENGG. LAB

(For all branches except EEE)

L	T	P	To	C
-	-	3	3	2

Course description and Objectives :

To understand basic electrical elements, electrical energy its consumption and measurement. To develop practical knowledge on electrical machines, electronic devices and circuits

Out Comes :

- Able to realize characteristics of electrical elements.
- Able to analyze given simple ac and dc networks.
- Able to work on different electrical machines.
- Able to reflect the knowledge of electronic devices to verify experimentally.

List of Experiments

1. Familiarization with basic components such as Resistors, Capacitors, Diodes, Transistors
2. Familiarization with basic electrical measuring instruments
3. Verification of ohm's law
4. Verification of KVL and KCL
5. Calculation of power factor in simple RL and RC circuits
6. Magnetization characteristic of a D.C. self excited generator
7. Measurement of power and energy.
8. Measurement of transformation ratio of single phase transformer.
9. Measurement of Power, Power factor of 3-phase induction motor.
10. Characteristics of PN junction diode.
11. Characteristics of Zener diode.
12. Operation of Full wave Rectifier
13. Operation of half wave Rectifier
14. Study and Working of fluorescent lamp
15. Measurement of armature and field resistances of d c machine using voltmeter-ammeter method.

Note : Any 10 of above experiments are to be conducted.

CS107 COMPUTER PROGRAMMING LAB

L	T	P	To	C
-	-	3	3	2

Course description and Objectives :

To familiarize the students in preparation of documents and presentations with office automation tools. A comprehensive problem solving skills through C language is offered to enable the students to write diversified solutions using this language.

Course Outcomes:

- Able to write, compile and debug programs in C language.
- Able to formulate problems and implement algorithms in C.
- Able to effectively choose programming components that efficiently solve computing problems in real-world

1. Write A Program to find simple Interest, compound interest
2. Write A Program to covert given temperature from C to F & F to C
3. Write A Program to check Entered number is positive or zero or Negative
4. Write A Program to print given year is Leap year or not
5. Write A Program to do arithmetic operations using switch
6. Write A Program to find biggest among 3 Numbers
7. Write A Program to print grade of a student for 5 sub avg>70(A), 60-70(B), 50-60(C),<50(F)
8. Write A Program to find Roots fo Quadratic Equation
9. Write A Program to find sum of individual digits of a given number
10. Write A Program to check whether the given number is PALINDRAM or not
11. Write A Program to check whether the given number is PERFECT or not
12. Write A Program to check whether the given number is PRIME or not
13. Write A Program to check whether the given number is ARMSTRONG or not
14. Write A Program to check whether the given number is STRONG or not
15. Write A Program to find sum of Natural Numbers

16. Write A Program to print the following triangle

```
         1
       2   3
     4   5   6
   7   8   9   10 etc……….
```

17. C Progrm to find Factorial of Given number using Recursive and Non Recursive Functions.
18. Write A Program to print Fibonacci Series upto given limit using recursive, Non recursive
19. Write program in C for determining the minimum and maximum and sum of elements of an array of ‘n’ elements and searching for a given element.
20. C Program for computing range, mean and standard deviation of a given numeric dataset.
21. Write A Program in C for performing addition, subtraction, multiplication and transpose operations on matrices.
22. Write program to perform the following string operations on the given string. a) string length b) string copy c) string concatenation d) string comparison e) reverse string f) sub string
23. Write A Program to read student record (no, name, marks1, marks2, marks3, marks4, marks5, calculate average and Grade) and display the student record.
24. Write A Program to do arithmetic operations using pointers.
25. Write A Program to create two data files and copy the content of these two data files as a single file in another new file?

CS108 DATA STRUCTURES LAB

(For CSE, IT & ECM)

L	T	P	To	C
-	-	3	3	2

Course Description & Objectives

In this course, students will learn the basic skills and knowledge of the general-purpose data structures to solve computational problems. The main objective of this course is to provide an introduction to basic data structures and manipulating them, by using C programming language

Course Outcomes

- Able to understand the importance of structure and abstract data type, and their basic usability in different applications through different programming languages.
- Able to understand the linked implementation, and its uses both in linear and non-linear data structure.
- Able to understand various data structure such as stacks, queues, trees, graphs, etc. to solve various computing problems.
- Able to decide a suitable data structure to solve a real world problem.

Programs

1. Code the following list ADT operations using array.
   (a) void is_emptyList(List 1)
   (b) List makeNullList(size n)
   (c) Position firstPost(List 1)
   (d) Position endPost(List 1)
   (e) Position nextPost(List 1, Position p)
   (f) Position prevPos(List 1, position p)
   (g) Position find(List 1, Element x)
   (h) Position findKth(List 1, int k)
2. Code the following list ADT operations using array
   (i) void insert(List 1, Position p)
   (j) void delete(List 1, Position p)
   (k) void append(List 1, Element x)
   (l) int cmp(List 1, Position p1, Position p2)
   (m) int cmp2(List11, List12, Position p1, Position p2)
   (n) void swap(List 1, Position p1, Position p2)
   (o) Element retrieve Element(List 1, Position p)
   (p) void print element(List 1, Position p)

3. Implement singly linked list
   i. Create list
   ii. Insert a new node into linked list at front, middle, end
   iii. Delete an existing node from list.
   iv. Traverse the list in forward direction
4. Write a program that reads two lists of elements, prints them, reverses them, prints the reverse list, merges the list, prints merge list.
5. Implement a polynomial ADT and write a program to read two polynomials and print them, adds the polynomials, prints the sum, multiply the polynomials and print the product.
6. write a program that reads an infix arithmetic expression of variables, constants, operators (+, -, *, /) and converts it into the corresponding postfix form. Using Stack data structure.
7. Implement Circular Queue ADT .
8. Implement Binary search Tree ADT and write a program that interactively allows

   (a) Insertion (b) Deletion (c) Find_min (d) Find_max (e) Find operations (f) Height of tree.
9. Implement Binary Tree Traversals recursion/non recursion.
10. WAP for AVL Tree to implement following operations: (For nodes as integers)
    a. Insertion: Test program for all cases (LL, RR, RL, LR rotation)
    b. Deletion: Test Program for all cases (R0, R1, R-1, L0, L1, L-1)
    c. Display: using set notation.
11. Write a Program to implement graph traversals techniques.

Text books:

1. Richard F.Gilberg, Behrouz A. Forouzan, “Data Structures –A Pseudocode Approach with C”, 2nd Edition, Cengage Learning.
2. Y.Langsam, M.J.Augeustein and A.M.Tenenbaum, “Data Structures Using C”, Pearson Education Asia.

ME103 ENGINEERING GRAPHICS

L	T	P	To	C
1	-	3	4	3

Course description and Objectives :

To familiarize students with the conventional concept of engineering drawing and application through AutoCAD.

Course Outcomes:

After completion of this course, student will be able to prepare plan and elevation of any pictorial view either conventional or through AutoCAD.

UNIT - I

Introduction to Engineering drawing: Introduction to Engineering Drawing – Types of lines, lettering, dimensioning Construction of polygon & Conics. (Ellipse, Parabola & Hyperbola by general method)

UNIT - II

Orthographic Projections: Principle of projection-Planes of projections.

Projections of points:

Projection of straight lines: Inclined to one plane and both the planes.

Projections of planes: Simple planes, Planes inclined to reference planes.

UNIT - III

Projections & Sections of solids – projections of prisms – cylinders – cones - pyramids – solid axis inclined to one plane, simple sections- prism, cylinder, pyramid and cone. AutoCAD Fundamentals.

UNIT - IV

Isometric projections: Isometric drawing of simple objects through AutoCAD

UNIT - V

Orthographic projections: Conversion of Pictorial view into orthographic view using AUtoCAD and Conventional.

TEXT BOOKS :

1. N.D.Bhatt, “Engineering Drawing”, 49th ed., Charotar Publication, 2007.
2. K. Venugopal, “Engineering Drawing through Auto CAD”, 1st ed., New Age Publication, 2008.

REFERENCE BOOKS :

1. Jhole, “Engineering Drawing”, 2nd ed., Tata McGraw Hill, 2008.
2. K.L. Narayana, “Engineering drawing” 2nd ed., Scitech Publications, 2008.

ME105 WORKSHOP PRACTICE

L	T	P	To	C
-	-	3	3	2

Course description and Objectives :

To provide the hands on experience to the students on basic workshop skills.

Course Outcomes:

After completion of this course, students will be able to identify various tools connected to all the trades. They are also able to make various objects to the given dimension by using various types of tools.

Trades for exercises:

1. Carpentry:
2. Fitting
3. Tin Smithy & Black smithy4. House wiring
5. Foundry & Welding (Demonstration)
6. Machine shop & CNC (Demonstration)
7. IT Workshop
8. Study of discrete components of computer and networking (1 session)
9. Demonstration of assembling a computer, disk partitioning and installation of system and application software. installation of modem etc. (2 sessions)

Note: In each trade, the students has to perform at least two jobs

TEXT BOOKS :

1. S.K. Hazra Choudhury, Elements of workshop Technology, 11th Edition, Media Promoters, 1997
2. Gopal, T.V., Kumar, T., and Murali, G., A first course on workshop practice – Theory, Practice and Work Book, Suma Publications, Chennai, 2005.
3. Venkatachalapathy, V. S., First year Engineering Workshop Practice, Ramalinga Publications, Madurai, 1999.

VFSTR UNIVERSITY

II Year - B.Tech

SYLLABUS

I SEM & II SEM

II Year B.Tech. IT I - Semester

L	T	P	To	C
4	-	-	4	4

CS217 DISCRETE MATHEMATICAL STRUCTURES

Course Description and Objectives:

Discrete mathematics is the study of mathematical structures that are discrete rather than continuous. Discrete mathematics deals with discrete objects. Its objective is to extend student's Logical and Mathematical ability to deal with abstraction. Also its goal is to introduce most of the basic terminologies used in computer science courses and application of ideas to solve practical problems.

Course Outcomes:

- *At the end of the course, students would have knowledge of the concepts needed to test the logic of a program.*
- *Have an understanding in identifying structures on many levels.*
- *Be aware of a class of functions which transform a finite set into another finite set which relates to input output functions in computer science.*
- *Be aware of the counting principles*
- *Be exposed to concepts and properties of algebraic structures such as semi groups, monoids and groups.*

UNIT I - Mathematical reasoning

Propositions; negation disjunction and conjuction; implication and equivalence; truth tables; predicates; quantifiers; natural deduction; rules of Inference; methods of proofs; use in program proving; resolution principle; application to PROLOG.

UNIT II - Set theory

Paradoxes in set theory; inductive definition of sets and proof by induction; Peono postulates; Relations; representation of relations by graphs; properties of relations; equivalence relations and partitions; Partial orderings; Posets; Linear and well-ordered sets;

UNIT III - Graph Theory

Elements of graph theory, cut vertices and edges, covering, matching, Euler graph, Hamiltonian path, trees traversals, spanning trees Independent sets, Isomorphism, planarity.

UNIT IV - Functions

Mappings; injection and surjections; composition of functions; inverse functions;special functions; Peono postulates; pigeonhole principle; recursive function theory;

UNIT V - Group Theory& Elementary Combinatorics

Definition and elementary properties of groups, semigroups, monoids, rings, fields, vector spaces and lattices;Elementary combinatorics; counting techniques; recurrence relation; generating functions;

TEXT BOOKS:

1. K.H.Rosen, Discrete Mathematics and applications,TataMcGraw Hill, fifth edition, 2003.
2. C.L.Liu, Elements of Discrete Mathematics, McGraw-Hill Book, Second Edition, 2006.

REFERENCE BOOKS:

1. J .L.Mott, A.Kandel, T.P .Baker, Discrete Mathematics for Computer Scientists and Mathematicians, Prentice Hall of India, second edition, 1986.
2. W.K.Grassmann and J.P.Trembnlay, Logic and Discrete Mathematics, A Computer Science Perspective, Prentice Hall, First edition, 1996.

II Year B.Tech. IT	**I - Semester**	**L**	**T**	**P**	**To**	**C**
		4	-	-	4	4

CS219 DIGITAL LOGIC DESIGN

Course Description and Objectives:

To understand basic number systems, codes and logic gates. To understand the boolean algebra and minimization logic. To understand the design of combinational and sequential circuits. To understand the basics of various memory.

Course outcomes:

- *Students learn the concept of number system, gates and boolean algebra.*
- *After this course students should be able to design the combinational and sequential circuits.*
- *They will acquire enough knowledge necessary to continue with Computer Organization course in next semester.*

UNIT I - Digital Systems

Binary Numbers, Octal, Hexa-Decimal and other base numbers, Number base conversions, complements, signed binary numbers, Floating point number representation, binary codes, error detecting and correcting codes, digital logic gates (AND, NAND,OR,NOR, Ex-OR, Ex-NOR), Boolean algebra, basic theorems and properties, Boolean functions, canonical and standard forms.

UNIT II - Gate –Level Minimization and combination circuits

The K-Maps Methods, Three Variable, Four Variable, Five Variable , sum of products , product of sums Simplification, Don't care conditions, NAND and NOR implementation and other two level implantation.

UNIT III - Combinational Circuits

Design Procedure, Combinational circuit for different code converters and other problems, Binary Adder, subtractor, Multiplier, Magnitude comparator, Decoders, Encoders, Multiplexers, De-multiplexers.

UNIT IV - Sequential Circuits

Synchronous Sequential Circuits: Latches, Flip-flops, analysis of clocked sequential circuits, design of counters, Up-down counters, Ripple counters, Registers, Shift registers, Synchronous Counters,.

Asynchronous Sequential Circuits:Reduction of state and flow tables, Role free Conditions.

UNIT V - Memory

Random Access memory, types of ROM, Memory decoding, address and data bus, Sequential Memory, Cache Memory, Programmable Logic Arrays, memory Hierarchy in terms of capacity and access time .

TEXT BOOKS:

1) M. Morris Mano, Digital Design, Pearson Prentice Hall, Third Edition, 2002.
2) A. Anand Kumar, Switching theory & Logic Design, PHI Learning private Limited, Third Edition, 2010.

REFERENCE BOOKS:

1) Zvi Kohavi and Niraj K.Jha, Switching and Finite Automata Theory, Tata McGraw Hill, Third Edition, 2010.
2) C.V.S. Rao, Switching Theory and Logic Design, Pearson Education, First Edition, 2007.
3) Donald D.Givone, Digital Principles and Design, Tata McGraw Hill, First Edition, 2002.
4) M. Rafiquzzaman, Fundamentals of Digital Logic & Micro Computer Design, John Wiley, 5th Edition, 2005.

II Year B.Tech. IT I - Semester	L	T	P	To	C
	4	-	-	4	4

CS221 ADVANCED DATA STRUCTURES

Course Description and Objectives:

Describe and implement a variety of advanced data structures (hash tables, priority queues, balanced search trees). Demonstrate an understanding of external memory and external search and sorting algorithms. Data structures for querying large collections of large strings. Emphasis on object-oriented design, writing and documenting medium-sized programs.

Course Outcomes:

At the end of the course students should be able to :

- *Analyze run-time execution of sorting methods.*
- *Understand and implement priority based queues;*
- *Understand and implement binary search trees;*
- *Understand and analyze heap sort;*
- *Knowledge on basic search and sort algorithms. Adequate knowledge to choose appropriate data structure and algorithm to solve a problem.*

UNIT I - Sorting

Internal sorting -Insertion sort, Selection sort ,Shell sort , Bubble sort ,Quick sort ,Merge sort, radix sort. External sorting -Multi way merge. Searching Sequential search, Binary search and ternary search.

UNIT II - Hashing

General Idea, Hash function, separate chaining, linear probing, quadratic probing, double hashing, rehashing. Priority queues- Applications, heap sort, Huffman codes.

UNIT III - Tree, Binary tree, Binary search trees

Representation –insertion, deletion , searching. Balanced Search Trees AVL Trees: Representation –insertion, deletion , searching. Binary Search trees Red black trees: Representation –insertion, deletion , searching. B-Trees – Representation – insertion, deletion , searching.

UNIT IV - Graphs

Graph Representation, Graph Traversals, Shortest Paths Problems (Dijkstras Algorithm, Floyd warshalls Algorithm) Connectivity – Directed and Undirected Graphs, Minimum spanning trees- Prims Algorithm, Kruskals Algorithm, Topological Sort

UNIT V - Text Processing

String operations, pattern matching problems, Treis, Text compression, Text similarity testing. Sub string search problems: brute force method , knuth morris pratt, Boyer moore algorithm.

TEXT BOOKS:

1. Sartaj Sahni, Data Structures, Algorithms and Applications in Java, Universities Press, Second Edition, 2005.
2. A.Drozdek Data Structures and Algorithms in Java, 3rd edition, , Cengage Learning, 2008.

REFERENCE BOOKS:

1. Michael T Goodrich Roberto Tamassia, David Mount “Data Structures & Algorithms in C++” WSE, WILEY, 2014.
2. Jean Paul Tremblay and Paul G. Sorenson, An Introduction to Data Structures with Applications,Tata Mc-Graw Hill, Second Edition, 26th Reprint 2004.

II Year B.Tech. IT I - Semester

L	T	P	To	C
4	-	-	4	4

CS223 OBJECT ORIENTED PROGRAMMING THROUGH JAVA

Course description and Objectives:

On Completion of this course, the student will be able to understand fundamentals of object- oriented programming in Java, including defining classes, invoking methods, using class libraries. Have the ability to write a computer program to solve specified problems. Be able to use the Java SDK environment to create, debug and run simple Java programs.

Course Outcomes:

The student is expected to have

- *Understanding of OOP concepts and basics of java programming (Console and GUI based)*
- *The skills to apply OOP and Java programming in problem solving*
- *Should have the ability to extend his knowledge of Java programming further on his/her own.*

UNIT I - Introduction, Classes and Objects

Creation of Java, Importance of Java to Internet, Byte code, Java buzzwords, OOP Principles- Encapsulation, Inheritance and Polymorphism, Data types, Variables, Declaring variables, Dynamic initialization, Scope and life time of variables, Arrays, Operators, Control statements, Type conversion and casting, Compiling and running of simple Java program, Concepts of classes and objects Class fundamentals – Declaring objects, Assigning object reference variables, Introducing methods, Constructors, Usage of static with data and methods, Usage of final with data, Access control, this key word, Garbage collection, Overloading methods and constructors, Call by value, Recursion, Nested classes and Inner classes, Exploring the String class.

UNIT II - Inheritance, Packages and Interfaces

Basic concepts, Member access rules, Usage of super key word, Forms of inheritance, Method overriding, Abstract classes, Dynamic method dispatch, Using final with inheritance, the Object class. Defining, Creating and Accessing a Package,

Understanding CLASSPATH, Importing packages, Differences between classes and interfaces, Defining an interface, Implementing interface, Applying interfaces, Variables in interface and Extending interfaces.

UNIT III - Exception Handling, Multithreading

Concepts of Exception handling, Types of exceptions, Usage of try, Catch, Throw, Throws and Finally keywords, Built-in exceptions, Creating own exception Sub classes, Concepts of Multithreading, Differences between process and thread, Thread life cycle, Creating multiple threads using Thread class, Runnable interface, Synchronization, Thread priorities, Inter thread communication, Daemon threads, deadlocks, Thread groups.

UNIT IV - Applets & Event Handling & AWT Controls

Applet Class, Applet Architecture, Applet Skeleton - Applet Initialization and Termination, Overriding update(), Simple Applet, Display Methods, Requesting Repainting - A simple banner Applet, Using The Status Window, The HTML APPLET Tag, Passing parameters to Applets, Applet Context and show Document.

Event sources, Event classes – ActionEvent, AdjustmentEvent, ComponentEvent, Container Event, Focus Event, InputEvent, ItemEvent, KeyEvent and MouseEvent, Delegation event model, Event Listeners, Handling mouse and Keyboard events, Adapter classes.

UNIT V - AWT & Swing

Concepts of components, Container, Panel, Window, Frame, Canvas, Font class, Color class and Graphics. AWT Controls : Buttons, Labels, Text fields, Text area, Check boxes, Check box groups, Lists, Choice, Scrollbars, Menus, Layout Managers - Flow, Border, Grid, Card and Grid bag.

JApplet, JFrame and JComponent, Icons and Labels, Handling threading issues, Text fields, Buttons – The JButton class, Check boxes, Radio buttons, Combo boxes, Tabbed Panes, Scroll Panes, Trees, and Tables.

TEXT BOOKS:

1. Herbert Schildt, “The Complete Reference Java J2SE”, 7th ed., TMH Publishing Company Ltd, New Delhi, 2008.
2. Joe Wiggles worth and Paula McMillan, “Java Programming Advanced Topics”, 3rd ed., TMH, 2009.

REFERENCE BOOKS:

1. Cay Horstmann, “Big Java”, 2nd ed., John Wiley and Sons, 2006.

II Year B.Tech. IT I - Semester	L	T	P	To	C
	4	-	-	4	4

CS225 SOFTWARE ENGINEERING

Course Description and Objectives:

This course will be helpful for the student to understand the concept of a software life cycle, the role of process models and how to produce a set of software requirements. This course introduces the concepts and methods required for the construction of large software intensive systems. It aims to develop a broad understanding of the discipline of software engineering.

Course Outcomes:

After completing the course students will be able to:

- *Plan a software engineering process to account for quality issues and non-functional requirements;*
- *Employ a selection of concepts and techniques to complete a small-scale analysis and design project.*
- *Interact with a client to elicit input, and communicate progress.*
- *Employ group working skills - including general organization, planning and time management, and inter-group negotiation, etc.*
- *Translate a specification into a design, and then realize that design practically, all using an appropriate software engineering methodology.*

UNIT I - Introduction to Software Engineering, A Generic view of process & Process models

The evolving role of software, Changing Nature of Software, Software myths. Software engineering- A layered technology, a process framework, The Capability Maturity Model Integration (CMMI), Process patterns, process assessment, personal and team process models. The waterfall model, Incremental process models, Evolutionary process models, The Unified process.

UNIT II - Requirements Engineering & Analysis Modeling

Requirements engineering Tasks: Inception, elicitation, elaboration, negotiation, specification, validation, requirements management.

Initiation of requirements engineering process: Identify stakeholders recognizing multiple view points, working towards collaborator, asking the first question. Building the analysis model: data modeling-data objects, attributes, relationship, cardinality and modularity. Class based modeling: identify analysis classes, specify attributes, and define operations, CRC model, association and dependency, analysis package.

UNIT III - Software Design

Design Engineering: Design process and Design quality, Design concepts, the design model, Data flow diagrams, process specification.

Creating an architectural design: Software architecture, Data design, Architectural styles and patterns, Architectural Design.

Performing User interface design: Golden rules, User interface analysis and design, interface analysis, interface design steps, Design evaluation.

UNIT IV - Process & Product Metrics and Software Testing

Product metrics: Software Quality, Metrics for Analysis Model, Metrics for Design Model, Metrics for source code, Metrics for testing, Metrics for maintenance. Metrics for Process and Products: Software Measurement, Metrics for software quality.

Testing Strategies: A strategic approach to software testing, test strategies for conventional software, Black-Box and White-Box testing, Validation testing, System testing, the art of Debugging.

UNIT V - Risk & Quality Management

Risk management: Reactive vs. Proactive Risk strategies, software risks, Risk identification, Risk projection, Risk refinement, RMMM, RMMM Plan.

Quality Management: Quality concepts, Software quality assurance, Software Reviews, Formal technical reviews, Statistical Software quality Assurance, Software reliability, The ISO 9000 quality standards.

TEXT BOOKS:

1. Roger S. Pressman "Software Engineering, A practitioner's Approach", 6th ed., McGrawHill International Edition, 2008.

REFERENCE BOOKS:

1. Sommervelle "Software Engineering",7th ed., Pearson education, 2008.
2. Shely Cashman Rosenblatt," Systems Analysis and Design" 1st ed., Thomson Publications,2006.

II Year B.Tech. IT I - Semester	**L**	**T**	**P**	**To**	**C**
	-	-	3	3	2

CS227 ADVANCED DATA STRUCTURES LAB

Course description and Objectives:

The fundamental design, and implementation of data structures. Principles for good program design, especially the uses of data abstraction.

Course Outcomes:

At end of this laboratory the student will be able to

- *Write well-structured object-oriented programs of medium size of code.*
- *Write programs and class libraries given a specification.*
- *Students will collaboratively design and then individually implement a robust set of tools to efficiently and elegantly organize data, with optimized access methods.*

List of Programs:

1. Write Java programs that use recursive and non-recursive functions to traverse the given binary tree in
   a) Preorder b) Inorder c) Postorder.
2. Write a Java program to perform the following operations:
   a) Construct a binary search tree with given elements.
   b) Search for a key element in the above binary search tree.
   c) Delete an element from the above binary search tree.
3. Write Java programs that use both recursive and non-recursive functions for implementing the following searching methods:
   a) Linear search b) Binary search
4. Write a Java program to implement priority queue ADT.
5. Write Java programs for implementing the following sorting methods:
   a) Bubble sort b) Insertion sort c) Radix sort
6. Write Java programs for implementing the following sorting methods:
   a) Quick sort b) Merge sort
7. Write a Java program to implement all the functions of a dictionary (ADT) using Hashing.

8. Write a Java program to perform the following operations:
   a) Insertion into a B-tree b) Searching in a B-tree
9. Write a Java program that implements KMP algorithm for pattern matching.

REFERENCE BOOKS:

1. A.Drozdek, Data Structures and Algorithms in Java, 3rd edition, Cengage Learning, 2008
2. J.R.Hubbard, Data Structures with Java, 2nd edition, Schaum's Outlines, TMH, 2013.
3. S.Sahani Data structures, Algorithms and Applications in java, 2nd Edition, universities Press, 2009.

II Year B.Tech. IT I - Semester

L	T	P	To	C
-	-	3	3	2

CS229 OBJECT ORIENTED PROGRAMMING THROUGH JAVA LAB

Course description and Objectives:

This course is introduced to understand the basic concepts of Java,Class syntax, data types, flow of control, classes, methods, objects, arrays, exception handling, recursion, and graphical user interfaces (GUIs). Writing and testing applets for potential inclusion in web pages. Understanding how to access enterprise data bases from the application programs.

Course outcomes:

The student is expected to have hands on experience with the following:

1. Basics of Java programming, multi-threaded programs and Exception handling
2. The skills to apply OOP in Java programming in problem solving
3. Use of GUI components (Console and GUI based)

List of Experiments:

1. Write a Java program that prompts the user for an integer and then prints out all prime numbers up to that. Integer.
2. Write a Java program that checks whether a given string is a palindrome or not.
   Ex: MADAM is a palindrome.
3. Write a Java program for sorting a given list of names in ascending order.
4. Write a Java Program that reads a line of integers, and then displays each integer, and the sum of all the integers (use StringTokenizer class)
5. Write a Java program that reads a file and displays a file and displays the file on the screen, with a line number before each line.
6. Write a Java program that displays the number of characters, lines and words in a text file.
7. Write a Java program for creating multiple threads
   a) Using Thread class.
   b) Using Runnable interface.

8. Write a Java program that illustrates how run time polymorphism isachieved.
9. Write a java program that illustrates the following
   a) Creation of simple package.
   b) Accessing a package.
   c) Implementing interfaces.
10. Write a java program that illustrates the following
    a) Handling predefined exceptions.
    b) Handling user defined exceptions
11. APPLETS
    a) Working with Frames and various controls.
    b) Working with Dialogs and Menus.
    c) Working with Panel and Layout.
    d) Incorporating Graphics.
    e) Working with colors and fonts
12. SWINGS
    Jpanel- Jframe – Jtoolbar—JwindowFramework

REFERENCE BOOKS:

1. Dietel & Dietel, Java How to Program, 5th Edition, Pearson Education, 2009.
2. P.J.Deitel and H.M.Deitel, Java for Programmers, Pearson education, PHI, 2008.
3. P.Radha Krishna, Object Oriented Programming through Java, Universities Press, 2010.
4. Bruce Eckel, Thinking in Java, Pearson Education, 2010.
5. S.Malhotra and S.Choudhary, Programming in Java, Oxford Univ. Press, 2009.

II Year B.Tech. IT	**I - Semester**	**L**	**T**	**P**	**To**	**C**
		-	-	3	3	2

HS217 SOFT SKILLS LAB

Course Description & Objectives:

The Soft Skills Laboratory course equips students with required skills such as interpersonal skills, communication skills, leadership skills etc. It aims at training undergraduate students on employability skills to win in the job interviews and building confidence to handle professional tasks.

Training Methodology:

The training methodology is designed to bring about changes in attitudes through experience-based learning. Activities in simulated environments such as role plays, group discussions, micro-presentations, audio-video clippings, case studies, psychometric tests etc., will provide students insights into their strengths and weaknesses.

Course Outcomes:

To help students to develop formal communication skills in a work place. To make them acquire team skill by working in group activities. To equip them with suitable language and speech patterns in a workplace. To enhance the ability of critical & lateral thinking while addressing the issues at any situation. To enable them to present themselves confidently in job interviews.

Course Contents:

Personality Development Skills

a) Role of language in Personality – How language reflects, impacts personality – Using gender-neutral language in MNCs – being culturally sensitive.
   Activity – Appraising each other – Worksheets related to the above
b) Career Planning- job vs. career- goal setting- SWOT analysis- planning and prioritization - four quadrant time management system - time management – self-management – stress-management.
   Activity: Setting a SMART goal - SWOT analysis of the self – Writing a Statement of Purpose (SOP).

c) Effective Resume-Writing: structure and presentation - planning and defining the career objective - projecting one's strengths and skill-sets – summarizing - formats and styles - covering letter.
Activity: Resume preparation –writing a covering letter.

Language Skills

a) Functional English - Formal/informal context – purpose - interpersonal dynamics - ideation –content organization - initiating a conversation – responding appropriately - right body language.
Activity - Role play in different situations, - self-introduction - social background (family, home town etc.,) - role model - my future - likes/ dislikes (movies, persons, places, food, music etc.,) - a mini project on functional English.

b) Vocabulary-Building: Etymology of words - word roots - prefixes & suffixes - synonyms & antonyms- collocations - one-word substitutes – analogies - idioms and phrases - contextual guessing of unfamiliar words – task-oriented learning (100 words).
Activity: Flash cards (200 words) – vocabulary exercises with hand-outs.

Communication Skills

a) Group Discussion: Articulation and flow of oral presentation - dynamics of group discussion – intervention – summarizing - voice modulation – content generation – Key Word Approach (KWA) – Social, Political, Economic, Legal and Technical Approach (SPELT) – View Point of Affected Part (VAP) - language relevance - fluency and coherence.
Activity: Mock sessions on four types of GD topics.

b) Facing Interviews: Interview process - understanding employer expectations - pre-interview planning - opening strategies - answering strategies – stress-based interviews - tele-interviews, video interviews- frequently asked questions (FAQs).
Activity: Writing responses to FAQs - mock interviews.

Comprehensive skills

a) Reading Comprehension: Reading as a skill- techniques for speed reading- skimming- scanning- appreciating stylistics - impediments for speed reading - eye fixation - sub-vocalisation - critical reading - reading

based on purpose - reading for information - reading for inference - understanding tone.
Activity: Reading comprehension exercises with texts drawn from subject areas. (Hand-outs)

b) Listening Comprehension: Listening as skill - different types of listening - hidden data of communication - active listening - top-down approach - bottom-up approach.
Activity: Following different accents (Indian, British, American) listening comprehension exercises with audio and video excerpts.

Analytical Skills

a) Data Commentary: Deductive & inductive reasoning - data interpretation - tables & charts - bar charts - pie charts - line graphs - ratios & proportions – percentages - coding and decoding - reasoning by analogy - artificial language etc.,

b) Analytical Thinking: Statement and Conclusion - Data Sufficiency - Statement and Argument - Statement and Assumption - Logical Deduction - Logical Problems.
Activity: Exercises with handouts.

REFERENCE BOOKS:

1. *Edward Holffman, **"**Ace the Corporate Personality**"**, McGraw Hill,2001* Adrian Furnham, *Personality and Intelligence at Work*, Psyc
2. hology Press, 2008.
3. John Adair Kegan Page, "*Leadership for Innovation***"** 1st ed., Kogan, 2007.
4. M.Ashraf Rizvi, "*Effective Technical Communication***",** 1st edition, Tata McGraw Hill, 2005.
5. Krishna Mohan & NP Singh , "*Speaking English Effectively***"** 1st edition, Macmillan, 2008.
6. ***Soft Skills Material* of Infosys** Under the Academic Initiative of Campus Connect, 2011.
7. K.R. Lakshminarayana & T. Murugavel**,** ***"**Managing Soft Skills**",*** Scitech Publications. 2009
8. Dr. S.P. Dhanvel**,** *English and Soft Skills***,** Orient Blackswan, 2011
9. Rajiv K. Mishra, ***Personality Development*-**, Rupa & Co. 2004.
10. R.S.Agarwal, Quantitative Aptitude, S. Chand& Co. Latest edition, 2013.
11. R.S.Agarwal, Verbal & Non-verbal Reasoning, S. Chand& Co. Latest ed.,2003

II Year B.Tech. IT II - Semester

L	T	P	To	C
4	-	-	4	4

HS213 PROBABILITY & STATISTICS

Course description and Objectives:

Aim of this course is to introduce statistical techniques which are useful in every walk of life. It also introduces some probability which has many applications. By the end of the course, student would have learned regression, correlation techniques, probability, distributions, test of hypothesis and their applications.

Course outcomes:

- *The students will understand the use of statistical techniques in every walk of life.*
- *The statistical techniques like regressions, correlation can be used for finding qualitative and quantitative relation between two or more variables*
- *Probability , probability distributions can be used in many places like academics ,real life problems for decision making.*
- *Test of hypothesis will be useful for them in taking decisions .*
- *All these topics are useful in academics as well as in research work.*
- *They find applications at work places as well as in their real life.*

UNIT I - Descriptive Statistics

Basic Definitions, Frequencies, Graphical Representation, Histogram, Ogive curves, Measures of Central tendency, Arithmetic mean, Median, Mode, mean deviation, standard deviation, Symmetry and Skewness, Karl Pearson's Coefficient of skewness.

UNIT II - Curve Fitting and Correlation, Regression

Least squares method, curve fitting (straight line and parabola only) Covariance, Correlation, Types, Pearson's Coefficient of correlation, Rank correlation, Spearman's rank correlation. Regression, Regression lines, multiple regression.

UNIT III - Probability

Introduction, Definition (Classical and Axiomatic approach), Addition theorem, Conditional probability, Multiplication theorem, Total probability, Bayes theorem.

VFSTR UNIVERSITY

UNIT IV - Distributions

Random variables, Discrete and Continuous variables, Introduction to Distributions.

Binomial distribution : Definition, Mean and Standard deviation, Recurrence relation, Applications, Fitting of binomial distribution.

Poisson Distribution : Definition, Mean and Standard deviation, Recurrence relation, Poisson Distribution is an approximation of Binomial distribution, Applications, Fitting of Poisson distribution.

Geometric Distribution : Definition, Properties.

Normal Distribution : Definition, Normal curve, Mean and Standard deviation, Median, Mode, Normal Distribution applications, Normal Distribution is an approximation to Binomial distribution.

Exponential Distribution : Definition, Properties.

UNIT V - Sampling Methods

Population and Sampling, Parameters and Statistics, Types of sampling, Sampling Distributions, Central limit theorem, Standard Error of mean from infinite population, Standard deviation of variance.Test of hypothesis and test of significance, confidence limits, confidence interval, Test of significance of Large samples, T-distribution, Chi square test.

TEXT BOOKS :

1. H. K. Dass and Er. Rajnish Verma, Higher Engineering Mathematics, S. Chand & Co., New Delhi, 2011.
2. Miller and Fruinds, Fundamentals of Probability and Statistics, PHI publication, 2003.

REFERENCE BOOKS :

1. S.C. Gupta and V.K .Kapoor, "Fundamentals of Mathematical Statistics", Sultan Chand & Co., New Delhi, 2005.
2. B.V. Ramana, "Higher Engineering Mathematics", 3rd Edition, Tata McGraw-Hill Publishing Co, 2008.
3. R K Jain, S R K Iyengar, "Advanced Engineering Mathematics", 2nd Edition, Narosa Publishing House, 2005.
4. Erwin Kreyszig, "Advanced Engineering Mathematics", 8th Edition, John Wiley & Sons (Asia) Pvt. Ltd. 2001.

II Year B.Tech. IT II - Semester

L	T	P	To	C
4	-	-	4	4

CS220 COMPUTER ORGANIZATION

Course description and Objectives:

To understand the basic chip design and organization of 8086 with assembly language programming.

Course Outcomes:

After this course,

- õ *Students understand in a better way the I/O and memory organization in depth.*
- õ *They should be in a position to write assembly language programs for various applications.*

UNIT I - Introduction to Computer Organization

Organization and architecture, Block diagram of digital computer, Structure and function, Data Representation, Fixed Point Representation, Floating – Point Representation and Error Detection codes.

UNIT II - Register Transfer Language, Microoperations and Computer Arithmetic

Register Transfer language – Register Transfer Bus and memory transfers, Arithmetic Mircrooperations, Logic Micro Operations, Shiftmicro operations and Arithmetic logic shift unit, Addition and subtraction, Multiplication Algorithms and Division Algorithms, Floating – point Arithmetic operations.

UNIT III - Basic Computer Organization and Micro Programmed Control

Instruction codes, Computer Registers, Computer instructions – Instruction cycle, Memory – Reference Instructions, Register Reference instructions, Input – Output and Interrupt, Stack organization, Instruction formats, Addressing modes, DATA Transfer and manipulation, Program control, Reduced Instruction set computer, Control memory, Address sequencing, Micro program example, Design of control unit, Hard-wired control and Micro programmed control unit.

UNIT IV - The Memory System

Memory Hierarchy, Main memory, Auxiliary memory, Associative memory, Cache memory, Virtual memory and Memory management hardware.

UNIT V - Input Output Organization

Peripheral Devices, Input-Output Interface, Asynchronous data transfer Modes of Transfer, Priority Interrupt Direct memory Access, Input-Output Processor (IOP) Serial communication, Introduction to peripheral component and Interconnect (PCI) bus.

TEXT BOOK:

1. M. Moris Mano, “Computer Systems Architecture”, 3rd ed., Pearson/PHI, 1993.

REFERENCE BOOKS :

1. William Stallings, “Computer Organization and Architecture”, 7th ed., Pearson/ PHI, 2007.
2. Carl Hamacher, Zvonko Vranesic, Safwat Zaky, “Computer Organization”, 5th ed., TMH, 2007.

II Year B.Tech. IT II - Semester

L	T	P	To	C
4	-	-	4	4

CS222 DATABASE SYSTEMS

Course description and Objectives:

The objective of the course is to present an introduction to database management systems, with an emphasis on how to organize, maintain and retrieve - efficiently, and effectively - information from a DBMS. The course will focus on 5 main areas such as Information gathering, Data analysis, Database design, Concurrency and robustness, Efficiency and scalability.

Course Outcomes:

Upon successful completion of this course, students should be able to:

- *Describe the fundamental elements of relational database management systems*
- *Explain the basic concepts of relational data model, entity-relationship model, relational database design, relational algebra and SQL.*
- *Design ER-models to represent simple database application scenarios*
- *Convert the ER-model to relational tables, populate relational database and formulate SQL queries on data.*
- *Improve the database design by normalization.*

UNIT I - Database System- concepts and architecture

Data modelling using the Entity Relationship (ER) modelling and Enhanced Entity Relationship (EER) modelling, Specialization and Generalization.

UNIT II - The Relational Model

Relational database design using ER to relational mapping, Relational algebra and relational calculus, Tuple Relational Calculus, Domain Relational Calculus, SQL.

VFSTR UNIVERSITY

UNIT III - Database design theory and methodology

Functional dependencies and normalization of relations, Normal Forms, Properties of relational decomposition, Algorithms for relational database schema design.

UNIT IV - Transaction processing concepts

Schedules and serializability, Concurrency control, Two Phase Locking Techniques, Optimistic Concurrency Control, Database recovery concepts and techniques.

UNIT V - Data Storage and indexing

Single level and multi level indexing, Dynamic Multi level indexing using B Trees and B+ Trees, Query processing and Query Optimization, Introduction to database security.

TEXT BOOKS:

1. Ramez Elmasri and Shamkant B. Navathe, Fundamentals of Database Systems (5/e), Pearson Education, 2008.
2. Raghu Ramakrishnan and Johannes Gehrke, Database Management Systems (3/e), McGraw Hill, 2003.

REFERENCE BOOKS:

1. Silberschatz, Korth, “Data base System Concepts”, 4th ed., McGraw hill, 2006.
2. Peter Rob and Carlos Coronel, Database Systesm- Design, Implementation and Management (7/e), Cengage Learning, 2007.

II Year B.Tech. IT II - Semester

L	T	P	To	C
4	-	-	4	4

CS224 FORMAL LANGUAGES AND AUTOMATA THEORY

Course description and Objectives:

The purpose of this course is to acquaint the student with an overview of the theoretical foundations of computer science from the perspective of formal languages. Classify machines by their power to recognize languages. Employ finite state machines to solve problems in computing. Explain deterministic and nondeterministic machines.

Course Outcomes:

As a result of the content and structure of this course, students should be able to:

- *Understand the functioning of Finite-State Machines, Deterministic Finite-State Automata, Nondeterministic Finite-State Automata and Pushdown Automata and Turing Machines.*
- *Create Automata to accept strings from various simple languages.*
- *Understand Formal Grammars.*
- *Beware of the Regular, Context-Free and Context-Sensitive languages.*

UNIT I - Introduction & Simplified notation

Alphabets, Strings and Languages; Automata and Grammars, Regular Languages. Deterministic finite Automata (DFA)-Formal Definition. State transition graph, Transition table, Language of DFA, Nondeterministic finite Automata (NFA), NFA with epsilon transition, Language of NFA, Equivalence of NFA and DFA, Minimization of Finite Automata, Distinguishing one string from other, Myhill-Nerode Theorem. FA with output: Moore and Mealy machine, Equivalence of Moore and Mealy Machine, Applications and Limitation of FA.

UNIT II - Regular expression (RE)

Definition, Operators of regular expression and their precedence, Algebraic laws for Regular expressions, Kleen's Theorem, Regular expression to FA, DFA to Regular expression, Arden Theorem, Non Regular Languages, Pumping Lemma for regular Languages. Application of Pumping Lemma, Closure properties of Regular Languages, Decision properties of Regular Languages. (Proofs not required)

UNIT III - Grammar Formalism

Regular grammars-right linear and left linear grammars, equivalence between regular linear grammar and FA, Context Free Grammar, Definition, Examples, Derivation, Derivation trees, Ambiguity in Grammar, Inherent ambiguity, Ambiguous to Unambiguous CFG, Useless symbols, Simplification of CFGs, Normal forms for CFGs: CNF and GNF, Closure properties of CFLs, Decision Properties of CFLs: Emptiness, Finiteness and Membership, Pumping lemma for CFLs. (Proofs not required)

UNIT IV - Push Down Automata (PDA)

Description and definition, Instantaneous Description, Language of PDA, Acceptance by Final state, Acceptance by empty stack, Deterministic PDA, Equivalence of PDA and CFG, CFG to PDA and PDA to CFG, Two stack PDA.

UNIT V - Turing machines (TM)

Basic model, definition and representation, Instantaneous Description, Language acceptance by TM, Computable functions, Types of Turing machines, Universal TM, Church's Thesis, Recursive and recursively enumerable languages, Halting problem, Introduction to Undecidability, Undecidable problems about TMs. Post correspondence problem (PCP), Modified PCP.

TEXT BOOK :

1. Hopcroft, Ullman, "Introduction to Automata Theory, Languages and Computation", 2nd ed., Pearson Education, 2007.

REFERENCE BOOKS:

1. K.L.P. Mishra and N.Chandrasekaran, "Theory of Computer Science: Automata, Languages and Computation", 2nd ed., PHI, 2004.
2. Martin J. C., "Introduction to Languages and Theory of Computations", 2nd ed., TMH, 2005.
3. Papadimitrou, C. and Lewis, C.L., "Elements of the Theory of Computation", 2nd ed., PHI, 2009.

II Year B.Tech. IT II - Semester

L	T	P	To	C
4	-	-	4	4

CS226 DESIGN AND ALALYSIS OF ALGORITHMS

Course description and Objectives:

The course enables the students to understand the importance of algorithms in the problem solving process, create algorithms for solving simple problems.

Course Outcomes:

At the end of the course students should be able to :

- õ *Analyze behavior of various algorithms with respect to space and time complexities.*
- õ *Apply existing techniques to solve new real world problems.*
- õ *Understood algorithm techniques like divide and conquer, greedy approach dynamic programming, and back tracking and their applicability.*
- õ *Understood deterministic and non deterministic problems.*

UNIT I - Introduction

Algorithm, Pseudo code for expressing algorithms, Performance Analysis-Space and Time complexity, Asymptotic Notation - Big oh notation, Omega notation, Theta notation and Little oh notation, Randomized algorithms.

UNIT II - Divide and conquer

General method, Applications - Binary search, Quick sort, Merge sort, and Stassen's matrix multiplication, Greedy method, General method, Applications - Job sequencing with deadlines, Knapsack problem, Minimum cost spanning trees and Tree vertex splitting problem.

UNIT III - Dynamic Programming

General method, Applications - Multi stage graphs, Optimal binary search trees, matrix chain multiplication 0/1 knapsack problem, All pairs shortest path problem, Travelling sales person problem,

VFSTR UNIVERSITY

UNIT IV - Backtracking

Disjoint Sets - disjoint set operations, Union and find algorithms, connected components and Biconnected components.

General method, Applications – n-queen problem, Sum of subsets problem, Graph coloring, Hamiltonian cycles.

UNIT V - Branch and Bound & Complete problems

General method, Applications - Traveling sales person problem, 0/1 knapsack problem – LC Branch and Bound solution, FIFO Branch and Bound solution, NP - Hard and NP - Basic concepts, non-deterministic algorithms, NP - Hard and NP Complete classes, Cook's theorem.

TEXT BOOKS:

1. Ellis Horowitz, SatrajSahni and Rajasekharam, “Fundamentals ofComputer Algorithms”,2nded., Galgotia publications pvt. Ltd., 2006.
2. Introduction to Algorithm 2nd Edition Thomas H.Coremen, Charles E.Leiserson, Ronald L.Rivest, Clifford Stein, 2014.

REFERENCE BOOKS:

1. AnonyLevitin,” Introduction to Design and Analysis of Algorithms”, 2nd ed., Pearson Education, 2008.

II Year B.Tech. IT II - Semester

L	T	P	To	C
-	-	3	3	2

CS228 DATABASE SYSTEMS LAB

Course description and Objectives:

Course Objective: *This lab course will enhance database handling, data manipulation and dataprocessing skills in student through SQL & PL/SQL, and helps them gain knowledge in designing forms, Menus and also helps them in developing database applications.*

Course Outcomes:

Completion of this course, Students would be able to perform the following tasks:

- *Understand, analyze, and apply common SQL Statements including DDL, DML and DCL statements to perform different operations.*
- *Understand, analyze, and apply PL/SQL blocks using Cursors and Triggers.*
- *Design and implement a database for a given problem according to well-known design principles that balance data retrieval performance with data consistency.*

1. Introduction to ER Design tool (ex. TOAD)
2. Familiarization of MYSQL RDBMS
3. Data Definition, Table Creation, Constraints, Insert, Select Commands, Update and Delete Commands.
4. Nested Queries and Join Queries
5. Views
6. Design and development of database using MYSQL
7. High level programming language extensions (Control structures, Procedures and Functions).
8. Front end Tools
9. Forms
10. Triggers
11. Menu Design
12. Reports.
13. Case Study/ Database application project.

REFERENCE BOOKS:

1. Oracle certified associate Mysql beginner's guide.
2. Oracle certified associate Oracle 10g &11g SQL fundamentals.

II Year B.Tech. IT II - Semester

L	T	P	To	C
-	-	3	3	2

CS230 DESIGN AND ANALYSIS OF ALGORITHM LAB

Course Objectives:

In this laboratory after completing experiments student has to learn how to analyze a problem & design the solution for the problem. In addition to that, solution must be optimum, i.e., time complexity & memory usage of the solution must be very low.

Course Outcomes:

At end of this laboratory the student will be able to code,

- *Well-structured object-oriented programs of medium size of code in C++.*
- *Various algorithmic techniques to solve problems like spanning trees, knap sack and queens.*
- *Students will collaboratively design and then individually implement a robust set of tools to solve new problems efficiently.*

List of Experiments

1. Write C++ programs to implement the following:
   a) Prim's algorithm.
   b) Kruskal's algorithm.
2. Write a C++ program to find optimal ordering of matrix multiplication. (Note: Use Dynamic programming method).
3. Consider the problem of eight queens on an (8x8) chessboard. Two queens are said to attack each other if they are on the same row, column, or diagonal. Write a C++ program that implements backtracking algorithm to solve the problem i.e. place eight non-attacking queens on the board.
4. Write a C++ program to find the strongly connected components in a digraph.
5. Write a C++ program to implement file compression (and un-compression) using Huffman's algorithm.
6. Write a C++ program to implement dynamic programming algorithm to solve all pairs shortest path problem.

7. Write a C++ program to solve 0/1 knapsack problem using the following:
   a) Greedy algorithm.
   b) Dynamic programming algorithm.
   c) Backtracking algorithm.
   d) Branch and bound algorithm.

II Year B.Tech. IT II - Semester

L	T	P	To	C
-	-	3	3	2

HS304 PROFESSIONAL COMMUNICATION LAB

Course description and Objectives:

The Professional Communication exposes students to conventions of corporate communication and documentation procedures involved in the day-to-day functioning of the business world. The

course is aimed at improving written communication skills of undergraduate students and preparing them to meet professional challenges in the work spheres. Writing and Personality are not two exclusive spheres of influence and this course will work on the relationship between professional writing and a personality that is able to meet the goals of an organization in creative and innovative ways.

Training Methodology:

The methodology is designed to give hands-on practice to students in formal and informal report writing, structure and format of letters as well as other organization related work.

Course outcomes:

To enable students to write logical sentences and paragraphs, use appropriate diction, grammar and punctuation.

To expose them to the world of business and business register

To make them compose clear and concise business messages

To produce business documents for mailing to external recipients or intra-organizational circulation

To enable them to speak business English for handling various business situations

Mechanics of writing

- Elements of Technical Writing : Sentence structure - reducing verbosity - arranging ideas logically – building coherence - paragraph level and document level - topic sentence - cohesive devices – transitionals – paraphrasing – précis-writing.

- Mechanics of Writing: Stylistic elements – the rapporteur- the purpose- the reader (audience) -elementary rules of grammar- choice of diction - elementary principles of composition - matters of form – punctuation - conventions of business communication -language and tone - weak links in business correspondence - ethical concerns in business writing

Business Report Writing

- Parts of the Report: Writing an abstract - features of a good abstract – approach - compare and contrast - cause and effect.
- Types of Technical Reports : Drafting a technical proposal - formal and informal proposals - factual reports, feasibility reports, survey reports – parts of a report - title page –declaration – acknowledgements – table of contents - abstract – introduction – conclusion – citations – references - appendices - oral reports and presentations

Business Letter Writing

- Letter-Writing - Formal and informal letters - structure of formal letters - expressions of salutations, introductory and concluding paragraphs - different types of letters - sales letter - complaint letter - adjustment letter - letter to the editor - covering letter - claim letter – letter of condolence.

Business E- writing:

- E-mail – nature and scope - e-mail etiquette – Common Errors in composing e-mails – Quotations - Inviting quotations - sending quotations –placing orders. Office Communication - agenda - notice - circular
- Effective Resume-Writing: Structure and presentation - defining career objective - projecting one's strengths and skill-sets
- Summarizing - formats and styles - covering letter.

Business visual presentations

- Business Proposals: Drafting business proposals - calculating profit and loss-averages - ratios and proportions – partnership - simple interest - compound interest - calculating volumes and areas
- Course of action - cause and effect- theme detection - making judgments - logical deductions - analyzing arguments – syllogisms - Venn diagrams - matching definitions -verbal reasoning - numerical reasoning - working out justifications.

REFERENCE BOOKS:

1. Strunk , William, Jr.*The Elements of Style*, Fourth Edition
2. Rozakis, Laurie, Ph.D, (2003). *English Grammar for the Utterly Confused*, McGraw-Hill
3. Sharma. C. (1978) *Business Correspondence & Report Writing*, Tata McGraw-Hill
4. Kirkman, John. *Good Style: Writing for science & technology*, Routledge Study Guides, second edition.
5. Monippally, Matthukutty. M. 2001. *Business Communication Strategies*. 11th Reprint. Tata McGraw-Hill. New Delhi

VFSTR UNIVERSITY

III Year - B.Tech

SYLLABUS

I SEM & II SEM

III Year B.Tech. IT I - Semester

L	T	P	To	C
4	-	-	4	4

CS234 WEB TECHNOLOGIES

Course Description and Objectives:

On completion of this course, a student will be familiar with client server architecture and able to develop a web application using java technologies. Students will gain the skills and project-based experience needed for entry into web application and development careers. Students will be able to use a variety of strategies and tools to create websites and also integrate with IDE's for fast development of web applications.

Course Outcomes:

- *Students are able to develop a dynamic webpage by the use of java script and DHTML.*
- *Students will be able to write a well formed / valid XML document.*
- *Students will be able to connect a java program to a DBMS and perform insert, update and delete operations on DBMS table.*
- *Students will be able to write a server side java application called Servlet to catch form data sent from client, process it and store it on database.*
- *Students will be able to write a server side java application called JSP to catch form data sent from client and store it on database.*

UNIT I - Introduction to Tier Architecture & HTML

Client/Server Architecture**,** J2EE Multi Tier Architecture. HTML Common tags- Block Level and Inline Elements, Lists, Tables, Images, Forms, Frames; Cascading Style sheets, CSS Properties;

UNIT II - Java Script & XML

Introduction to Java Script, Objects in Java Script, Dynamic HTML with Java Script.

The Need for XML, SGML and XML, Well-Formed XML, Valid XML, Displaying XML, XML Application Languages, Document type definition, XML Schema.

UNIT III - JDBC

Data Base, Database Schema, A Brief Overview Of The JDBC Process, JDBC Driver Types, JDBC Packages, Database Connection, Associating The JDBC-ODBC Bridge With Database, Creating, Inserting, Updating And Deleting Data In Database Tables, Result Set, Metadata.

UNIT IV - Web Servers and Servlets

Tomcat web server, Introduction to Servlets: Servlets, the Advantage of Servlets over "Traditional" CGI, Basic Servlet Structure, Simple Servlet Generating Plain Text, Compiling and Installing the Servlet, Invoking the Servlet, Lifecycle of a Servlet, The Servlet API, Reading Servlet parameters, Reading Initialization parameters, Context Parameters, Handling Http Request & Responses, Using Cookies-Session Tracking, Servlet with JDBC.

UNIT V - Introduction to JSP

The Problem with Servlet. The Anatomy of a JSP Page, JSP Processing, JSP Application Development: Generating Dynamic Content, Using Scripting Elements, Implicit JSP Objects, Declaring Variables and Methods , Sharing Data Between JSP pages, Users Passing Control and Data between Pages, JSP application design with JDBC, JSP Application Design with MVC.

TEXT BOOKS:

1. Beginning Web Programming-Jon Duckett, WROX, 2008.
2. Core Servlets and Java Server pages Vol. 1: Core Technologies By Marty Hall and Larry Brown Pearson, 2006.

REFERENCE BOOKS:

1. Programming world wide web-Sebesta,Pearson, 2015.
2. Internet and World Wide Web – How to program by Dietel and Nieto PHI/ Pearson Education Asia, 2011.
3. Jakarta Struts Cookbook, Bill Siggelkow, S P D O'Reilly, 2015
4. Murach's beginning JAVA JDK 5, Murach, SPD, 2005.
5. An Introduction to web Design and Programming –Wang-Thomson, 2011.

III Year B.Tech. IT I - Semester

L	T	P	To	C
4	-	-	4	4

CS313 COMPUTER NETWORKS

Course Description and Objectives:

This course will focus on imparting knowledge about the aspects of data communication and computer network systems with the required basic principles behind them. This course provides essential knowledge about the OSI model and TCP/IP model. It creates a good foundation covering the physical, data link, network, transport, and application layers.

Course Outcomes:

- *To understand the communication basics.*
- *To have the knowledge of different networks.*
- *To know about different protocols.*
- *To understand how to find the routes by using different routing algorithms.*
- *To understand the basics of Internet.*

UNIT I - Introduction

Use of computer networks, network hardware, network software, reference models, example networks.

UNIT II - Physical layer, Data link layer & Medium access control sublayer

Guided Transmission Media.

Design issues, Error detection & correction, Elementary data link protocols, Sliding window protocols.

The channel allocation problem, multiple access protocols.

UNIT III - Network Layer

Design issues, Routing algorithms, Congestion control algorithms, Quality of Service (QOS), Internetworking, the network layer in the Internet.

UNIT IV - Transport layer

The transport service, elements of transport protocols, the internet transport protocols: UDP & TCP.

UNIT V - Application Layer

DNS-Domain Name System. The World Wide Web, Multimedia.

TEXT BOOK:

1. Andrew S Tanenbaum, "Computer Networks", 4th ed., Pearson Education, 2003.

REFERENCE BOOKS:

1. Behrouz A. Forouzan, "Data communications and Networking", 3rd ed.,TMH, 2003.
2. William Stallings, "Data and Computer Communications", 7th ed., Pearson Education, 2004.
3. J.F. Kurose and K . W. Ross, "Computer Networking-A Top-Down Approach Featuring Internet," 3rd ed., Perason Education, 2005.

III Year B.Tech. IT	I - Semester	L	T	P	To	C
		4	-	-	4	4

CS315 OPERATING SYSTEMS

Course Description and Objectives:

In this course students should understand how the operating system effectively manages system resources.

Course Outcomes:

- õ *To understand the types of Operating systems and analyze the process scheduling Algorithms and Case study on processing Scheduling.*
- õ *To understand the resource sharing among the processes in the system.*
- õ *To understand how to manage the memory during the process execution (Memory Management) and File Management system.*

UNIT I - Introduction

What Operating System do, Operating System structure. Process Concept: Overview, Process scheduling, Operations on process, Inter process communication. Process Scheduling: Scheduling Criteria, Scheduling Algorithms, Multiple-Processor Scheduling, Case Study: Process scheduling in Linux.

UNIT II - Process Synchronization

The Critical-Section Problem, Peterson's Solution, Synchronization Hardware, Semaphores, Monitors, Classical problems of synchronization, Case Study : Process Synchronization in Linux.

.

UNIT III - Deadlocks

Deadlock Characterization, Methods of Handling Deadlocks, Deadlock prevention, Deadlock avoidance, Deadlock Detection and Recovery.

UNIT IV - Memory Management

Continuous memory allocation, paging, structure of the page table, segmentation, demand paging, page replacement algorithms.

UNIT V - File System

File Concept, Access Methods, Directory Structure, File System Mounting, File Sharing, Protection, File-System Structure, File System Implementation, Directory Implementation, Allocation Methods, Free Space Management. Secondary-Storage Structure: Overview of Mass-Storage Structure, Disk Structure, Disk Scheduling, RAID Structure.

TEXT BOOK:

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, “Operating System Principles”, 7th edition, John Wiley & Sons Inc, 2006.

REFERENCE BOOKS:

1. William Stallings, “Operating Systems – Operating System: Internals and Design Principles”, 6th edition, , Prentice Hall, 2005.
2. Andrew S Tanenbaum ,”Modern Operating Systems”, 3rd edition, , Prentice Hall, 2007.

VFSTR UNIVERSITY

III Year B.Tech. IT	I - Semester	L	T	P	To	C
		4	-	-	4	4

CS317 COMPILER DESIGN

Course Description & Objectives:

To understand, design and implement a lexical analyzer , parser and code generation schemes. To understand optimization of codes and runtime environments.

Course Outcomes:

On completion of the course the student will:

- õ *Be able to prove an understanding of a program language structure and its translation to executable code by constructing and demonstrating a compiler for a language defined by a certain grammar.*
- õ *Prove knowledge of ongoing events when executing programs written in high level language. This is done by explaining and demonstrating these events while running a simple program translated by a personally designed compiler.*
- õ *Know how to design a compiler for a regular high level language.*

UNIT I - Introduction to Compiling

Compilers – Analysis of the source program – Phases of a compiler – Cousins of the Compiler – Grouping of Phases – Compiler construction tools – Lexical Analysis – Role of Lexical Analyzer – Input Buffering – Specification of Tokens, data structures in compilation – LEX lexical analyzer generator

UNIT II - Syntax Analysis

Role of the parser –Writing Grammars –Context-Free Grammars – Top Down parsing –Recursive Descent Parsing – Predictive Parsing – Bottom-up parsing – Shift Reduce Parsing – Operator Precedent Parsing – LR Parsers – SLR Parser – Canonical LR Parser – LALR Parser ,YACC – automatic parser generator.

UNIT III - Semantic analysis

Intermediate forms of source Programs – abstract syntax tree, polish notation and three address codes. Attributed grammars, Syntax directed translation, Conversion of popular Programming languages language Constructs into Intermediate code forms, Declarations – Assignment Statements –Boolean Expressions.

UNIT IV - Code optimization and Run Time Environments

Introduction– Principal Sources of Optimization –Optimization of basic Blocks – Introduction to Global Data Flow Analysis - Basic blocks, Flow graphs, data flow equation, global optimization, data flow analysis for structured Programs.

UNIT V - Code Generation

Issues in the design of code generator – The target machine – Next-use Information – A simple Code generator – DAG representation of Basic Blocks – Peephole Optimization.

TEXT BOOK :

1. Alfred Aho, Ravi Sethi, Jeffrey D Ullman, “Compilers Principles, Techniques and Tools”, 1st ed., Pearson Education Asia, 2003.

REFERENCE BOOKS :

1. Allen I. Holub “Compiler Design in C”, 1st ed., Prentice Hall of India, 2003.
2. C. N. Fischer and R. J. LeBlanc, “Crafting a compiler with C”, 1st ed., Benjamin Cummings, 2003.
3. J.P. Bennet, “Introduction to Compiler Techniques”, 2nd ed., Tata McGraw-Hill, 2003.
4. Henk Alblas and Albert Nymeyer, “Practice and Principles of Compiler Building with C”, 3rd ed., PHI, 2001.
5. Kenneth C. Louden, “Compiler Construction: Principles and Practice”, 1st ed., Thompson Learning, 2003.

VFSTR UNIVERSITY

III Year B.Tech. IT	I - Semester	L	T	P	To	C
		4	-	-	4	4

IT303 DIGITAL IMAGE PROCESSING
(Elective-I)

Course Description and Objectives:

To introduce to students the analytical tools and methods, which are currently used in digital image processing as applied to image information for human viewing. Students will learn to apply these tools in the laboratory in image restoration, enhancement, compression and segmentation.

Course Outcomes:

- *Understand how images are formed, sampled, quantized and represented digitally.*
- *Understand how image are processed by discrete, linear, time-invariant systems*
- *Understand how color is represented*
- *Understand how image information can be modeled analytically*
- *Understand the principles of image compression*

UNIT I - Digital Image Fundamentals

Elements of visual perception, Image sensing and acquisition, Image sampling and quantization Basic relationship between pixels, Basic geometric transformations, Introduction to Fourier Transform and DFT, Properties of 2D Fourier Transform, FFT Separable Image Transforms, Walsh, Hadamard, Discrete Cosine Transform, Haar Transform, Slant Transform and Hotelling Transform.

UNIT II - Enhancement

Spatial Domain methods**,** Basic grey level transformation, Histogram equalization, Image subtraction, Image averaging, Spatial filtering: Smoothing, sharpening filters, Laplacian filters, Frequency domain filters: Smoothing, Sharpening filters, Homomorphic filtering.

UNIT III - Restoration

Model of Image Degradation/restoration process, Noise models, Inverse filtering, Least mean square filtering, Constrained least square filtering, Blind image restoration, Pseudo inverse, Singular value decomposition.

UNIT IV - Compression

Fundamentals of image compression, image compression models, lossless compression, Variable length coding, LZW coding, Bit plane coding, predictive coding, DPCM. Lossy Compression: Transform coding, Wavelet coding, Basics of Image compression standards: JPEG, MPEG, Basics of Vector quantization.

UNIT V - Segmentation

Detection of discontinuities, Thresholding , Region Based segmentation.

TEXT BOOKS :

1. Rafael C Gonzalez, Richard E Woods , “Digital Image Processing”, 2nd ed., Pearson Education, 2003
2. A.K. Jain, “Fundamentals of Digital Image Processing”, 1st ed., PHI, 2004.

REFERENCE BOOKS :

1. Millman Sonka, Vaclav hlavac, Roger Boyle, “Image Processing Analysis and Machine Vision”, 1st ed., Thompson Learning, 1999.
2. Chanda Dutta Majumdar, “Digital Image Processing and Applications”, 1st ed., Prentice Hall of India, 2000.
3. Rafael C Gonzalez, “Digital Image Processing using MATLAB”, 1st ed., Pearson Education, 2002.

III Year B.Tech. IT I - Semester

L	T	P	To	C
4	-	-	4	4

CS332 ARTIFICIAL INTELLIGENCE

(Elective-II)

Course Description and Objectives:

Provide knowledge of ideas and techniques underlying the design of intelligent computer systems. Develop problem solving skills in students. Provide knowledge of the tools and applications of AI. Lay the foundation for research areas like Natural language Processing(NLP) and Machine learning(ML).

Course Outcomes:

- *Basic knowledge of AI principles, techniques, Expert Systems*
- *Applications of basic AI techniques for problem solving.*
- *Knowledge representation and new knowledge deduction in intelligent systems.*
- *A brief idea of NLP, and Machine learning techniques.*

UNIT I - Introduction to Intelligent Systems

Introduction- What is AI? Examples of AI systems, Brief history of AI. Intelligent Agent- Agents and environments, The concept of rationality, The nature of environments, Structure of agents, stimulus-response agents (simple reflex agents), Model based agents, Goal based agents, Utility based agents, Learning agents.

UNIT II - Problem Solving

Searching: Solving problems by searching, A* algorithm, AO* algorithm, Heuristic functions, Hill climbing. Searching game trees (Adversarial search): Games, Optimal decisions in games, Minimax procedure, Alpha-beta pruning.

UNIT III - Knowledge Representation and Reasoning & First order logic

Propositional logic: Logical agents, reasoning patterns in propositional logic, Inference in propositional logic i.e. Resolution, Forward chaining, Backward chaining.

Reasoning patterns in First order logic, Inference in First order logic i.e. Resolution, Forward chaining, Backward chaining.

UNIT IV - Planning

The planning problem, planning with state space search, partial order planning, planning graphs, planning with propositional logic, analysis with planning approaches.

UNIT V - Learning

Forms of learning, Inductive learning, Learning Decision Trees, Ensemble Learning, Why learning works. Natural Language Processing(NLP): Introduction, Understanding, Perception, Machine learning.

TEXT BOOK:

1. Stuart Russell, Peter Norvig, “Artificial Intelligence”, Second Edition, Pearson Education, 2003.

REFERENCE BOOKS:

1. G.Luger, W.A. Stubblefield, “Artificial Intelligence”, Third Edition, Addison-Wesley Longman, 1998.
2. N.J. Nilsson, “Principles of Artificial Intelligence”, Narosa Publishing House, 1980.

III Year B.Tech. IT I - Semester

L	T	P	To	C
4	-	-	4	4

CS334 PRINCIPLES OF PROGRAMMING LANGUAGES
(Elective-I)

Course Description and Objectives:

After the completion of this course Student should be able to understand how to design a new Programming Language. Know the differences between Structured and unstructured programming constructs.

Course Outcomes:

On completion of the course the student will:

- ***U**nderstand the concepts in programming languages*
- *The way of using those constructs in different programming languages.*
- *Familiar with the design of a new programming language.*

UNIT I - Syntax and Semantics of Programming Languages

Reasons for studying concepts of programming languages, Programming domains, Language Evaluation Criteria, Von Neuman Architecture, Language categories, Implementation Methods, Programming environments, General Problem of describing Syntax – Language. Recognizers and Language Generators, Formal methods of describing syntax – BNF, EBNF , Attribute grammars, Dynamic Semantics – Axiomatic , Operational and Denotational semantics.

UNIT II - Variables and Data Types

Names, Variables, Concept of binding, Type checking, Strong typing, Type compatibility, Named constants, Variable initialization, Data types – Primitive, Character, User defined, Array, Associative Arrays, Record, Union, Pointer and Reference types, Design and implementation uses related to these data types.

UNIT III - Expressions and Statements

Arithmetic, Relational and Boolean expressions, Short circuit evaluation, Mixed mode assignment, Assignment Statements, Statement-Level Control structures – Introduction, Selection and Iteration statements, Unconditional branching, Guarded commands.

UNIT IV - Subprograms, Blocks, Abstraction and OOP

Fundamentals of sub-programs, Static and Dynamic, Scope and lifetime of variable, Design issues of subprograms, Local referencing environments, Parameter passing methods, Overloaded sub-programs, Generic sub-programs, Parameters that are sub-program names, Design issues for functions, User defined overloaded operators, Co routines.

UNIT V - Concurrency and Exception Handling

Subprogram level concurrency, Introduction to Exception Handling, Exception Handling in Ada, C++ and Java, Functional Programming languages-Haskell, LISP

TEXT BOOKS:

1. Robert .W. Sebesta,"Concepts of Programming Languages", 8th ed., Pearson Education, 2009.
2. Ellis Horowitz, "Fundamentals of Programming Languages", 2nd ed., Computer Science Press, 2003.

REFERENCE BOOKS:

1. Pratt and Zelkowitz," Programming Languages Design and Implementation", 4th ed., PHI/Pearson Education,2002.
2. Watt, "Programming Languages", 4th ed., Wiley Dreamtech, 2002.
3. H.M.Dietel and P.J.Dietel, "Java How to Program", 6th ed., Pearson Education/PH

III Year B.Tech. IT I - Semester

L	T	P	To	C
4	-	-	4	4

IT305 ADVANCED COMPUTER ARCHITECTURE
(Elective – I)

Course Description & Objectives :

The course focuses on processor design, pipelining, superscalar, out-of order execution, caches (memory hierarchies), virtual memory, storage systems, and simulation techniques. Advanced topics include a survey of parallel architectures and future directions in computer architecture

Course Outcomes:

At the end of this course students should:

- *Understand pipelining, instruction set architectures, memory addressing.*
- *Understand the performance metrics of microprocessors, memory, networks, and disks*
- *Understand the various techniques to enhance a processors ability to exploit Instruction-level parallelism (ILP), and its challenges.*
- *Understand exploiting ILP using dynamic scheduling, multiple issue, and speculation.*
- *Understand multithreading by using ILP and supporting thread-level parallelism (TLP).*

UNIT I - Fundamentals of Computer design

Technology trends - cost- measuring and reporting performance quantitative principles of computer design. Instruction set principles and examples- classifying instruction set- memory addressing- type and size of operands- addressing modes for signal processing-operations in the instruction set- instructions for control flow- encoding an instruction set.-the role of compiler

UNIT II - Instruction level parallelism (ILP)

Over coming data hazards- reducing branch costs –high performance instruction delivery- hardware based speculation- limitation of ILP ILP software approach- compiler techniques- static branch protection - VLIW approach - H.W support for more ILP at compile time- H.W verses S.W Solutions

UNIT III - Memory hierarchy design

Cache performance- reducing cache misses penalty and miss rate – virtual memory- protection and examples of VM.

Multiprocessors and thread level parallelism- symmetric shared memory architectures- distributed shared memory- Synchronization- multi threading.

UNIT IV - Storage systems

Types – Buses - RAID- errors and failures- bench marking a storage device- designing a I/O system.

UNIT V - Inter connection networks and clusters

Interconnection network media – practical issues in interconnecting networks- examples – clusters- designing a cluster.

TEXT BOOK :

1. L. Hennessy & David A. Patterson "Computer Architecture A quantitative approach", 3rd ed., Morgan Kufmann (An Imprint of Elsevier), 2002.

REFERENCE BOOKS :

1. Kai Hwang and A.Briggs "Computer Architecture and parallel Processing", 1st ed., International Edition, McGraw-Hill,1984.
2. Dezso Sima, Terence Fountain, Peter Kacsuk" Advanced Computer Architectures", 7th ed., Pearson Educatiob,2009.
3. David E. Culler, Jaswinder Pal singh with Anoop Gupta "Parallel Computer Architecture, A Hardware / Software Approach", 1st ed., Morgan Kufmann (An Imprint of Elsevier) 1999.

III Year B.Tech. IT I - Semester	L	T	P	To	C
	-	-	3	3	2

CS236 WEB TECHNOLOGIES LAB

Course Description & Objectives:

To create fully functional website with MVC architecture.

Course Outcomes:

- *Understand the various steps in designing a creative and dynamic website.*
- *They will able to write html, JavaScript, CSS and applet codes.*
- *They will have clear understanding of hierarchy of objects in HTML and XML.*
- *Finally they can create good, effective and customized websites.*
- *Know regarding internet related technologies. Systematic way of developing a website.*

List of Experiments:

Lab Cycle – 1

1. Create an HTML page having Four frames named
   a. Top
   b. Center
   c. Bottom
   d. Left

   The Top frame should contain company logo and title. The bottom frame should contain copy right information. The Left frame should contain various links like Home, Products, Services, Branches, about us, etc. When we click on those links, the contents should come in to Center Frame.
2. Create a HTML document to demonstrate Form Elements that includes Form, input-text, password, radio, checkbox, hidden, button, submit, reset, label, text area, select, option, file upload.
3. Write a HTML program with at least two <h1>, two images, two buttons and appropriate CSS to display

a. All <h1> with font-size 12pt, and bold in Verdana font using Inline CSS.
b. All <img> with border color yellow, thickness 10px using Document Level CSS
c. All <input type='button'> should change background color to red on mouse over them using External CSS.

4. Design an HTML having a text box and four buttons viz Factorial, Fibonacci, Prime, and Palindrome. When a button is pressed an appropriate java script function should be called to display
   a. Factorial of that number
   b. Fibonacci series up to that number
   c. Prime numbers up to that number
   d. Is it palindrome or not
5. Write java script programs to demonstrate
   a. Math Object with at least five methods.
   b. String Object with at least five methods.
   c. Array Object with at least five methods.
   d. Date Object with at least five methods.
6. Write a java script program to display message on OnBlur and OnFocus events.
7. Create an XML document where CSEBooks is the root tag, it consists of 5 books named as(book1, book2, book3, book4, book5) whose copies of books are 10 and provide the child tag such as author, title, pages, price for all books.
8. For the above program, provide an associate DTD.
9. Create an XML document where automobiles is the root tag, it consists of 5 vehicles named as (vehicle1, vehicle2, vehicle3, vehicle4, vehicle5) and use attributes type, model, engine no, color, cc.
10. For the above program, provide an associated Schema.

Lab Cycle – 2

1. Write a java program to connect to a database server using JDBC and insert 10 students information of user choice in to student table.
2. Write a java program to display all records in the student table.

3. Develop a simple Servlet to display Welcome to Servlet.
4. Develop a Servlet to validate user name and password with the data stored in Servlet configuration file. Display authorized user if she/he is authorized else display unauthorized user.
5. Demonstrate Life cycle of Servlet
6. Develop a Servlet to validate user name and password stored in database. Display authorized user is she/he is authorized else display unauthorized user.
7. Write a Servlet program to store student details sent from registration form in to database table.
8. Write JSP Program to store student information sent from registration page into database table.
9. Develop a program to validate username and password that are stored in Database table using JSP.
10. Write appropriate JSP pages to insert, update and delete data in student table in a single application with proper linking of JSP pages and session management.

REFERENCE BOOKS:

1. ChrisBates,"Webprogramming-BuildingInternet Applications", 2nd ed.,WileyPublishers,2006.
2. DietelandNieto,"InternetandWorldWideWeb-Howtoprogram", 4th ed., PHI/PearsonEducation Asia,2007.
3. Marty Hall, "Core Servlets and Java Server Pages", 1st ed., Prentice Hall PTR, 2000.
4. The complete Reference Java 2 Fifth Edition by Patrick Naughton and Herbert Schildt. TMH, 1999.

III Year B.Tech. IT I - Semester

L	T	P	To	C
-	-	3	3	2

CS329 COMPUTER NETWORKS LAB

Course Description & Objectives:

Learn basic concepts of computer networking and acquire practical notions of protocols with the emphasis on TCP/IP.Able to explain, configure, verify, and troubleshoot complex computer networks problem. A lab provides a practical approach to Ethernet/Internet networking: networks are assembled, and experiments are made to understand the layered architecture and how do some important protocols work.

Course Outcomes:

- õ *After completing the course, students will be able to:*
- õ *Understand the structure and organization of computer networks; including the division into network layers, role of each layer, and relationships between the layers.*
- õ *Understand the basic concepts of application layer protocol design; including client/server models, peer to peer models, and network naming.*
- õ *In depth understanding of transport layer concepts and protocol design; including connection oriented and connection-less models, techniques to provide reliable data delivery and algorithms for congestion control and flow control.*
- õ *In depth understanding of network layer concepts and protocol design; including virtual circuit and datagram network designs, datagram forwarding, routing algorithms, and network interconnections.*

List of experiments:

1. Study of Network devices in detail
2. Connect the computers in Local Area Network
3. Implementation of Data Link Framing method - Character Count.
4. Implementation of Data link framing method - Bit stuffing and De stuffing.

5. Implementation of Error detection method - even and odd parity.
6. Implementation of Error detection method - CRC Polynomials.
7. Implementation of Data Link protocols - Unrestricted simplex protocol
8. Implementation of data link protocols - Stop and Wait protocol
9. Implementation of routing algorithms - Dijkstra's algorithm
10. Study of Network IP Addressing
11. Study of sockets in detail
12. Design TCP client and server application to transfer file
13. Design UDP client and server application to transfer file
14. Working on Network Protocol Analyzer Tool (Ethereal/Wireshark) Working on NMAP Tool for Port scanning.

III Year B.Tech. IT I - Semester

L	T	P	To	C
-	-	3	3	2

CS331 OPERATING SYSTEMS LAB

Course Description & Objectives:

To provide an understanding of the design aspects of operating system

Course Outcomes:

- *Programs on process creation and synchronization,*
- *Inter process communication including shared memory, pipes and messages*
- *Simulation of CPU Scheduling Algorithms. (FCFS, RR, SJF, Priority, Multilevel Queuing)*
- *Simulation of Banker's Algorithm for Deadlock Avoidance, Prevention*
- *Program for FIFO, LRU, and OPTIMAL page replacement algorithm.*

(Implement the following on LINUX or other UNIX like platform. Use C for high level language Implementation)

Write programs using the following system calls of UNIX operating system:

1. fork, exec, getpid, exit, wait, close, stat, opendir, readdir
2. Write programs using the I/O System calls of UNIX operating system. (open, read, write, etc)
3. Write C programs to simulate UNIX commands like ls, grep, etc.
4. Given the list of processes, their CPU burst times and arrival times. Display/print the Gantt chart for FCFS and SJF. For each of the scheduling policies, compute and print the average waiting time and average turnaround time.
5. Given the list of processes, their CPU burst times and arrival times. Display/print the Gantt chart for Priority and Round robin. For each of the scheduling policies, compute and print the average waiting time and average turnaround time.
6. Develop Application using Inter-Process-Communication (Using shared memory, pipes or message queues).
7. Implement the Producer-Consumer problem using semaphores (Using UNIX system calls)

8. Implement some Memory management schemes like Paging and Segmentation.
9. Implement some Memory management schemes like FIRST FIT, BEST FIT & WORST FIT.
10. Implement any file allocation techniques (Contiguous, Linked or Indexed)

TEXT BOOKS:

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, "Operating System Principles", 7th edition, John Wiley & Sons Inc, 2006.
2. Richard. Stevens, "Advanced Programming in the Unix Environment", Addison-Wesley, 2nd edition, 1992

III Year B.Tech. IT II - Semester

L	T	P	To	C
4	-	-	4	4

CS322 OBJECT ORIENTED ANALYSIS & DESIGN

Course Description and Objectives:

This course explains how a software design may be represented as a set of interacting objects that manage their own state and operations. It describes the activities in the object - oriented design process and introduces various models that can be used to describe an object-oriented design.

Course Outcomes:

- õ *To understand the fundamental principles of Object Oriented programming.*
- õ *To master key principles in Object Oriented analysis, design, and development.*
- õ *Be familiar with the application of the Unified Modelling Language (UML) towards analysis and design.*
- õ *To know common patterns in Object Oriented design and implement them.*
- õ *To be familiar with alternative development processes.*

UNIT I - Introduction to UML

Importance of Modeling, Principles of Modeling, Object Oriented Modeling, Conceptual model of the UML, Architecture, Software Development Life Cycle.

UNIT II - Basic Structural Modeling & Basic Behavioral Modeling

Classes, Relationships, Common Mechanisms, and Diagrams. Use cases, Use case Diagrams, Interactions, Interaction Diagrams, Activity Diagrams.

UNIT III - Class & Object Diagrams

Terms, Concepts, Modeling Techniques for Class & Object Diagrams.

UNIT IV - Advanced Structural Modeling & Advanced Behavioral Modeling

Advanced Classes, Advanced Relationships, Interfaces, Types and Roles, Packages.

Events and Signals, State Machines, Processes and Threads, Time and Space, State Chart Diagrams.

UNIT V - Architectural Modeling

Component, Deployment, Component Diagrams and Deployment Diagrams.

TEXT BOOKS:

1. Booch G., Rumbaugh J. & Jacobsons I., “The Unified Modeling Language User Guide”, Addison Wesley, 2002.

REFERENCE BOOKS:

1. Meilir Page-Jones, “Fundamentals of Object Oriented Design in UML”, 4th ed., Pearson Education, 2008.
2. Pascal Roques, “Modeling Software Systems Using UML2”, 2nd ed., WILEY- Dreamtech India Pvt. Ltd, 2004.
3. Atul Kahate, “Object Oriented Analysis & Design”, 1st ed., The McGraw-Hill Companies, 2008.
4. Hans-Erik Eriksson, Magnus Penker, Brian Lyons, David Fado, “UML 2 Toolkit”, 1st ed., WILEYDreamtech India Pvt. Ltd., 2003.

III Year B.Tech. IT II - Semester

L	T	P	To	C
4	-	-	4	4

CS324 MIDDLEWARE TECHNOLOGIES

Course Description and Objectives:

The main objective of this course is to get on awareness of a the various technologies which can help in the implementation of the various live project

***Course Outcomes**:*

Upon completion of the subject, students will be able to:

- *Understand the basic structure of distributed systems;*
- *Understand the motivation of using middleware;*
- *Understand the basic concepts underlying the ASP.net and C#.net;*
- *Learn to make judgment in choosing a suitable middleware for application problems;*
- *Understand the basic concepts of Web Services and EJB.*

UNIT I - Emergence of Middleware

Introduction,Objects, Web Services,Middleware Elements, Vendor Architecture, interoperability,Middleware in distributed applications, Types of Middleware,RMI, JDBC,Client/Server CORBA Style.

UNIT II - ASP.NET

Introduction,Lifecycle,ServerControls,Basic Controls,Directives,Validators, Database Access,ADO.Net,File Uploading, Data Sources, Data Binding,Custom Controls,Security,Data Caching,Multithreading, Deployment.

UNIT III - Fundamentals of C#& .NET platform

Comprehensive .NET Assemblies.OOPs with C#, Attributes, Reflection, Properties, Indexers ,Delegates ,Events,Collections, Generics,Anonymous Methods, Unsafe Codes and Multithreading

UNIT IV - Web Services

Introduction,Architecture, Components,Security,XML Web Service Standards,Creating Web Services,Extending Web Services, Messaging Protocol,describing,discovering,securing

UNIT V - EJB

Java Bean Component Model,EJB Architecture,Session Bean,Java Message Service,Message Driven Bean,Entity Bean

TEXT BOOKS:

1. WortgangEmmerichJohn,”Engineering Distributed Objects”, Wiley, 2000.
2. Mesbah Ahmed, Chris Garrett, Jeremy Faircloth, Chris Payne, DotThatCom.com, “ASP.net web developer guide”,Wei Meng Lee (Series Editor),Jonothon Ortiz (Technical Editor),Syngress Publications, 2001.

REFERENCE BOOKS:

1. Andrew Troelsen, “C# and the .NET Platform”,Apress Wiley-dreamtech, India Pvt.Ltd, 2011.
2. “.NET Web Services-Architecture and Implementation”, Keith Ballinger, Pearson Education, 2002.

III Year B.Tech. IT II - Semester

L	T	P	To	C
4	-	-	4	4

IT308 MICROPROCESSORS & MICROCONTROLLERS

Course description and Objectives:

To develop an in-depth understanding of the operation of microprocessors and microcontrollers, machine language programming & interfacing techniques.

Course Outcomes:

- õ *The student will learn the internal organization of some popular microprocessors /microcontrollers.*
- õ *The student will learn hardware and software interaction and integration.*
- õ *The students will learn the design of microprocessors/ microcontrollers-based systems.*

UNIT I - Introduction to Microprocessor

An over view of 8085 - Architecture of 8086 Microprocessor - Signal descriptions of 8086 – Physical memory organization – general bus operation - Special processor activities – Minimum mode 8086 system and timings - Minimum mode 8086 system and timings – Comparison between 8086 and 8088.

UNIT II - Assembly Language Programming

Machine Language instruction formats – Addressing modes of 8086 – instruction set of 8086 – Assembler directives and operators – Assembly language programming – interrupts and interrupt service routines – Macros.

UNIT III - Interfacing

Semiconductor memory interfacing – Interfacing I/O ports – PIO 8255 – modes of operation of 8255 – interfacing analog to digital converters – interfacing digital to analog converters – stepper motor interfacing.

UNIT IV - Advanced Processors

Introduction to 80286, Salient Features of 80386, Real and Protected Mode Segmentation & Paging, Salient Features of Pentium, Branch Prediction, Overview of RISC Processors.

UNIT V - 8051 Microcontroller

Overview of 8051 microcontroller Architecture - I/O Ports - Memory organization - addressing modes and instruction set of 8051 - simple programs.

TEXT BOOKS :

1. Advanced microprocessor and Peripherals - A.K.Ray and K.M.Bhurchandi, TMH, 2000.
2. 8051 Micro Controller Architecture, Programming and Applications by Kenneth J.Ayala, 2009.

REFERENCE BOOKS:

1. Micro Processors & Interfacing – Douglas U. Hall, 2007.
2. The 8088 and 8086 Micro Processors – PHI, 4th Edition, 2003.
3. Micro Computer System 8086/8088 Family Architecture, Programming and Design - By Liu and GA Gibson, 2010.
4. Yu-cheng Liu, Glenn A. Gibson, “Microcomputer systems: The 8086 /8088 Family architecture, Programming and Design”, Second edition, Prentice Hall of India, 2003.

III Year B.Tech. IT   II - Semester

L	T	P	To	C
4	-	-	4	4

CS435 SOFTWARE TESTING METHODOLOGIES

Course Description and Objectives:

Software testing is a subject where the student will learn and apply basic skills needed to create and automate the test plan of a software project.It aims to describe principles and strategies for generating system test cases and to understand the essential characteristics of tools used for test automation.

Course Outcomes:

Students who have completed this course would have learned

- *Various test processes and continuous quality improvement*
- *Types of errors and fault models*
- *Methods of test generation from requirements*
- *Behavior modeling using UML: Finite state machines (FSM)*
- *Test adequacy assessment using: control flow, data flow, and program mutations*

UNIT I - Introduction

Purpose of testing, Dichotomies, model for testing, consequences of bugs, taxonomy of bugs Flow graphs and Path testing: Basics concepts of path testing, predicates, path predicates and achievable paths, path sensitizing, path instrumentation, application of path testing.

UNIT II - Transaction Flow Testing & Domain Testing

Transaction flows, transaction flow testing techniques. Dataflow testing:- Basics of dataflow testing, strategies in dataflow testing, application of dataflow testing.

Domains and paths, Nice & ugly domains, domain testing, domains and interfaces testing, domain and interface testing, domains and testability.

UNIT III - Paths, Path products and Regular expressions

Path products & path expression, reduction procedure, applications, regular expressions & flow anomaly detection.

UNIT IV - Logic Based Testing & State, State Graphs and Transition testing

Overview, decision tables, path expressions, kv charts, specifications.
State graphs, good & bad state graphs, state testing, Testability tips.

UNIT V - Graph Matrices and Application

Motivational overview, matrix of graph, relations, power of a matrix, node reduction algorithm, building tools. Usage of JMeter and Winrunner tools for functional / Regression testing (Ref Text book2).

TEXT BOOKS:

1. Boris Beizer, “Software Testing Techniques”, 2nd ed., Dreamtech, 2006.
2. Dr.K.V.K.K.Prasad, “Software Testing Tools”, 1st ed., Dreamtech. 2008.

REFERENCE BOOKS:

1. Brian Marick, “The craft of software testing”, 2nd ed., Pearson Education, 2007.
2. Edward Kit, “Software Testing in the Real World “, 2nd ed., Pearson Education, 2008.

III Year B.Tech. IT II - Semester

L	T	P	To	C
4	-	-	4	4

IT310 SOFT COMPUTING

(Elective-II)

Course Description and Objectives:

To know about the components and building block hypothesis of Genetic algorithm. To understand the features of neural network and its applications and to study the fuzzy logic components

Course Outcomes:

- *Implement machine learning through neural networks.*
- *Gain Knowledge to develop Genetic Algorithm and Support vector machine based machine learning system.*
- *Understand fuzzy concepts and develop a Fuzzy expert system to derive decisions.*
- *Able to Model Neuro Fuzzy system for data clustering and classification.*

UNIT I - Neural Networks

History, overview of biological Neuro-system, Mathematical Models of Neurons, ANN architecture, Learning rules, Learning Paradigms-Supervised, Unsupervised and reinforcement Learning, ANN training Algorithms-perceptions, Training rules, Delta.

UNIT II - Fuzzy Logic

Back Propagation Algorithm, Multilayer Perceptron Model, Hopfield Networks, Associative Memories, Applications of Artificial Neural Networks.

Introduction to Fuzzy Logic, Classical and Fuzzy Sets: Overview of Classical Sets, Membership Function, Fuzzy rule generation.

UNIT III- Operations on Fuzzy Sets & Fuzzy Arithmetic

Compliment, Intersections, Unions, Combinations of Operations, Aggregation Operations.

Fuzzy Numbers, Linguistic Variables, Arithmetic Operations on Intervals & Numbers, Lattice of Fuzzy Numbers, Fuzzy Equations.

UNIT IV - Fuzzy Logic

Classical Logic, Multivalued Logics, Fuzzy Propositions, Fuzzy Qualifiers, Linguistic Hedges. Uncertainty based Information : Information & Uncertainty, Nonspecificity of Fuzzy & Crisp Sets, Fuzziness of Fuzzy Sets.

UNIT V - Application of Fuzzy Logic & Genetic Algorithm

Introduction of Neuro - Fuzzy Systems, Architecture of Neuro Fuzzy Networks. Medicine, Economics etc. An Overview, GA in problem solving, Implementation of GA

TEXT BOOKS:

1. AI & Expert system, Janki Raman ,MacMillen,2003
2. Artificial Intelligence, Knight ,TMH,1991.

REFERENCE BOOKS:

1. Artificial Intelligence, G.F luger,Pearson education,2003
2. Artificial Intelligence, Patricks henry ,Winston,Pearson education,2001
3. Artificial Intelligence, Nilsson , Morgon, Kufmann 1998.
4. George J. Klir and Bo Yuan, “Fuzzy Sets and Fuzzy Logic-Theory and Applications”, Prentice Hall, 1995.

IV Year B.Tech. CSE I - Semester

L	T	P	To	C
3	1	-	4	4

CS401 INFORMATION SECURITY

Objective of the Course :

This Course focuses towards the introduction of network security using various cryptographic algorithms. Underlying network security applications. It also focuses on the practical applications that have been implemented and are in use to provide e_mail and web security.

UNIT - I

Classical Encryption Techniques – Symmetric Cipher Model – Substitution Techniques – Transposition Techniques – Rotor Machines – Steganography

UNIT - II

BLOCK CIPHERS AND DATA ENCRYPTION STANDARD Block Cipher Principles – Data Encryption Standard – Strength of DES – Differential and Linear Cryptanalysis - Block Cipher Design Principles.-Advanced Encryption Standard – Evaluation Criteria of AES – AES Cipher – More on Symmetric Ciphers – Multiple encryption and Triple DES – Block Cipher Modes of Operation – RC4.

UNIT - III

PUBLIC-KEY ENCRYPTION AND HASH FUNCITONS Principles of Public – Key Cryptosystems – RSA Algorithm – Key Management – Message Authentication and Hash Functions – Authentication Requirements – Authentication Functions – Message Authentication – Hash Functions – Security of Hash Functions and MACs- Digital Signatures - Authentication Protocols – Digital Signature Standard.

UNIT - IV

NETWORK SECURITY INTRODUCTION Security Trends – Security attacks – Security services – Security Mechanisms – A Model for Network Security Model APPLICATIONS Kerberos – X.509 Authentication Service – Public Key Infrastructure – Pretty Good Privacy – S/MIME- IP Security Overview – IP Security architecture- Authentication Header – Encapsulating Security Payload – Combining Security associations – Key Management

UNIT - V

Web Security- Secure Socket Layer and Transport Layer Security – Secure Electronic Transaction. SYSTEM SECURITY Intruders – Intrusion Detection – Password Management – Malicious Software - Firewalls – Trusted Systems.

TEXT BOOKS :

1. William Stallings, “Cryptography and Network security”, 4th ed., Pearson Education, 2010.
2. William Stallings “Network Security Essentials Applications and Standards”, 2nd ed.,Pearson Education, 2009.

REFERENCE BOOKS :

1. Eric Malwald, “Fundamentals of Network Security “, 4th ed., Pearson Education, 2010.
2. Charlie Kaufman, “Radis Perlman and Mike Speciner ,Network Security – Private Communication in a Public World”, 1st ed., Pearson Education,2009 .
3. Buchmann, Springer ,”Introduction to Cryptography”, 2nd ed., Pearson Education, 2009.
4. William Stallings,”Cryptography and Network security”, 1st ed., Pearson Education, 2008.
5. Lorrie Faith Cranor, Simson Garfinkel, “Security & Usability”, 2nd ed., SPD OREILLY Publications, 2005.
6. Chris Frj & Martin Nystrom “Security Monitoring”, 1st ed., SPD OREILLY Publications, 2009.

IV Year B.Tech. CSE   I - Semester

	L	T	P	To	C
	3	1	-	4	4

CS405 DATAWAREHOUSING & DATAMINING

Objective of the Course :

To understand and implement classical algorithms in data mining and data warehousing. To assess the strengths and weaknesses of the algorithms. To identify the application area of algorithms, and apply them

UNIT - I

Data Warehouse : Introduction-A Multi-dimensional data model, Data Warehouse Architecture, Data Warehouse Implementation, From Data Warehouse to Data Mining.

Data Mining : Introduction, Data Mining, Kinds of Data, Data Mining Functionalities, Classification of Data Mining Systems, Major issues in Data Mining.

UNIT - II

Data Preprocessing : Data cleaning, Data Integration & Transformation, Data Reduction, Discritization & Concept Hierarchy Generation, Data Mining Primitives.

Mining Association rules in large databases : Association rule mining, mining single-dimensional Boolean Association rules from Transactional Databases, Mining Multi-dimensional Association rules from relational databases & Data Warehouses.

UNIT - III

Concept Description : Introduction, Data Generalization and Summarization-Based Characterization, Analytical Characterization, Mining Class Comparisons, Mining Descriptive Statistical Measures in Large Databases.

UNIT - IV

Classification & Prediction : Introduction, Classification by Decision tree induction, Bayesian Classification, Classification by Back propagation, Other Classification Methods, Prediction, Classifier accuracy.

Mining Complex Type of Data : Multidimensional Analysis and Descriptive Mining of Complex Data Objects, Mining Spatial Databases, Mining Multimedia Databases, Mining Text Databases, Mining the World Wide Web.

UNIT - V

Cluster Analysis : Introduction, Types of data in Cluster analysis, A categorization of major clustering methods, partitioning methods, Hierarchical methods, Density-Based Methods: DBSCAN, Grid-based Method: STING; Model-based Clustering Method: Statistical approach, Outlier analysis.

TEXT BOOKS :

1. Jiawei Han Micheline Kamber – "Data Mining Concepts & Techniques", 1st ed., Morgan Kaufmann Publishers, 2007.

REFERENCE BOOKS :

1. Usama M.Fayyad, Gregory Piatetsky Shapiro, Padhrai Smyth, Ramasamy Uthurusamy, "Advances in Knowledge Discover and Data Mining", 1st ed., The M.I.T. Press, 1996.
2. Ralph Kimball, Margy Ross, "The Data Warehouse Toolkit", 1st ed., John Wiley and Sons Inc., 2002.
3. Alex Berson, Stephen Smith, Kurt Thearling, "Building Data Mining Applications for CRM", 1st ed., Tata McGraw Hill, 2000.
4. Margaret Dunham, "Data Mining: Introductory and Advanced Topics", 1st ed., Prentice Hall, 2002.
5. Paulraj Ponnaiah, "Data Warehousing Fundamentals", 1st ed., Wiley Publishers, 2001.

IV Year B.Tech. CSE   I - Semester

L	T	P	To	C
3	1	-	4	4

CS407 SOFTWARE PROJECT MANAGEMENT

Objective of the Course :

To describe activities of SPM highlights and train in the planning and implementation of project management. It brings a specific project to complete on time and on budget.

UNIT - I

Conventional Software Management : The waterfall model, conventional software Management performance. Evolution of Software Economics : Software Economics, pragmatic software cost estimation.

Improving Software Economics : Reducing Software product size, improving software processes, improving team effectiveness, improving automation, Achieving required quality, peer inspections.

UNIT - II

The old way and the new : The principles of conventional software Engineering, principles of modern software management, transitioning to an iterative process.
Life cycle phases : Engineering and production stages, inception, Elaboration, construction, transition phases.

UNIT - III

Artifacts of the process : The artifact sets, Management artifacts, Engineering artifacts, programmatic artifacts.

Model based software architectures : A Management perspective and technical perspective.

UNIT - IV

Iterative Process Planning : Work breakdown structures, planning guidelines, cost and schedule estimating, Iteration planning process, Pragmatic planning.

Project Organizations and Responsibilities : Line-of-Business Organizations, Project Organizations, evolution of Organizations.
Process Automation : Automation Building blocks, The Project Environment.

UNIT - V

Project Control and Process instrumentation : The seven core Metrics, Management indicators, quality indicators, life cycle expectations, pragmatic Software Metrics, Metrics automation.

Future Software Project Management : Modern Project Profiles, Next generation Software economics, modern process transitions.

TEXT BOOK :

1. Walker Royce ,"Software Project Management", 1st ed., Pearson Education, 2005.

REFERENCES BOOKS :

1. Bob Hughes and Mike Cotterell, "Software Project Management", 3rd ed., Tata McGraw - Hill Edition, 2005.
2. Joel Henry, "Software Project Management", 1st ed., Pearson Education, 2006.
3. Pankaj Jalote, "Software Project Management in practice", 1st ed., Pearson Education, 2005.

IV Year B.Tech. CSE   I - Semester

L	T	P	To	C
3	1	-	4	4

CS409   NETWORK PROGRAMMING

(Dept. Elective - II)

Objective of the Course :

To teach students various forms of IPC through UNIX and socket Programming.

UNIT - I

IPC : Introduction, File and record locking, Pipes, FIFOs streams and messages, Name spaces, system IPC,Message queues, Semaphores.

UNIT - II

Introduction to Network Programming: OSI model, Unix standards, TCP and UDP & TCP connection establishment and Format, Buffer sizes and limitation, standard internet services, Protocol usage by common internet application.

UNIT - III

Sockets : Address structures, value – result arguments, Byte ordering and manipulation function and related functions Elementary TCP sockets – Socket, connect, bind, listen, accept, fork and exec function, concurrent servers. Close function and related function.

UNIT - IV

TCP client server : Introduction, TCP Echo server functions, Normal startup, terminate and signal handling server process termination.

I/O Multiplexing and socket options: I/O Models, select function, Batch input, shutdown function, poll function, TCP Echo server, getsockopt and setsockopt functions. Socket states, Generic socket option IPV6 socket option ICMPV6 socket option IPV6 socket option and TCP socket options.

UNIT - V

Elementary UDP sockets : Introduction UDP Echo server function, lost datagram,

Elementary name and Address conversions : DNS, gethost by Name function, Resolver option, Function and IPV6 support, uname function.

TEXT BOOK :

1. W.Richard Stevens,"UNIX Network Programming Sockets API", Vol. I, 2nd ed., Pearson Education, 2006.

REFERNCE BOOKS :

1. T CHAN ,"UNIX Systems Programming Using C++",1st ed., PHI, 2005.
2. GRAHAM GLASS, KING ABLES ,"UNIX for programmers and Users", 3rd ed., Pearson Education,2008.
3. M J Rochkind, "Advanced UNIX programming", 2nd ed., Pearson education, 2007.
4. W.Richard Stevens, "UNIX Network Programming",1st ed., PHI, 2005.

IV Year B.Tech. CSE   II - Semester

L	T	P	To	C
3	1	-	4	4

CS416 DISTRIBUTED COMPUTING

(Dept. Elective - IV)

Objective of the Course :

To understand the basic research needed to develop new geographic information technologies that are distributed, ubiquitous, and mobile, allowing geographic information to be accessed, analyzed, and used in decision-making anywhere, at any time.

UNIT - I

Distributed systems versus Parallel systems, Characterization of Distributed Systems, System Models, Models based on states,Networking and Internetworking, Inter Process communication

UNIT - II

Logical clocks, Vector clocks, verifying clock algorithms, Direct dependency clocks, Mutual Exclusion, Lamport's algorithm, Ricart Agrawala algorithm. Mutual exclusion using timestamps, tokens ad Quorums.

UNIT - III

Dining philosophers problem under heavy and light load conditions. Leader election algorithms. Chang-Roberts algorithm, Causal message ordering algorithms, Self stabilization , Mutual exclusion with K-state machines.

UNIT - IV

Name Services and Domain Name System, Directory and Discovery Systems, Drinking philosophers problem, Global state, Global snapshot algorithm, Termination Detection - Dijikstra and Scholten's algorithm**UNIT - V**

Transactions and Concurrency Control, Distributed Transactions, Distributed Deadlocks, Transaction Recovery, Fault-tolerant Services, Distributed Shared Memory, Distributed consensus.

TEXT BOOKS :

1. Vijay K. Garg."Elements of Distributed Computing", 1st ed., Wiley Interscience, 2002.
2. Nancy Lynch, "Distributed Algorithms", 1st ed., Morgan Kaufmann Publishers Inc., 1996.

REFERENCE BOOKS :

1. Coulouris G., Dollimore J. & Kindberg T., "Distributed Systems Concepts And Design", 3rd ed., Addison Wesley, 2004.
2. Tanenbaum S, Maarten V.S., "Distributed Systems Principles and Paradigms", 2nd ed., Pearson Education, 2004.
3. Chow R. & Johnson T., "Distributed Operating Systems and Algorithms", 1st ed., Addison Wesley, 2003.
4. Tanenbaum S., "Distributed Operating Systems", 5th ed., Pearson Education, 2005.

IV Year B.Tech. ECE I - Semester

L	T	P	To	C
3	1	-	4	**4**

EC407 DIGITAL IMAGE PROCESSING

(Dept. Elective - I)

Objective of the Course :

To Introduce to students the analytical tools and methods, which are currently used in digital image processing as applied to image information for human viewing. Students will learn to apply these tools in the laboratory in image restoration, enhancement, compression and segmentation.

UNIT - I

Digital Image Fundamentals: Elements of visual perception, Image sensing and acquisition, Image sampling and quantization Basic relationship between pixels, Basic geometric transformations, Introduction to Fourier Transform and DFT, Properties of 2D Fourier Transform, FFT Separable Image Transforms, Walsh, Hadamard, Discrete Cosine Transform, Haar Transform, Slant Transform and Hotelling Transform.

UNIT - II

Enhancement: Spatial Domain methods**,** Basic grey level transformation, Histogram equalization, Image subtraction, Image averaging, Spatial filtering: Smoothing, sharpening filters, Laplacian filters, Frequency domain filters: Smoothing, Sharpening filters, Homomorphic filtering.

UNIT - III

Restoration: Model of Image Degradation/restoration process, Noise models, Inverse filtering, Least mean square filtering, Constrained least square filtering, Blind image restoration, Pseudo inverse, Singular value decomposition.

UNIT - IV

Compression: Fundamentals of image compression, image compression models, lossless compression**,** Variable length coding, LZW coding, Bit plane coding, predictive coding, DPCM.Lossy Compression: Transform coding, Wavelet coding, Basics of Image compression standards: JPEG, MPEG, Basics of Vector quantization.

UNIT - V

Segmentation: Detection of discontinuities, Thresholding , Region Based segmentation.

TEXT BOOKS :

1. Rafael C Gonzalez, Richard E Woods , "Digital Image Processing", 2nd ed., Pearson Education, 2003
2. A.K. Jain, "Fundamentals of Digital Image Processing", PHI.

REFERENCE BOOKS :

1. Millman Sonka, Vaclav hlavac, Roger Boyle, "Image Processing Analysis and Machine Vision", Thompson Learning (1999).
2. Chanda Dutta Majumdar, "Digital Image Processing and Applications", Prentice Hall of India, 2000.
3. Rafael C Gonzalez, "Digital Image Processing using MATLAB".

IV Year B.Tech. IT   II - Semester

L	**T**	**P**	**To**	**C**
3	1	-	4	4

IT406 DESIGN PATTERNS
(Dept. Elective - IV)

Objective of the Course :

This course is an introduction to software design patterns. Each pattern represents a best practice solution to a software problem in a specific context. The course covers the rationale and benefits of object-oriented software design patterns. Numerous problems will be studied to investigate the implementation of good design patterns.

UNIT – I

Introduction : What Is a Design Pattern?, Design Patterns in Smalltalk MVC, Describing Design Patterns, The Catalog of Design Patterns, Organizing the Catalog, How Design Patterns Solve Design Problems, How to Select a Design Pattern, How to Use a Design Pattern.

UNIT - II

A Case Study : Designing a Document Editor : Design Problems, Document Structure, Formatting, Embellishing the User Interface, Supporting Multiple Look-and-Feel Standards, Supporting Multiple Window Systems, User Operations Spelling Checking and Hyphenation, Summary.

Creational Patterns : Abstract Factory, Builder, Factory Method, Prototype, Singleton, Discussion of Creational Patterns.

UNIT - III

Structural Pattern Part-I : Adapter, Bridge, Composite.

Structural Pattern Part-II : Decorator, açade, Flyweight, Proxy.

UNIT - IV

Behavioral Patterns Part-I : Chain of Responsibility, Command, Interpreter, Iterator.

Behavioral Patterns Part-II : Mediator, Memento, Observer, State, Strategy, Template Method ,Visitor, Discussion of Behavioral Patterns.

UNIT - V

What to Expect from Design Patterns, A Brief History, The Pattern Community An Invitation, A Parting Thought.

TEXT BOOK :

1. Erich Gamma ,"Design Patterns",1st ed., Pearson Education,2008.

REFERENCE BOOKS :

1. Eric Freeman, "Head First Design Patterns" 1st ed., Oreilly-spd, 2004.
2. Alan Shalloway, "Design Patterns Explained", 2nd ed., Pearson Education, 2002.

I Year B.Tech. Mechanical Engg. I-Semester

L	T	P	To	C
4	-	-	4	4

EE105 FUNDAMENTALS OF ELECTRICAL ENGINEERING

Course description & Objectives :

To understand the basic concepts, laws, techniques in analyzing various DC and AC circuits and concepts in coupled circuits. Study of construction details, working of various electrical machines and Semiconductor Devices and operation

Course Outcomes:

- Able to explain the notation and components of electric circuits
- Able to analyze DC and single phase and three phase AC circuits using different methods and theorems
- Able to operate various electrical machines.
- Able to explain the concepts of Semiconductor Devices and operation

UNIT I - Fundamentals Of DC Circuits

Circuit Concepts: Concepts of network, Active and passive elements, voltage and current sources, concept of linearity and linear network, unilateral and bilateral elements, R, L and C as linear elements. Ohm's Law – Kirchhoff's Laws –application to simple series, parallel circuits, mesh and nodal analysis of simple resistive circuits.(simple numerical problems).

UNIT II - Fundamentals of A.C. Circuits:

Generation of A.C. voltage - frequency, average value, R.M.S. value, form factor, peak factor for sinusoidal only - phasor representation of alternating quantities. Analysis of simple series and parallel A.C. circuits-(simple numerical problems)

Balanced Three phase systems – relation between phase and line quantities of voltages and currents in star and delta connected systems (Elementary treatment only)

UNIT III - Fundamentals of Electromagnetism and Transformers:

Concepts of Magneto motive force, reluctance, flux and flux density , concept of Self Inductance and Mutual Inductance, Coefficient of coupling-only elementary treatment. (simple numerical problems).

Transformers: Principle of operation of single phase transformer – constructional features – EMF equation (simple numerical problems)

UNIT IV - Electrical Machines:

DC Machines: Constructional details of a D.C. Machine.

D.C. Generator – Principle of operation – EMF equation – types of D.C. generators (simple numerical problems)

D.C. Motor – Principle of operation – Torque equation – types of D.C. motors (simple numerical problems)

A.C Machines: Principle of operation of three phase induction motors – slip ring and squirrel cage motors – Torque equation derivation, Constructional details of synchronous machines.

UNIT V - Semiconductor Devices:

Classification of solids based on energy band theory - Intrinsic semiconductors - Extrinsic semiconductors - P type and N type semiconductors - P-N junction diode and its characteristics –Half and Full wave rectifiers- Zener diode and its characteristics - Voltage regulator. Bipolar junction transistor – Operation-Types- Applications.

TEXT BOOKS:

1. Mittle, V.N., “Basic Electrical Engineering”, 2nd ed., TMH, New - Delhi, 1990.
2. V.K.Mehta,”Principles of Electrical Engineering and Electronics”, 3rd ed., S. Chand Publications, New Delhi, 2010.

REFERENCE BOOKS:

1. Millman & Halkias, “Integrated Electronics”, McGraw Hill, 1979.
2. A.K. Thereja & B.L. Thereja, “Electrical Technology”, Vol. – II, S.Chand Publications, 2007.
3.. U.Bakshi & A.Bakshi, “Basic Electrical Engineering”, 1st ed., Technical Publications, Pune, 2005.
4. U.Bakshi & A.Bakshi, “Basic Electrical Engineering”, 1st ed., Technical Publications, Pune, 2005.

I Year B.Tech. Mechanical Engg. I-Semester

L	T	P	To	C
3	1	-	4	4

HS111 ENGINEERING MATHEMATICS - I

Course description & Objectives :

Without mathematics not a single day of an engineer will pass! All the topics of this course are relevant to all branches of engineering. Differential equations are used in various places. Laplace transformations are used, for example, for conversion of domains, from time domain to frequency domain. These are also used to solve ordinary differential equations. When data is given at only a finite points, we use numerical methods for find the approximate values of functions, also to solve differential equations approximately etc. Maxima, minima of a function has got many applications.

Course Outcomes:

- Students will understand that Mathematics which they learn can be used at different levels in their Engineering course irrespective of their branches.
- This course will help to sketch the graph of a differential equation and its direction mixing fields
- Laplace transform used to compute solutions of equations involving impulse functions
- They will be able to use Laplace transformations for conversion of domains from time domain to frequency domain.
- Differential Equations help them to find approximate values of function.
- They will be able to analyze and use them in different applications.
- Eigen values and Eigen vectors play a prominent role in the study of ordinary differential equations and in many applications of physical sciences.

UNIT I - Ordinary Differential Equations & Differential Equations of Second Order :

Differential Equations of First Order : Definiton, Order and degree of a differential equation, Formation of differential equations, Solution of a differential equation, Differential equations of first order and first degree : variables separable, Homogenous equations, Linear equations, Exact differential equations.

Differential Equations of Second Order : Linear differential equations of second order with constant coefficients, Methods for finding the complementary functions and particular integral, General method of finding the particular integral of any function.

UNIT II - Applications of Differential Equations and Laplace Transformations

Applications of Differential Equations : Newton's law of cooling, Natural law of growth, Orthogonal trajectiories**.**

Laplace transformations : Definition, Properties, Convolution theorem, Inverse Laplace transformation, Solving differential equations using Laplace Transformation.

UNIT III - Numerical Methods

Taylor's Method, Picard Method, Euler Method, Modified Euler Method, Runga-Kutta Methods.

Interpolation by Lagrange and Newton methods.

UNIT IV - Matrices

Rank of a matrix, finding rank of a matrix using Echelon form, Normal form, triangular form, PAQ form, inverse of a matrixEigen values, Eigen vectors, properties, Cayley-Hamilton theorem (without proofs), Diagonalisation of a matrix.

Solving System of equations (Gauss-Siedal method only)

UNIT V - Maxima and Minima & Jacobians

Maxima and Minima : Review of partial differentiation: Partial derivatives, Partial derivatives of higher order, Homogeneous function, Euler's theorem, Total differential coefficient,

Maxima and Minima of a function of two variables, Conditions for extreme values, Lagrange method of undetermined multipliers.

Jacobians : Definition, Properties, Jacobian of implicit functions, Partial derivaties of Implicit functions using Jacobian.

TEXT BOOKS :

1. *H. K. Dass* and *Er. Rajnish Verma*, Higher Engineering Mathematics, S. Chand & Co., New Delhi, 2011.
2. *B.S. Grewal*, "Higher Engineering Mathematics", 40th edition, Khanna Publishers, 2009.

REFERENCE BOOKS :

1. *B.V. Ramana*, "Higher Engineering Mathematics", 3rd Edition, Tata McGraw-Hill Publishing Co, 2008.
2. *R K Jain, S R K Iyengar*, "Advanced Engineering Mathematics", 2nd Edition, Narosa Publishing House.
3. *Erwin Kreyszig*, "Advanced Engineering Mathematics", 8th Edition, John Wiley & Sons (Asia) Pvt. Ltd. 2001.

I Year B.Tech. Mechanical Engg. I-Semester	L	T	P	To	C
	4	-	-	4	4

HS117 ENGINEERING CHEMISTRY

Course description and Objectives :

Chemistry is the backbone in designing and understanding the nature and properties of various engineering materials. Currently, the electronics and computer engineers are waiting for suitable polymers for using miniature super computers. So this subject develops fundamental knowledge about new engineering materials and their significance in technical fields and industrial sectors. Water is an essential element for the existence of human, plant and animal lives, besides that it has greater industrial applications. The knowledge about water is the basic requirement for a professional student. Characterization of materials with instrumental techniques is essential for engineers.

Course Outcomes:

- Differentiate between soft and hard water. Understand the disadvantages of using hard water domestically and industrially. Select and apply suitable softening methods (Soda-lime, zeolite, ion-exchange methods, etc.) to soften the hard water for industrial and domestic applications.
- Acquaintance of primary and secondary cells, Hydrogen-Oxygen and Methanol fuel cells, dry and wet corrosions, corrosion controlling methods
- Acquaintance of the properties and engineering applications of Ceramics, Refractories, Glasses, Cement, Abrasives, Lubricants
- Acquaintance of Preparation, properties and applications of different polymers (Polyethylene, PVC, Tefflon, Bakelite,Urea-Formaldehyde, Silicones, Rubber – Vulcanization, Synthetic Rubbers-(Buna-S, Buna-N, Neoprene); treatment of membranes.
- Acquaintance of various spectroscopic methods (UV-visible / IR), Beer-Lambert's Law, qualitative and quantitative analysis, block diagrams of UV and IR spectrophotometers.

UNIT I - Water Technology :

Introduction-Hardness of water-Determination of hardness by EDTA-Disadvantages of hard water-Scales & Sludges-Caustic embrittlement-Boiler corrosion-Priming & Foaming, WHO, BIS Standards of water-Softening

Methods- Lime Soda process, Zeolite process, Ion Exchange process - Desalination of brackish water-Reverse osmosis, Electro dialysis.

UNIT II - Electrochemical cells and AND Corrosion:

Electrochemical cells: primary cell-(Dry or lecalanche cell), Secondary cell-(Lead-acid storage cell, Lithium ion battery), Hydrogen-Oxygen Fuel cell, Methanol fuel cell.

Corrosion: Introduction-Dry corrosion (chemical)-Wet corrosion (electrochemical)-Mechanism of wet corrosion-Bimetallic corrosion-Concentration cell corrosion-Factors influencing corrosion-Corrosion control methods- Cathodic protection and Electroplating.

UNIT III - Engineering Materials :

Properties and engineering applications of Ceramics, Refractories, Glasses, Cement,Abrasives, Lubricants.

UNIT IV - Polymers :

Introduction –Types of polymerization-Preparation, properties and applications of Polyethylene, PVC, Tefflon, Bakelite, UreaFormaldehyde, Silicones, Rubber – Vulcanization, Synthetic Rubbers - (Buna-S, Buna-N, Neoprene). Elementary treatment of Membranes

UNIT V - Instrumental Techniques :

Interaction of radiation with matter,UV-Visible Spectroscopy-Beer –Lambert's law ,Qualitative and Quantitative Analysis,Block diagram of UV-Visible Spectrophotometer.IRSpectroscopy-Types of Vibrations,Identification of functional groups,Block diagram of IR Spectrophotometer**.**

TEXT BOOKS :

1. P.C Jain and Monica Jain, "Engineering Chemistry", 15th edition, Dhanpat Rai Publications 2009.
2. Gurudeep Raj and Chatwal Anand, "Instrumental Methods of Analysis", 5th edition, Himalaya Publications, 2007.

REFERENCE BOOKS :

1. S.S.Dara, "Text book of Engineering Chemistry" 1st edition, S. Chand Publications, 2009.
2. C.V. Agarwal, C.P. Murthy, A.Naidu, "Chemistry of Engineering materials", 9th edition, BSP Publications, 2008.
3. M.R. Senapati, "Advanced Engineering Chemistry" 2nd edition, Lakshmi Publications, 2006
4. H.W. Wilard and Demerit, "Instrumental methods of Analysis", 7th edition, CBS Publications, 1986.

I Year B.Tech. Mechanical Engg. I-Semester

L	T	P	To	C
3	-	-	3	3

HS118 ENVIRONMENTAL STUDIES

Course description & Objectives :

The objective of this course is to heighten on awareness of nature and its importance to students

and make them understand the need to make judicious use of all natural resources for long team sustenance of life on this planet.

Course Outcomes:

- To provide Knowledge on importance of natural resources and integrate technical "field" knowledge with analytical skills to prevent natural resources depletion
- To maintain healthy and Diverse Ecosystems ,
- Work together to conserve the biodiversity
- Take immediate measures to control the Pollution
- Adopt Ecofriendly technology.
- Maintenance of hygienic conditions

UNIT I - Environment and Natural Resources :

Environment: Definition, Scope and Importance – Need for Public Awareness

Natural Resources: Renewable and non-renewable resources – Natural resources and associated problems – Forest Resources: Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources: Use and over utilization of surface and ground water – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources - Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity–Energy resources: renewable and non-renewable energy sources, alternate energy sources. Land resources: Land as a resource, land degradation, Soil erosion – case studies - Role of an individual in conservation of natural resources.

UNIT II - Ecosystems and Biodiversity :

Ecosystem: Concept of an ecosystem. – Complete and incomplete ecosystem - Structure and functions of an ecosystem - Ecological succession. - Food chains, food webs -Structure and functional features of the following ecosystem: a. Forest ecosystem b. Grassland ecosystem c. Desert ecosystem, d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) **Biodiversity**: introduction of biodiversity, Bio-geographical classification of India - Value of biodiversity- Biodiversity at global, National and local levels - Hot-spots of biodiversity - Threats to biodiversity - Endangered and endemic species of India – Conservation of biodiversity

UNIT III - Environmental Pollution and Applications of Remote Sensing / GIS on Environment

Definition, Cause, effects and control measures of: Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution - Solid waste Management: Causes, effects and control measures of municipal and industrial wastes - Climate change, global warming, acid rain, ozone layer depletion -Case Studies - Role of an individual in prevention of pollution - Pollution case studies. – Green technology and its concept, role of green technology in controlling environmental problems.

UNIT IV - Social issues and EIA :

Sustainable development -water conservation: Cloud Seeding (Artificial rain making system), rainwater harvesting, watershed management - Disaster management: floods, earthquake, cyclone and landslides - Environment Protection Act. - Air (Prevention and Control of Pollution) Act. - Water (Prevention and control of Pollution) Act - Wildlife Protection Act - Forest Conservation Act

EIA: introduction to E.I.A.-definition of E.I.A and E.I.S – scope and objectives of E.I.A.- methods of E.I.A –CEIA, REIA, MOEF, CPCB, SPCB – Importance of E.I.A in proposed Projects / Industry /

Developmental activity - Remote sensing / GIS: Introduction of remote sensing / GIS, definition of remote sensing, applications of the remote sensing on environment (site selection, land use/land cover pattern, water/air/soil quality models, a criteria of environmental information systems)

UNIT V - Environmental Sanitation :

Food sanitation: food and drugs Act, food preservations, food borne diseases- Milk sanitation: tests for milk, pasteurization of the milk - water borne diseases-

air borne diseases-viral diseases (HIV/AIDS, SARS, bird-flu, anthrax)-maintenance of sanitary and hygienic conditions

Field Work/Environmental Visit: Visit to a local area to document environmental assets – river/ forest/ grassland / hill /mountain - Study of local environment - common plants, insects, birds - Study of simple ecosystems – pond, river, hill, slopes etc - Visits to industries, water treatment plants, effluent treatment plants

TEXT BOOKS :

1. Y. Anjaneyulu, “Introduction to Environmental Science”, B S Publications, 2008.
2. Dr. M. Chandrasekhar, “A Text book of Environmental Studies”, HI-TECH publications, 2006

REFERENCE BOOKS :

1. Dr. M. Anji Reddy, “A Text book of environmental science and Technology”, B S Publications, 2008
2. Dr. K. Mukkanti, “A Text book of Environmental Studies”, S.CHAND Company Ltd, 2009.
3. EHILRS and ST, “Text book of Municipal and Rural Sanitation”, M.S Hill, 1998.
4. C. S. Rao, Wiley Eastern Ltd, “Environmental Pollution Control Engineering”, New Age International Ltd, 2001
5. Dr. M. Anji Reddy, “Introduction to Remote Sensing”, B S Publications, 2004.
6. Kurian Joseph and R.Nagendram, “Essentials of environmental studies”, Pearson Education Pt Ltd, Delhi, 2007.
7. Sharma & Kour “Text book of Environmental pollution”.
8. H.C Perkins “Text book of Air Pollution”.

I Year B.Tech. Mechanical Engg. I-Semester	L	T	P	To	C
	4	-	-	4	4

HS122 ENGINEERING MATERIALS

Course description & Objectives :

The course will help students to learn about the elementary relationships between structure and properties of materials how materials can be classified. It also reveals the engineering applications of metals, alloys, semi conductors and magnetic materials and relation between properties and engineering applications.

Course Outcomes:

The students will be made to get acquainted to the following learning outcomes:

- The bonding in solids. Crystal systems and their structural features
- Fundamentals related to phase equilibria and relevance in Materials Science
- Mechanical properties of solids, factors affecting such properties in order to gain materials information.
- Classification of solids based on band theory, sources of resistivity in metals, semi conductors transport mechanism and applications.
- Classification of magnetic materials, hysteresis, ferrites and applications
- Super conductors, classification and their applications. Dielectric materials, types of polarization and new engineering materials and their usefulness.

UNIT I - Bonding in Solids & Crystallography:

Bonding in Solids: Inter atomic forces – Types of bonds – Primary & Secondary bonded materials and their properties – Cohesive energy.

Crystallography: Introduction – classification of Crystal systems – SC, BCC & FCC structures –Miller indices of planes & directions – Separation between successive planes – X-ray diffraction – Bragg's Law – Powder method – Crystal imperfection – Point and line imperfections – Grain boundaries

UNIT II - Phase Equilibria & Mechanical Properties :

Phase Equilibria: Gibb's phase rule & terms involved – Reduced phase rule - Two component systems–invariant reactions – Eutectic system & Iron – Carbon system - Lever rule.

Mechanical Properties : Introduction – mechanical properties of materials – Stress-Strain relations of various solids – Elastic moduli- deformations in solids- Fracture – Creep- Fatigue – Factors affecting mechanical properties of materials.

UNIT III - Conducting Materials & Semiconductors :

Conducting Materials: Introduction – Classification of solids based on the band models - Relaxation time and electrical conductivity of a metal – Collision time & mean free path – Sources of resistivity of metals.

Semiconductors: Introduction – Generation & recombination – Intrinsic semiconductors – Extrinsic semiconductors – Drift and diffusion (Qualitative treatment) – Einstein relation – Hall effect – Direct and Indirect band gap.

UNIT IV - Magnetic Properties & Superconductivity

Magnetic Properties: Introduction – Origin of magnetic moment – Classification of magnetic materials – Domain theory of ferromagnetism – Hysteresis curve - Soft and hard magnetic materials – Ferrites and their applications.

Superconductivity – Introduction - Meissner Effect – Types of superconductors – High Temperature superconductors – Applications.

UNIT V - Dielectrics & Functional materials

Dielectrics : Introduction – Dielectric polarization – Internal electric field – Clausius – Mossotti relation – Ferro and Piezo electricity - Electrets – Applications.

Functional materials: Introduction – Metallic glasses – Biomaterials – Composites – Metal matrix composites - Fiber reinforced plastics – Conducting polymers - shape memory alloys – smart materials.

TEXT BOOKS :

1. V. Raghavan, “Materials Science and Engineering”, 3 rd ed., PHI, 1996.
2. Lawrence H. Van Vlack, “Element s of Materials Science and Engineering”, 6th ed., Wesley Publication, 1989.

REFERENCE BOOKS :

1. Arumugam. M “Material Science” Anuradha Technical Book Publishers, Kumbakonam.K, 1997.
2. Manas Chandra, “Science of Engineering Materials”, Vol 1-3, Mc - Millian Company of India, Delhi.
3. Pillai, S.O, “Solid State Physics”, New Age International, 1998.
4. William F. Smith, “Principles of Materials Science and Engineering”, MGH, Publishers, 1988.
5. Structure and Properties of Materials – John Wulff – Wiley Eastern Ltd.

I Year B.Tech. Mechanical Engg. I-Semester

L	T	P	To	C
2	-	-	2	-

PROFESSIONAL ETHICS, VALUES AND HUMAN RIGHTS

Course description & Objectives :

• *To create an awareness on Engineering Ethics and Human Values.*

• *To instill Moral and Social Values and Loyalty*

• *To appreciate the workplace rights of Others, responsibilities and Safety of others.*

Course Outcomes:

The course will enable the students to attain the following:

= an understanding of professional and ethical responsibility in workplace

= the broad education necessary to understand the impact of engineering solutions in a global and societal context

= a knowledge of contemporary issues related to human and professional interactions at workplace

= an engineer's life-long commitment to serve the disadvantaged

UNIT I - Human Values :

Morals, Values and Ethics – Integrity – Work Ethic – Service Learning – Civic Virtue – Respect for Others – Living Peacefully – Caring – Sharing – Honesty – Courage – Valuing Time – Co-operation – Commitment – Empathy – Self-Confidence – Character – Spirituality.

UNIT II - Engineering Ethics & **Engineering as social experimentation :**

Engineering Ethics : Variety of moral issues – types of inquiry moral dilemmas – moral autonomy – The problems of Many Hands – Kohlburg's theory – Gilligan's theory Impediments to Responsible Action.

Engineering as social experimentation - Codes of ethics - a balanced outlook on law - the challenger case study.

UNIT III - Engineer's Responsibility for Safety :

Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis – Reducing Risk – The Government Regulator's Approach to Risk - Chernobyl Case Studies and Bhopal.

UNIT IV - Workplace Rights and Responsibilities & Work Environment :

Workplace Rights and Responsibilities : Engineers and Managers. Oganizational complaint procedures. Government agencies. Resolving Employee concerns. Limits on acceptable behaviour in large corporation.

Work Environment : Ethical and legal considerations, Organizational responses to offensive behaviour and harassment. Ethics in a Global Context.

UNIT V - Global Issues :

Multinational Corporations – Business Ethics - Environmental Ethics – Computer Ethics - Role in Technological Development – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Honesty – Moral Leadership – Sample Code of Conduct.

TEXT BOOKS :

1. Mike Martin and Roland Schinzinger, “Ethics in Engineering”, McGraw Hill, New York, 2005.

REFERENCE BOOKS :

1. Prof. (Col) P S Bajaj and Dr. Raj Agrawal, “Business Ethics – An Indian Perspective”, Biztantra, New Delhi, 2004
2. Charles E Harris, Michael S. Protchard and Michael J Rabins, “Engineering Ethics – Concepts and Cases”, Wadsworth Thompson Learning, United States, 2000 (Indian Reprint now available)
3. Engineering Ethics-An industrial Perspective, Gail Dawn Baura
4. Charles E Harris, Michael S Pritchard and Michael J Rabins, “Engineering Ethics – Concepts and Cases”, Thompson Learning, 2000.
5. Charles E Harris, Michael S Pritchard and Michael J Rabins, “Engineering Ethics – Concepts and Cases”, Thompson Learning, 2000.
6. PSR Murthy, “Indian Culture Values and Professional Ethics”, BS Publications
7. Edmund G Seebauer and Robert L Barry, “Fundamentals of Ethics for Scientists and Engineers”, Oxford University Press, Oxford, 2001.

I Year B.Tech. Mechanical Engg. I-Semester	L	T	P	To	C
	-	-	3	3	2

EE109 FUNDAMENTAL OF ELECTRICAL ENGG. LAB

Course description & Objectives :

To understand basic electrical elements, electrical energy its consumption and measurement. To develop practical knowledge on electrical machines, electronic devices and circuits

Out Comes :

- Able to realize characteristics of electrical elements.
- Able to analyze given simple ac and dc networks.
- Able to work on different electrical machines.
- Able to reflect the knowledge of electronic devices to verify experimentally.

List of Experiments

1. Familiarization with basic components such as Resistors, Capacitors, Diodes, Transistors
2. Familiarization with basic electrical measuring instruments
3. Verification of ohm's law
4. Verification of KVL and KCL
5. Calculation of power factor in simple RL and RC circuits
6. Magnetization characteristic of a D.C. self excited generator
7. Measurement of power and energy.
8. Measurement of transformation ratio of single phase transformer.
9. Measurement of Power, Power factor of 3-phase induction motor.
10. Characteristics of PN junction diode.
11. Characteristics of Zener diode.
12. Operation of Full wave Rectifier
13. Operation of half wave Rectifier
14. Study and Working of fluorescent lamp
15. Measurement of armature and field resistances of d c machine using voltmeter-ammeter method.

Note : Any 10 of above experiments are to be conducted.

I Year B.Tech. Mechanical Engg. I-Semester

L	T	P	To	C
-	-	3	3	2

HS121 ENGINEERING CHEMISTRY LAB

Course description & Objectives :

This lab is intended to make the students enlighten with the theoretical concepts of chemistry. Instrumental techniques are useful for characterization of materials for future engineers.

Students may have to take up any 10 experiments from the following experiments.

Course Outcomes:

- To enable the students to analyse the hardness & chlorides in the potable water.
- To help students to determine the Alkalinity in water used especially in industries.
- To impart knowledge on polymers used as insulators.
- To provide an idea about Advanced techniques in chemical analysis using conductometer and spectrophotometer.

Volumetric Analysis:

1. Determination of total Alkalinity of water
2. Determination of Percentage purity of Washing soda
3. Determination of Fe(II) by Dichrometry
4. Determination of Percentage of available chlorine in Bleaching powder
5. Determination of chlorides by Argentometry
6. Determination of Total hardness of water

Preparations:

7. Preparation of Bakelite
8. Preparation Of Urea- Formaldehyde Resin

Instrumental methods of Analysis:

9. Determination of Viscosity of a Lubricating oil
10. Determination of Strength of acid by conductometry
11. Determination of Mn^{+7} by Colorimetry
12. Demonstration of UV-Visible Spectrophotometer with Ferrothiocyanate

REFERENCE BOOKS:

1. Vogel's Text book of qualitative Chemical Analysis J.Mendham, R.C Denney, J.D. Bares, M.Thomas & B. Siva Sankar, Pearson Publications – Volume I (2009).
2. Experiments in Applied Chemistry by Dr.Sunita Rattan. S.K. Kataria & Sons publications,2008.

I Year B.Tech. Mechanical Engg. I-Semester

L	T	P	To	C
1	-	3	4	3

ME103 ENGINEERING GRAPHICS

Course description & Objectives :

To familiarize students with the conventional concept of engineering drawing and application through AutoCAD.

Course Outcomes:

After completion of this course, student will be able to prepare plan and elevation of any pictorial view either conventional or through AutoCAD.

UNIT - I

Introduction to Engineering drawing: Introduction to Engineering Drawing – Types of lines, lettering, dimensioning Construction of polygon & Conics. (Ellipse, Parabola & Hyperbola by general method)

UNIT - II

Orthographic Projections: Principle of projection-Planes of projections.

Projections of points:

Projection of straight lines: Inclined to one plane and both the planes.

Projections of planes: Simple planes, Planes inclined to reference planes.

UNIT - III

Projections & Sections of solids – projections of prisms – cylinders – cones - pyramids – solid axis inclined to one plane, simple sections- prism, cylinder, pyramid and cone. AutoCAD Fundamentals.

UNIT - IV

Isometric projections: Isometric drawing of simple objects through AutoCAD

UNIT - V

Orthographic projections: Conversion of Pictorial view into orthographic view using AUtoCAD and Conventional.

TEXT BOOKS :

1. N.D.Bhatt, “Engineering Drawing”, 49th ed., Charotar Publication, 2007.
2. K. Venugopal, “Engineering Drawing through Auto CAD”, 1st ed., New Age Publication, 2008.

REFERENCE BOOKS :

1. Jhole, “Engineering Drawing”, 2nd ed., Tata McGraw Hill, 2008.
2. K.L. Narayana, “Engineering drawing” 2nd ed., Scitech Publications, 2008.

I Year B.Tech. Mechanical Engg. II-Semester

L	T	P	To	C
4	1	-	5	5

CS101 PROBLEM SOLVING AND COMPUTER PROGRAMMING

Course description &Objectives :

Aim of this course is to introduce the techniques of problem solving and concepts of programming language to the students. Because of its popularity and suitability to develop different types of applications, 'C' language has become the de-facto programming language to engineers. A comprehensive introduction of C language is offered through this course to enable the students to write diversified programs.

Course Outcomes:

On Completion of this course student should be able to

- Able to understand the basic terminology used in computer programming and to write, compile and debug programs in C language.
- Use different data types in a computer program and design programs involving decision structures, loops and functions.
- Able to understand the allocation of dynamic memory using pointers
- Use different data types to create/update basic data files.

UNIT I - Fundamentals of computers

Basic functional units and discrete components of a computer, computer networks, networking components, Binary representation of integers and real numbers, ASCII, EBCDIC, Unicode, Generations of computer languages.

UNIT II - Problem Solving Steps and Basic of C Language

Problem understanding, Formulating a mathematical model, Development of an algorithm, Representation of an algorithm, Flow chart and Pseudo code, Coding, Testing and Debugging, Comments, Processor statement, Function header statement, Variable declaration statement and Executable statement, C Character Set, constants, identifiers, operators, punctuations, keywords, Basic data types, modifiers, identifiers, variables, C scopes, type qualifiers, storage class specifiers, variable initializations, constants, reading and writing characters, formatted I/O.

UNIT III – Preliminaries of C

Assignment, arithmetic , relational, logical, bitwise, ternary, address, indirection, sizeof, dot, arrow, and parentheses operators, Expressions Precedence of operators and associatively, Category of Statements, Selection, Iteration, jump, label, expression and block, Function declaration, prototype, definition, calling by value and address, standard library functions and recursive functions.

UNIT IV - Arrays and Pointers

Declaration, initialization, reading, writing, accessing and passing as a parameter to functions, Multidimensional arrays and String functions, pointer expressions, pointer and arrays, multiple indirection, initializing pointers, pointer to functions, Dynamic memory allocation functions.

UNIT V - Structures and File Processing

declaration, initialization and accessing, array of structures and passing structures to functions, structure pointers, arrays and structures within structures, unions, bit-fields, typedef and enumerations, I/O and processing operations on text and binary files. pre-processor directives.

TEXT BOOKS :

1. Reema Thareja, “Introduction to C Programming”, Oxford University Press, India, 2013
2. Herbert Schildt, C: “The Complete Reference”, 4th Edition, Tata McGraw-Hill, 2000.

REFERENCE BOOKS :

1. E. Balagurusamy, “ Programming in ANSI C”, 4TH Edition, Tata McGraw- Hill, 2008.
2. R Ravichandran and T Jeyapoovan, “ Computer Programming with C”, Soni Graphics, India, 2014.

I Year B.Tech. Mechanical Engg. II-Semester

L	T	P	To	C
4	-	-	4	4

HS113 ENGINEERING PHYSICS

Course description & Objectives :

There is a symbiotic relation between physics and engineering. Broadly speaking, engineering is mainly applied physics. Recent technical developments have been the result of joint efforts of physicists and engineers. A proper study of physics is therefore indispensable for an engineering student to excel in his field. The purpose of this course is to present the principles and concepts of physics as relevant to an engineer.

Course Outcomes:

The students will be made to get acquainted to the following learning outcomes:

- Concepts of Physical optics, devices and applications.
- Ultrasonic waves, production, applications in NDT.
- Introduction to Quantum mechanics in relevance to that of modern physics.
- Exposure to latest inventions like lasers, fibers and applications
- Insight into nano technology and applications, solar energy to combat energy crisis.

UNIT I - Physical Optics

Interference – Types - Interference in thin films (Reflection) – Newton's Rings – Michelson's Interferometer, Fabry-perot interferomenter – Applications.

Diffraction – Fraunhoffer Diffraction at single slit – Diffraction grating

Polarization – Production of plane polarized light – Nicol prism – Optical activity – photo elasticity.

UNIT II - Ultrasonics & NDT

Ultrasonics : Introduction – production of ultrasonic waves – piezoelectric method – Properties of ultrasonic waves – Types of ultrasonic waves – Determination of Velocity of ultrasonic waves in solids and liquids – Applications.

NDT : Introduction - Types – Theory and practice of Ultrasonic Testing – Ultrasonic Testing Systems – Ultrasonic Testing Methods – X-Ray Radiography.

UNIT - III Quantum Mechanics & Free electron theory of metals

Quantum Mechanics : Matter waves - Schroedinger's time independent wave equation - Physical significance of the wave function - Particle in one dimensional potential well – tunneling phenomenon.

Free electron theory of metals : Introduction – Classical free electron theory – Electrical conductivity of metal – Fermi - Dirac distribution function and its variation with temperature – Quantum free electron theory.

UNIT IV - Lasers & Fiber Optics:

Lasers: Characteristics of Laser light – Spontaneous and Stimulated emission of radiation – Low power and High power lasers, He-Ne Laser – CO_2 Laser – Nd-Yag laser - Applications of Lasers, Holography and Applications

Fiber Optics: Principle of optical fiber - materials – Numerical Aperture – Types of fibers – Dispersion and Attenuation in optical fibers – Optical sensors – Optical fiber communication system.

UNIT V - Solar Energy & NanoScience and Technology

Solar Energy : Solar radiation – Photovoltaic effect – solar cells – Efficiency of solar cell – Solar thermal energy conversion systems.

NanoScience & Technology : Introduction to nano meterials – Basic principles of nanoscience & Technology – Fabrication of nanomaterials – Physical & Chemical properties of nanomaterials – Applications of nanotechnology.

TEXT BOOKS :

1. M.R.Srinivasan, "Physics for Engineers" New Age International, 2002-2003.
2. M.N. Avadhanulu & P.G. Kshirasagar, "Engineering Physics", 1st edition, S. Chand & Company Ltd, 1992.

REFERENCE BOOKS :

1. Halliday, Resnic and Walker, "Fundamentals of Physics", 6th edition, John Willey publishers, 2003.
2. Grawfor F.S., Berkley Physics courses, "Waves and Oscillations", Volume III McGraw Hill, 1992.
3. V. Raghavan, "Materials Science and Engineering", 5th edition, Prentice-Hall India, 2004.
4. S.O.Pillai, "Solid State Physics", 6th edition, New Age International Publications, Revised, 2005.
5. V.Rajendran, "Engineering Physics", 1st edition, TMH Publications, 2010.

I Year B.Tech. Mechanical Engg. II-Semester	L	T	P	To	C
	3	2	-	5	5

HS114 TECHNICAL ENGLISH COMMUNICATION

Course description & Objectives :

To introduce students to the specific use of language for the purposes of Technical Communication which would be an essential prerequisite for success in the areas of writing and speech. The teaching efforts in this course will be directed towards making students develop their technical and non-technical writing abilities using the fundamental principles that apply to the correct use of the English language free of grammatical and other related errors.

Course Outcomes:

Students shall achieve the ability to write and demonstrate college-level proficiency in the following:

- Clear and effective communication of meaning in speaking and writing.
- The ability to perform effectively the essential steps of the writing process (Note making, organizing, composing, revising, and editing).
- The ability to explain, develop, and criticize ideas effectively.
- Effective organization within the paragraph and the essay.
- Accuracy, variety, and clarity of sentences.
- Appropriate diction.
- Control of conventional mechanics (e.g., punctuation, spelling)

UNIT - I

- Text : Environmental Consciousness (Climate Change – Green Cover – Pollution)
- Grammar : Articles – Prepositions – Sentence Types and Construction
- Vocabulary : Root – Prefixes - Suffixes
- Composition : Paragraph Writing (Descriptive & Narrative)
- Lab Practice : Introduction to Phonetics (Organs of Speech; Consonants, Vowels & Diphthongs; Syllable, Stress & Intonation)

UNIT - II

- Text : Emerging Technologies (Solar Power – Cloud Computing – Nanotechnology)
- Grammar : Time and Tense (Present-Past-Future; Helping Verbs; Modals)
- Vocabulary : Synonyms – Antonyms
- Composition : Note-making
- Lab Practice : Grammar Practice (Speaking of past, present & future)

UNIT - III

- Text : Energy (Renewable and Non-renewable Sources – Alternative Sources – Conservation – Nuclear Energy)
- Grammar : Subject-Verb Agreement - Sentence Construction (Characteristics of Technical Writing)
- Vocabulary : Idioms & Phrases
- Composition : Summarizing
- Lab Practice : Situational Conversations – Role-Plays (Introducing; Greeting; Enquiring; Informing; Requesting; Inviting)

UNIT - IV

- Text : Engineering Ethics (Challenger Disaster – Biotechnology – Genetic Engineering – Protection from Natural Calamities)
- Grammar : Sentence Transformation (Degrees, Voice, Speech & Synthesis)
- Vocabulary : Phrasal Verbs
- Composition : Letter Writing (Informal)
- Lab Practice : Situational Conversations – Role-Plays (Emotions; Directions; Descriptions; Agreements; Refusals; Suggestions)

UNIT - V

- Text : Travel and Tourism (Advantages and Disadvantages of Travel-Tourism – Atithi Devo bhava – Tourism in India)
- Grammar : Common Errors
- Vocabulary : One-word Substitutes
- Composition : Letter Writing (Formal)
- Lab Practice : Group Discussions

TEXT BOOKS :

Mindscapes - English for Technologists and Engineers, Orient Black Swan, 2012.

REFERENCE BOOKS :

1. V. R. Narayana Swamy***, "Strengthen Your Writing",*** 1st edition, Orient Longman, 2003.
2. Thomas Elliott Berry***, "The Most Common Mistakes in English Usage",*** 1st edition, Tata McGraw Hill, 2004.
3. T. Balasubramanyam, ***A Textbook of English Phonetics for Indian Students***, Macmillan Ltd., 2000.
4. Sasikumar.V and P.V. Dhamija,. ***Spoken English: A Self-Learning Guide to Conversation Practice,*** 34th Reprint, Tata McGraw Hill, New Delhi, 1993.
5. Margaret M Maison, **"Examine your English",** 1st edition**,** Orient Longman, 1999.
6. Ashraf Rizwi, "***Technical English Communication***", Tata McGraw Hill, Latest Edition.

I Year B.Tech. Mechanical Engg. II-Semester

L	T	P	To	C
4	-	-	4	4

HS115 ENGINEERING MATHEMATICS - II

Course description & Objectives :

Without mathematics not a single day of an engineer will pass! All the topics of this course are relevant to all branches of engineering. In real life, many quantities are dependent on more than one quantity. Hence study of functions of several variables is crucial. In this course, we study partial differentiation, partial differential equations, multiple integrals all involving functions of two variables. We also study Fourier series and Z-transformations and difference equations.

Course Outcomes:

- The students will understand that many quantities are dependent on more than one quantity so they learn functions of several variables.

- They will be able to solve Partial Differential Equations, multiple integrals which are involving functions of two variables.
- They can apply Z – transforms to solve difference equations.
- They will be able to calculate areas and volumes.
- The student will enable to locate the maxima and minima of a function is an important task which arises often in applications of mathematics to problems in engineering and science.
- Vector differentiation and integration used to find the arc lengths and curvatures of space curves

UNIT I - Partial Differential Equations :

Formation of Partial Differential Equations, Linear (Lagrange) Equations, Method of multipliers, Non-linear partial differential equations (Types), Charpit's method.

Second order linear equations, classifications, Solution by method of separation of variables.

UNIT II - Fourier Series :

Periodic functions, Fourier series, Dirichlet's conditions, Determination of Fourier coefficients, Discontinuous functions, even and odd functions, Half-range series, Functions having arbitrary period.

UNIT III - Z-transformations & Applications :

Z-transformations : Sequences, Z-transformation, Properties, Inverse Z-transformation, Multiplication and division by k, Initial and final value theorems, Convolution, Determination of inverse Z-transformation.

Applications : Solutions of difference equations using Z-transformations.

UNIT IV - Multiple Integrals :

Double integrals, Evaluation, Evaluation in Polar coordinates, Change of order of integration, Change of variables, Applications to Area in Cartesian coordinates and polar coordinates.

Triple integrals, Fundamentals, Evaluation of triple integrals.

UNIT V - Vector Differentiation and Integration

Vector Function, Differentiation, Scalor and Vector point function, Gradient, Normal, Divergence, Directional Derivate, Curl, Vector identities.

Line Integral, Surface Integral, Volume integral, Green's theorem, Stoke's theorem, Gauss theorem of divergence (without proofs).

TEXT BOOKS :

1. *H. K. Dass* and *Er. Rajnish Verma*, Higher Engineering Mathematics, S. Chand & Co., New Delhi, 2011.
2. *B.S. Grewal*, “Higher Engineering Mathematics”, 40^{th} edition, Khanna Publishers, 2009.

REFERENCE BOOKS :

1. *B.V. Ramana*, “Higher Engineering Mathematics”, 3^{rd} Edition, Tata McGraw-Hill Publishing Co, 2008.
2. *R K Jain, S R K Iyengar*, “Advanced Engineering Mathematics”, 2^{nd} Edition, Narosa Publishing House.
3. *Erwin Kreyszig*, “Advanced Engineering Mathematics”, 8^{th} Edition, John Wiley & Sons (Asia) Pvt. Ltd. 2001.

I Year B.Tech. Mechanical Engg. II-Semester	L	T	P	To	C
	3	1	-	4	4

ME101 ENGINEERING MECHANICS

Course description & Objective :

The course aims to impart the knowledge to understand the forces and their reactions on various static and dynamic conditions.

Course Outcomes:

- Use scalar and vector analytical techniques for analyzing forces in statically determinate structures.
- Solve the engineering problems in case of equilibrium conditions and to calculate the reaction forces of various supports of different structures.
- Determine the centroid, centre of gravity and moment of inertia of various surfaces and solids.
- Solve the problems involving dry friction.
- Apply fundamental concepts of kinematics and kinetics of particles to the analysis of simple, practicalproblems.

UNIT I - Basic Concepts and Principles of Statics :

Introduction to Engineering Mechanics, Scalar and Vector quantities, Forces, Characteristics of a force, Definitions and examples of various types of force systems, Law of transmissibility, Definition of resultant, Composition and resolution of forces, Moment of a force, Principles of moments of force, Couples, characteristics of a couple, Transformations of a couple, Resultants of Force Systems, Possible resultants of different types of force systems, Resultant of a concurrent coplanar force system, Resultant of a non concurrent coplanar force system

UNIT II - Equilibrium of Rigid Bodies

Free body diagrams, Types of supports and their reactions, requirements of stable equilibrium, Equations of equilibrium of a concurrent coplanar force system, Equilibrium of Bodies acted on by two or three forces, Equilibrium of bodies acted on by non-concurrent coplanar force system

UNIT III - Properties of Surfaces and Solids :

Centroid and Center of Gravity: Centre of gravity of parallel forces in a plane, centroids and center of gravity of composite bodies, Distributed Loads on Beams.

Moments of Inertia: Definition, Parallel axis theorem and perpendicular axis theorem for areas, Polar Moment of inertia, Second moment of area by integration, Radius of gyration of areas, Moments of inertia of composite areas.

UNIT IV - Friction :

Nature of friction, Laws of friction, Coefficient of friction, Angle of friction, Cone of friction, Types of Friction - Sliding Friction, Rolling Friction, Belt Friction, Ladder Friction, Wedge friction.

UNIT V - Kinematics and Kinetics :

Absolute Motion: Introduction, Recapitulation of basic terminology of mechanics, Displacement, Velocity and acceleration their relationship, Rectilinear motion of a particle

Relative Motion: Introduction to kinematics of relative motion, Relative displacement, Relative velocity

Kinetics: Introduction to Kinetics, Force, Mass and Acceleration, Newton's Laws of motion, Equation of motion for a particle, D Alembert's principle, Rectilinear translation of a rigid body, Work done by a force, Work done by a force system, Energy, Potential energy, Kinetic energy, Principle of Work and kinetic energy, Conservation of energy, Linear impulse, Linear momentum, Principle of linear impulse and linear momentum, Conservation of linear momentum.

TEXT BOOKS :

1. J. L. Meriam, L. G. Kraige, “Engineering Mechanics: Dynamics”, 7th ed., John wiley & sons, 2012
2. A. K. Tayal, “Engineering Mechanics”, Umesh Publications, 2005.

REFERENCE BOOKS :

1. L. Singer - Harper, “Engineering Mechanics”, 3rd ed., Fedinand . , Collins, 1975.
2. Timoshenko & Young, “Engineering Mechanics”, 4th ed., Tata McGraw Hill, New Delhi, 2007.
3. S. S. Bhavakati & J. G. Rajasekharappa, “Engineering Mechanics”, 3nd ed., New Age International Publications, New Delhi, 2008.

I Year B.Tech. Mechanical Engg. II-Semester	L	T	P	To	C
	2	-	-	2	-

CS105 NETWORK SECURITY

Course description & Objectives :

This Course focuses towards the introduction of System, Information and Network security using various methodologies. It also focuses on the practical aspects that have been used to provide e_mail and web security.

Course Outcomes:

On Completion of this course student should be able to

- understand the Importance of Information Security
- Know the ways to protect the information
- understand the Firewall importance
- understand the need of Virtual Private Networks.

UNIT I - History of security :

History of security – Physical security, communications security, emissions security, computer security, network security and information security. Security process - Anti-virus software, access controls, firewalls, smart cards, biometrics, intrusion detection, policy management, vulnerability scanning, encryption, physical security mechanisms.

UNIT II - Access attacks

Snooping, eavesdropping, interception; Modification attacks - Changes, insertion and deletion; Denial of service attacks- Denial of access to information, applications, systems and communication; Repudiation attacks - Masquerading and denying an event. Hacking - Hacker motivation, historical hacking techniques, IP spoofing and malicious code.

UNIT - III

Confidentiality of files, information in transmission and traffic flow, integrity, availability and accountability; Integrity of files and information during transmission; Availability - backups, failover and disaster recovery; Accountability – identification and authentication, and audit.

UNIT - IV

Concepts of firewalls, Application layer and packet filtering firewalls; Virtual Private Networks.

UNIT - V

Basic encryption concepts, Private Key encryption standards-DES, triple DES and AES. Public key encryption – RSA. Concepts of digital signatures.

TEXT BOOKS :

1. Eric Maiwald, Fundamentals of Network security, Dreamtech Press, 2007.

REFERENCE BOOKS :

1. William Stallings, “Cryptography and Network security”, 4th edition, Pearson Education, 2010.

I Year B.Tech. Mechanical Engg. II-Semester	**L**	**T**	**P**	**To**	**C**
	-	-	3	3	2

CS107 COMPUTER PROGRAMMING LAB

Course description & Objectives :

To familiarize the students in preparation of documents and presentations with office automation tools. A comprehensive problem solving skills through C language is offered to enable the students to write diversified solutions using this language.

Course Outcomes:

- Able to write, compile and debug programs in C language.
- Able to formulate problems and implement algorithms in C.
- Able to effectively choose programming components that efficiently solve computing problems in real-world

1. Write A Program to find simple Interest, compound interest
2. Write A Program to covert given temperature from C to F & F to C
3. Write A Program to check Entered number is positive or zero or Negative
4. Write A Program to print given year is Leap year or not
5. Write A Program to do arithmetic operations using switch
6. Write A Program to find biggest among 3 Numbers
7. Write A Program to print grade of a student for 5 sub avg>70(A), 60-70(B), 50-60(C),<50(F)
8. Write A Program to find Roots fo Quadratic Equation
9. Write A Program to find sum of individual digits of a given number
10. Write A Program to check whether the given number is PALINDRAM or not
11. Write A Program to check whether the given number is PERFECT or not
12. Write A Program to check whether the given number is PRIME or not
13. Write A Program to check whether the given number is ARMSTRONG or not
14. Write A Program to check whether the given number is STRONG or not
15. Write A Program to find sum of Natural Numbers

16. Write A Program to print the following triangle

```
      1
    2   3
  4   5   6
7   8   9   10 etc……….
```

17. C Progrm to find Factorial of Given number using Recursive and Non Recursive Functions.
18. Write A Program to print Fibonacci Series upto given limit using recursive, Non recursive
19. Write program in C for determining the minimum and maximum and sum of elements of an array of 'n' elements and searching for a given element.
20. C Program for computing range, mean and standard deviation of a given numeric dataset.
21. Write A Program in C for performing addition, subtraction, multiplication and transpose operations on matrices.
22. Write program to perform the following string operations on the given string. a) string length b) string copy c) string concatenation d) string comparison e) reverse string f) sub string
23. Write A Program to read student record (no, name, marks1, marks2, marks3, marks4, marks5, calculate average and Grade) and display the student record.
24. Write A Program to do arithmetic operations using pointers.
25. Write A Program to create two data files and copy the content of these two data files as a single file in another new file?

I Year B.Tech. Mechanical Engg. II-Semester	**L**	**T**	**P**	**To**	**C**
	-	-	3	3	2

HS120 ENGINEERING PHYSICS LAB

Course description & Objectives :

This lab is intended to make the students realize the theoretical concepts of physics having hands on experience in conducting the following experiments. Students may have to take up any 10 experiments from each section.

Course Outcomes:

- Students realize concept of resonance of sound conducting the experiment of Sonometer Melde's experiment and volume generator.
- The students understand the concepts of light conducting the experiments of dispersion of light, diffraction of light, optical fibers and lasers.
- The students acquire the knowledge of magnetic field theory, thermal energy and elastic properties by conducting the experiments of field along the axis of circular coil, Lee's experiment, Seebeck effect and Torsional pendulum.

PHYSICS LAB

1. Verification of laws of transverse vibrations in stretched string - Sonometer
2. Melde's Experiment - Transverse and Longitudinal modes.
3. Determination of Rigidity modulus of a material in the form of a wire - Torsional pendulum
4. Dispersive power of the material of a Prism - Spectrometer
5. Determination of wavelength of a monochromatic light source - Diffraction Grating.
6. Field along the axis of a circular coil – stewart Gee's apparatus.
7. Volume Resonator.
8. Band gap of semiconductor
9. Hall coefficient
10. Thermal conductivity of bad conductor Lee's method
11. Optical Fiber – Determination of numerical aperture
12. Solar Cell
13. Seebeck effect

REFERENCE BOOKS:

1. Vogel's Text book of qualitative Chemical Analysis J.Mendham, R.C Denney, J.D. Bares, M.Thomas & B. Siva Sankar, Pearson Publications – Volume I (2009).

I Year B.Tech. Mechanical Engg. II-Semester

L	T	P	To	C
-	-	3	3	2

ME105 WORKSHOP PRACTICE

Course description & Objective :

To provide the hands on experience to the students on basic workshop skills.

Course Outcomes:

After completion of this course, students will be able to identify various tools connected to all the trades. They are also able to make various objects to the given dimension by using various types of tools.

Trades for exercises:

1. Carpentry:
2. Fitting
3. Tin Smithy & Black smithy4. House wiring
5. Foundry & Welding (Demonstration)
6. Machine shop & CNC (Demonstration)
7. IT Workshop
8. Study of discrete components of computer and networking (1 session)
9. Demonstration of assembling a computer, disk partitioning and installation of system and application software. installation of modem etc. (2 sessions)

Note: In each trade, the students has to perform at least two jobs

TEXT BOOKS :

1. S.K. Hazra Choudhury, Elements of workshop Technology, 11th Edition, Media Promoters, 1997
2. Gopal, T.V., Kumar, T., and Murali, G., A first course on workshop practice – Theory, Practice and Work Book, Suma Publications, Chennai, 2005.
3. Venkatachalapathy, V. S., First year Engineering Workshop Practice, Ramalinga Publications, Madurai, 1999.

VFSTR UNIVERSITY

II Year - B.Tech

COURSE CONTENT

I SEM & II SEM

II B.Tech. Mechanical Engg. I - Semester	L	T	P	To	C
	4	0	-	4	4

ME215 MANUFACTURING PROCESS - I

Course Description & Objectives:

Become familior with some basic casing methods. To provide an overview of the concepts, theory, operations, and application of manufacturing processes. Develop understanding of basic manufacturing processes. Methods of sheet metal processes such as shearing, blanking, bending, deep drawing or introduced. To understand the principles of fabrication of metals.

Course Outcomes:

1. *Indicate which types of manufacturing process are suited to producing different shapes of product.*
2. *Indicate which processes are likely to be used for producing a particular product using a specific material or class of material.*
3. *Describe the advantages and disadvantages of the different classes of manufacturing processes.*
4. *Describe the difference between the hot and cold working of metals and give the advantages of each.*
5. *Communicate effectively with industry personnel by developing a manufacturing-centric vocabulary.*

UNIT - I Casting:

Casting terminology – sand-moulding process – types of moulding sands – composition – properties. Patterns-pattern materials – types of patterns – allowances – cores – elements of gating system – types of gates – gating design - Dry sand mould - Skin dry sand mould.

UNIT - II Special casting process:

Investment casting – die casting - centrifugal casting - shell moulding - continuous casting.

Casting defects – destructive and nondestructive testing of castings.

Metal Melting: Cupola, crucible furnaces-Electric resistance furnace.

UNIT - III Metal forming process:

Hot, cold and warm working – workability-work hardening – recrystalization - annealing- rolling – theory of rolling - roll mills - Forging – smith forging – drop forging – press and machine forging – forging defects – power hammers.

Extrusion : Hot and cold extrusion – direct and indirect extrusion – hydrostatic extrusion – impact extrusion.

UNIT - IV Sheet metal operations:

Shearing – blanking – piercing – spinning – drawing – bending.

Dies: Progressive dies, combination dies, compound dies - coining, embosing, strech forming.

Drawing: Deep drawing, wire drawing, tube drawing.

Bending: Theory of bending and types of bending.

UNIT - V Welding:

Classification of welding-Gas welding – types of flames – welding techniques –arc welding –types- manual metal arc welding-submerged arc welding ,TIG and MIG welding – Thermit welding - Resistance welding-spot, butt, projection, and seam welding.- Welding defects. Introduction to soldering and brazing.

TEXT BOOKS :

1. P.N. Rao, "Manufacturing Technology", 2nd ed., Tata McGrahill, 2008.
2. S.K. Hajra Chowdary, "Elements of workshop technology", 11th ed., Media Promotors, 1997.

REFERENCE BOOKS :

1. R.K. Jain, "Production Technology", 6th ed., Khanna Publishers,New Delhi, 2005
2. Sarma P.C, "Production Technology", 3rd ed., S.Chand & Co, 2008.

II Year B.Tech. Mechanical Engg. I - Semester

L	T	P	To	C
4	0	-	4	4

ME217 MATERIAL SCIENCE & METALLURGY

Course Description & Objective:

To familiarize the students with the fundamentals of crystallography, metallurgy, heat treatment and metal properties.

Course Outcomes:

1. *The student will be able to understand and create the areas and domains in Materials & Metallurgical Engineering on the basis of his/her interest and opportunity available in present industrial scenario.*
2. *The student will be able to understand the basic principles of selection of materials and challenges to entrepreneurs in metallurgy*
3. *Apply knowledge of basic, advanced science and engineering principles to problems in materials engineering.*
4. *Design and conduct experiments as well as analyze and interpret data involving materials applications*
5. *Possess the skills to utilize modern technical equipment and computational tools in the exercise of materials engineering practice.*
6. *Process and select a material to meet desired needs.*

UNIT - I Iron -Iron carbide diagram, constitution, microstructures & properties:

Cast Iron and Steels: Constitution, properties of gray, white, malleable and spherodial graphite cast irons. Effect of Silicon, Manganese, Sulphur, Phosphorous and other elements on the properties of Cast Iron. Effect of alloying elements such as Manganese, Nickel, Chromium, Molybdenum, Vanadium, Tungsten, Cobalt and Boron on steels, Plain Carbon Steels, Stainless Steel.

UNIT - II Heat treatment of steel:

Types of Annealing, Normalizing, Hardening, Carburizing, Nitriding, Cyaniding, Induction hardening, Flame hardening, Aging, Hardenability, Controlled atmosphere in heat treatments, TTT and CCT Diagrams, Age hardening.

UNIT - III Strengthening mechanisms:

strengthening by grain-size reduction, solid solution strengthening, strain hardening, Recovery, recrystallization and grain growth, dispersion hardening. **Powder Metallurgy** : Introduction to powder metallurgy, advantages of powder metallurgy, manufacturing processes, production of powder compacting, sintering, products of powder metallurgy.

UNIT - IV Ceramics:

Ceramics as a class of material, classification of ceramics, bonding and structure of various ceramic materials-AX type, A_mX_p type, $A_mB_nX_p$ type crystal structures; Pauling Rules, Zachariasen Rules, Stanworth rules, structure of silicates; defects in ceramics.

UNIT - V Composites:

Introduction to Composites, Types of composites based on matrix and reinforcement, influence of fiber length, orientation and concentration, fracture behavior of fiber reinforced composites, toughness of composites. Manufacturing methods for composites: MMC's: liquid-metal infiltration, stir casting PMC: Extrusion, Injection moulding.

TEXT BOOKS:

1. Avner, "Introduction to Physical Metallurgy", McGraw Hill International Book Company, 1994.
2. William D. Callister, " Materials Science and Engineering an Introduction",Eigth edition - John Wiley & Sons, Inc.

REFERENCE BOOKS :

1. Kodgire UD, "Material Science &Matellurgy", 12th ed., Eve rest Publishing House.
2. Raghavan, V., " Mate rials Science and Engineering ", Prentice Hall of India Pvt.Ltd., 1999.
3. Muralidhara M.K., "Materials Science and Processes", DanpatRaiPublishingCo., 1998.
4. George E. Diter, " Mechanical Metallurgy", SI Metric edition-McGraw-Hill Book Company.

II Year B.Tech. Mechanical Engg. I - Semester

L	T	P	To	C
3	1	-	4	4

ME219 THERMODYNAMICS

Course Description & Objectives:

To understand the nature of the thermodynamic properties of matter. Students will learn to recognize and understand the different forms of energy and restrictions imposed by the First Law of Thermodynamics on conversion from one form to another.

Course Outcomes:

1. *Should be able to distinguish thermodynamic properties with their S.I units and fundamental understanding of zeroth law of thermodynamics*
2. *A fundamental understanding of the first and second laws of thermodynamics and their application to systems under different kinds of interactions with sorroundings*
3. *Ability to distinguish between a open and closed system, boundaries of the system, work and heat interactions; Develop an understanding of various kinds of work interaction over processes, cycles and subsequently apply first and second law of thermodynamics*
4. *An ability to evaluate entropy changes in a wide range of processes and determine the reversibility or irreversibility of a process from such calculations. Familiarity with calculations of the efficiencies of heat engines and other engineering devices.*
5. *Familiarity with the construction and principles governing the form of simple and complex one-component pressure-temperature diagrams and the use of volume-temperature and pressure-volume phase diagrams and the steam tables in the analysis of engineering devices and systems.*
6. *Understand the concept of ideal and real gases, the gas laws, maxwells relations and subsequently apply first and second laws of thermodynamics for an ideal gas and gas mixtures and ideal gases undergoing power and refrigeration cycles.*

UNIT - I Basic Concepts and First Law of Thermodynamics :

Concept of Continuum, Thermodynamicequilibrium, system, boundary and surroundings, State, Property, Process, Cycle, Reversibility,Quasi–static Process, Irreversible Process, Causes of Irreversibility, Work and Heat, Point and Pathfunction, Zeroth Law of Thermodynamics, Concept of quality of Temperature, PMM-I Joule'sExperiments, First law of Thermodynamics – Corollaries – First law applied to a Process – applied toa flow system – Steady Flow Energy Equation.

UNIT - II Second Law of Thermodynamics, Entropy and Availability :

Limitations of the First Law,Thermal Reservoir, Heat Engine, Heat pump, Parameters of performance, Second Law ofThermodynamics, Kelvin-Planck and Clausius Statements - Corollaries, PMM-II, Carnot's principle, Carnot cycle, Clausius Inequality, Entropy, Principle of Entropy Increase, Availability and Irreversibility, Thermodynamic Potentials, Gibbs and HelmholtzFunctions, Elementary Treatment of the Third Law of Thermodynamics.

UNIT - III Properties of Pure Substances :

Pure Substances, p-V-T- surfaces, T-S and h-s diagrams, Phase - Transformations, Triple point at critical state properties during change of phase, Dryness Fraction.Mollier charts, Various Thermodynamic processes and energy Transfer.

UNIT - IV Ideal and Real Gases, Gas Mixtures:

Perfect Gas Law, Equation of State, specific and UniversalGas constants, Vander Waals Equation of State –Compressibility charts variable specific Heats – GasTables. Gas mixtures – Avagadro's law.Dalton's law of partial pressure, T-D relations, Maxwellrelations, Clausius Clapeyron equations, Joule Thomson Coefficient.

UNIT - V Power Cycles:

Otto, Diesel, Dual, Ericsson, Stirling Cycles–Description and representation on P–V and T-S diagram, Thermal Efficiency, Mean Effective Pressures on Air standard basis – comparison of Cycles.

TEXT BOOKS :

1. G F C Rogers and Y R Mayhew, "Engineering Thermodynamics Work and Heat Transfer" 4thed., Pearson, 2003.
2. P.K Nag, "Engineering Thermodynamics", 3rd ed., Tata McGraw Hill, 2005.

REFERENCE BOOKS :

1. Y. A. Cengel and M. A. Boles, "Thermodynamics, An Engineering Approach", 4th ed., TataMcGraw Hill, 2003.
2. YunusCengel& Boles, "Thermodynamics – An Engineering Approach", 4th ed., TataMcGraw Hill, 2002.
3. J.P.Holman, "Thermodynamics" 4th ed., Mc.Graw Hill, 1995.

II Year B.Tech. Mechanical Engg. I - Semester

L	T	P	To	C
3	1	-	4	4

ME221 MECHANICS OF SOLIDS

Course Description & Objectives:

To establish an understanding of the fundamental concepts of mechanics of deformable solids; including static equilibrium, geometry of deformation, and material constitutive behavior. To provide students with exposure to the systematic methods for solving engineering problems in solid mechanics. To discuss the basic mechanical principles underlying modern approaches for design of various types of structural members subjected to axial load, torsion, bending, transverse shear, and combined loading.

Course Outcomes:

1. *Understand the concepts of stress and strain at a point as well as the stress-strain relationships for homogenous, isotropic materials.*
2. *To establish relation between shear load and shear force. And draw shear force and bending moment diagram*
3. *Derive flexural formula for simple bending and able to calculate variation shear stress – shear stress distribution for various cross sections*
4. *Calculate the stresses and strains associated with thin-wall spherical and cylindrical pressure vessels.*
5. *Determine the deflections and rotations produced by the three fundamental types of loads: axial, torsional, and flexural.*

UNIT - I Stress and strain:

types, Stress – strain diagram for ductile and Brittle materials, salient points. Elastic Constants- relations strain energy, Simple and compound bars Thermal Stresses - Stress on an inclined plane, principle stresses – Mohr circle

UNIT - II Transverse Loading on Beams:

Types of loads and beams - Relation between shear load, shearforce and bending moment -Shear force and bending moment diagrams - Cantilevers – Simplysupported beams and over-hanging beams-point of contra flexure - For point loads and UDL.

UNIT - III Bending stresses in Beams:

Theory of simple bending – Flexural formula-Bending stresses inbeams for various cross sections.

Shear stresses in beams-Introduction-derivation for variation of shear stress-shear stress distribution for various cross sections.

UNIT - IV Torsion :

Introduction-Torsion equation-shear stress distribution for circular solid and hollow shafts -Stepped shafts - Shafts fixed at both the ends.

Thin Cylindrical Shells: Introduction-hoop and longitudinal stresses- strains-thin spherical shell—stresses.

UNIT - V Deflection of Beams :

Introduction-deflection equation for elastic curve of a beam –deflection,slope for cantilever beam and simply supported beams -for point loads and UDL. Double integration method - Macaulay's method - Area moment methods.

TEXT BOOKS :

1. Egor P. Popov, " Engineering Mechanics of Solids", 3rd ed., Prentice Hall of India, 1997.
2. Srinath L.N., "Advanced Mechanics of Solids", 2nd ed., Tata McGraw Hill Publication, 2005.

REFERENCE BOOKS :

1. Bhavikatti, "Strength of Materials", 3rd ed., New Age International Publishers, 1998.
2. S.Thinshenko "Strength of Materials", 2nd ed., D.Van Nostrand Company, 1978.
3. Arthur P. Borsei, "Advanced Mechanics of Materials", 6th ed., John Wiley & Sons Inc., 2003.

II Year B.Tech. Mechanical Engg. I - Semester	L	T	P	To	C
	3	1	-	4	4

ME223 COMPUTATIONAL METHODS FOR ENGINEERS

Course Description & Objectives:

The aim of the course is to provide fundamental criteria for the choice of numerical methods. It also provides a sound understanding of the use of computational simulation and modeling techniques applied to engineering problems. This course also introduces nonlinear statistical modelling methods.

Course Outcomes:

1. *Design programs which numerically compute derivatives and integrals of functions which model physical systems*
2. *Design programs incorporating loops in C which numerically solve a plurality of problems using Newton's and Euler's method*
3. *Design programs incorporating loops in C which numerically solve a plurality of differential equations which model physical systems*
4. *Derive the differential equations for a chemical reaction system and design the algorithms and programs to numerically solve said equations and graphically illustrate the results thereof*
5. *Design algorithms and programs incorporating loops which model probability laws*

UNIT - I Introduction:

Numbers and their accuracy, Computer Arithmetic, Mathematical preliminaries, Errors and their Computation, General error formula, Error in a series approximation.

Solution of Algebraic and Transcendental Equation: Bisection Method, Iteration method, Method of false position, Newton-Raphson method, Methods of finding complex roots, Muller's method, Rate of convergence of Iterative methods, Polynomial Equations.

UNIT - II Interpolation:

Finite Differences, Difference tables Polynomial Interpolation**:** Newton's forward and backward formula Central Difference Formulae: Gauss forward and backward formula, Stirling's, Bessel's, Everett's formula.

Interpolation with unequal intervals: Langrange's Interpolation, Newton Divided difference formula, Hermite's Interpolation.

UNIT - III Numerical Integration and Differentiation:

Introduction, Numerical differentiation

Numerical Integration: Trapezoidal rule, Simpson's 1/3 and 3/8 rule, Boole's rule, Waddle's rule.

UNIT - IV Solution of differential Equations:

Picard's Method, Euler's Method, Taylor's Method, Runge-Kutta Methods, Predictor Corrector Methods, Automatic Error Monitoring and Stability of solution

UNIT - V Statistical Computation:

Frequency chart, Curve fitting by method of least squares, fitting of straight lines, polynomials, exponential curves etc, Data fitting with Cubic splines, Regression Analysis, Linear and Non linear Regression, Multiple regression, Statistical Quality Control methods.

TEXT BOOKS :

1. Jain, Iyangar and Jain, "Numerical Methods for Scientific and Engineering Computations", 3rd ed., New Age Int, 2004.
2. T. Veerarajan and T. Ravichandran, "Theory and Problems in Numerical Methods", 5th ed., TMH, 1996.

REFERENCE BOOKS :

1. Rajaraman, "Gomputer Oriented Numerical Methods", 2nd Edition, 1990.
2. Grewal B.S., "Numerical Methods in Engineers and Science", 5th ed., Khanna Publishers, 1992.
3. Gupta C.B. and Vijay Gupta, "Introduction to Statistical Methods",1st ed., Vikas Publishing, 2009

II Year B.Tech. Mechanical Engg. II-Semester

L	T	P	To	C
-	-	1	1	1

SR002 SEMINAR

Course Description & Objective:

Seminar is offered as an opportunity for graduate students to broaden their knowledge beyond their specific area of research and/or studies. This is important at and beyond the graduate level where our activities are highly focused and specialized from a topical perspective.

II Year B.Tech. Mechanical Engg. I - Semester

L	T	P	To	C
-	-	3	3	2

ME209 STRENGTH OF MATERIALS AND METALLURGY LAB

Course Description & Objectives:

To familiarize and make the students to know how to obtain the mechanical properties like Tensile strength, hardness, Young's Modulus of various metals. To impart the practical knowledge of the subject Mechanics of Solids this is studying in the present semester. To learn and to gain experience in the preparation of metallographic specimens. To examine and analyze the microstructures of carbons steels, brass, cast irons. To understand the basic principles of optical microscopy. To measure the harden ability of mild steel samples

Course Outcomes:

1. *By performing the Tensile test students get experience in drawing the Stress strain curve of the given material. With this graph, they can understand the salient features and properties of metals. They can also understand the difference between Ductile and brittle material.*
2. *By performing the Hardness test, students get the information of hardness property of given metals. With the Torsion test students can understand the importance of rigidness of metal in transmitting a torque by shafts. Students can also understand the importance of Torsion equation while designing a shaft problems.*
3. *By performing the Deflection test on beams students can understand the importance of bending equation of beams. Students can be able to calculate the Elastic limit of any material by conducting the simple and easy experiment on any beam.*
4. *After the completion of this laboratory course, the student is able to prepare the specimens for metallographic examination with best practice, can operate the optical microscope and understand, interpret, analyze the microstructures of materials.*

Details of the Experiments :

STRENGTH OF MATERIALS

1. Direct tension test
2. Bending test on
   a) Simply supported beam
   b) Cantilever beam
3. Torsion test
4. Hardness test
   a) Brinells hardness test
   b) Rockwell hardness test
5. Test on springs
6. Compression test on cube
7. Impact test

METALLURGY:

1. Preparation and study of the Micro Structure of pure metals like Iron, Cu and Al.
2. Preparation and study of the Microstructure of Mild steels, low carbon steels, high – C steels.
3. Study of the Micro Structures of Cast Irons.
4. Study of the Micro Structures of Non-Ferrous alloys.
5. Study of the Micro structures of Heat treated steels.
6. Hardenability of steels by Jominy End Quench Test.
7. To find out the hardness of various treated and untreated steels.

II Year B.Tech. Mechanical Engg. I - Semester

L	T	P	To	C
-	-	3	3	2

ME212 MANUFACTURING PROCESS LAB

Course Description & Objective:

The course aims to create awareness among the students about pattern making, mould making and welding.

Course Outcomes:

Upon completion of the subject, students will be able to:

1. *Processing of wooden patterns (i.e. Single piece and Two piece) using carpentry tools .Also Symmetrical & complex shaped patterns are processing using wood working lathe machine.*
2. *Learn how to prepare moulding sand, preparation of moulds & also test the moulds using mould hardness tester.*
3. *Learn the design of gating system used in casting process & practical exposure on melting of metals in furnace*
4. *Learn the working principles & practical exposure on welding techniques such as arc welding, Gas welding, Spot welding.*
5. *Learn the working principles & practical exposure on injection moulding machine and blow moulding machine for processing of plastics.*
6. *Learn the various press working operations using Hydraulic press and dies.*

1. METAL CASTING:

1. Pattern Design and making - for one casting drawing.
2. Testing of sand - Properties
3. Moulding, Melting and Casting - Single piece
4. Moulding, Melting and Casting - Two piece patern

2. WELDING:

1. ARC Welding Lap & Butt Joint - 2 Exercises
2. Spot Welding - 1 Exercise
3. TIG Welding - 1 Exercise
4. Brazing - 1 Exercises
5. Gas welding - 1 Exercises

3. MECHANICAL PRESS WORKING:

1. Blanking & Piercing operation and study of simple, compound and progressive press tool.

2. Hydraulic Press : Deep drawing and extrusion operation.

4. **PROCESSING OF PLASTICS**
   1. Injection Moulding
   2. Blow Moulding

II Year B.Tech. Mechanical Engg. I - Semester

L	T	P	To	C
-	-	3	3	2

ME211 COMPUTATIONAL METHODS FOR ENGINEERS LAB

Course Description & Objective:

To provide hands on experience in MAT LAB and to write simple codes to implement the numerical methods covered during the theory course.

Course Outcomes:

1. *This course will enable the Mechanical engineers to understand the fundamental criteria for the choice of numerical methods.*
2. *They will understand the use of computational simulations and modeling techniques which are applied to their engineering problems.*
3. *This course also enables them to understand non – linear statistical modeling methods and to utilize them in their real life situations.*
4. *The student will be able to apply the statical quality control techniques in the product quality and quantity.*
5. *They will be able to calculate polynomials to anylise data using interpolation.*

Write Programs in ‘C’ / MAT LAB:

1. To deduce error involved in polynomial equation.
2. To Find out the root of the Algebraic and Transcendental equations using Bisection, Regula-falsi, Newton Raphson and Iterative Methods. Also give the rate of convergence of roots in tabular form for each of these methods.
3. To implement Newton’s Forward and Backward Interpolation formula.
4. To implement Gauss Forward and Backward, Bessel’s, Sterling’s and Evertt’s Interpolation formula
5. To implement Newton’s Divided Difference and Langranges Interpolation formula.
6. To implement Numerical Differentiations.

7. To implement Numerical Integration using Trapezoidal, Simpson 1/3 and Simpson 3/8 rule.
8. To implement Least Square Method for curve fitting.
9. To draw frequency chart like histogram, frequency curve and pie-chart etc.
10. To estimate regression equation from sampled data and evaluate values of standard deviation, t-statistics, regression coefficient, value of R^2 for at least two independent variables.

II Year B.Tech. Mechanical Engg. II - Semester

L	T	P	To	C
4	-	-	4	4

CS218 DATA STRUCTURES

Course Description & Objective:

The main objective of this course is to provide an introduction to basic data structures and manipulating them, by using C programming language.

Course Outcomes:

Having successfully completed this course, the student will be able to:

1. *Apply advance C programming techniques such as pointers, dynamic memory allocation, structures to developing solutions for particular problems;*
2. *Design and implement abstract data types such as linked list, stack, queue and tree by using C as the programming language using static or dynamic implementations;*
3. *Evaluate and choose appropriate abstract data types to solve particular problems;*
4. *Design and implement C programs that apply abstract data types.*

UNIT - I Introduction:

Data, Data type, Data Structures – Primitive and Non-primitive, Storage structures – Sequential and linked storage representations, File structures, Abstract Data Type (ADT). Overview of Structures-arrays, operations on arrays(retrieval of an element, search an element, insertion deletion of an element), manipulations on arrays such as finding the sum of elements of an array, adding two arrays, and reversing an array. Maximum sub sequence problem, Multi dimensional arrays.

UNIT - II Linked Lists:

Types of Linked Lists Singly Linked List, Doubly Linked List, Circular Linked List. Operations on linked lists-insertion, deletion, traversing forward/reverse order. Multi lists, Applications of Linked Lists.

UNIT - III Staks:

Stacks – ADT, array and linked representations, Implementation and their applications. Queues – ADT, array and linked representations, Implementation of linear, circular and doubly-ended queues, and their applications.

UNIT - IV Preliminaries:

Preliminaries – Binary Tree – ADT, array and linked representations, Binary tree properties, tree traversal, Implementation, Expression trees. The Search Tree ADT – Binary Search Trees, Implementation. AVL Trees – Single Rotations, Double rotations.

UNIT - V Graphs:

Graphs – ADT, definitions and properties, modeling problems as graphs, representation – adjacency matrix and adjacency list, basic graph traversals – breath first search and depth first search. Applications of graphs

TEXT BOOKS :

1. Richard F.Gilberg, Behrouz A. Forouzan, Data Structures - A Pseudo code Approach with C, Second Edition, Cengage Learning.
2. Y. Langsam, M.J.Augeustein and A.M.Tenenbaum, “Data Structures Using C”, Pearson Education Asia.

REFERENCE BOOKS :

1. Mark Allen Weiss, “Data Structures and Algorithm Analysis in C”, Second Edition, Pearson Education.
2. Sartaj Sahni, Data Structures, Algorithms and Applications in C++ , Universities Press, Second Edition, 2005
3. Jean Paul Tremblay and Paul G. Sorenson, An Introduction to Data Structures with Applications,Tata Mc-Graw Hill, Second Edition, 26th Reprint 2004
4. KRUSE, Data Structures and Programming Design-PHI

II Year B.Tech. Mechanical Engg. II - Semester

L	T	P	To	C
3	1	-	4	4

ME216 FLUID MECHANICS AND HYDRAULIC MACHINES

Course Description & Objectives:

Read and follow directions for laboratory experiments. Operate fluid flow equipment and instrumentation. Collect and analyze data using fluid mechanics principles and experimentation methods. Prepare reports following accepted writing and graphical techniques. Perform exercises in small teams. Demonstrate principles discussed in Fluid Mechanics lecture course. Student can able to identify the type of turbine with known specific speed. Student can able to identify and design the pumps with known specific speed and manometric head.

Course Outcomes:

1. *Read and follow directions for laboratory experiments.*
2. *Operate fluid flow equipment and instrumentation.*
3. *Collect and analyze data using fluid mechanics principles and experimentation methods.*
4. *Prepare reports following accepted writing and graphical techniques.*
5. *Perform exercises in small teams.*
6. *Demonstrate principles discussed in Fluid Mechanics lecture course.*
7. *Student can able to identify the type of turbine with known specific speed.*
8. *Student can able to identify and design the pumps with known specific speed and manometric head.*

UNIT - I Basics of Fluid &Fluid Statics:

Units and Dimensions - Properties of fluids - density, specific gravity, specific weight, viscosity, compressibility, vapour pressure, Capillarity and surface tension. Forces on immersed surfaces. Introduction about center of pressure and buoyancy. Piezometer, U-tube & Differential Manometers.

UNIT - II Fluid Kinematics & Dynamics:

Flow characteristics, concepts of system and control volume -Continuity equation - application of control volume to continuity - Energy equation – Euler equation - Bernoulli equation and Momentum equation.

UNIT - III Flow Through Circular Conduits:

Laminar flow through circular tubes and boundary layer concepts -Boundary layer thickness – Hydraulic and energy gradient - Darcy equation on pipe roughness - Friction factor - Minor losses – Flow through pipes in series and in parallel.

UNIT - IV Rotodynamic Machines :
Impact of jets -fixed and moving vanes-classification of turbines, impulse and reaction turbines, Pelton wheel, Francis turbine, Kaplan turbine-working proportions, work done, efficiencies, draft tube theory-efficiency.

UNIT - V Centrifugal and Reciprocating Pumps:

Classification, working Principles -Manometric head losses and efficiencies-specific speed-pumps in series and parallel. Reciprocating pumps-working-Discharge-slip-indicator diagram, Air vessels.

TEXT BOOKS :

1. Kumar K.L., “Engineering Fluid Mechanics “, 7th ed., Eurasia Publishing House (P) Ltd.,New Delhi,1995.
2. P.N.Modi and Seth, “Fluid Mechanics and Hydraulic Machines”,15th ed., Standard Book House, 2002.

REFERENCE BOOKS :

1. R.K.Rajput, “A Text Book of Fluid Mechanics & Hydraulic Machines”, 3rd ed., S. Chand,2006.
2. Bansal R.K., “Fluid Mechanics and Hydraulic Machines”, 5th ed., Laxmi Publications (P)Ltd., New Delhi, 1995
3. Roberson J.A. & Crowe C.T., “Engineering Fluid Mechanics”, 4th ed., M/s Jaico PublishingCo.,1998.

II Year B.Tech. Mechanical Engg. II - Semester	L	T	P	To	C
	3	1	-	4	4

HS213 PROBABILITY & STATISTICS

Course Description & Objectives:

Aim of this course is to introduce statistical techniques which are useful in every walk of life. It also introduces some probability which has many applications. By the end of the course, student would have learned regression, correlation techniques, probability, distributions, test of hypothesis and their applications.

Course Outcomes:

1. *The students will understand the use of statistical techniques in every walk of their lives.*

2. *The statistical techniques like regressions, Correlation, probability distribution and mainly test of hypothesis will be useful for them in their research work, academics and applications at work places as well as in their real life.*

UNIT - I Descriptive Statistics:

Basic Definitions, Frequencies, Graphical Representation, Histogram, Ogive curves, Measures of Central tendency, Arithmetic mean, Median, Mode, mean deviation, standard deviation, Symmetry and Skewness, Karl Pearson's Coefficient of skewness.

UNIT - II Curve Fitting and Correlation, Regression:

Least squares method, curve fitting (straight line and parabola only)

Covariance, Correlation, Types, Pearson's Coefficient of correlation, Rank correlation, Spearman's rank correlation.

Regression, Regression lines, multiple regression.

UNIT - III Probability:

Introduction, Definition (Classical and Axiomatic approach), Addition theorem, Conditional probability, Multiplication theorem, Total probability, Bayes theorem.

UNIT - IV Distributions :

Random variables, Discrete and Continuous variables, Introduction to Distributions.

Binomial distribution : Definition, Mean and Standard deviation, Recurrence relation, Applications, Fitting of binomial distribution.

Poisson Distribution : Definition, Mean and Standard deviation, Recurrence relation, Poisson Distribution is an approximation of Binomial distribution, Applications, Fitting of Poisson distribution.

Geometric Distribution : Definition, Properties.

Normal Distribution : Definition, Normal curve, Mean and Standard deviation, Median, Mode, Normal Distribution applications, Normal Distribution is an approximation to Binomial distribution.

Exponential Distribution : Definition, Properties.

UNIT - V Sampling Methods:

Population and Sampling, Parameters and Statistics, Types of sampling, Sampling Distributions, Central limit theorem, Standard Error of mean from infinite population, Standard deviation of variance.Test of hypothesis and test of significance, confidence limits, confidence interval, Test of significance of Large samples, T-distribution, Chi square test.

TEXT BOOKS :

1. *H. K. Dass* and *Er. Rajnish Verma*, Higher Engineering Mathematics, S. Chand & Co., New Delhi, 2011.
2. *Miller and Fruinds*, Fundamentals of Probability and Statistics, PHI publication.

REFERENCE BOOKS :

1. *S.C. Gupta* and *V.K .Kapoor*, “Fundamentals of Mathematical Statistics”, Sultan Chand & Co., New Delhi, 2005.
2. *B.V. Ramana*, “Higher Engineering Mathematics”, 3rd Edition, Tata McGraw-Hill Publishing Co, 2008.
3. *R K Jain, S R K Iyengar*, “Advanced Engineering Mathematics”, 2nd Edition, Narosa Publishing House.
4. *Erwin Kreyszig*, “Advanced Engineering Mathematics”, 8th Edition, John Wiley & Sons (Asia) Pvt. Ltd. 2001.

II Year B.Tech. Mechanical Engg. II - Semester	L	T	P	To	C
	3	1	-	4	4

ME218 KINEMATICS OF MACHINES

Course Description & Objectives:

The course under Theory of Machine-I has been designed to cover the basic concepts of kinematic aspects of mechanical machines and major parts used in running of the machines. The students will understand the basic concepts of machines and able to understand constructional and working features of important machine elements. The students should be able to understand various parts involved in kinematics of machines for different applications. The students shall also be able to understand requirements of basic machine parts which would help them to understand the design aspects of the machine parts.

Course Outcomes:

1. *Familiarity with common mechanisms used in machines and everyday life.*
2. *Ability to calculate mobility (number of degrees-of-freedom) and enumerate rigid links and types of joints within mechanisms.*

3. *Ability to conduct a complete (translational and rotational) velocity, acceleration analysis of the mechanism and to understand steering mechanism and the importance of universal (Hooke's) joint*
4. *Helps to understand various cam motion profiles and follower mechanism , their classification and design based on the prescribed follower motion (SHM , constant velocity and acceleration)*
5. *At the end of this unit students are able to understand gear mechanism classification and to become familiar with gear standardization and specification in design.*
6. *To understand importance gear trains and their practical applications.*
7. *At the end of this unit, the students should be able to understand: Uses and advantages of belt drives Types and their nomenclature, Relationship between belt tensions commonly used design parameters.*

UNIT - I Introduction:
Statics and dynamics, links, classification of links, kinematic pairs-classification, degrees of freedom, constrained motion-types, kinematic chains, mechanisms, inversions of quadratic chain, single slider crank chain and double slider crank chain.
Straight line motion mechanisms: classification of straight line motion mechanisms, peaucellier's, grass hopper and Pantograph mechanisms.

UNIT - II Velocity and acceleration in Mechanisms:
Motion of a link in machine, velocity of a point on a link – Instantaneous center – types of instantaneous centers – kennedy theorem – velocity measusrement by Instantaneous center method, Relative velocity method.
Acceleration of a point on a link - acceleration in slider crank mechanism, Coriolis component of accleration.
Steering gear mechanism: Davis and Ackerman steering gear, Single and Double Hook Joint analysis.

UNIT - III Cams:
Definitions, Types of cams and followers, types of follower motion, generation of cam profiles for uniform velocity, uniform acceleration and simple harmonic motion. Maximum velocity and maximum acceleration, analysis of roller follower and circular cam with straight flanks.

UNIT - IV Gears:
Friction wheels and toothed gears- types-law of gearing, condition of constant velocity ratio for transmission of motion- cycloidal and involute teeth profiles, velocity of sliding-interference - condition for minimum number of teeth to avoid interference- expressions for arc of contact and path of contact.

UNIT - V Gear Trains:
Introduction, Types of Gear Trains – Simple, Compound, Reverted and epicyclic gear train, velocity ratio – epicyclic gear train with bevel gears.
Belts: Introduction, types of belts, materials, length of open & cross belt drive, slip & creep of the belt, power transmission by a belt, angle of contact, centrifugal tension, condition for maximum power transmission, initial tension.

TEXT BOOKS :

1. A.Ghosh & A.K. Mallik, "Theory of Mechanisms and Machines", 2nd ed., Affiliated EWP Press, 2007.
2. S.S. Rattan, "Theory of Machines", 3rd ed., Tata McGraw-Hill Publishing Company Limited, New Delhi, 2009.

REFERENCE BOOKS :

1. Jagdish Lal, "Theory of Mechanisms and Machines", 2nd ed., Metropolitan Book Company, 1998.
2. J. E. Shigley, J. J. Uicker and G.Pennock, "Theory of Machines and Mechanisms", 4th ed., Oxford University Press, 2010.

II Year B.Tech. Mechanical Engg. II - Semester

L	T	P	To	C
3	1	-	4	4

ME220 THERMAL ENGINEERING - I

Course Description & Objectives:
To establish an understanding of the fundamental concepts of internal combustion engines and air compressors including measurements of air supply, fuel supply, performance evaluation. To make them understand thoroughly the combustion phenomenon and types of combustion chambers and fuels to be used which reduces knocking tendency. To provide students with exposure to the systematic methods for solving engineering problems in I.C. engines and compressors. To build the necessary theoretical background that suits the automobile industry needs.

Course Outcomes:

1. *Classify I.C. Engines, differentiate among air standard, fuel-air and actual cycles of operation, Necessity of early opening and late closing of inlet and exhaust valves, differentiate 2-S vs 4-S and S.I. vs C.I. engines.*
2. *Understand the combustion phenomenon and knocking of S.I. and C.I. Engines, types of combustion chambers, fuels used and their rating and the working of various engine systems like ignition, lubrication, fuel supply and cooling.*

3. *Understand the methods of various measurements like air supply, fuel supply, exhaust emissions and the working of various components like Carburetor, Fuel pump and Injector and types of injection systems.*
4. *Evaluation of various engine performance parameters and the use of conducting Morse test, Heat balance, Retardation and Motoring tests to measure brake power, indicated power and friction power.*
5. *Should be able to classify the air compressors and understand their working and suitability to the present industry needs.*
6. *A fundamental understanding of Multi stage compression with inter cooling and the evaluation of various efficiencies of compressors.*

UNIT - I Introduction:

Introduction, Comparison of Air Standard and Actual Cycles, Actual and Fuel-Air Cycles of IC Engines, Classification - Working principles, Valve and Port Timing Diagrams.

Engine systems – Fuel Carburettor, Fuel Injection System, Ignition, Cooling and Lubrication.

UNIT - II Combustion in S.I Engines:

Normal, Abnormal Combustion and Detonation, Importance of flame speed, pre-ignition and knocking, anti knock additives, combustion chamber, types.

Combustion in C.I. Engine: Stages of combustion – Delay period and its importance – DieselKnock– Need for air movement, suction, compression and combustion induced turbulence.

UNIT – III Performance of I.C Engines:

Measurement of cylinder pressure, fuel Consumption, air intake, exhaust gas composition, Brake power – Determination of frictional losses and indicated power –Performance test – Heat balance sheet.

UNIT – IV Reciprocating Compressors:

Classification and working principle, work of compression with and without clearance. Volumetric efficiency, Isothermal efficiency and isentropic efficiency of reciprocating air compressors. Multistage air compressor and inter cooling – working of multistage air compressor.

UNIT - V Centrifugal compressors:

Principle of operation – velocity and pressure variation. Energy transfer impeller blade shape-losses, slip factor, power input factor, pressure coefficient velocity diagrams, power.

Axial Flow Compressors - Mechanical details and principle of operation – velocity triangles and energy transfer per stage degree of reaction, work done factor - isentropic efficiency. Polytropic efficiency.

TEXT BOOKS:

1. John B. Hey Wood" "Fundamentals of I.C. Engines", 2nd ed., Mc.Graw-Hill, 2004.
2. GANESAN V., "Internal Combustion Engines", 2nd ed., TMH. 2007.

REFERENCE BOOKS:

1. Sarkar B.K, "Thermal Engineering", 2nd ed., Tata Mc.Graw-Hill, 2003.
2. R.YADAV, "Thermal Engineering" , 2nd ed., Central Book Depot, 2005.
3. Mathur R.P., and Sharma, "Internal Combustion Engines", 8th ed., Dhanpath Rai& Sons, New Delhi, 2002.

II Year B.Tech. Mechanical Engg. II-Semester	L	T	P	To	C
	-	-	1	1	1

SR002 SEMINAR

Course Description & Objective:

Seminar is offered as an opportunity for graduate students to broaden their knowledge beyond their specific area of research and/or studies. This is important at and beyond the graduate level where our activities are highly focused and specialized from a topical perspective.

II Year B.Tech. Mechanical Engg. II - Semester	L	T	P	To	C
	-	-	3	3	2

HS217 SOFT SKILLS LAB

Course Description & Objectives:

The Soft Skills Laboratory course is aimed at training undergraduate students and enabling them to acquire employability skills. Designed to impart work related skills, the course will help trainees develop interpersonal communication, leadership and team skills. It will give them the required competence and confidence to handle professional tasks.

Training Methodology:

The training methodology is designed to bring about changes in attitudes through experience-based learning. Activities in simulated environments such as role plays, group discussions, micro-presentations, audio-video clippings, case studies, psychometric tests etc., will provide students insights into their strengths and weaknesses.

Course Outcomes:

1. *The Soft Skills course will help students develop professional and non-personal ways of approaching people and work through the correct use of language and speech in a workplace environment along with the ability to think critically on issues demanding attention.*
2. *This includes enhancing self-awareness and a sense of self-worth in the students in order to improve their productivity and performance at the workplace.*

UNIT - I

a) Role of language in Personality – How language reflects, impacts personality – Using gender-neutral language in MNCs – being culturally sensitive.

Activity – Appraising each other – Worksheets related to the above

b) Career Planning- job vs. career- goal setting- SWOT analysis- planning and prioritization - four quadrant time management system - time management – self-management – stress-management.

Activity: Setting a SMART goal - SWOT analysis of the self – Writing a Statement of Purpose (SOP).

c) Effective Resume-Writing: structure and presentation - planning and defining the career objective - projecting one's strengths and skill-sets – summarizing - formats and styles - covering letter.

Activity: Resume preparation –writing a covering letter.

UNIT - II

a) Functional English - Formal/informal context – purpose - interpersonal dynamics - ideation –content organization - initiating a conversation – responding appropriately - right body language.

Activity - Role play in different situations, - self-introduction - social background (family, home town etc.,) - role model - my future - likes/dislikes (movies, persons, places, food, music etc.,) - a mini project on functional English.

b) Vocabulary-Building: Etymology of words - word roots - prefixes & suffixes - synonyms & antonyms- collocations - one-word substitutes – analogies - idioms and phrases - contextual guessing of unfamiliar words – task-oriented learning (100 words).

Activity: Flash cards (200 words) – vocabulary exercises with hand-outs.

UNIT - III

a) Group Discussion: Articulation and flow of oral presentation - dynamics of group discussion – intervention – summarizing - voice modulation – content generation – Key Word Approach (KWA) – Social, Political, Economic, Legal and Technical Approach (SPELT) – View Point of Affected Part (VAP) - language relevance - fluency and coherence.

Activity: Mock sessions on four types of GD topics.

b) Facing Interviews: Interview process - understanding employer expectations - pre-interview planning - opening strategies - answering strategies – stress-based interviews - tele-interviews, video interviews-frequently asked questions (FAQs).

Activity: Writing responses to FAQs - mock interviews.

UNIT - IV

a) Reading Comprehension: Reading as a skill- techniques for speed reading-skimming- scanning- appreciating stylistics - impediments for speed reading - eye fixation - sub-vocalisation - critical reading - reading based on purpose - reading for information - reading for inference -understanding tone.

Activity: Reading comprehension exercises with texts drawn from subject areas. (Hand-outs)

b) Listening Comprehension: Listening as skill - different types of listening - hidden data of communication - active listening - top-down approach - bottom-up approach.

Activity: Following different accents (Indian, British, American) listening comprehension exercises with audio and video excerpts.

UNIT - V

a) Data Commentary: Deductive & inductive reasoning - data interpretation - tables & charts - bar charts - pie charts - line graphs - ratios & proportions – percentages - coding and decoding - reasoning by analogy - artificial language etc.

b) Analytical Thinking: Statement and Conclusion - Data Sufficiency - Statement and Argument - Statement and Assumption - Logical Deduction - Logical Problems.

Activity: Exercises with handouts.

REFERENCE BOOKS :

1. *Edward Holffman,* ***Ace the Corporate Personality****, McGraw Hill,2001*
2. Adrian Furnham, ***Personality and Intelligence at Work***, Psychology Press, 2008.
3. John Adair Kegan Page, “***Leadership for Innovation”*** 1st edition, Kogan, 2007.
4. M.Ashraf Rizvi, “***Effective Technical Communication”,*** 1st edition, Tata McGraw Hill, 2005.
5. Krishna Mohan & NP Singh , “***Speaking English Effectively”*** 1st edition, Macmillan, 2008.

6. ***Soft Skills Material*** of **Infosys** Under the Academic Initiative of Campus Connect
7. K.R. Lakshminarayana & T. Murugavel***, "Managing Soft Skills",*** Scitech Publications. 2009
8. Dr. S.P. Dhanvel***, English and Soft Skills,*** Orient Blackswan, 2011

II Year B.Tech. Mechanical Engg. II - Semester	**L**	**T**	**P**	**To**	**C**
	-	-	3	3	2

ME222 MACHINE DRAWING

Course Description & Objective:

Students will learn to apply principles of technical drawing and acquire skills in the use of appropriate computer aids for effective preparation of 3D models in Machine Drawing.

Course Outcomes:

On Successful completion of this lab the students will be able to

1. *Draw the isometric view of a given three dimensional object/part.*
2. *Draw the orthogonal projection of a solid body.*
3. *Represent different kinds of materials and Mechanical components conventionally.*
4. *Identify the elements of a detailed drawing.*
5. *Understand the shape and structure of different types of screws, keys and Couplings.*
6. *Produce the assembly drawing using part drawings.*

Total 12 sheets to be drawn, minimum being 10

Sheet 1 : Conversion of isometric views to orthometric views
Sheet 2 : Conversion of optometric views to isometric views
Sheet 3 : Conventions of different materials and standard components
Sheet 4 : Sectional views
Sheet 5 : Fasteners, bolts and nuts, locknuts
Sheet 6 : Keys, couplings

Assembly drawing

Sheet 7 : Stuffing box
Sheet 8 : Eccentric
Sheet 9 : Screw jack
Sheet 10 : Connecting rod

Sheet 11 : Swivel bearing

Sheet 12 : Piston assembly

TEXT BOOKS:

1. K.L. Narayana, "Machine Drawing", 3rd ed., New Age International, 2007.

REFERENCE BOOKS

1. N.D. Bhatt, "Machine Drawing", Charotar Publishing House, 2008.
2. R.K. Dhawan, "Machine Drawing", 2nd ed., S.Chand & Company Ltd., 1998.

II Year B.Tech. Mechanical Engg. II - Semester	L	T	P	To	C
	-	-	3	3	2

ME224 FLUID MECHANICS & HYDRAULIC MACHINARY LAB

Course Description & Objective:

To create in students awareness about the factors related to determination of efficiencies of hydraulic pumps and turbines.

Course Outcomes:

Students who successfully complete this course will have demonstrated ability to:

1. *Identify, name, and characterize flow patterns.*
2. *Understand basic units of measurement, convert units, and appreciate their magnitudes.*
3. *Utilize basic measurement techniques of fluid mechanics.*

List of Experiments:

1. Impact of jets on Vanes.
2. Performance Test on Pelton Wheel.
3. Performance Test on Francis Turbine.
4. Performance Test on Kaplan Turbine.
5. Performance Test on Single Stage Centrifugal Pump.
6. Performance Test on Multi Stage Centrifugal Pump.
7. Performance Test on Reciprocating Pump.
8. Calibration of Venturimeter.
9. Calibration of Orifice meter.
10. Determination of friction factor for a given pipe line.
11. Determination of loss of head due to sudden contraction in a pipeline
12. Verification of Bernoullie's equation

VFSTR UNIVERSITY

III Year - B.Tech

COURSE CONTENT

I SEM & II SEM

III Year B.Tech. Mechanical Engg. I - Semester

L	T	P	To	C
3	1	-	4	4

ME317 DESIGN OF MACHINE ELEMENTS - I

Course Description & Objectives:

To impart knowledge of the basic engineering design against static and dynamic loading by considering strength and rigidity. To train individual components design methodology and selection procedure for various industrial applications.

Course Outcomes:

1. *Designing the components against static loading.*
2. *Designing the components against cyclic loading.*
3. *Designing the fasteners like rivits, bolts and cotter joints.*
4. *Designing power transmission shafts and couplings.*

UNIT - I Introduction to Design :

Steps involved in conventional design – Preferred numbers and significance.
Engineering Materials – Classification – Properties – Specifications.
Principal stresses - Principal planes - Mohr's circle
Theories of failure - Maximum Principal stress theory - Maximum shear stress theory - Distortion energy theory.
Factor of safety and its importance in design – design for static strength - rigidity.

UNIT - II Design for Fatigue Strength:

Stress concentration - Methods to reduce stress concentration – Fluctuating stresses – Fatigue failure – Endurance limit – Factors influencing fatigue strength – Fatigue stress concentration – Notch sensitivity. Low cycle and high cycle fatigue – Cumulative fatigue – Design for finite and infinite life – Soderberg, Goodman, Gerber equations for fatigue design.

UNIT - III Design of Fastners:

Design of Bolted Joints : Joints designed for simple and eccentric loadings.

Design of Riveted Joints : Lap and butt joint . Failure of riveted joints – Design of boiler joints – Joints of Uniform strength – Eccentrically loaded riveted joints.

UNIT - IV Design of Welds:

Strength of transverse and parallel fillet welds – Butt welds - Eccentrically Loaded welded joints.

Keys, Cotters and Knuckle Joints : Types of Keys - Stresses in Keys - Cotter Joints - Socket and Spigot joints - Sleeve and cotter - Gib and Cotter Joints - Knuckle Joints.

UNIT - V Design of Shafts:

Materials used for shafts – Stresses in shafts – Shafts subjected to fluctuating loads – Combined bending , twisting and axial loads – Design for strength and rigidity.

Design of couplings: Muff, split muff, flanged and bushed pin coupling, Modified Flange Coupling,Oldham Coupling, Universal coupling.

TEXT BOOKS :

1. J.E. Shiegly, "Mechanical Engineering Design", 9th ed., Tata McGraw Hill, 2013.
2. V.B. Bhandari, "Design of Machine Elements", 3rd ed., Tata McGraw Hill, 2010.

REFERENCE BOOKS :

1. Juvinell, Marshell, "Fundamentals of Machine Conponents", 5th ed., John Wiley & Sons, 2011.
2. R.S. Khurmi and J.K. Gupta, "Machine Design", 14th ed., S.Chand & Co., 2010.
3. R.L. Norton, "Machine Design - An Integrated Approach", 5th ed., Pearson Publication, 2013.

III Year B.Tech. Mechanical Engg. I - Semester	L	T	P	To	C
	3	1	-	4	4

ME319 DYNAMICS OF MACHINES

Course Description & Objective:

The course will focus on the study of forces, motion and inertia in machines and performance of machines under dynamic conditions and their analysis.

Course Outcomes:

1. *Able to do static and dynamic force analysis on slider crank mechanism but also on other mechanisms.*

2. *Able to demonstrate the torque analysis on any kind of fly wheel i.e., either on engine flywheel or machine flywheel*
3. *Able to calculate the brake force analysis on any type of four wheeler*
4. *Able to perform the experiment and measure the torque acting on a dynamometer*
5. *Able to conduct experiment on the effect of the gyroscopic torque on any moving/rotating machine*
6. *Able to demonstrate the working principle of a governor and able to identify different types of governors in actual practice*

UNIT - I Static and Dynamic force Analysis:

Introduction, analytical methods to find displacement, velocity and acceleration of the piston, forces acting on connecting rod and crank.

Flywheel: Turning moment diagram, determination of work done and power from turning moment diagram, fluctuation of energy, flywheels.

UNIT - II Brakes:

Block brakes, band brakes, differential band brakes, self locking and self energizing brakes, braking force analysis of a four wheeler.

Gyroscope: Precision motion and its effect on stability of ships, Aeroplanes, and four wheelers.

UNIT - III Governors:

Watt, Porter and Proell governors, spring loaded governors-Hartnell and Hartung governors, terms associated with governor performance - sensitiveness, isochronism and hunting.

Clutches: Uniform pressure and uniform wear, single plate and multiplate clutches, cone clutch.

UNIT - IV Balancing of Rotating Masses:

Balancing of rotating masses, single and multiple masses acting at single and different planes.

Balancing of Reciprocating Masses: primary, secondary balancing, analytical and graphical methods, unbalanced forces and couples, locomotive balancing- hammer blow, swaying couple and tractive efforts,balancing of inline engines.

UNIT - V Longitudinal Vibrations:

Introduction – Definitions – Types of Vibrations – Free Longitudinal Vibrations – Damped Vibrations – Logarithmic Decrement – Forced Vibrations – Vibrations Isolation and Transmissibility.

Transverse & Torsional vibrations – Whirling of Shafts – critical speeds - Free Torsional vibrations - Two rotor systems.

TEXT BOOKS :

1. J.E. Shigley, "Theory of Machines & Mechanisms", 4th ed., Oxford University Press, 2010.
2. R.S.Khurmi and J.K.Gupta, "Theory of Machines", 15th ed., Eurasia Publishing House (Pvt.) Ltd., New Delhi, 2009.

REFERENCE BOOKS :

1. William J. Thomson, "Theory of Vibrations with Applications", 5th ed., Prentice Hall, 1997.
2. J.S. Rao and R.V. Dukkipati, "Mechanism and Machine Theory", 2nd ed., New Age International, 2009.
3. S.S. Rattan, "Theory of Machines", 3rd ed., Tata Mc Graw-Hill Education Pvt. Ltd., New Delhi, 2009.

III Year B.Tech. Mechanical Engg. I - Semester	L	T	P	To	C
	4	0	-	4	4

ME321 MANUFACTURING PROCESS - II

Course Description & Objectives:

To expose students to the metal removal principles and its processes. To acquire deep knowledge of single point and multi point cutting tool geometry and its performance. With the help of various cutting tools and accessories development of various machine tools knowledge is imparted.

Course Outcomes:

1. *Complete knowledge of tool geometry and its performance.*
2. *Force and power requirement calculations for various machining operations.*
3. *Lathe machine and its operations exposure.*
4. *Plain surfaces machining by shaper and planer machine.*
5. *Drilling and milling operations familiarity.*
6. *Super finishing process and its applications.*

UNIT - I Introduction:

Principles and Elements of machining - Types of cutting tools – Geometry of single point cutting tool – chip formation and types of chips, chip breakers. Orthogonal and Oblique cutting – Machinability - Merchant's force diagram – velocity relationship – cutting speed, feed, depth of cut. Tool life and wear – Tool materials.

UNIT - II Lathe:

Classification - line diagram of lathe – Lathe Parts – Lathe specifications.
Work Holding Devices : Three jaw chuck – Four jaw chuck – combination chuck and other work holding devices. Tool holders.
Lathe Operations : Turning, facing – taper turning – thread cutting.
Capstan & Turret Lathe : Differences, collet chuck, tool holders, tool layout.

UNIT - III Shaper:

Line diagram and parts, specifications, quick return mechanism for shapers – work holding devices and shaper operations.
Planer : Types of planers, specifications, quick return mechanism of a planer – work holding devices.
Slotting Machine : Line diagram and parts of a slotter – specifications – Ram drive mechanism.

UNIT - IV Drilling Machine:
Classification and Specifications – Drill bits – twist drill – nomenclature – Tool Holding devices – Drilling operations. Special purpose machines.

Milling Machine : Classification of Milling Machines – Parts and Specifications – types of milling cutters – Milling Operations – Indexing heads – plain and universal dividing heads.

UNIT - V Grinding:

Cylindrical - external and internal, surface and centerless grinding machines.
Grinding Wheel : Specifications - Abrasives, bonds, grit, grade and structure of grinding wheel.
Fine Finishing Processes : Lapping, Honing and superfinishing operations.

TEXT BOOKS :

1. S.K.Hajra Chowdary “Workshop Technology”, Vol-II, 15th ed., Media Publishers, 2012.
2. B.S. Raghu Vamsi, “A Course in Workshop Technology”, Vol-II, 2nd ed., Dhanapathi Rai & Sons, 2013.

REFERENCE BOOKS :

1. Hindustan Machin Tools, “Production Technology”, 3rd ed., Tata McGrawHill, 2014.
2. R.K. Jain and S.C. Gupta, “Production Technology”, 17th ed., Kanna Publishers, 2011.

III Year B.Tech. Mechanical Engg. I - Semester

L	T	P	To	C
3	1	-	4	4

ME323 THERMAL ENGINEERING - II

Course Description & Objectives:

To establish an understanding of the types of steam boilers and its performance parameters and working of different steam turbines,steam nozzles, steam condensers gas turbines and jet propulsive devices. To make them understand thoroughly the methods to improve the thermal efficiency of the cycles. To provide students with exposure to the systematic methods for solving engineering problems on boiler performance, steam nozzles, steam condensers, steam turbines jet engines and rocket engines. To build the necessary theoretical background that suits the power sector needs.

Course Outcomes:

1. *Classifydifferent types of boilers and its applications and its various mountings and accessories and its performance parameters.*
2. *Understanding the working phenomenon ofchimney and condition for maximum discharge of mass through it.*
3. *Understand the working of different types of condensers, performance parameters and its applications in steam power plants.*
4. *Calculate the thermal efficiency ofRankine Cycle and methods to improve the efficiency of a steam power plant.*
5. *Understand the working of different types of steam nozzles and its applications, conditions for maximum discharge of steam through it*
6. *Classify different types of steam turbines and working of impulse turbine and its performance parameters and methods of compounding to reduce rotor speed of an impulse turbine.*

UNIT - I Boilers:

Classification - Working principles - H.P. Boilers, Mountings and Accessories. Properties of steam-dryness fraction of steam.

Performance of boilers - Parameters, equivalent evaporation, efficiency.
Draught - classification-artificial and forced draughts. Design of chimney for given draught and discharge,condition for maximum discharge, efficiency of chimney.

Steam Condensers: Use and Classification of condensers, working principles of different types, vacuum efficiency and condenser efficiency, air leakage - sources and its effects, air pump-cooling water requirement.

UNIT - II Vapour Power Cycles:

Rankine cycle, Thermodynamic Analysis, Concept of Mean Temperature of Heat addition, Methods to improve cycle performance, Regeneration & Reheating.

Steam Nozzles: Function of nozzle and its types - Flow through nozzles, thermodynamic analysis,assumptions, velocity of nozzle at exit-ideal and actual expansion in nozzle, condition for maximum discharge,criteria to decide nozzle shape, super saturated condition-Wilson line.

UNIT - III Steam Turbines:

Impulse Turbine : Classification, Mechanical details of Impulse turbine, Velocity diagram -effect of friction - power developed, axial thrust, blade or diagram efficiency - condition for maximum efficiency, De-Laval Turbine - its features.Methods to reduce rotor speed - Velocity compounding and pressure compounding, Velocity and Pressure variation along the flow, combined velocity and pressure compounding of impulse turbine.

Reaction Turbine: Mechanical details - principle of operation, Thermodynamic analysis of a stage, degree of reaction - velocity diagram - Parson's reaction turbine - condition for maximum efficiency.

UNIT - IV Gas Turbines:

Simple gas turbine plant - ideal cycle, essential components - parameters of performance -actual cycle - regeneration, inter cooling and reheating - Closed and Semi-closed cycles - merits and demerits.

UNIT - V Jet Proupulsion:

Classification of jet propulsive engines - Working Principles with schematic diagrams and representation on T.S. diagram. Thrust, Thrust Power and Propulsion Efficiency of Turbo jet engines-Thermodynamic Cycle, Performance Evaluation, Thrust Augmentation Methods.

Rocket Propulsion: Application - Working Principle - Classification - Propellant Type - Thrust, Propulsive Efficiency - Specific Impulse - Solid and Liquid propellant Rocket Engines.

TEXT BOOKS :

1. R.K. Rajput, "Thermal Engineering", 8th Edition, Laxmi Publications, New Delhi, 2010.
2. M M El Wakil, "Power Plant Technology", 2nd Edition, McGraw Hill International, 2002.

REFERENCE BOOKS :

1. V.Ganesan, "Gas Turbines", 3rd ed., Tata McGraw Hill, New Delhi, 2010.
2. Sarkar B. K, " Thermal Engineering", 1st ed., Tata McGraw Hill, 2005.
3. P K Nag, "Power Plant Engineering", 3rd ed.,Tata McGraw Hill, 2008.
4. Ballaney, P.L., "Thermal Engineering", 23rd ed., Khanna Publishers, 2007.

IV Year B.Tech. Mechanical Engg. I-Semester	L	T	P	To	C
	3	1	-	4	4

ME325 MECHANICAL VIBRATIONS

(Dept. Elective - I)

Course Description & Objectives:

An introductory course in linear mechanical vibrations where students acquire the ability to Formulate mathematical models of problems in vibrations using Newton's second law or energy principles, determine a complete solution to the modeled mechanical vibration problems. Correlate results from the mathematical model to physical characteristics of the actual system. Design of a mechanical system using fundamental principles developed in the class.

Course Outcomes:

1. *Students will be able to construct the equations of motion for free-body diagrams.*
2. *And are able to solve for the motion and the natural frequency of (1) a freely vibrating single degree of freedom undamped motion and (2) a freely vibrating single degree of freedom damped motion.*
3. *To construct the governing differential equation and its solution for a vibrating mass subjected to an arbitrary force. Students will be able to decompose any periodic function into a series of simple harmonic motions using Fourier series analysis.*
4. *Students will be able to solve for the motion and the natural frequency for forced vibration of a single degree of freedom damped or undamped system.*
5. *Students will have an ability to obtain the complete solution for the motion of a single degree of freedom vibratory system (damped or undamped) that is subjected to non-periodic forcing functions.*

6. *To solve vibration problems that contain multiple degrees of freedom. and to obtain numerical solutions to vibration problems by simple algorithms, and display the findings in graphical form.*

UNIT - I Single Degree of Freedom Systems:

Introduction, types of vibrations, Frequency and time period for longitudinal and transverse vibrations, Newton's Law of motion - Energy method, Raleigh's method.

UNIT - II Vibrations:

Free vibration, Forced vibration, Damped vibrations, types of damping, logarithmic decrement, Isolation of vibrations & Transmissibility.

UNIT - III Two Degree-of-Freedom Systems:

Two degrees-of-freedom system, Lagrange's equation, modes of vibration, Principal modes, Principles of orthogonality, Generalized coordinates, Co-ordinate coupling, Dynamic vibration Absorber.

UNIT - IV Multi Degrees-of-Freedom Systems:

Newton's second law to derive equation of motion, Influence co-efficients - Stiffness, Flexibility, Inertia. Eigen values & Eigen vectors.

UNIT - V Transient Vibration of Continuous Systems:

Transient Vibrations - Impulse excitation, Arbitrary excitation, Laplace Transform formulation - Continuous System - longitudinal Vibration of rods, Transverse Vibration of beams, Transverse Vibration of string, Torsional Vibration of shaft.

TEXT BOOKS :

1. G.K. Groover, "Mechanical Vibrations", 4th ed., NEM Chand & Brothers, 2009.
2. L.Meirovitch, "Fundamentals of Vibrations", 1st ed., Tata McGraw Hill, 2009.

REFERENCE BOOKS :

1. S.GrahamKelly, "Schaum's Outlines, Theory & Problems of Mechanical Vibrations", 3rd ed., Tata McGraw Hill, 2007.
2. W.T. Thomson and M.D. Dehlen, "Theory of Vibrations with Applications", 5th ed., Pearson Education, 2007.

III Year B.Tech. Mechanical Engg. I - Semester

L	T	P	To	C
4	0	-	4	4

ME327 METROLOGY & INSTRUMENTATION

Course Description & Objectives:

Manufacturing of components with correct dimensions and features like tapers, center positioning and surface finish are essential for quality products. At the same time product inspection should be finished in less time without any error. Metrology course is aimed to provide knowledge of limits, gauges, linear and angular measurements. Different process parameters like temperature, pressure, flow rate are very much important in process industry for the quality production. Students are given sufficient exposure of these through this course.

Course Outcomes:

1. *Sound knowledge in gauge design and gauge selection*
2. *Angle measurement with various measuring instruments*
3. *Different comparators working and selection, measurement of surface finish by different techniques*
4. *Various transducers working and application to physical parameters by the instruments*
5. *Different techniques to measure temperature force and flow.*

UNIT - I Introduction to Metrology:

Line and end standards – Theory of limits, fits and tolerances - Fundamental deviation – types – Grades of tolerances – Fits – Types of fits - Hole basis and shaft basis systems – Interchangeability and selective assembly. Limit Gauges - Taylor's principle – GO and NO GO gauges – plug and ring gauges.

UNIT - II Linear, Angle, Taper and Optical Measurements:

Linear measurements : Slip gauges – Dial indicators – Micrometer.

Angle and Taper measurement : Bevel protractor – Angle slip gauges —sine bar – Taper determination using Rollers and spheres.

Optical Measurements : Optical flats – NPL Interferometer.

UNIT - III comporators & Surface Roughness Measurement:

Comporators : Mechanical – Electrical – Pneumatic comparators.

Surface roughness measurement : Surface roughness and surface texture – Numerical assessment of surface finish – CLA – RMS- Ten point height of irregularity - Measuring Instruments - Profilograph – Talysurf.

UNIT - IV Introduction to Instrumentation & Displacement Measurement:
Introduction to Instrumentation : Generalized configuration and functional description of measuring instruments - Static and dynamic characteristics - Calibration.

Displacement measurements: Theory and construction of various transducers to measure displacement - Resitance type - LVDT – Capacitive type - piezo electric type Instruments

UNIT - V Temperature, Strain Measurements :
Temperature Measurements: various principles of temperature measurements, expansion thermometers, resistance thermometers, thermistors, thermocouples, pyrometers

Strain measurements: Various types of strain measurements, electrical resistance strain gauge, gauge factor - configurations to measure tensile, compressive and bending strains.

TEXT BOOKS:

1. D.S.Kumar, "Mecahnical Measurements & Controls", 5th ed., Metropolitan Book Pvt. Ltd., 2012.
2. R.K.Jain, "Engineering Metrology", 20th ed., Khanna Publishers, New Delhi, 2009.

REFERENCE BOOKS:

1. R.K. Rajput, "Mechanical Measurements & Instrumentation", 3rd ed., S.K. Kataria & Sons, 2010.
2. E.O. Doebelin, "Measurement Systems", 6th ed., Tata Mc Graw Hill, New Delhi, 2011.

III Year B.Tech. Mechanical Engg. I - Semester	L	T	P	To	C
	4	0	-	4	4

ME 329 RAPID PROTOTYPING

Course Description & Objectives:
This subject provides students with an understanding of the various rapid prototyping, rapid tooling technologies; The knowledge to select appropriate technologies for product development purposes.

Course Outcomes:
1. *Understand the principle, parameters and applications of R P processes*
2. *Recognize various types of rapid tooling*
3. *Identify different allied processes*

UNIT - I Introduction:

Need for the compression in product development, History of RP systems, Survey of applications, Growth of RP industry, Classification of RP systems.

UNIT-II RP Process:

Principle, process parameters, process details and applications of Stereo lithography systems, Selective Laser Sintering, Fused Deposition Modeling,

UNIT-III RP Process:

Principle, process parameters, process details and applications of Laminated Object Manufacturing, Solid Ground Curing, Laser Engineered Net Shaping, 3D Printing.

UNIT-IV Rapid Tooling

Indirect rapid tooling - silicone rubber tooling, aluminum filled epoxy tooling, spray metal tooling, Direct rapid tooling - direct AIM, copper polyamide, sand casting tooling, laminate tooling, soft tooling Vs hard tooling.

UNIT-V Rapid Manufacturing Process:

Rapid Manufacturing Process Optimization- Factors influencing accuracy, data preparation errors, part building errors, errors in finishing, influence of part build orientation.

TEXT BOOKS:

1. Pham D T and Dimov S S, “Rapid Manufacturing”, Verlag, 2001.
2. Paul F Jacobs, “Stereo lithography and other RP&M Technologies”, SME, 1996.

REFERENCE BOOKS:

1. Terry Wohlers, “Wohlers Report 2001”, Wohlers Associates, 2008.

II Year B.Tech. Mechanical Engg. II-Semester

L	T	P	To	C
-	-	1	1	1

SR002 SEMINAR

Course Description & Objective:

Seminar is offered as an opportunity for graduate students to broaden their knowledge beyond their specific area of research and/or studies. This is important at and beyond the graduate level where our activities are highly focused and specialized from a topical perspective.

III Year B.Tech. Mechanical Engg. I - Semester	L	T	P	To	C
	-	-	3	3	2

ME331 MACHINE TOOLS & METROLOGY LAB

Course Description & Objective:

To create awareness on various mechanical measuring instruments. To make students familiar with various operations on machine tools.

Course Outcomes:

1. *Hands on experience on lathe machine to perform turning, facing, threading operations.*
2. *Practical exposure on flat surface machining, milling and grinding operations.*
3. *Skill development in drilling and threading operations.*
4. *Linear and angular measurements exposure.*

1. Section - A

1. Step turning and taper turning using lathe machine.
2. Thread cutting and knurling using lathe machine.
3. Drilling and step boring using lathe machine.
4. Drilling and Tapping using drilling machine.
5. Shaping of V groove using shaper.
6. Slotting of a keyway using slotter machine.
7. Milling of gear.
8. Surface Grinding.

2. Section - B

1. Length, Depth, Diameter measuring using vernier calipers & micrometer.
2. Bore measurement using bore gauge.
3. Use of gear teeth caliper for checking the chordal addendum and chordal height of spur gear.
4. Angle and taper measurements using Bevel protractor, Sine bar and slip gauges.
5. Screw thread measurement by Three wire method.
6. Surface roughness measurement by Tolysurf.

III Year B.Tech. Mechanical Engg. I - Semester

L	T	P	To	C
-	-	3	3	2

ME333 FUELS & I.C. ENGINES LAB

Course Description & Objectives:

The main objective of this lab is to develop an idea of fuel properties and their variation with temperature, determination of kinematic viscosity and calorific value of fuels, understanding of basic internal combustion engine performance, determination of friction power and volumetric efficiency of I.C. engines and the use of multi-stage compression.

Course Outcomes:

After the completion of this course, the student should be able to:

1. *Understand the complete operation of 2 stroke and 4 stroke I.C engines which can be further confirmed through V.T.D and P.T.D*
2. *Find the performance of 2-S and 4-S engines and the variation of various performance parameters with load and speed.*
3. *Know how to balance the heat energy available in engine cylinder after the combustion process.*
4. *Understand the working and performance evaluation of mechanical power consuming devices like compressors.*
5. *Analyze the performance of the variable compression ratio engine with computerized set up which enables the understanding of pressure variation with crank angle during a cycle of operation.*
6. *Find the kinematic viscosity of fuels and its variation with temperature.*

I. FUELS & LUBRICANTS :

1. Determination of Flash and Fire points of Liquid Fuels / Lubricants: Pensky martens apparatus
2. Carbon Residue Test : Solid/ Liquid Fuels
3. Determination of Viscosity : Liquid Lubricants & Fuels : Saybolts viscometer, Redwood Viscometer, Engler Viscometer.
4. Determination of Calorific Value: Solid/Liquid/Gaseous Fuels: Bomb Calorimeter, Junker Calorimeter.
5. Grease Penetration Test.

II. I.C. ENGINES :

1. I.C. Engines Valve Timing Diagram (Diesel Engine)
2. I.C. Engines Valve Timing Diagram (Petrol Engine)

3. I.C. Engines Performance Test (4 – S Diesel Engines)
4. I.C. Engines Performance Test (2 – S Petrol Engines)
5. Evaluation of Engine friction by conducting morse test on 4-S Multi cylinder Petrol Engine and retardation and motoring test on 4-S diesel engine.
6. I.C. Engines Heat Balance Sheet.
7. Performance Test on Variable Compression Ratio Engines, economical speed test.
8. Performance Test on Reciprocating Air-Compressor Unit
9. Study of Boilers
10. Dis-assembly / Assembly of Engines.

Note : A minimum of total 12 Experiments to be completed by a student.

III Year B.Tech. Mechanical Engg. I - Semester	**L**	**T**	**P**	**To**	**C**
	-	-	3	3	2

ME335 MANUFACTURING DRAWING & INSRUMENTATION LAB

Course Description & Objective:

To provide basic knowledge in the preparation of production drawings and to give exposure on calibration of various instruments.

Course Outcomes:

1. Able to aware of various types of measurements, requirement of calibrations, instruments used errors in measurement etc.
2. Able to perform accurate measurements and measuring instrument for any engineering system.

I. Production Drawing :

Limits and Fits : Types of fits, exercises involving selection / interpretation of fits and estimation of limits from tables.

Form and Positional Tolerances : Introduction and indication of the tolerances of from and position on drawings, deformation of runout and total runout and their indication.

Surface roughness and its indication : Definitions - finishes obtainable from various manufacturing processes, recommended surface roughness on mechanical components.

Part and Assembly Drawings : Drawing of parts from assembly drawings with indications of size, tolerances, roughness, form and position errors etc.

II. Instrumentation :

1. Study and calibration of LVDT transducer for displacement measurement.
2. Calibration of strain gauge for force measurement.
3. Calibration of thermocouple for temperature measurement.
4. Calibration of resistance temperature detector for temperature measurement.
5. Calibration of capacitative pick-ups for angular displacement.
6. Study and calibration of photo and magnetic speed pickups for the measurement of speed.

III Year B.Tech. Mechanical Engg. II-Semester

L	T	P	To	C
3	1	-	4	4

ME318 DESIGN OF MACHINE ELEMENTS - II

Course Description & Objective:

To provide enough hands on experience with the usage of design data book to design standard machine elements like bearings, gears and other elements. Students are familiarized with the design of Internal combustion engine parts to know the way how a system of elements in an engine are designed.

Course Outcomes:

1. *Journal and roller bearing design and selection from the data book*
2. *Gear design against static and dynamic loading along with wear strength*
3. *Stress and load calculations along with deformations of various types of springs*
4. *Power screws design and curved beam application to crane hook design*
5. *Piston, connecting rod and crankshaft design based on maximum bending and twisting moment*

UNIT - I Bearings:

Introduction – Classification of bearings – Hydrodynamic and Hydrostatic lubrication – McKee equation – Design of Journal bearings. Design of Thrust bearings. Rolling contact bearings – Classification and selection of rolling contact bearings – Advantages and limitations of rolling contact bearings – Static load carrying capacity – Dynamic load carrying capacity – Life-load relationship – Selecting the bearing using manufacturers catalogue.

UNIT - II Design of Gears:

Classification of gears – Design of spur gears – Lewis Beam strength equation – Bukingham's equation - Wear strength. Design of helical gear.

UNIT - III Design of Springs:

Introduction to springs – Classification – materials used for springs – Nomenclature in springs – Stresses and deflection of springs – Helical, torsional, Coaxial springs. Laminated springs – Stresses and deflection in Leaf springs – Applications.

UNIT - IV Design of Curved Beams:

Introduction - Stresses in curved beams – Expression for radius of neutral axis for rectangular – Circular, trapezoidal and T-Section - Design of crane hooks, C-Clamps.

Design of Power Screws : Types of thread profiles - Square, Buttress, ACME; design of square threads and nuts, design of screw jack, compound screw and differential screw.

UNIT - V Design of Engine Parts:

Design of Piston – Cylinder, Cylinder liner – Connecting rod – Stress due to whipping action on connecting rod ends – Crank and Crank shafts – Side Crank – Center Crank – Crank Pins, Crank Shafts.

DATA BOOKS :

1. B. Mahadevan, "Design Data Hand Books for Mechanical Engineers.", 4th ed., CBS Publishers, 2013.
2. P.S.G., "Design Data Book of Engineers ". 1st ed., Kalaikathir Achagam Publishers, 2011.

Note : Design data books are permitted in the Examination.

TEXT BOOKS :

1. J.E. Shiegly, "Mechanical Engineering Design", 9th ed., Tata McGraw Hill, 2013.
2. V.B. Bhandari, "Design of Machine Elements", 3rd ed., Tata McGraw Hill, 2010.

REFERENCE BOOKS :

1. Juvinell, Marshell, "Fundamentals of Machine Conponents", 5th ed., John Wiley & Sons, 2011.
2. R.S. Khurmi and J.K. Gupta, "Machine Design", 14th ed., S.Chand & Co., 2010.
3. R.L. Norton, "Machine Design - An Integrated Approach", 5th ed., Pearson Publication, 2013.

III Year B.Tech. Mechanical Engg. II-Semester

L	T	P	To	C
3	1	-	4	4

ME320 HEAT TRANSFER

Course Description & Objectives:

This course is designed to introduce a basic study of the phenomena of heat to develop methodologies for solving a wide variety of practical engineering problems, and to provide useful information concerning the performance and design of particular systems. A knowledge-based design problem requiring the formulations of solid conduction and fluid convection and the technique of numerical computation progressively elucidated in different chapters will be assigned and studied in detail. As well, to gain experience in designing experiments for thermal systems, the design, fabrication, and experimentation of a thin film heat flux gage will be attempted as part of laboratory requirements.

Course Outcomes:

1. *Understand the basic laws of heat transfer.*
2. *Account for the consequence of heat transfer in thermal analyses of engineering systems.*
3. *Analyze problems involving steady state heat conduction in simple geometries.*
4. *Develop solutions for transient heat conduction in simple geometries.*
5. *Obtain numerical solutions for conduction and radiation heat transfer problems.*
6. *Understand the fundamentals of convective heat transfer process.*
7. *Evaluate heat transfer coefficients for natural convection.*
8. *Evaluate heat transfer coefficients for forced convection inside ducts.*
9. *Evaluate heat transfer coefficients for forced convection over exterior surfaces.*
10. *Analyze heat exchanger performance by using the method of log mean temperature difference.*
11. *Analyze heat exchanger performance by using the method of heat exchanger effectiveness.*
12. *Calculate radiation heat transfer between black body surfaces.*
13. *Calculate radiation heat exchange between gray body surfaces.*

UNIT - I Introduction:

Modes and mechanisms of heat transfer - Basic laws of heat transfer - General discussion about applications of heat transfer.

Conduction Heat Transfer : Fourier's law - General heat conduction equation in Cartesian, Cylindrical and Spherical coordinates.

UNIT - II One Dimensional Steady State Conduction Heat Transfer:

Homogeneous slabs, hollow cylinders and spheres - overall heat transfer coefficient, electrical analogy - Critical radius of insulation. systems with heat sources or Heat generation. Heat transfer through extended surfaces – rectangular fins.

UNIT - III One Dimensional Transient Conduction Heat Transfer:

Systems with negligible internal resistance -Significance of Biot and Fourier Numbers - Chart solutions of transient conduction systems.

UNIT - IV Convective Heat Transfer:

Concepts about Continuity, Momentum and Energy Equations.Concepts about hydrodynamic and thermal boundary layer and use of empirical correlations for convective heat transfer - Flat plates and Cylinders.

Heat Exchangers : Classification of heat exchangers - overall heat transfer Coefficient and fouling factor -Concepts of LMTD and NTU methods - Heat Exchanger design using LMTD and NTU methods.

UNIT - V Boiling and condensation:

Pool boiling - Regimes, Calculations on Nucleate boiling, Critical Heat flux and Film boiling **:** Film wise and drop wise condensation - Nusselt's Theory of Condensation on a vertical plate.

Radiation Heat Transfer : Emission characteristics and laws of black-body radiation heat exchange between two black bodies - concepts of shape factor - Emissivity - heat exchange between grey bodies -radiation shields - electrical analogy for radiation networks.

DATA BOOK:

1. C. P. Kothandaraman, "Heat And Mass Transfer Data Book", 6th ed., New Age International Publishers Ltd., 2007.

TEXT BOOKS:

1. Holman J.P "Heat transfer" 10th ed., McGraw Hill, London, 2009.
2. R.K.Rajput,"Heat And Mass Transfer", 4th ed., S.Chand & Co, New Delhi, 2008.

REFERENCE BOOKS:

1. R C Sachdeva "Fundamentals of Engineering Heat and Mass Transfer " 4th Edition, New Age International Publishers Ltd., 2009.
2. Sukhatme S.P., "Heat Transfer",4th Edition, University Press India Ltd., 2006.
3. Frank P. Incropera, David P. DeWitt, "Fundamentals of Heat and Mass Transfer", 7th Edition, Wiley Publications, 2011.
4. R Yadav "Heat Transfer", 6th Edition, McGraw Hill Publications, 2004.
5. R.K. Rajput, Thermal Engineering, 8th Edition, Laxmi Publications, New Delhi, 2010.

III Year B.Tech. Mechanical Engg. II-Semester

L	T	P	To	C
3	1	-	4	4

ME322 FINITE ELEMENT ANALYSIS

Course Description & Objective:

This course deals with the theory and application of the finite element methods for analyzing structural systems and heat transfer problems.

Course Outcomes:

The students can follow the terminology and basics associated with finite element method. The manual problems solving skills also help to use the analysis package efficiently.

1. *Familiarize with the energy methods used for FEM procedure*
2. *Able to solve 1D static structural bar problems subjected to axial loading*
3. *Able to solve the plane truss problems under different loading*
4. *Able to solve the 2D plane problems associated with plane stress and plane strain by using 3 noded triangular elements*
5. *Familiarize with the higher order elements used for solving 2D problems*
6. *Able to solve complicated integral equations by using numerical methods*

UNIT - I Fundamental Concepts and Energy Methods:

Introduction, Historical background, Stresses and Equilibrium, Boundary conditions, Strain-Displacement relations, Stress-Strain relations, Plane stress, Plane strain problems, Potential energy method. The Rayleigh - Ritz method, Galerkin's method, bar problems only.

One Dimensional problems : Finite element modeling coordinates and shape functions. Assembly of Global stiffness matrix and load vector. Finite element equations, Treatment of boundary conditions, Quadratic shape functions, Simple bar / stepped bar problems by using two noded line elements.

UNIT - II Two-dimensional Problems Using Constant Strain Triangles:
Introduction, Finite element modeling, Constant strain triangle, Problem modeling and boundary conditions.
Plane Trusses: Global and local d.o.f, Truss element stiffness matrix, Analysis of Plane trusses up to four members only.

UNIT - III Two-dimensional Isoparametric Elements and Numerical Integration:
Introduction, shape functions of four-node quadrilateral elements. Numerical integration: 1D,2D Gauss Quadrature (up to 2 / 2 x 2 Gauss points).
Analysis of Beams: Introduction, Finite element formulation, Load vector, element stiffness matrix, boundary considerations, Shear force and bending moment.

UNIT - IV Heat Transfer Analysis:
One dimensional analysis of plane walls, fins. Two dimensional analysis of plane walls.

UNIT - V Dynamic Analysis:
Dynamic considerations, Formulation of finite element model, elemental mass matrices, evaluation of Eigen values and Eigen vectors for a stepped bar.

TEXT BOOKS:

1. Chandraputla, Ashok and Belegundu, “Introduction to Finite Elements in Engineering”, 3rd ed., PHI Publishers, 2009.
2. S.S. Rao, “The Finite Element Methods in Engineering”, 4th ed., Pergamon, 2011.

REFERENCE BOOKS:

1. J.N. Reddy, “An introduction to Finite Element Method”, 3rd ed., Tata McGraw Hill, 2005.
2. Alavala, “Finite Element Methods”, 2nd ed., PHI, 2008.
3. Kenneth H. Huebner, Donald L. Dewhirst, “The Finite Element Method for Engineers”, 4th ed., John Wiley & Sons (ASIA), 2007.
4. C.S. Krishna Murthy, “Finite Element Analysis”, 2nd ed., Tata MC graw Hill, 2009.

III Year B.Tech. Mechanical Engg. II - Semester

L	T	P	To	C
4	0	0	4	4

ME324 CAD / CAM

Course Description & Objective:

To familiarize the students with drafting, design, modeling and manufacturing aspects using computers.

Course Outcomes:

1. *Students will understood the basic structure of CAD, CAM and product development.*
2. *They got the knowledge on working of various input and output devices in computer.*
3. *They will understood the, how the line was generated on computer screen.*
4. *They learn, the mathematical form of object/drawing transformations in 2D and 3D.*
5. *They will understood, the methodology developed for representation of cures and importance of parametric form.*
6. *Got the knowledge on usage of Boolean operations in solid modeling.*

UNIT - I Introduction to CAD/CAM:

Definitions, Applications, product life cycle, Automation, Types of automation, Advantages of CAD/CAM, Basic structure, Input & output devices, CAD procedure, DDA algorithm.

UNIT - II Transformation of Geometry:

2-D, 3-D and Homogenous Coordinate systems, Translation, Scaling, Reflection and Rotation.

Geometric modeling- Requirements, Primitives and Boolean operators, Wireframe model, Curve representation, Cubic Splines, B-splines, Bezier-Curves, Surface model, Solid model - Sweep representation.

UNIT - III NC/CNC Machines:

Introduction, NC components, NC procedure, NC coordinates systems and NC motion control Systems. Applications of NC, Economies of NC,NC Machining center. Computer controls in NC-Introduction to CNC, DNC.

UNIT - IV NC Part Programming:

NC co-ordinate system. Axis movements and interpolation with other axes. Application of rotary axis, Part programming fundamentals. Manual part programming - Programming formats, G-codes and M-codes. Introduction to

Computer Assisted part programming-APT language. Computer aided process planning (retrieval type system and generative type system).

UNIT - V Group Technology & Flexible Manufacturing System:

Introduction, part families, parts Classification and Coding systems, design and manufacturing attributes, Production Flow Analysis (Rank order clustering technique), Benefits of GT. Basics of FMS and lean-manufacturing methods.

TEXT BOOKS:

1. Ibrahim Zeid, "CAD/CAM Theory and Practice", 2nd ed., Tata Mc Graw Hill, 5th reprint, 2010.
2. Koren, "Computer Control of Manufacturing Systems", 2nd ed., Tata Mc Graw Hill, 2nd reprint 2006.

REFERENCE BOOKS:

1. Groover M.P., "Automation Production Systems and Computer Integrated Manufacturing", 4th ed., Prentice Hall of India, 2014.
2. P.N.Rao, "CAD/CAM Principles and Applications" 3rd ed., Tata McGraw Hill, 2nd reprint 2010.
3. David F.Rogers and J.Alan Adams, "Computer Graphics", 2nd ed., Tata McGraw Hill, 2002,
4. Kundra T.K. Rao P.N. & Tewari N.K, "Computer Aided Manufacturing", 1st ed., Tata McGraw Hill, 13th reprint 2008.

III Year B.Tech. Mechanical Engg. II-Semester	**L**	**T**	**P**	**To**	**C**
	3	1	-	4	4

ME326 COMPUTATIONAL FLUID DYNAMICS

(Dept. Elective - II)

Course Description & Objective:

Students will be taught to appreciate how computers are used to perform millions of calculations required to simulate the interaction of fluids and gases with the complex surfaces used in engineering.

Course Outcomes:

1. *Understand the process of developing a geometrical model of the flow, applying appropriate boundary conditions, specifying solution parameters, and visualizing and analyzing the results.*
2. *Become conscious of the limitations of CFD and develop an appreciation for the factors limiting the accuracy of CFD solutions.*
3. *To develop an understanding for the major theories, approaches and methodologies used in CFDand apply it to numerically solve the governing equations for fluid flow*
4. *To build up the skills in the actual implementation of CFD methods (e.g. boundary conditions, turbulence modelling etc.)*
5. *Understand and apply finite difference and finite volume methods to fluid flow problems*
6. *Understand how to assess stability and conduct a grid-convergence assessment.*

UNIT - I Governing Equations and Boundary Conditions:

Basics of computational fluid dynamics – Definition and overview of CFD, need, advantages, problem areas, Governing equations of fluid dynamics – Continuity, Momentum and Energy equations –– Physical boundary conditions – Time-averaged equations for Turbulent flow - Turbulence -Kinetic -Energy Equations – mathematical behavior of PDEs in CFD: Elliptic, Parabolic and Hyperbolic equations.

UNIT - II Discretization and Solution Methodologies:

Methods of Deriving the Discretization Equations - Taylor Series formulation – Finite difference method – Control volume Formulation – Detailed treatment of Finite Difference method, explicit and implicit methods, errors and stability analysis.

Solution methodologies: The Lax-Wendroff Technique, MacCormack's Technique, Space marching, Direct and iterative methods, Thomas algorithm, Relaxation method, Alternating Direction Implicit method.

UNIT - III Heat Conduction:

Finite difference and finite volume formulation of steady/transient one-dimensional conduction equation, Source term linearization, Incorporating boundary conditions, Finite volume formulations for two and three dimensional conduction problems.

UNIT - IV Convection and Diffusion:

Finite volume formulation of steady one-dimensional convection and Diffusion problems, Central, upwind, hybrid and power-law schemes - Discretization equations for two dimensional convection and diffusion.

UNIT - V Calculation of Flow Field:

Representation of the pressure gradient term and continuity equation - Staggered grid - Momentum equations - Pressure and velocity corrections - Pressure - Correction equation, SIMPLE algorithm and its variants.

TEXT BOOKS :

1. Versteeg, H.K, and Malalasekera, W., "An Introduction to Computational Fluid Dynamics : The Finite Volume Method", 2nd ed., Longman Publication, 2004.
2. John D. Anderson Jr, "Computational Fluid Dynamics-The Basics withApplications", 6th ed., Mcgraw Hill, 2009.

REFERENCE BOOKS :

1. C. Hirsch, "Numerical Computation of Internal and External Flows", Volumes I and II, 2nd ed., John Wiley & Sons, 2007.
2. Subas, V.Patankar "Numerical heat transfer fluid flow", 2nd ed., Hemisphere Publishing Corporation, 2004.
3. Muralidhar, K.,and Sundararajan,T., "Computational Fluid Flow and Heat Transfer", 2nd ed., Narosa Publishing House New Delhi, 2011.
4. Fletcher C.A.J. "Computational Techniques for Fluid Dynamics", Volumes I and II, 2nd ed., Springer, 2000.
5. Anderson, D.A.,Tannehill, I.I., and Pletcher, R.H., Computational Fluid Mechanics and Heat Transfer, 2nd ed., Hemishphere Publishing Corporation, 1997.

III Year B.Tech. Mechanical Engg. II-Semester	L	T	P	To	C
	4	-	-	4	4

ME328 MECHATRONICS

Course Description & Objective:

This course gives an overview of Mechatronics systems and their components for evolving hybrid technologies in various applications.

Course Outcomes:

On successful completion of this module the learner will be able to:

1. *Summerise how mechatronics integrates knowledge from different disciplines in order to realise engineering and consumer products that are useful in everyday life.*

2. *Design static and dynamic boolean logic systems using Combinational, synchronous and asynchronous sequential logic.*
3. *Outline the operation of the fundamental elements of microprocessor systems.*
4. *Select appropriate transducer signal conditioning and devices for data conversion including operational amplifiers for analogue signal processing.*
5. *Implement a continuous-time control design using software on a microprocessor for the Manipulation, Transmission, and Recording of Data.*

UNIT - I Introduction:

Introduction to Mechatronics - Multi disciplinary Scenarios, Systems for Measurement and Control. Microprocessor based controllers, Response of Systems.

UNIT - II Signal Conditioning:

Signal Conditioning, the op-amp, protection, filtering, Wheatstone bridge, digital signals, multiplexers, Data acquisition, Digital signal processing, pulse modulation, displays, magnetic recording, measurement systems, Testing calibration.

UNIT - III System Modeling& Dynamic Response of Systems:

Introduction to Mathematical Modeling, Building Blocks of Mechanical Systems, Electrical Systems, Fluid Systems and thermal systems. Engineering Systems: Rotational, translational, Electro-Mechanical & Hydraulic- Mechanical. Performance measures of first order & second order systems, Transfer function.

UNIT - IV H & P Systems:

Actuation to Hydraulic and Pneumatic Systems, Mechanical Systems, Electrical Systems, Mechanical Switches, Solid State Switches, Operation of Solenoids, AC, DC & Stepper Motors.

UNIT - V Microprocessors & PLC's:

Introduction to digital logic - logic gates - applications of logic gates - sequential logic - Applications - Basic structure of PLCs - selection of a PLC - case studies of mechatronics systems - Microprocessor systems - microcontrollers.

TEXT BOOKS:

1. W. Bolton, "Mechatronics Electronic Control Systems in Mechanical and Electrical Engineering" 3rd ed., Pearson Education, 2009.
2. Appuu Kuttan K K, "Introduction to Mechatronics", 2nd ed., Oxford Press, 2009.

REFERENCE BOOKS:

1. Nitaigour Premchand Mahalik, "Mechatronics Principles, Concepts and Applications" 2nd ed., Tata McGraw Hill, 2008.
2. David G Alciators, Michael B. Histand, "Mechatronics and Measurement Systems" 3rd ed., Tata McGraw Hill, 2009.

III Year B.Tech. Mechanical Engg. II-Semester	L	T	P	To	C
	4	0	-	4	4

ME330 COMPOSITE MATERIALS

Course Description and objective:

This course focuses on contituent materials,processing, testing and various applications of the composites materials.

Course Outcomes:

Uponcompletion of this course, the students will be able to:

1. *know various composite components e.g. reinforcement andmatrices*
2. *develop a knowledge of the manufacturing of composite materials.*
3. *employ principles of material selection and design for composite materials.*
4. *demonstrate basic knowledge on the various composite processing techniques.*
5. *explain International and national standardtesting methods*

UNIT –I Introduction to Composites:

General introduction & concept, Historical development, Concept of Composite materials, material properties that can be improved by forming a composite material& its engineering potential. Basic definitions, Types of composites based on matrix and fiber. Advantages & limitations of Composites

UNIT-II Constituent materials in Composites :

Role and Selection of reinforcement materials, Types of fibers, Mechanical properties of fibers, Glass fibers, Carbon fibers, Aramid fibers, Metal fibers, Alumina fibers, Boron Fibers, Silicon carbide fibers, Quartz and Silica fibers, Multiphase fibers, Whiskers, Flakes etc. Functions of a Matrix, Desired Properties of a Matrix Polymer Matrix (Thermosets and Thermoplastics),Metal matrix, Ceramic matrix, Carbon Matrix, Glass Matrix etc.

Fiber reinforced Polymer (FRP) Laminated composites.Lamina & Laminate Lay-up, Ply-orientation definition

UNIT-III Composite Manufacturing Processes :

Fabrication Techniques:Tooling and Specialty materials, Release agents, Peel plies, release films and fabrics, Bleeder and breather plies, bagging films. Hand Lay-up, Autoclave molding, Fiber-only performs, Wet Lay-up and Spray-up, Filament winding, Pultrusion, Resin Transfer Molding(RTM), Compounding, Injection molding

Recycling of CompositesCategories of scrap composites, Recycling methods for: Thermoplastic matrix composites, Thermoset matrix composites.

UNIT-IV Characterization of Composites:

Mechanical testing of composites, Tensile testing, Compressive testing, Intralaminar shear testing, Inter laminar shear testing, Thermal testing, Fracture testing etc. Environmental Effects on composite.

Strength and Failure theories:Strength of Laminates Failure Mechanics of Composites, Macromechanical Failure Theories, Maximum stress theory, Maximum Strain Theory , Tsai-Hill Theory , Tsai-Wu Theory,Comparison of Failure Theories

UNIT-V Engineering Applications :

Applications of FRP composites. Applications related to Aerospace, Automobile, , Bridge and other Civil Engineering Structures.

Civil Engineering Applications : Typical Applications of FRP Composites in Civil Engineering Adhesively Bonded FRP composites in strengthening of civil engineering structural components such as beams, Columns, Masonry etc.Various Strengthening Techniques, Advantage and Disadvantage of FRP composites laminated plate bonding & Misc. Issues

TEXT BOOKS:

1. Hull D. and Clyne T.W., An Introduction to Composite Materials, 2nd Ed., Cambridge University Press 2013
2. Mallick, P.K. and Newman S., (edition)," Composite Materia ls Technology Processes and properties", Hansen Publisher, Munish, 1990.

REFERENCE BOOKS:

1. Mallick, P.K., Fiber Reinforced Composites Materials, Manufacturing and Manufacturing and Design", Maneel Dekker Inc, 1993.
2. Chawla K.K., Composite Materials: Science and Engineering 3rd Ed., Springer 2012

II Year B.Tech. Mechanical Engg. II-Semester	L	T	P	To	C
	-	-	1	1	1

SR002 SEMINAR

Course Description & Objective:

Seminar is offered as an opportunity for graduate students to broaden their knowledge beyond their specific area of research and/or studies. This is important at and beyond the graduate level where our activities are highly focused and specialized from a topical perspective.

III Year B.Tech. Mechanical Engg. II-Semester	L	T	P	To	C
	-	-	3	3	2

ME332 MODELING AND SIMULATION LAB

Course Description & Objectives:

This lab is meant for the development of modeling and analysis skills of the machine components using software. This enables the students basic idea regarding modeling activities that are carried in present industries using modeling software.

Course Outcomes:

1. *Students will expertise on modelling tools, for drawing machine components on computer screen.*
2. *Students will gain the knowledge on 3D and assemble drawings of machine components, which helps to understanding its functioning.*
3. *Students will expertise on simulation software, for analyzing machine components.*
4. *Students will gain the knowledge on structural, thermal and modal analysis.*
5. *The graphical and animation of the simulation results helps to the students, to understanding the load or its functional effects on machine components.*

MODELING :

1. **Sketcher:** Development of part drawings for various components in the form of orthographic and isometric. Constraining the drawings. Study of blueprints.

2. **3-D Modeling:** Generation of various 3D models through protrusion, revolve, shell sweep. Creation of various features. Study of parent child relation. Feature based and Boolean based modeling surface.
3. **Assembly:** Assembly modeling, study of various standard assembly operations. Assembling of simple components like Bolt & Nut, Sleeve and cotter joint, Knuckle Joint, shaft with journal bearing.
4. **Sheet metal work:** Basic sheet metal operations, making different sheet metal patterns.

SIMULATION :

1. Static Analysis of Plane Truss
2. Static Analysis of Thick cylinder using 2D axis symmetry
3. Analysis of a plate with center hole
4. Free vibrations analysis of a simply supported beam.
5. Steady state heat transfer in square plate
6. Analysis of plate with center hole at quarter section
7. Static analysis of simple plane truss
8. Steady state heat transfer in composite plate
9. Static analysis of thick cylinder using 3D
10. Analysis of cantilever beam with point load at its end.

III Year B.Tech. Mechanical Engg. II-Semester	L	T	P	To	C
	-	-	3	3	2

ME334 MINIPROJECT

Course Description & Objective:

The main objective of this miniproject is to enable the students analytical and practical exposure by giving the targets like Hands on work, also it is very much essential before the students allow into the main curriculum project work.

III Year B.Tech. Mechanical Engg. II-Semester

L	T	P	To	C
1	-	2	3	2

HS304 PROFESSIONAL COMMUNICATION LAB

Course Rationale:

The Professional Communication exposes students to conventions of corporate communication and documentation procedures involved in the day-to-day functioning of the business world. The course is aimed at improving written communication skills of undergraduate students and preparing them to meet professional challenges in the work spheres. Writing and Personality are not two exclusive spheres of influence and this course will work on the relationship between professional writing and a personality that is able to meet the goals of an organization in creative and innovative ways.

Training Methodology:*The methodology is designed to give hands-on practice to students in formal and informal report writing, structure and format of letters as well as other organization related work.*

Course Description & Objectives:

To enable students to write logical sentences and paragraphs, use appropriate diction, grammar and punctuation.

To expose them to the world of business and business register. To make them compose clear and concise business messages. To produce business documents for mailing to external recipients or intra-organizational circulation. To enable them to speak business English for handling various business situations

Mechanics of writing:

- Elements of Technical Writing : Sentence structure - reducing verbosity - arranging ideas logically – building coherence - paragraph level and document level - topic sentence - cohesive devices – transitionals – paraphrasing – précis-writing.
- Mechanics of Writing: Stylistic elements – the rapporteur- the purpose- the reader (audience) -elementary rules of grammar- choice of diction - elementary principles of composition - matters of form – punctuation - conventions of business communication -language and tone - weak links in business correspondence - ethical concerns in business writing

Business Report Writing:

- Parts of the Report: Writing an abstract - features of a good abstract – approach - compare and contrast - cause and effect.
- Types of Technical Reports : Drafting a technical proposal - formal and informal proposals - factual reports, feasibility reports, survey reports – parts of a report - title page –declaration – acknowledgements – table of contents - abstract – introduction – conclusion – citations – references - appendices - oral reports and presentations

Business Letter Writing:

- Letter-Writing - Formal and informal letters - structure of formal letters - expressions of salutations, introductory and concluding paragraphs - different types of letters - sales letter - complaint letter - adjustment letter - letter to the editor - covering letter - claim letter – letter of condolence.

Business E- writing:

- E-mail – nature and scope - e-mail etiquette – Common Errors in composing e-mails –
- Quotations - Inviting quotations - sending quotations –placing orders

  Office Communication - agenda - notice - circular
- Effective Resume-Writing: Structure and presentation - defining career objective - projecting one's strengths and skill-sets
- Summarizing - formats and styles - covering letter.

Business visual presentations:

- Business Proposals: Drafting business proposals - calculating profit and loss-averages - ratios and proportions – partnership - simple interest - compound interest - calculating volumes and areas
- course of action - cause and effect- theme detection - making judgments - logical deductions - analyzing arguments – syllogisms - Venn diagrams - matching definitions -verbal reasoning - numerical reasoning - working out justifications.

Reference Books:

1. Strunk , William, Jr.*The Elements of Style*, Fourth Edition,
2. Rozakis, Laurie, Ph.D, (2003). *English Grammar for the Utterly Confused*, McGraw-Hill.
3. Sharma. C. (1978) *Business Correspondence & Report Writing*, Tata McGraw-Hill.
4. Kirkman, John. *Good Style: Writing for science & technology*, Routledge Study Guides, second edition.
5. Monippally, Matthukutty. M. 2001. *Business Communication Strategies*. 11th Reprint. Tata McGraw-Hill, New Delhi.

IV Year B.Tech. Mechanical Engg. I-Semester

L	T	P	To	C
3	1	-	4	4

(ME401) OPERATIONS RESEARCH

Objective of the Course:

To familiarize the students about operations research techniques to optimize the utilization of resources in organizations.

UNIT - I

Definition - Characteristics and phases, Applications of OR.

Allocation Models : Linear Programming Problem Formulation - Graphical solution - Simplex method - Artificial variables technique (i.e. Big M method only) - Duality principle, simple problems on dual formulation only.

UNIT - II

Transportation Model: Formulation, IBFS, Optimality test by MODI method, unbalanced transportation problem.

Assignment Model - Formulation - Optimal solution by Hungarian method – Unbalanced Assignment problem- Restricted case.

UNIT - III

Sequencing: Introduction - Optimal solution for processing ‘n’ jobs through two machines and ‘n’ jobs through three machines.

Replacement Model: Introduction - Replacement of resources that deteriorate with time - when money value is counted and not counted.

UNIT - IV

Theory of Games: Introduction-classification of games- 2 person zero sum games- Assumptions -solution of games with saddle points - Rectangular games without saddle points, dominance principle - 2 X 2 games by Algebraic method, Matrix method to 3 x 3 games – m X 2 & 2 X n games by graphical method.

Waitingline Models: Introduction – Kendall’s Lee notation- single channel with infinite population, Multichannel with infinite population.

UNIT - V

Inventory Models: Introduction - single item - Deterministic models - Purchase inventory models with one price break when shortages are not allowed.

Simulation : Definition - types of simulation models - inventory and queuing problems.

TEXT BOOKS :

1. Taha, “Introduction to Operations Research.”, 8th Edition, PHI Publications, 2008.
2. S.D. Sharma, “Operations Research”, 8th Edition, Kedarnath Publishers, 2007.

REFERENCE BOOKS :

1. Hiller & Libermann, “Introduction to Operations Research”, 8th Edition, Tata Mc Graw Hill, 2010.
2. D.S. Hira and R.K. Gupta, “Operations Research”, 5th Edition, S.Chand & Co., 2008.
3. P.K.Gupta and Manmohan, “Problems in Operations Research”, 8th Edition, S.Chand & Co., 2003.
4. Manohar Mahajan, “Operation Research”, 1st Edition, Dhanpat Rai & Co., 2008.

IV Year B.Tech. Mechanical Engg. I-Semester

L	T	P	To	C
3	1	-	4	4

(ME403) ROBOTICS

Objective of the Course:

This course is aimed at giving exposure to students on the Robot anatomy, sensors, kinematics, applications and problems associated with their design.

UNIT - I

Definition of automation-programmable automation - flexible automation - Definition of a Robot - Basic Concepts - Robot configurations - characteristics of robots – accuracy and repeatability-load carrying capacity - Actuators - Basic robot motions - Point to point control - Continuous path control.

UNIT - II

Basic control system concepts – control system analysis – robot actuation and feed back,Manipulators – direct and inverse kinematics – the Denavit-Hartenberg Transformation Method – Coordinate transformation.

UNIT - III

Brief Robot dynamics. Types of Robot end effectors – Grippers, tools as end effectors – End effectors interfacing. Automated Manufacturing Work Cell – Concepts and Design.

UNIT - IV

Range sensing - Proximity sensing - Touch sensing - Force and Torque sensing. Introduction to Machine vision - Sensing and digitizing - Image processing and analysis. Encoders - tachometers.

UNIT - V

Application and characteristics of robots in machining - Welding - Assembly - Material handling -Loading and unloading – spray painting - inspection – forging -medical surgery - CIM.

TEXT BOOKS :

1. Spong M. and Vidyasagar M., “Robot Dynamics and Control”, 2nd Edition, John Wiley & Sons, 2008.
2. Mikell P. Groover, Mitchell Weiss, “Industrial Robotics, Technology, Programming and Applications”, 2nd Edition, McGraw Hill International , 2008.

REFERENCE BOOKS :

1. K.S. Fu., R.C.Gonalez and C.S.G.Lee, “Robotics Control sensing, Vision and Intelligence”, 1st Edition, McGraw Hill International, 1987.
2. R.K. Mittal & I.J.Nagrath, “Robotics and Control”, 2nd Edition, Tata McGraw Hill, 2004.
3. Saeed B.Niku, “Introduction to Robotics Analysis, Systems, Applications”, 2nd Edition, PHI Learning Publication, 2009.
4. S.K. Saha, “Introduction to Robotics”, 2nd Edition, Tata McGraw Hill, 2009.

IV Year B.Tech. Mechanical Engg. I-Semester

L	T	P	To	C
3	1	-	4	4

(ME405) REFRIGERATION AND AIR CONDITIONING

Objective of the Course:

This subject explores about basics of psychrometry and various types of refrigeration and aircondition system which will be applicable for both domestic and industry.

UNIT - I

Air Refrigeration System : Introduction to Refrigeration - Unit of refrigeration,Reversed Carnot Cycle, Bell-Coleman refrigeration system

Air Refrigeration: Actual air refrigeration system - Refrigeration needs of Aircrafts - Adoption of Air refrigeration, Justification - Types of air refrigeration systems - Problems.

Refrigerants: Desirable and undesirable properties - Common refrigerants used - Nomenclature.

UNIT - II

Vapour Compression Refrigeration System : Vapour Compression System. Wet Compression, Dry Compression, Superheated Compression Representation of cycle on T-S, P-H and H-S charts - effect of subcooling and super heating - cycle analysis - Actual Cycle, Influence of various parameters on system performance - use of P-H charts - Problems

System Components: Compressors - General classification - comparison - Advantages and disadvantages.Condensors - Classification - Working. Evaporators - Classification - Working. Expansion Devices - Types - Working.

UNIT - III

Vapour Absorption Refrigeration System : Basic vapour absorption system. Ammonia absorption system,Electrolux refrigeration system Li - Br system, Calculation of COP. Principle and Operation of (i) Steam Jet Refrigeration System, (ii) Thermoelectric Generator and (iii) Vortex tube or Hilsch tube.

UNIT - IV

Psychrometry : Psychrometric Properties and Processes, Need for Ventilation, Infiltration, Concepts of RSHF,ASHF, ESHF and ADP. Concept of human comfort and effective temperature, comfort Air conditioning,Industrial Air conditioning and Requirements.

UNIT - V

Equipment of Air-Conditioning Systems : Air cleaning and filters, Humidifiers and dehumidifiers, Fans and Blowers, Grills and Registers. Heat pump, different heat pump circuits - Application.Air conditioning Load Calculations.

TEXT BOOKS:

1. S.C. Arora & Domkundwar, “A Course in Refrigeration and Air Conditioning”, 2nd Edition, Dhanpatrai & Sons, 2009.
2. Dossat, “Principles of Refrigerations”, 2nd Edition, Wiley Eastern, 2006.

REFERENCE BOOKS:

1. Manohar Prasad, “Refrigeration and Air Conditioning”, 2nd Edition, New Age, 2002.
2. C.P. Arora, “Refrigeration and Air Conditioning”, TMH, 3rd Edition, 2009.

IV Year B.Tech. Mechanical Engg. I-Semester

L	T	P	To	C
3	1	-	4	4

(ME407) MECHATRONICS

Objective of the Course:

This course gives an overview of Mechatronics systems and their components for evolving hybrid technologies in various applications.

UNIT - I

Introduction: Introduction to Mechatronics - Multi disciplinary Scenarios, Systems for Measurement and Control. Microprocessor based controllers, Response of Systems.

UNIT - II

Signal Conditioning, the op-amp, protection, filtering, Wheatstone bridge, digital signals, multiplexers, Data acquisition, Digital signal processing, pulse modulation, displays, magnetic recording, measurement systems, Testing calibration.

UNIT - III

System Modeling & Dynamic Response of Systems: Introduction to Mathematical Modeling, Building Blocks of Mechanical Systems, Electrical Systems, Fluid Systems and thermal systems. Engineering Systems: Rotational, translational, Electro-Mechanical & Hydraulic- Mechanical. Performance measures of first order & second order systems, Transfer function.

UNIT - IV

Actuation to Hydraulic and Pneumatic Systems, Mechanical Systems, Electrical Systems, Mechanical Switches, Solid State Switches, Operation of Solenoids, AC, DC & Stepper Motors.

UNIT - V

Microprocessors & PLC's: Introduction to digital logic - logic gates - applications of logic gates - sequential logic - Applications - Basic structure of PLCs - selection of a PLC - case studies of mechatronics systems - Microprocessor systems - microcontrollers.

TEXT BOOKS:

1. W. Bolton, "Mechatronics Electronic Control Systems in Mechanical and Electrical Engineering" 3rd Edition, Pearson Education, 2009.
2. Appuu Kuttan K K, "Introduction to Mechatronics" 2nd Edition, Oxford Press, 2009.

REFERENCE BOOKS:

1. Nitaigour Premchand Mahalik, "Mechatronics Principles, Concepts and Applications" 2nd Edition, Tata McGraw Hill, 2008.
2. David G Alciators, Michael B. Histand, "Mechatronics and Measurement Systems" 3rd Edition, Tata McGraw Hill, 2009.

IV Year B.Tech. Mechanical Engg. I-Semester

L	T	P	To	C
3	1	-	4	4

(ME409) NON-CONVENTIONAL SOURCES OF ENERGY
(Elective - II)

This course is aimed to introducing the fundamentals concerned with alternative ways of producing power, highlighting the advantages and disadvantages. It also enables the importance of fuature energy demand.

UNIT – I

Principles of Solar Radiation : : Role and potential of new and renewable energy sources. Environmental impact of solar energy, physics of the sun, the solar constant, extraterrestrial and terrestrial solar radiation, solar radiation on tilted surface, instruments for measuring solar radiation and sun shine, solar radiation data.

UNIT – II

Solar Energy Collection, Storage and Applications : Flat plate and concentrating collectors; classification of concentrating collectors, their orientation and thermal analysis. Brief on advanced collectors. Different methods of storage - Sensible, latent heat, stratified and solar ponds. Solar Applications- solar heating and cooling techniques, solar distillation and drying, photovoltaic energy conversion.

UNIT - III

Wind Energy : Sources and potential, horizontal and vertical axis windmills, performance characteristics, Betz criteria.

Bio-mass Energy : Principles of Bio-Conversion, Anaerobic/aerobic digestion, types of Bio-gas digesters, gas yield, combustion characteristics of bio-gas, utilization for cooking, I.C.Engine operation and economic aspects.

UNIT - IV

Geothermal Energy & Ocean Energy : Resources, types of wells, methods of harnessing the energy, potential in India. OTEC, Principles utilization, setting of OTEC plants, thermodynamic cycles. Tidal and wave energy: Potential and conversion techniques, mini-hydel power plants, and their economics.

UNIT - V

Direct Energy Conversion : Need for DEC, Carnot cycle, limitations, principles of DEC. Thermo-electric generators, Seeback, Peltier and Joule Thomson effects, Figure of merit, materials, applications, MHD generators, principles, dissociation and ionization, Hall effect, magnetic flux, MHD accelerator, MHD Engine, power generation systems, electron gas dynamic conversion, economic aspects. Fuel cells, principles, Faraday's laws, thermodynamic aspects, selection of fuels and operating conditions.

TEXT BOOKS:

1. Tiwari and Ghosal, "Renewable energy resources", 1st Edition, Narosa Publications, 2007.
2. G.D. Rai, "Non-Conventional Energy Sources", 2nd Edition, Standards Publishers, 2004.

REFERENCE BOOKS :

1. Sukhatme, "Solar Energy", 3rd Edition, Tata Mc Graw Hill, 2008.
2. Ashok V Desai, "Non-Conventional Energy", 2nd Edition, New Age International, 2008.
3. B.H. Khan, "Non Conventional Energy Sources", 1st Edition, Tata Mc Graw Hill, 2009.

IV Year B.Tech. Mechanical Engg. I-Semester

L	T	P	To	C
3	1	-	4	4

(ME411) NANO TECHNOLOGY
(Elective - II)

Objective of the Course :

This course is intended to develop interest among the students in the area of nano technology and to initiate research inclination.

UNIT - I

Genesis of Nano Technology : Introduction - Nano Science - Nano technology - Nano materials - Scope of applications - topics from nature - Basic principles of Nano science and technology - Basics of quantum mechanics - Quantum Nano structures.

UNIT - II

Fabrication of Nano Materials : Introduction - Nano materials - Properties of Nano materials - Techniques used in Nano technology - Top - Down approach - Bottoms-up approach - Tools used in Nano technology - Electron Micro Scope - Atomic Force Microscope (AFM). Synthesis of Nano materials.

UNIT - III

Carbon Nano Tubes (CNT) : Introduction - Preparation - Properties - Classification - Fullerens - Applications of Carbon Nano Tubes.

UNIT - IV

Domain Application of Nano Technology : Introduction - Applications of Nano technology - Environment and Energy - Textiles - Agriculture - Electronics & Communication - Computers - Medicine - Space technology.

UNIT - V

Projected use & Implications of Nano Technology : Introduction - Assessment of opportunities - Bottlenecks in implementation of Nano technology - Exploration and Economical concerns of Nano technology - Current research activity.

TEXT BOOKS :

1. Mark Ratner, "Nano technology", 3rd Edition, Pearson Education, 2008.
2. Manasi Karkare, "Nano Technology Fundamentals and Applications", 1st Edition, I.K. International Publishing House, 2008.

REFERENCE BOOKS :

1. T. Pradeep, "Nano The Essentials", 3rd Edition, McGraw-Hill Education, 2009.
2. A.K. Badyopadhyay, "Nano Materials", 1st Edition, New age International Publications, 2009.

IV Year B.Tech. Mechanical Engg. I-Semester

L	T	P	To	C
3	1	-	4	4

(ME413) MACHANICAL VIBRATIONS
(Elective - II)

Objective of the Course:

To provide basic knowledge in the various types of vibrations and evalution techniques.

UNIT - I

Single Degree of Freedom Systems : Introduction, types of vibrations, Frequency and time period for longitudinal and transverse vibrations, Newton's Law of motion - Energy method, Raleigh's method.

UNIT - II

Free vibration, Forced vibration, Damped vibrations, types of damping, logarithmic decrement, Isolation of vibrations & Transmissibility.

UNIT - III

Two Degrees-of-Freedom Systems : Two degrees-of-freedom system, Lagrange's equation, modes of vibration, Principal modes, Principles of orthogonality, Generalized coordinates, Co-ordinate coupling, Dynamic vibration Absorber.

UNIT - IV

Multi Degrees-of-Freedom Systems : Newton's second law to derive equation of motion, Influence co-efficients - Stiffness, Flexibility, Inertia. Eigen values & Eigen vectors.

UNIT - V

Transient Vibration of Continuous Systems : Transient Vibrations - Impulse excitation, Arbitrary excitation, Laplace Transform formulation - Continuous System - longitudinal Vibration of rods, Transverse Vibration of beams, Transverse Vibration of string, Torsional Vibration of shaft.

TEXT BOOKS :

1. G.K. Groover, "Mechanical Vibration", 4^{th} Edition, NEM Chand & Brothers, 2009.
2. L.Meirovitch, "Fundamental of Vibration", 1^{st} Edition, Tata McGraw Hill, 2009.

REFERENCE BOOKS :

1. S.GrahamKelly, "Schaum's Outlines, Theory & Problems of Mechanical Vibrations", 1^{st} Edition, Tata McGraw Hill, 2007.
2. W.T. Thomson and M.D. Dehlen, "Theory of Vibration with Applications", 5^{th} Edition, Pearson Education, 2007.

IV Year B.Tech. Mechanical Engg. I-Semester

L	T	P	To	C
-	-	2	2	2

(ME415) PROJECT-I SEMINAR PART

B.Tech Project

B.Tech Project is offered as two units B.Tech Project-I and B.Tech Project-II in VII and VIII semesters respectively. These projects are supervised by a faculty member assigned to a student or a group of students. Student has to submit a project report in each semester and defend before a panel of examiners. The progress will be monitored periodically in each semester. In the interim presentations in VII and VIII semesters, a panel of examiners will be from the department only. In the final presentation in the VIII semester, an external expert will also be a member in the panel of examiners. The dates of submission of reports and presentations will be decided by the respective departments and will be displayed in notice boards in advance. The weightage for B.Tech Project -1 will be 50 marks and for B.Tech Project-II will be 250 marks.

Weightage

	Guide	Panel	Total
Project - IA (Start Date + 2 Months)	10	15	25
Project - IB (Start Date + 4 Months)	10	15	25
Totals	**20**	**30**	**50**
Project - IIA (Start Date + 2 Months)	35	35	70
Project - IIB (Start Date + 4 Months)	40	40	80
Project - IIB External	-	-	100
Total	**75**	**75**	**250**
Grand Total:			**300**

IV Year B.Tech. Mechanical Engg. I-Semester

L	T	P	To	C
-	-	3	3	2

(ME417) HEAT TRANSFER LAB

Objective of the Course:

Through this course, students will study about the various heat transfer processes, so as to train the students practically to utilize this knowledge in industry.

1. Composite Slab Apparatus - Overall heat transfer co-efficient.
2. Heat Transfer through lagged pipe.
3. Heat Transfer through a Concentric Sphere.
4. Thermal Conductivity of given metal rod.
5. Heat transfer through pin-fin
6. Experiment on Transient Heat Conduction.
7. Heat transfer in forced convection apparatus.
8. Heat transfer in natural convection.
9. Parallel and counter flow heat exchanger.
10. Emissivity apparatus.
11. Stefan Boltzman Apparatus.
12. Heat transfer in drop and film wise condensation.
13. Critical Heat flux apparatus.
14. Study of heat pipe and its demonstration.
15. Shell and tube heat exchanger.

Note : A minimum of total 12 Experiments to be completed by a student.

IV Year B.Tech. Mechanical Engg. VII-Semester

L	T	P	To	C
-	-	3	3	2

(MT313) HYDRAULICS & PNEUMATICS LAB

LIST OF EXPERIMENTS

1 Introduction to the hydraulic work benches and lab equipments.

2 Principles of hydraulic systems, power and control circuits, cavitations.

3 Introduction to the pneumatic work benches and lab equipments.

4 Basic pneumatic circuits.

5 Speed control and feedback and timers.

6 Advance pneumatic circuits.

7 Introduction to the electrical work benches and lab equipments.

8 Basic electrical switching circuits.

9 Relay and timer circuits.

10 Electro pneumatic circuits.

IV Year B.Tech. Mechanical Engg. II-Semester

L	T	P	To	C
3	1	-	4	4

(ME402) OPERATIONS MANAGEMENT

Objective of the Course:

The Objective of the course is to enable the students to learn the basics about managerial aspects of Operations and Production which will help them in understanding the actual business process.

UNIT – I

Introduction to operations management: Manufacturing Operations - Types of manufacturing systems-characteristics. Productivity concept in manufacturing operations and its advantages. Factory layout - types - travel charts. Functions of production planning and control.

UNIT - II

Planning for Production - Concepts of MRP - concepts of MRP - II. Demand forecasting techniques - (i.e., Time series analysis, least square method, moving average method, Exponential smoothing method).

Scheduling of Production : Techniques - ‘n’ jobs through 2 machines, ‘n’ jobs through 3 machines & ‘n’ jobs through ‘m’ machines.

UNIT - III

Inventory management - Functions of inventories - relevant inventory costs - ABC analysis - VED analysis - EOQ model (Purchase and production models without shortages) - Singe and multiple Price breaks without shortages-Simple problems on above concepts. Introduction to supply chain management.

UNIT - IV

Automation - types - Automation in operations for (a) continuous production (b) Batch production. Introduction to Group Technology Layouts.

UNIT - V

Line Balancing - Concept - Advantages. Line balancing techniques (Rank positional weightage method). Capacity planning for manufacture - Aggregate planning - Transportation technique applied to Aggregate planning for optimization.

TEXT BOOKS :

1. Joseph Monks, "Operations Management", 3rd Edition, Tata Mc Graw Hill, 2005.
2. S.N. Chary, "Production & Operations Management", 4th Edition, Tata Mc Graw Hill, 2009.

REFERENCES BOOKS :

1. R. Panner Selvam, "Production & Operations Management", 2nd Edition, Prentice Hall of India, 2009.
2. Martand Telsang, "Industrial Engineering and Production Management", 2nd Edition, S.Chand & Co. Ltd., 2009.
3. Samuel Eilon, "Elements of Production Planning and Conrol", 1st Edition, Universal Book Publishers, 2004.
4. Baffa & Rakesh Sarin, "Modem Production Operations Management", 8th Edition, John Willey Publishers, 2007.

IV Year B.Tech. Mechanical Engg. II-Semester

L	T	P	To	C
3	1	-	4	4

(ME404) A. AUTOMOBILE ENGINEERING
(Elective - III)

Objective of the Course :

To familiarize students with concepts of automobile engineering like chassis, various engine components, power transmission system of an automobile.

UNIT - I

Introduction to an automobile – components of four wheeler automobile, chassis, frame, body, engine, cylinder block and crankcase, cylinder head, liners – pistons, connecting rod – engine valves – valve mechanisms.

UNIT - II

SI engine fuel supply system – types – fuel pumps – carburettors – functions – mixture strength, simple carburettor – defects and remedies – typical carburettors - Solex carburettor, Zenith Carburettor.

CI engine fuel supply system- functional requirements of an injection system – methods of injection – fuel injection pumps – fuel injector – spray formation.

UNIT - III

Engine lubrication : Objectives of lubrication –requirements of lubricants- Types of lubrication systems– oil pumps and filters.

Cooling system : Objectives of Cooling – methods of cooling – components of air and water cooling systems – radiators.

UNIT - IV

Ignition systems : Requirements of an ignition system – types of ignition system – battery ignition system, magneto ignition system and electronic ignition system - Ignition advance methods - Spark plug.

Starting system – starting motor – bendex drive – solenoid switch.

UNIT - V

Transmission system : Requirements of transmission system – principle of clutch- types of clutches-cone clutch, single plate clutch, multi plate clutch, magnetic and centrifugal clutches. Gear boxes- Need of gear box- types- sliding mesh, constant mesh, synchro mesh epicyclic type gear box. propeller shaft , Hotch kiss drive, differential and rear axles.

TEXT BOOKS :

1. Heitner, "Automobile Engineering", 1st Edition, IPC Transport Press Ltd., 1969.
2. Dr. Kirpal Singh, "Automobile Engineering", Volume - 1 & 2, 9th Edition, Standard Publishers Distributors, 2009.

REFERENCE BOOKS :

1. K.R. Govindan, "Automobile Engineering", 1st Edition, Anuradha Publications, 2005.
2. R.K. Rajput, "Automobile Engineering", 1st Edition, Lakshmi Publications, 2007.

IV Year B.Tech. Mechanical Engg. II-Semester	L	T	P	To	C
	3	1	-	4	4

(ME406) B. COMPUTATIONAL FLUID DYNAMICS (Elective - III)

Objective of the Course :

Students will be taught to appreciate how computers are used to perform millions of calculations required to simulate the interaction of fluids and gases with the complex surfaces used in engineering.

UNIT - I

Governing Equations And Boundary Conditions : Basics of computational fluid dynamics – Definition and overview of CFD, need, advantages, problem areas, Governing equations of fluid dynamics – Continuity, Momentum and Energy equations — Physical boundary conditions – Time-averaged equations for Turbulent flow - Turbulence - Kinetic -Energy Equations – mathematical behavior of PDEs in CFD: Elliptic, Parabolic and Hyperbolic equations.

UNIT - II

Discretization And Solution Methodologies : Methods of Deriving the Discretization Equations - Taylor Series formulation – Finite difference method – Control volume Formulation – Detailed treatment of Finite Difference method, explicit and implicit methods, errors and stability analysis.

Solution methodologies: The Lax-Wendroff Technique, MacCormack's Technique, Space marching, Direct and iterative methods, Thomas algorithm, Relaxation method, Alternating Direction Implicit method.

UNIT - III

Heat Conduction : Finite difference and finite volume formulation of steady/ transient one-dimensional conduction equation, Source term linearization, Incorporating boundary conditions, Finite volume formulations for two and three dimensional conduction problems.

UNIT - IV

Convection And Diffusion : Finite volume formulation of steady one-dimensional convection and Diffusion problems, Central, upwind, hybrid and power-law schemes - Discretization equations for two dimensional convection and diffusion.

UNIT - V

Calculation Of Flow Field : Representation of the pressure gradient term and continuity equation - Staggered grid - Momentum equations - Pressure and velocity corrections - Pressure - Correction equation, SIMPLE algorithm and its variants.

TEXT BOOKS :

1. Versteeg, H.K, and Malalasekera, W., "An Introduction to Computational Fluid Dynamics: The Finite Volume Method", 2nd Edition, Longman Publication, 2004.
2. John D. Anderson Jr, "Computational Fluid Dynamics-The Basics withApplications", 6th Edition, Mcgraw Hill, 2009.
3. Anderson, D.A.,Tannehill, I.I., and Pletcher, R.H., Computational Fluid Mechanics and Heat Transfer, 2nd Edition, Hemishphere Publishing Corporation, 1997.

REFERENCE BOOKS :

1. C. Hirsch, "Numerical Computation of Internal and External Flows", Volumes I and II, 2nd Edition, John Wiley & Sons, 2007.
2. Subas, V.Patankar "Numerical heat transfer fluid flow", 2nd Edition, Hemisphere Publishing Corporation, 2004.
3. Muralidhar, K.,and Sundararajan,T., "Computational Fluid Flow and Heat Transfer", 2nd Edition, Narosa Publishing House New Delhi, 2011.
4. Fletcher C.A.J. "Computational Techniques for Fluid Dynamics", Volumes I and II, 2nd Edition, Springer, 2000.

IV Year B.Tech. Mechanical Engg. II-Semester	L	T	P	To	C
	3	1	-	4	4

(ME408) C. AUTOMATION IN MANUFACTURING (Elective - III)

Objective of the Course:

To expose the students to the areas of automation in manufacturing and familiarize with automated storage and retrieval systems, Automated assembly and Adaptive control systems.

UNIT – I

Introduction: Types and strategies of automation, pneumatic and hydraulic components and circuits. Automation in machine tools, Mechanical feeding systems and machine tool control systems.

UNIT – II

Automated flow lines : Methods of work part transport, Mechanical buffer storage control function, design and fabrication considerations.

Analysis of Automated flow lines: General terminology and analysis of transfer lines without and with buffer storage, partial automation and implementation aspects.

UNIT – III

Assembly line balancing : Assembly process and systems, assembly line, line balancing methods, ways of improving line balance, flexible assembly lines.

UNIT – IV

Automated material handling : Types of equipment, functions, analysis and design of material handling systems, conveyor systems, automated guided vehicle systems.

Automated storage and retrieval systems; work in process storage, interfacing of handling and storage with manufacturing.

UNIT – V

Adaptive control systems : Introduction, adaptive control with optimization, Adaptive control with constraints, Application of A.C. in Machining operations. Use of various parameters such as cutting force, Temperatures, vibration and acoustic emission.

TEXT BOOKS :

1. M.P. Groover, "Automation, Production Systems and Computer Integrated Manufacturing", 3rd Edition, PHI Publications, 2008.
2. Radhakrishnan, "CAD / CAM/ CIM" 3rd Edition, Newage Publications, 2000.

REFERENCE BOOKS :

1. Yoram Koren, "Computer control of Manufacturing Systems", 2nd Edition, McGraw Hill Publications, 2005.
2. W. Buekinsham, "Automation", 3rd Edition, PHI Publications, 2004.

IV Year B.Tech. Mechanical Engg. II-Semester

L	T	P	To	C
3	1	-	4	4

(EE206) A. CONTROL SYSTEMS

(INTERDISCIPLINARY SUBJECT)

Objective of the Course:

This course enables mathematical modelling of physical systems (electrical mechanical, chemical ,thermal ,pneumatic systems) and presents different methods of analysis and design of physical systems.

UNIT - I

Introduction: Concepts of Control Systems - Open Loop and closed loop control systems and their differences - Different examples of control systems - Clasification of control systems.

Mathematical Models of Physical Systems : Differentical equations - transfer functions and block diagram representation of systems considering electrical systems as examples Block diagram algebra - Representation by Signal flow graph - reduction using Mason's gain formula - translational and rotational mechanical systems.

UNIT - II

Feed-Back Characteristics : What is Feedback? Effects of feedback - reduction of parameter variations by use of feedback-Control over system dynamics - by the use of feedback.

Elements of Control Systems : DC Servo motor - AC Servo motor - Synchro transmitter and Receiver

UNIT - III

Time Response Analysis : Standard test signals - Time response of first order systems - Characteristic Equation of Feedback control systems, Transient response of second order systems - Time domain specifications - Steady state response - Steady state errors and error constant - Effects of proportional derivative, proportional integral systems.

Concepts of stability : The concept of stability, Routh stability criterion - qualitative stability and conditional stability.

UNIT - IV

Root Locus Technique : The root locus concept - construction of root loci - effect of adding poles and zeros to G(s)H(s) on the root loci

Frequency Response Analysis : Introduction, Frequency domain specifications - Bode diagrams - Determination of Frequency domain specifications and transfer function from the Bode Diagram - Phase margin and Gain margin - Stability Analysis from Bode Plots. Polar Plots, Nyquist Plots and applications of Nyquist stability criterion.

UNIT - V

Design and Compensation Technique : Introduction and Preliminary design considerations - Lead, Lag, Lead-lag - compensation Based on frequency response approach. PID controller.

State Space Analysis of Continuous Systems : Concepts of state, state variables and state model, derivation of state models from block diagrams, Diagonalization - Solving the Time Invariant state Equations - State Transition Matrix.

TEXT BOOKS :

1. I. J. Nagrath and M. Gopal, "Control Systems Engineering", 2nd Edition, New Age International (P) Limited.
2. B. C. Kuo, "Automatic Control Systems", 8th Edition, John wiley and son's, 2003.
3. Katsuhiko Ogata, "Modern Control Engineering", 3rd Edition, Prentice Hall of India Pvt. Ltd., 1998.

REFERENCE BOOKS :

1. N.K.Sinha,"Control Systems", 3rd Edition, New Age International (P) Limited Publishers, 1998.
2. John wiley, "Control Systems Engg.", 3rd Edition, NISE.

IV Year B.Tech. Mechanical Engg. II-Semester	L	T	P	To	C
	3	1	-	4	4

(EC208) B. SWITCHING THEORY LOGIC DESIGN (Interdisciplinary Subject)

Objective of the Course :

With this course, students will learn different number systems, and their applications . Also, Student will learn to appreciate the design of the basic logic circuits, components used inside the computer.

UNIT - I

NUMBER SYSTEM: Phylosophy of number systems, complement representation of negative numbers, binary arithmatic, binary codes, error detecting and correcting codes, Hamming codes. Fundamental concepts of Boolean algebra, Basic theorems and properties, switching functions canonical and standard forms, Algbric simplification digital logic gates, properties of XOR gates, Universal gates, Multi level NAND and NOR realization.

UNIT - II

MINIMIZATION OF SWITCHING FUNCTIONS: Map method, prime implicants, don't care combinations, minimal SOP and POS forms, Tabular method, prime implicant chart.

UNIT - III

COMBINATIONAL LOGIC DESIGN :Design using conventional Logic gates, Encoder, Decoder, Multiplexer, Demultiplexer, Parity bit generator, code converters, basic PLDs, ROM, PROM, PLA, PAL.

UNIT - IV

SEQUENTIAL CIRCUITS - 1: Classification of sequential circuits, basic Flip-Flops, triggering and Excitation tables, Design of Synchronous Sequential circuits like detectors and binary counters.

UNIT - V

COUNTERS: Finet state machines, Capabilities and Limitations, Mealy and Moor machines, Counters, Shift registers.

TEXT BOOKS :

1. ZVI KOHAVI "Switching and Finite Automata Theory", 2nd Edition,Tata McGraw-Hill, 2009
2. Morris Mano, "Digital Logic & Computer Design", 1st Edition, Pearson, 2005.

REFERENCE BOOKS :

1. John M. Yarbrough, "Digital Logic Applications and Design", 1st Edition,Thomson Publications, 2006.
2. Fletcher, "An Engineering Approach To Digital Design" , 1st Edition, Prentice Hall of India, 2009.
3. Taub & Schilling, "Digital Integrated Electronics", 1st Edition, Tata McGraw-Hill, 2008.

IV Year B.Tech. Mechanical Engg. II-Semester	L	T	P	To	C
	3	1	-	4	4

(CS202) C. OBJECT ORIENTED PROGRAMMING (Interdisciplinary Subject)

Objective of the Course :

On completion of this course, the student will be able to program in Java using subset of data types, control statements etc., also be able to construct simple Java user interfaces and identify the data structures in those user interfaces.

UNIT - I

Introduction, Classes and Objects : Creation of Java, Importance of Java to Internet, Byte code, Java buzzwords, OOP Principles - Encapsulation, Inheritance and Polymorphism, Data types, Variables, Declaring variables, Dynamic initialization, Scope and life time of variables, Arrays, Operators, Control statements, Type conversion and casting, Compiling and running of simple Java program, Concepts of classes and objects Class fundamentals - Declaring objects, Assigning object reference variables, Introducing methods, Constructors, Usage of static with data and methods, Usage of final with data, Access control, this key word, Garbage collection, Overloading methods and constructors, Call by value, Recursion, Nested classes and Inner classes, Exploring the String class.

UNIT - II

Inheritance, Packages and Interfaces : Basic concepts, Member access rules, Usage of super key word, Forms of inheritance, Method overriding, Abstract classes, Dynamic method dispatch, Using final with inheritance, the Object class. Defining, Creating and Accessing a Package, Understanding CLASSPATH, Importing packages, Differences between classes and interfaces, Defining an interface, Implementing interface, Applying interfaces, Variables in interface and Extending interfaces.

UNIT - III

Exception Handling, Multithreading and Applets : Concepts of Exception handling, Types of exceptions, Usage of try, Catch, Throw, Throws and Finally keywords, Built-in exceptions, Creating own exception Sub classes, Concepts of Multithreading, Differences between process and thread, Thread life cycle, Creating multiple threads using Thread class, Runnable interface, Synchronization, Thread priorities, Inter thread communication, Daemon threads, deadlocks, Thread groups.

Applets - Applet Class, Applet Architecture, Applet Skeleton - Applet Initialization and Termination, Overriding update (), Simple Applet, Display Methods, Requesting Repainting - A simple banner Applet, Using The Status Window, The HTML APPLET Tag, Passing parameters to Applets, Applet Context and show Document .

UNIT - IV

Event Handling & AWT Controls : Event sources, Event classes – ActionEvent, AdjustmentEvent, ComponentEvent, Container Event, Focus Event, InputEvent, ItemEvent, KeyEvent and MouseEvent, Delegation event model, Event Listeners, Handling mouse and Keyboard events, Adapter classes.

AWT: Concepts of components, Container, Panel, Window, Frame, Canvas, Font class, Color class and Graphics.

AWT Controls : Buttons, Labels, Text fields, Text area, Check boxes, Check box groups, Lists, Choice, Scrollbars, Menus, Layout Managers - Flow, Border, Grid, Card and Grid bag.

UNIT - V

Swing : JApplet, JFrame and JComponent, Icons and Labels, Handling threading issues, Text fields, Buttons – The JButton class, Check boxes, Radio buttons, Combo boxes, Tabbed Panes, Scroll Panes, Trees, and Tables. Networking – Networking Basics, Socket Overview, Client/Server, Reserved Sockets, Proxy Servers, Internet Addressing, The Networking Classes and Interfaces, InetAddress – Factory Methods, Instance Methods, TCP/IP Client Sockets, URL connection,TCP/IP Server Socket, A caching Proxy HTTP Server, Datagrams – Datagram Packet, Datagram Server and Client, The URL Class.

TEXT BOOKS :

1. Herbert Schildt, "The Complete Reference Java J2SE", 7th Edition, Tata McGraw-Hill, Publishing Company Ltd, New Delhi, 2008.
2. Joe Wiggles worth and Paula McMillan, "Java Programming Advanced Topics", 3rd Edition, 2009.

REFERENCE BOOK :

1. Horstmann, "Big Java Cay", 2nd Edition, John Wiley and Sons, 2006.

IV Year B.Tech. Mechanical Engg. II-Semester	L	T	P	To	C
	-	-	10	10	10

(ME410) PROJECT - II

B.Tech Project

B.Tech Project is offered as two units B.Tech Project-I and B.Tech Project-II in VII and VIII semesters respectively. These projects are supervised by a faculty member assigned to a student or a group of students. Student has to submit a project report in each semester and defend before a panel of examiners. The progress will be monitored periodically in each semester. In the interim presentations in VII and VIII semesters, a panel of examiners will be from the department only. In the final presentation in the VIII semester, an external expert will also be a member in the panel of examiners. The dates of submission of reports and presentations will be decided by the respective departments and will be displayed in notice boards in advance. The weightage for B.Tech Project -1 will be 50 marks and for B.Tech Project-II will be 250 marks.

	Weightage		
	Guide	Panel	Total
Project - IA (Start Date + 2 Months)	10	15	25
Project - IB (Start Date + 4 Months)	10	15	25
Totals	**20**	**30**	**50**
Project - IIA (Start Date + 2 Months)	35	35	70
Project - IIB (Start Date + 4 Months)	40	40	80
Project - IIB External	-	-	100
Total	**75**	**75**	**250**
Grand Total:			**300**

HS 111 ENGINEERING MATHEMATICS - I

L	T	P	To	C
3	1	-	4	4

Course Description & Objectives :

Without mathematics not a single day of an engineer will pass! All the topics of this course are relevant to all branches of engineering. Differential equations are used in various places. Laplace transformations are used, for example, for conversion of domains, from time domain to frequency domain. These are also used to solve ordinary differential equations. When data is given at only a finite points, we use numerical methods for find the approximate values of functions, also to solve differential equations approximately etc. Maxima, minima of a function has got many applications.

Course Outcomes:

1. *Students will understand that Mathematics which they learn can be used at different levels in their Engineering course irrespective of their branches.*
2. *This course will help to sketch the graph of a differential equation and its direction mixing fields*
3. *Laplace transform used to compute solutions of equations involving impulse functions*
4. *They will be able to use Laplace transformations for conversion of domains from time domain to frequency domain.*
5. *Differential Equations help them to find approximate values of function.*
6. *They will be able to analyze and use them in different applications.*
7. *Eigen values and Eigen vectors play a prominent role in the study of ordinary differential equations and in many applications of physical sciences.*

UNIT I - Ordinary Differential Equations & Differential Equations of Second Order :

Differential Equations of First Order : Definiton, Order and degree of a differential equation, Formation of differential equations, Solution of a differential equation, Differential equations of first order and first degree : variables separable, Homogenous equations, Linear equations, Exact differential equations.

Differential Equations of Second Order : Linear differential equations of second order with constant coefficients, Methods for finding the complementary functions and particular integral, General method of finding the particular integral of any function.

UNIT II - Applications of Differential Equations and Laplace Transformations

Applications of Differential Equations : Newton's law of cooling, Natural law of growth, Orthogonal trajectictiories**.**

Laplace transformations : Definition, Properties, Convolution theorem, Inverse Laplace transformation, Solving differential equations using Laplace Transformation.

UNIT III - Numerical Methods

Taylor's Method, Picard Method, Euler Method, Modified Euler Method, Runga-Kutta Methods.

Interpolation by Lagrange and Newton methods.

UNIT IV - Matrices

Rank of a matrix, finding rank of a matrix using Echelon form, Normal form, triangular form, PAQ form, inverse of a matrixEigen values, Eigen vectors, properties, Cayley-Hamilton theorem (without proofs), Diagonalisation of a matrix.

Solving System of equations (Gauss-Siedal method only)

UNIT V - Maxima and Minima & Jacobians

Maxima and Minima : Review of partial differentiation: Partial derivatives, Partial derivatives of higher order, Homogeneous function, Euler's theorem, Total differential coefficient,

Maxima and Minima of a function of two variables, Conditions for extreme values, Lagrange method of undetermined multipliers.

Jacobians : Definition, Properties, Jacobian of implicit functions, Partial derivaties of Implicit functions using Jacobian.

TEXT BOOKS :

1. H. K. Dass and Er. Rajnish Verma, Higher Engineering Mathematics, S. Chand & Co., New Delhi, 2011.
2. B.S. Grewal, "Higher Engineering Mathematics", 40th edition, Khanna Publishers, 2009.

REFERENCES:

1. B.V. Ramana, "Higher Engineering Mathematics", 3rd Edition, Tata McGraw-Hill Publishing Co, 2008.
2. R K Jain, S R K Iyengar, "Advanced Engineering Mathematics", 2nd Edition, Narosa Publishing House.
3. Erwin Kreyszig, "Advanced Engineering Mathematics", 8th Edition, John Wiley & Sons (Asia) Pvt. Ltd. 2001.

HS 113 ENGINEERING PHYSICS

L	T	P	To	C
3	1	-	4	4

Course Description & Objectives :

There is a symbiotic relation between physics and engineering. Broadly speaking, engineering is mainly applied physics. Recent technical developments have been the result of joint efforts of physicists and engineers. A proper study of physics is therefore indispensable for an engineering student to excel in his field. The purpose of this course is to present the principles and concepts of physics as relevant to an engineer.

Course Outcomes:

The students will be made to get acquainted to the following learning outcomes:

1. *Concepts of Physical optics, devices and applications.*
2. *Ultrasonic waves, production, applications in NDT.*
3. *Introduction to Quantum mechanics in relevance to that of modern physics.*
4 *Exposure to latest inventions like lasers, fibers and applications*
5. *Insight into nano technology and applications, solar energy to combat energy crisis.*

UNIT I - Physical Optics

Interference – Types - Interference in thin films (Reflection) – Newton's Rings – Michelson's Interferometer, Fabry-perot interferomenter – Applications.

Diffraction – Fraunhoffer Diffraction at single slit – Diffraction grating

Polarization – Production of plane polarized light – Nicol prism – Optical activity – photo elasticity.

UNIT II - Ultrasonics & NDT

Ultrasonics : Introduction – production of ultrasonic waves – piezoelectric method – Properties of ultrasonic waves – Types of ultrasonic waves – Determination of Velocity of ultrasonic waves in solids and liquids – Applications.

NDT : Introduction - Types – Theory and practice of Ultrasonic Testing – Ultrasonic Testing Systems – Ultrasonic Testing Methods – X-Ray Radiography.

UNIT - III Quantum Mechanics & Free electron theory of metals

Quantum Mechanics : Matter waves - Schroedinger's time independent wave equation - Physical significance of the wave function - Particle in one dimensional potential well – tunneling phenomenon.

Free electron theory of metals : Introduction – Classical free electron theory – Electrical conductivity of metal – Fermi - Dirac distribution function and its variation with temperature – Quantum free electron theory.

UNIT IV - Lasers & Fiber Optics:

Lasers: Characteristics of Laser light – Spontaneous and Stimulated emission of radiation – Low power and High power lasers, He-Ne Laser – CO_2 Laser – Nd-Yag laser - Applications of Lasers, Holography and Applications

Fiber Optics: Principle of optical fiber - materials – Numerical Aperture – Types of fibers – Dispersion and Attenuation in optical fibers – Optical sensors – Optical fiber communication system.

UNIT V - Solar Energy & NanoScience and Technology

Solar Energy : Solar radiation – Photovoltaic effect – solar cells – Efficiency of solar cell – Solar thermal energy conversion systems.

NanoScience & Technology : Introduction to nano meterials – Basic principles of nanoscience & Technology – Fabrication of nanomaterials – Physical & Chemical properties of nanomaterials – Applications of nanotechnology.

TEXT BOOKS :

1. M.R.Srinivasan, "Physics for Engineers" New Age International, 2002-2003.
2. M.N. Avadhanulu & P.G. Kshirasagar, "Engineering Physics", 1st edition, S. Chand & Company Ltd, 1992.

REFERENCES:

1. Halliday, Resnic and Walker, "Fundamentals of Physics", 6th edition, John Willey publishers, 2003.
2. Grawfor F.S., Berkley Physics courses, "Waves and Oscillations", Volume III McGraw Hill, 1992.
3. V. Raghavan, "Materials Science and Engineering", 5th edition, Prentice-Hall India, 2004.
4. S.O.Pillai, "Solid State Physics", 6th edition, New Age International Publications, Revised, 2005.
5. V.Rajendran, "Engineering Physics", 1st edition, TMH Publications, 2010.

EE 111 FUNDAMENTALS OF ELECTRICAL ENGINEERING

L	T	P	To	C
4	0	-	4	4

Course Description & Objectives :

To understand the basic concepts, laws, techniques in analyzing various DC and AC circuits and concepts in coupled circuits. Study of construction details, working of various electrical machines and Semiconductor Devices and operation

Course Outcomes:

1. *Able to explain the notation and components of electric circuits*
2. *Able to analyze DC and single phase and three phase AC circuits using different methods and theorems*
3. *Able to operate various electrical machines.*
4. *Able to explain the concepts of Semiconductor Devices and operation*

UNIT I - Fundamentals Of DC Circuits

Circuit Concepts: Concepts of network, Active and passive elements, voltage and current sources, concept of linearity and linear network, unilateral and bilateral elements, R, L and C as linear elements. Ohm's Law – Kirchhoff's Laws –application to simple series, parallel circuits, mesh and nodal analysis of simple resistive circuits.(simple numerical problems).

UNIT II - Fundamentals of A.C. Circuits:

Generation of A.C. voltage - frequency, average value, R.M.S. value, form factor, peak factor for sinusoidal only - phasor representation of alternating quantities. Analysis of simple series and parallel A.C. circuits-(simple numerical problems)

Balanced Three phase systems – relation between phase and line quantities of voltages and currents in star and delta connected systems (Elementary treatment only)

UNIT III - Fundamentals of Electromagnetism and Transformers:

Concepts of Magneto motive force, reluctance, flux and flux density , concept of Self Inductance and Mutual Inductance, Coefficient of coupling-only elementary treatment. (simple numerical problems).

Transformers: Principle of operation of single phase transformer – constructional features – EMF equation (simple numerical problems)

UNIT IV - Electrical Machines:

DC Machines: Constructional details of a D.C. Machine.

D.C. Generator – Principle of operation – EMF equation – types of D.C. generators (simple numerical problems)

D.C. Motor – Principle of operation – Torque equation – types of D.C. motors (simple numerical problems)

A.C Machines: Principle of operation of three phase induction motors – slip ring and squirrel cage motors – Torque equation derivation, Constructional details of synchronous machines.

UNIT V - Semiconductor Devices:

Classification of solids based on energy band theory - Intrinsic semiconductors - Extrinsic semiconductors - P type and N type semiconductors - P-N junction diode and its characteristics –Half and Full wave rectifiers- Zener diode and its characteristics - Voltage regulator. Bipolar junction transistor – Operation- Types- Applications.

TEXT BOOKS:

1. Mittle, V.N., “Basic Electrical Engineering”, 2nd ed., TMH, New - Delhi, 1990.
2. V.K.Mehta,”Principles of Electrical Engineering and Electronics”, 3rd ed., S. Chand Publications, New Delhi, 2010.

REFERENCES:

1. Millman & Halkias, “Integrated Electronics”, McGraw Hill, 1979.
2. A.K. Thereja & B.L. Thereja, “Electrical Technology”, Vol. – II, S.Chand Publications, 2007.
3.. U.Bakshi & A.Bakshi, “Basic Electrical Engineering”, 1st ed., Technical Publications, Pune, 2005.
4. U.Bakshi & A.Bakshi, “Basic Electrical Engineering”, 1st ed., Technical Publications, Pune, 2005.

HS 114 TECHNICAL ENGLISH COMMUNICATION

L	T	P	To	C
3	2	-	5	5

Course Description & Objectives :

To introduce students to the specific use of language for the purposes of Technical Communication which would be an essential prerequisite for success in the areas of writing and speech. The teaching efforts in this course will be directed towards making students develop their technical and non-technical writing abilities using the fundamental principles that apply to the correct use of the English language free of grammatical and other related errors.

Course Outcomes:

Students shall achieve the ability to write and demonstrate college-level proficiency in the following:

1. *Clear and effective communication of meaning in speaking and writing.*
2. *The ability to perform effectively the essential steps of the writing process (Note making, organizing, composing, revising, and editing).*
3. *The ability to explain, develop, and criticize ideas effectively.*
4. *Effective organization within the paragraph and the essay.*
5. *Accuracy, variety, and clarity of sentences.*
6. *Appropriate diction.*
7. *Control of conventional mechanics (e.g., punctuation, spelling)*

UNIT - I

- Text : Environmental Consciousness (Climate Change – Green Cover – Pollution)
- Grammar : Articles – Prepositions – Sentence Types and Construction
- Vocabulary : Root – Prefixes - Suffixes
- Composition : Paragraph Writing (Descriptive & Narrative)
- Lab Practice : Introduction to Phonetics (Organs of Speech; Consonants, Vowels & Diphthongs; Syllable, Stress & Intonation)

UNIT - II

- Text : Emerging Technologies (Solar Power – Cloud Computing – Nanotechnology)
- Grammar : Time and Tense (Present-Past-Future; Helping Verbs; Modals)
- Vocabulary : Synonyms – Antonyms
- Composition : Note-making
- Lab Practice : Grammar Practice (Speaking of past, present & future)

UNIT - III

- Text : Energy (Renewable and Non-renewable Sources – Alternative Sources – Conservation – Nuclear Energy)
- Grammar : Subject-Verb Agreement - Sentence Construction (Characteristics of Technical Writing)
- Vocabulary : Idioms & Phrases
- Composition : Summarizing
- Lab Practice : Situational Conversations – Role-Plays (Introducing; Greeting; Enquiring; Informing; Requesting; Inviting)

UNIT - IV

- Text : Engineering Ethics (Challenger Disaster – Biotechnology – Genetic Engineering – Protection from Natural Calamities)
- Grammar : Sentence Transformation (Degrees, Voice, Speech & Synthesis)
- Vocabulary : Phrasal Verbs
- Composition : Letter Writing (Informal)
- Lab Practice : Situational Conversations – Role-Plays (Emotions; Directions; Descriptions; Agreements; Refusals; Suggestions)

UNIT - V

- Text : Travel and Tourism (Advantages and Disadvantages of Travel-Tourism – Atithi Devo bhava – Tourism in India)
- Grammar : Common Errors
- Vocabulary : One-word Substitutes
- Composition : Letter Writing (Formal)
- Lab Practice : Group Discussions

TEXT BOOKS :

Mindscapes - English for Technologists and Engineers, Orient Black Swan, 2012.

REFERENCES:

1. V. R. Narayana Swamy***, "Strengthen Your Writing",*** 1st edition, Orient Longman, 2003.
2. Thomas Elliott Berry***, "The Most Common Mistakes in English Usage",*** 1st edition, Tata McGraw Hill, 2004.
3. T. Balasubramanyam, ***A Textbook of English Phonetics for Indian Students***, Macmillan Ltd., 2000.
4. Sasikumar.V and P.V. Dhamija,. ***Spoken English: A Self-Learning Guide to Conversation Practice,*** 34th Reprint, Tata McGraw Hill, New Delhi, 1993.
5. Margaret M Maison, **"Examine your English",** 1st edition**,** Orient Longman, 1999.
6. Ashraf Rizwi, "***Technical English Communication***", Tata McGraw Hill, Latest Edition.

CS 101 PROBLEM SOLVING AND COMPUTER PROGRAMMING

L	T	P	To	C
4	1	-	5	5

Course Description & Objectives :

Aim of this course is to introduce the techniques of problem solving and concepts of programming language to the students. Because of its popularity and suitability to develop different types of applications, 'C' language has become the de-facto programming language to engineers. A comprehensive introduction of C language is offered through this course to enable the students to write diversified programs.

Course Outcomes:

On Completion of this course student should be able to

1. *Able to understand the basic terminology used in computer programming and to write, compile and debug programs in C language.*
2. *Use different data types in a computer program and design programs involving decision structures, loops and functions.*
3. *Able to understand the allocation of dynamic memory using pointers*
4. *Use different data types to create/update basic data files.*

UNIT I - Fundamentals of computers

Basic functional units and discrete components of a computer, computer networks, networking components, Binary representation of integers and real numbers, ASCII, EBCDIC, Unicode, Generations of computer languages.

UNIT II - Problem Solving Steps and Basic of C Language

Problem understanding, Formulating a mathematical model, Development of an algorithm, Representation of an algorithm, Flow chart and Pseudo code, Coding, Testing and Debugging, Comments, Processor statement, Function header statement, Variable declaration statement and Executable statement, C Character Set, constants, identifiers, operators, punctuations, keywords, Basic data types, modifiers, identifiers, variables, C scopes, type qualifiers, storage class specifiers, variable initializations, constants, reading and writing characters, formatted I/O.

UNIT III – Preliminaries of C

Assignment, arithmetic , relational, logical, bitwise, ternary, address, indirection, sizeof, dot, arrow, and parentheses operators, Expressions Precedence of operators

and associatively, Category of Statements, Selection, Iteration, jump, label, expression and block, Function declaration, prototype, definition, calling by value and address, standard library functions and recursive functions.

UNIT IV - Arrays and Pointers

Declaration, initialization, reading, writing, accessing and passing as a parameter to functions, Multidimensional arrays and String functions, pointer expressions, pointer and arrays, multiple indirection, initializing pointers, pointer to functions, Dynamic memory allocation functions.

UNIT V - Structures and File Processing

declaration, initialization and accessing, array of structures and passing structures to functions, structure pointers, arrays and structures within structures, unions, bit-fields, typedef and enumerations, I/O and processing operations on text and binary files. pre-processor directives.

TEXT BOOKS :

1. Reema Thareja, "Introduction to C Programming", Oxford University Press, India, 2013
2. Herbert Schildt, C: "The Complete Reference", 4th Edition, Tata McGraw-Hill, 2000.

REFERENCES:

1. E. Balagurusamy, " Programming in ANSI C", 4TH Edition, Tata McGraw- Hill, 2008.
2. R Ravichandran and T Jeyapoovan, " Computer Programming with C", Soni Graphics, India, 2014.

HS 115 ENGINEERING MATHEMATICS - II

L	T	P	To	C
3	1	-	4	4

Course Description & Objectives :

Without mathematics not a single day of an engineer will pass! All the topics of this course are relevant to all branches of engineering. In real life, many quantities are dependent on more than one quantity. Hence study of functions of several variables is crucial. In this course, we study partial differentiation, partial differential equations, multiple integrals all involving functions of two variables. We also study Fourier series and Z-transformations and difference equations.

Course Outcomes:

1. *The students will understand that many quantities are dependent on more than one quantity so they learn functions of several variables.*
2. *They will be able to solve Partial Differential Equations, multiple integrals which are involving functions of two variables.*
3. *They can apply Z – transforms to solve difference equations.*
4. *They will be able to calculate areas and volumes.*
5. *The student will enable to locate the maxima and minima of a function is an important task which arises often in applications of mathematics to problems in engineering and science.*
6. *Vector differentiation and integration used to find the arc lengths and curvatures of space curves*

UNIT I - Partial Differential Equations :

Formation of Partial Differential Equations, Linear (Lagrange) Equations, Method of multipliers, Non-linear partial differential equations (Types), Charpit's method.

Second order linear equations, classifications, Solution by method of separation of variables.

UNIT II - Fourier Series :

Periodic functions, Fourier series, Dirichlet's conditions, Determination of Fourier coefficients, Discontinuous functions, even and odd functions, Half-range series, Functions having arbitrary period.

UNIT III - Z-transformations & Applications :

Z-transformations : Sequences, Z-transformation, Properties, Inverse Z-transformation, Multiplication and division by k, Initial and final value theorems,

Convolution, Determination of inverse Z-transformation.

Applications : Solutions of difference equations using Z-transformations.

UNIT IV - Multiple Integrals :

Double integrals, Evaluation, Evaluation in Polar coordinates, Change of order of integration, Change of variables, Applications to Area in Cartesian coordinates and polar coordinates.

Triple integrals, Fundamentals, Evaluation of triple integrals.

UNIT V - Vector Differentiation and Integration

Vector Function, Differentiation, Scalor and Vector point function, Gradient, Normal, Divergence, Directional Derivate, Curl, Vector identities.

Line Integral, Surface Integral, Volume integral, Green's theorem, Stoke's theorem, Gauss theorem of divergence (without proofs).

TEXT BOOKS :

1. H. K. Dass and Er. Rajnish Verma, Higher Engineering Mathematics, S. Chand & Co., New Delhi, 2011.
2. B.S. Grewal, "Higher Engineering Mathematics", 40th edition, Khanna Publishers, 2009.

REFERENCES:

1. B.V. Ramana, "Higher Engineering Mathematics", 3rd Edition, Tata McGraw-Hill Publishing Co, 2008.
2. R K Jain, S R K Iyengar, "Advanced Engineering Mathematics", 2nd Edition, Narosa Publishing House.
3. Erwin Kreyszig, "Advanced Engineering Mathematics", 8th Edition, John Wiley & Sons (Asia) Pvt. Ltd. 2001.

HS 117 ENGINEERING CHEMISTRY

L	T	P	To	C
4	0	-	4	4

Course Description & Objectives :

Chemistry is the backbone in designing and understanding the nature and properties of various engineering materials. Currently, the electronics and computer engineers are waiting for suitable polymers for using miniature super computers. So this subject develops fundamental knowledge about new engineering materials and their significance in technical fields and industrial sectors. Water is an essential element for the existence of human, plant and animal lives, besides that it has greater industrial applications. The knowledge about water is the basic requirement for a professional student. Characterization of materials with instrumental techniques is essential for engineers.

Course Outcomes:

1. *Differentiate between soft and hard water. Understand the disadvantages of using hard water domestically and industrially. Select and apply suitable softening methods (Soda-lime, zeolite, ion-exchange methods, etc.) to soften the hard water for industrial and domestic applications.*
2. *Acquaintance of primary and secondary cells, Hydrogen-Oxygen and Methanol fuel cells, dry and wet corrosions, corrosion controlling methods*
3. *Acquaintance of the properties and engineering applications of Ceramics, Refractories, Glasses, Cement, Abrasives, Lubricants*
4. *Acquaintance of Preparation, properties and applications of different polymers (Polyethylene, PVC, Tefflon, Bakelite,Urea-Formaldehyde, Silicones, Rubber – Vulcanization, Synthetic Rubbers-(Buna-S, Buna-N, Neoprene); treatment of membranes.*
5. *Acquaintance of various spectroscopic methods (UV-visible / IR), Beer-Lambert's Law, qualitative and quantitative analysis, block diagrams of UV and IR spectrophotometers.*

UNIT I - Water Technology :

Introduction-Hardness of water-Determination of hardness by EDTA-Disadvantages of hard water-Scales & Sludges-Caustic embrittlement-Boiler corrosion-Priming & Foaming, WHO, BIS Standards of water-Softening Methods- Lime Soda process, Zeolite process, Ion Exchange process - Desalination of brackish water-Reverse osmosis, Electro dialysis.

UNIT II - Electrochemical cells and AND Corrosion:

Electrochemical cells: primary cell-(Dry or lecalanche cell), Secondary cell-(Lead-acid storage cell, Lithium ion battery), Hydrogen-Oxygen Fuel cell, Methanol fuel cell.

Corrosion: Introduction-Dry corrosion (chemical)-Wet corrosion (electrochemical)-Mechanism of wet corrosion-Bimetallic corrosion-Concentration cell corrosion-Factors influencing corrosion-Corrosion control methods- Cathodic protection and Electroplating.

UNIT III - Engineering Materials :

Properties and engineering applications of Ceramics, Refractories, Glasses, Cement,Abrasives, Lubricants.

UNIT IV - Polymers :

Introduction –Types of polymerization-Preparation, properties and applications of Polyethylene, PVC, Tefflon, Bakelite, UreaFormaldehyde, Silicones, Rubber – Vulcanization, Synthetic Rubbers - (Buna-S, Buna-N, Neoprene). Elementary treatment of Membranes

UNIT V - Instrumental Techniques :

Interaction of radiation with matter,UV-Visible Spectroscopy-Beer –Lambert's law ,Qualitative and Quantitative Analysis,Block diagram of UV-Visible Spectrophotometer.IRSpectroscopy-Types of Vibrations,Identification of functional groups,Block diagram of IR Spectrophotometer**.**

TEXT BOOKS :

1. P.C Jain and Monica Jain, "Engineering Chemistry", 15th edition, Dhanpat Rai Publications 2009.
2. Gurudeep Raj and Chatwal Anand, "Instrumental Methods of Analysis", 5th edition, Himalaya Publications, 2007.

REFERENCES:

1. S.S.Dara, "Text book of Engineering Chemistry" 1st edition, S. Chand Publications, 2009.
2. C.V. Agarwal, C.P. Murthy, A.Naidu, "Chemistry of Engineering materials", 9th edition, BSP Publications, 2008.
3. M.R. Senapati, "Advanced Engineering Chemistry" 2nd edition, Lakshmi Publications, 2006
4. H.W. Wilard and Demerit, "Instrumental methods of Analysis", 7th edition, CBS Publications, 1986.

HS 122 ENGINEERING MATERIALS

L	T	P	To	C
4	-	-	4	4

Course Description & Objectives :

The course will help students to learn about the elementary relationships between structure and properties of materials how materials can be classified. It also reveals the engineering applications of metals, alloys, semi conductors and magnetic materials and relation between properties and engineering applications.

Course Outcomes:

The students will be made to get acquainted to the following learning outcomes:

1. *The bonding in solids. Crystal systems and their structural features*
2. *Fundamentals related to phase equilibria and relevance in Materials Science*
3. *Mechanical properties of solids, factors affecting such properties in order to gain materials information.*
4. *Classification of solids based on band theory, sources of resistivity in metals, semi conductors transport mechanism and applications.*
5. *Classification of magnetic materials, hysteresis, ferrites and applications*
6. *Super conductors, classification and their applications. Dielectric materials, types of polarization and new engineering materials and their usefulness.*

UNIT I - Bonding in Solids & Crystallography:

Bonding in Solids: Inter atomic forces – Types of bonds – Primary & Secondary bonded materials and their properties – Cohesive energy.

Crystallography: Introduction – classification of Crystal systems – SC, BCC & FCC structures –Miller indices of planes & directions – Separation between successive planes – X-ray diffraction – Bragg's Law – Powder method – Crystal imperfection – Point and line imperfections – Grain boundaries

UNIT II - Phase Equilibria & Mechanical Properties :

Phase Equilibria: Gibb's phase rule & terms involved – Reduced phase rule - Two component systems–invariant reactions – Eutectic system & Iron – Carbon system - Lever rule.

Mechanical Properties : Introduction – mechanical properties of materials – Stress-Strain relations of various solids – Elastic moduli- deformations in solids- Fracture – Creep- Fatigue – Factors affecting mechanical properties of materials.

UNIT III - Conducting Materials & Semiconductors :

Conducting Materials: Introduction – Classification of solids based on the band models - Relaxation time and electrical conductivity of a metal – Collision time & mean free path – Sources of resistivity of metals.

Semiconductors: Introduction – Generation & recombination – Intrinsic semiconductors – Extrinsic semiconductors – Drift and diffusion (Qualitative treatment) – Einstein relation – Hall effect – Direct and Indirect band gap.

UNIT IV - Magnetic Properties & Superconductivity

Magnetic Properties: Introduction – Origin of magnetic moment – Classification of magnetic materials – Domain theory of ferromagnetism – Hysteresis curve - Soft and hard magnetic materials – Ferrites and their applications.

Superconductivity – Introduction - Meissner Effect – Types of superconductors – High Temperature superconductors – Applications.

UNIT V - Dielectrics & Functional materials

Dielectrics : Introduction – Dielectric polarization – Internal electric field – Clausius – Mossotti relation – Ferro and Piezo electricity - Electrets – Applications.

Functional materials: Introduction – Metallic glasses – Biomaterials – Composites – Metal matrix composites - Fiber reinforced plastics – Conducting polymers - shape memory alloys – smart materials.

TEXT BOOKS :

1. V. Raghavan, “Materials Science and Engineering”, 3 rd ed., PHI, 1996.
2. Lawrence H. Van Vlack, “Element s of Materials Science and Engineering”, 6^{th} ed., Wesley Publication, 1989.

REFERENCES:

1. Arumugam. M “Material Science” Anuradha Technical Book Publishers, Kumbakonam.K, 1997.
2. Manas Chandra, “Science of Engineering Materials”, Vol 1-3, Mc - Millian Company of India, Delhi.
3. Pillai, S.O, “Solid State Physics”, New Age International, 1998.
4. William F. Smith, “Principles of Materials Science and Engineering”, MGH, Publishers, 1988.
5. Structure and Properties of Materials – John Wulff – Wiley Eastern Ltd.

ME 101 ENGINEERING MECHANICS

L	T	P	To	C
3	1	-	4	4

Course Description & Objectives :

The course aims to impart the knowledge to understand the forces and their reactions on various static and dynamic conditions.

Course Outcomes:

1. *Use scalar and vector analytical techniques for analyzing forces in statically determinate structures.*
2. *Solve the engineering problems in case of equilibrium conditions and to calculate the reaction forces of various supports of different structures.*
3. *Determine the centroid, centre of gravity and moment of inertia of various surfaces and solids.*
4. *Solve the problems involving dry friction.*
5. *Apply fundamental concepts of kinematics and kinetics of particles to the analysis of simple, practicalproblems.*

UNIT I - Basic Concepts and Principles of Statics :

Introduction to Engineering Mechanics, Scalar and Vector quantities, Forces, Characteristics of a force, Definitions and examples of various types of force systems, Law of transmissibility, Definition of resultant, Composition and resolution of forces, Moment of a force, Principles of moments of force, Couples, characteristics of a couple, Transformations of a couple, Resultants of Force Systems, Possible resultants of different types of force systems, Resultant of a concurrent coplanar force system, Resultant of a non concurrent coplanar force system

UNIT II - Equilibrium of Rigid Bodies

Free body diagrams, Types of supports and their reactions, requirements of stable equilibrium, Equations of equilibrium of a concurrent coplanar force system, Equilibrium of Bodies acted on by two or three forces, Equilibrium of bodies acted on by non-concurrent coplanar force system

UNIT III - Properties of Surfaces and Solids :

Centroid and Center of Gravity: Centre of gravity of parallel forces in a plane, centroids and center of gravity of composite bodies, Distributed Loads on Beams.

Moments of Inertia: Definition, Parallel axis theorem and perpendicular axis theorem for areas, Polar Moment of inertia, Second moment of area by

integration, Radius of gyration of areas, Moments of inertia of composite areas.

UNIT IV - Friction :

Nature of friction, Laws of friction, Coefficient of friction, Angle of friction, Cone of friction, Types of Friction - Sliding Friction, Rolling Friction, Belt Friction, Ladder Friction, Wedge friction.

UNIT V - Kinematics and Kinetics :

Absolute Motion: Introduction, Recapitulation of basic terminology of mechanics, Displacement, Velocity and acceleration their relationship, Rectilinear motion of a particle

Relative Motion: Introduction to kinematics of relative motion, Relative displacement, Relative velocity

Kinetics: Introduction to Kinetics, Force, Mass and Acceleration, Newton's Laws of motion, Equation of motion for a particle, D Alembert's principle, Rectilinear translation of a rigid body, Work done by a force, Work done by a force system, Energy, Potential energy, Kinetic energy, Principle of Work and kinetic energy, Conservation of energy, Linear impulse, Linear momentum, Principle of linear impulse and linear momentum, Conservation of linear momentum.

TEXT BOOKS :

1. J. L. Meriam, L. G. Kraige, "Engineering Mechanics: Dynamics", 7th ed., John wiley & sons, 2012
2. A. K. Tayal, "Engineering Mechanics", Umesh Publications, 2005.

REFERENCES:

1. L. Singer - Harper, "Engineering Mechanics", 3rd ed., Fedinand . , Collins, 1975.
2. Timoshenko & Young, "Engineering Mechanics", 4th ed., Tata McGraw Hill, New Delhi, 2007.
3. S. S. Bhavakati & J. G. Rajasekharappa, "Engineering Mechanics", 3nd ed., New Age International Publications, New Delhi, 2008.

HS 118 ENVIRONMENTAL STUDIES

L	T	P	To	C
3	0	-	3	3

Course description and Objectives :

The objective of this course is to heighten on awareness of nature and its importance to students

and make them understand the need to make judicious use of all natural resources for long team sustenance of life on this planet.

Course Outcomes:

1. *To provide Knowledge on importance of natural resources and integrate technical "field" knowledge with analytical skills to prevent natural resources depletion*
2. *To maintain healthy and Diverse Ecosystems ,*
3. *Work together to conserve the biodiversity*
4. *Take immediate measures to control the Pollution*
5. *Adopt Ecofriendly technology.*
6. *Maintenance of hygienic conditions*

UNIT I - Environment and Natural Resources :

Environment: Definition, Scope and Importance – Need for Public Awareness

Natural Resources: Renewable and non-renewable resources – Natural resources and associated problems – Forest Resources: Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources: Use and over utilization of surface and ground water – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources - Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity–Energy resources: renewable and non-renewable energy sources, alternate energy sources. Land resources: Land as a resource, land degradation, Soil erosion – case studies - Role of an individual in conservation of natural resources.

UNIT II - Ecosystems and Biodiversity :

Ecosystem: Concept of an ecosystem. – Complete and incomplete ecosystem - Structure and functions of an ecosystem - Ecological succession. - Food chains, food webs -Structure and functional features of the following ecosystem: a. Forest ecosystem b. Grassland ecosystem c. Desert ecosystem, d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) **Biodiversity**: introduction of biodiversity, Bio-geographical classification of India - Value of biodiversity- Biodiversity at global, National and local levels - Hot-spots of biodiversity - Threats to biodiversity - Endangered and endemic species of India – Conservation of biodiversity

UNIT III - Environmental Pollution and Applications of Remote Sensing / GIS on Environment

Definition, Cause, effects and control measures of: Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution - Solid waste Management: Causes, effects and control measures of municipal and industrial wastes - Climate change, global warming, acid rain, ozone layer depletion -Case Studies - Role of an individual in prevention of pollution - Pollution case studies. – Green technology and its concept, role of green technology in controlling environmental problems.

UNIT IV - Social issues and EIA :

Sustainable development -water conservation: Cloud Seeding (Artificial rain making system), rainwater harvesting, watershed management - Disaster management: floods, earthquake, cyclone and landslides - Environment Protection Act. - Air (Prevention and Control of Pollution) Act. - Water (Prevention and control of Pollution) Act - Wildlife Protection Act - Forest Conservation Act

EIA: introduction to E.I.A.-definition of E.I.A and E.I.S – scope and objectives of E.I.A.- methods of E.I.A –CEIA, REIA, MOEF, CPCB, SPCB – Importance of E.I.A in proposed Projects / Industry /

Developmental activity - Remote sensing / GIS: Introduction of remote sensing / GIS, definition of remote sensing, applications of the remote sensing on environment (site selection, land use/land cover pattern, water/air/soil quality models, a criteria of environmental information systems)

UNIT V - Environmental Sanitation :

Food sanitation: food and drugs Act, food preservations, food borne diseases- Milk sanitation: tests for milk, pasteurization of the milk - water borne diseases-

air borne diseases-viral diseases (HIV/AIDS, SARS, bird-flu, anthrax)-maintenance of sanitary and hygienic conditions

Field Work/Environmental Visit: Visit to a local area to document environmental assets – river/ forest/ grassland / hill /mountain - Study of local environment - common plants, insects, birds - Study of simple ecosystems – pond, river, hill, slopes etc - Visits to industries, water treatment plants, effluent treatment plants

TEXT BOOKS :

1. Y. Anjaneyulu, "Introduction to Environmental Science", B S Publications, 2008.
2. Dr. M. Chandrasekhar, "A Text book of Environmental Studies", HI-TECH publications, 2006

REFERENCES:

1. Dr. M. Anji Reddy, "A Text book of environmental science and Technology", B S Publications, 2008
2. Dr. K. Mukkanti, "A Text book of Environmental Studies", S.CHAND Company Ltd, 2009.
3. EHILRS and ST, "Text book of Municipal and Rural Sanitation", M.S Hill, 1998.
4. C. S. Rao, Wiley Eastern Ltd, "Environmental Pollution Control Engineering", New Age International Ltd, 2001
5. Dr. M. Anji Reddy, "Introduction to Remote Sensing", B S Publications, 2004.
6. Kurian Joseph and R.Nagendram, "Essentials of environmental studies", Pearson Education Pt Ltd, Delhi, 2007.
7. Sharma & Kour "Text book of Environmental pollution".
8. H.C Perkins "Text book of Air Pollution".

CS 105 NETWORK SECURITY

L	T	P	To	C
2	-	-	2	-

Course description and Objectives :

This Course focuses towards the introduction of System, Information and Network security using various methodologies. It also focuses on the practical aspects that have been used to provide e_mail and web security.

Course Outcomes:

On Completion of this course student should be able to

1. *understand the Importance of Information Security*
2. *Know the ways to protect the information*
3. *understand the Firewall importance*
4. *understand the need of Virtual Private Networks.*

UNIT I - History of security :

History of security – Physical security, communications security, emissions security, computer security, network security and information security. Security process - Anti-virus software, access controls, firewalls, smart cards, biometrics, intrusion detection, policy management, vulnerability scanning, encryption, physical security mechanisms.

UNIT II - Access attacks

Snooping, eavesdropping, interception; Modification attacks - Changes, insertion and deletion; Denial of service attacks- Denial of access to information, applications, systems and communication; Repudiation attacks - Masquerading and denying an event. Hacking - Hacker motivation, historical hacking techniques, IP spoofing and malicious code.

UNIT - III

Confidentiality of files, information in transmission and traffic flow, integrity, availability and accountability; Integrity of files and information during transmission; Availability - backups, failover and disaster recovery; Accountability – identification and authentication, and audit.

UNIT - IV

Concepts of firewalls, Application layer and packet filtering firewalls; Virtual Private Networks.

UNIT - V

Basic encryption concepts, Private Key encryption standards-DES, triple DES and AES. Public key encryption – RSA. Concepts of digital signatures.

TEXT BOOKS :

1. Eric Maiwald, Fundamentals of Network security, Dreamtech Press, 2007.

REFERENCES:

1. William Stallings, "Cryptography and Network security", 4th edition, Pearson Education, 2010.

HS 119 PROFESSIONAL ETHICS, VALUES AND HUMAN RIGHTS

L	T	P	To	C
2	-	-	2	-

Course description and Objectives :

• To create an awareness on Engineering Ethics and Human Values.

• To instill Moral and Social Values and Loyalty

• To appreciate the workplace rights of Others, responsibilities and Safety of others.

Course Outcomes:

The course will enable the students to attain the following:

1. *an understanding of professional and ethical responsibility in workplace*
2. *the broad education necessary to understand the impact of engineering solutions in a global and societal context*
3. *a knowledge of contemporary issues related to human and professional interactions at workplace*
4. *an engineer's life-long commitment to serve the disadvantaged*

UNIT I - Human Values :

Morals, Values and Ethics – Integrity – Work Ethic – Service Learning – Civic Virtue – Respect for Others – Living Peacefully – Caring – Sharing – Honesty – Courage – Valuing Time – Co-operation – Commitment – Empathy – Self-Confidence – Character – Spirituality.

UNIT II - Engineering Ethics & **Engineering as social experimentation :**

Engineering Ethics : Variety of moral issues – types of inquiry moral dilemmas – moral autonomy – The problems of Many Hands – Kohlburg's theory – Gilligan's theory Impediments to Responsible Action.

Engineering as social experimentation - Codes of ethics - a balanced outlook on law - the challenger case study.

UNIT III - Engineer's Responsibility for Safety :

Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis – Reducing Risk – The Government Regulator's Approach to Risk - Chernobyl

Case Studies and Bhopal.

UNIT IV - Workplace Rights and Responsibilities & Work Environment :

Workplace Rights and Responsibilities : Engineers and Managers. Oganizational complaint procedures. Government agencies. Resolving Employee concerns. Limits on acceptable behaviour in large corporation.

Work Environment : Ethical and legal considerations, Organizational responses to offensive behaviour and harassment. Ethics in a Global Context.

UNIT V - Global Issues :

Multinational Corporations – Business Ethics - Environmental Ethics – Computer Ethics - Role in Technological Development – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Honesty – Moral Leadership – Sample Code of Conduct.

TEXT BOOKS :

1. Mike Martin and Roland Schinzinger, "Ethics in Engineering", McGraw Hill, New York, 2005.

REFERENCES:

1. Prof. (Col) P S Bajaj and Dr. Raj Agrawal, "Business Ethics – An Indian Perspective", Biztantra, New Delhi, 2004
2. Charles E Harris, Michael S. Protchard and Michael J Rabins, "Engineering Ethics – Concepts and Cases", Wadsworth Thompson Learning, United States, 2000 (Indian Reprint now available)
3. Engineering Ethics-An industrial Perspective, Gail Dawn Baura
4. Charles E Harris, Michael S Pritchard and Michael J Rabins, "Engineering Ethics – Concepts and Cases", Thompson Learning, 2000.
5. Charles E Harris, Michael S Pritchard and Michael J Rabins, "Engineering Ethics – Concepts and Cases", Thompson Learning, 2000.
6. PSR Murthy, "Indian Culture Values and Professional Ethics", BS Publications
7. Edmund G Seebauer and Robert L Barry, "Fundamentals of Ethics for Scientists and Engineers", Oxford University Press, Oxford, 2001.

HS 120 ENGINEERING PHYSICS LAB

L	T	P	To	C
-	-	3	3	2

Course description and Objectives :

This lab is intended to make the students realize the theoretical concepts of physics having hands on experience in conducting the following experiments. Students may have to take up any 10 experiments from each section.

Course Outcomes:

1. *Students realize concept of resonance of sound conducting the experiment of Sonometer Melde's experiment and volume generator.*
2. *The students understand the concepts of light conducting the experiments of dispersion of light, diffraction of light, optical fibers and lasers.*
3. *The students acquire the knowledge of magnetic field theory, thermal energy and elastic properties by conducting the experiments of field along the axis of circular coil, Lee's experiment, Seebeck effect and Torsional pendulum.*

PHYSICS LAB

1. Verification of laws of transverse vibrations in stretched string - Sonometer
2. Melde's Experiment - Transverse and Longitudinal modes.
3. Determination of Rigidity modulus of a material in the form of a wire - Torsional pendulum
4. Dispersive power of the material of a Prism - Spectrometer
5. Determination of wavelength of a monochromatic light source - Diffraction Grating.
6. Field along the axis of a circular coil – stewart Gee's apparatus.
7. Volume Resonator.
8. Band gap of semiconductor
9. Hall coefficient
10. Thermal conductivity of bad conductor Lee's method
11. Optical Fiber – Determination of numerical aperture
12. Solar Cell
13. Seebeck effect

REFERENCES:

1. Vogel's Text book of qualitative Chemical Analysis J.Mendham, R.C Denney, J.D. Bares, M.Thomas & B. Siva Sankar, Pearson Publications – Volume I (2009).

EE 113 FUNDAMENTAL OF ELECTRICAL ENGG. LAB

L	T	P	To	C
-	-	3	3	2

Course description and Objectives :

To understand basic electrical elements, electrical energy its consumption and measurement. To develop practical knowledge on electrical machines, electronic devices and circuits

Out Comes :

1. *Able to realize characteristics of electrical elements.*
2. *Able to analyze given simple ac and dc networks.*
3. *Able to work on different electrical machines.*
4. *Able to reflect the knowledge of electronic devices to verify experimentally.*

List of Experiments

1. Familiarization with basic components such as Resistors, Capacitors, Diodes, Transistors
2. Familiarization with basic electrical measuring instruments
3. Verification of ohm's law
4. Verification of KVL and KCL
5. Calculation of power factor in simple RL and RC circuits
6. Magnetization characteristic of a D.C. self excited generator
7. Measurement of power and energy.
8. Measurement of transformation ratio of single phase transformer.
9. Measurement of Power, Power factor of 3-phase induction motor.
10. Characteristics of PN junction diode.
11. Characteristics of Zener diode.
12. Operation of Full wave Rectifier
13. Operation of half wave Rectifier
14. Study and Working of fluorescent lamp
15. Measurement of armature and field resistances of d c machine using voltmeter-ammeter method.

Note : Any 10 of above experiments are to be conducted.

CS 107 COMPUTER PROGRAMMING LAB

L	T	P	To	C
-	-	3	3	2

Course description and Objectives :

To familiarize the students in preparation of documents and presentations with office automation tools. A comprehensive problem solving skills through C language is offered to enable the students to write diversified solutions using this language.

Course Outcomes:

1. *Able to write, compile and debug programs in C language.*
2. *Able to formulate problems and implement algorithms in C.*
3. *Able to effectively choose programming components that efficiently solve computing problems in real-world*

List of Experiments:

1. Write A Program to find simple Interest, compound interest
2. Write A Program to covert given temperature from C to F & F to C
3. Write A Program to check Entered number is positive or zero or Negative
4. Write A Program to print given year is Leap year or not
5. Write A Program to do arithmetic operations using switch
6. Write A Program to find biggest among 3 Numbers
7. Write A Program to print grade of a student for 5 sub avg>70(A), 60-70(B), 50-60(C),<50(F)
8. Write A Program to find Roots fo Quadratic Equation
9. Write A Program to find sum of individual digits of a given number
10. Write A Program to check whether the given number is PALINDRAM or not
11. Write A Program to check whether the given number is PERFECT or not
12. Write A Program to check whether the given number is PRIME or not
13. Write A Program to check whether the given number is ARMSTRONG or not
14. Write A Program to check whether the given number is STRONG or not
15. Write A Program to find sum of Natural Numbers

16. Write A Program to print the following triangle

```
      1
    2  3
  4  5  6
7  8  9  10 etc……….
```

17. C Progrm to find Factorial of Given number using Recursive and Non Recursive Functions.
18. Write A Program to print Fibonacci Series upto given limit using recursive, Non recursive
19. Write program in C for determining the minimum and maximum and sum of elements of an array of 'n' elements and searching for a given element.
20. C Program for computing range, mean and standard deviation of a given numeric dataset.
21. Write A Program in C for performing addition, subtraction, multiplication and transpose operations on matrices.
22. Write program to perform the following string operations on the given string. a) string length b) string copy c) string concatenation d) string comparison e) reverse string f) sub string
23. Write A Program to read student record (no, name, marks1, marks2, marks3, marks4, marks5, calculate average and Grade) and display the student record.
24. Write A Program to do arithmetic operations using pointers.
25. Write A Program to create two data files and copy the content of these two data files as a single file in another new file?

HS 121 ENGINEERING CHEMISTRY LAB

L	T	P	To	C
-	-	3	3	2

Course description and Objectives :

This lab is intended to make the students enlighten with the theoretical concepts of chemistry. Instrumental techniques are useful for characterization of materials for future engineers.

Students may have to take up any 10 experiments from the following experiments.

Course Outcomes:

1. *To enable the students to analyse the hardness & chlorides in the potable water.*
2. *To help students to determine the Alkalinity in water used especially in industries.*
3. *To impart knowledge on polymers used as insulators.*
4. *To provide an idea about Advanced techniques in chemical analysis using conductometer and spectrophotometer.*

Volumetric Analysis:

1. Determination of total Alkalinity of water
2. Determination of Percentage purity of Washing soda
3. Determination of Fe(II) by Dichrometry
4. Determination of Percentage of available chlorine in Bleaching powder
5. Determination of chlorides by Argentometry
6. Determination of Total hardness of water

Preparations:

7. Preparation of Bakelite
8. Preparation Of Urea- Formaldehyde Resin

Instrumental methods of Analysis:

9. Determination of Viscosity of a Lubricating oil
10. Determination of Strength of acid by conductometry
11. Determination of Mn^{+7} by Colorimetry
12. Demonstration of UV-Visible Spectrophotometer with Ferrothiocyanate

REFERENCE BOOKS:

1. Vogel's Text book of qualitative Chemical Analysis J.Mendham, R.C Denney, J.D. Bares, M.Thomas & B. Siva Sankar, Pearson Publications – Volume I (2009).
2. Experiments in Applied Chemistry by Dr.Sunita Rattan. S.K. Kataria & Sons publications,2008.

ME 103 ENGINEERING GRAPHICS

L	T	P	To	C
1	-	2	3	3

Course description and Objectives :

To familiarize students with the conventional concept of engineering drawing and application through AutoCAD.

Course Outcomes:

After completion of this course, student will be able to prepare plan and elevation of any pictorial view either conventional or through AutoCAD.

UNIT - I

Introduction to Engineering drawing: Introduction to Engineering Drawing – Types of lines, lettering, dimensioning Construction of polygon & Conics. (Ellipse, Parabola & Hyperbola by general method)

UNIT - II

Orthographic Projections: Principle of projection-Planes of projections.

Projections of points:

Projection of straight lines: Inclined to one plane and both the planes.

Projections of planes: Simple planes, Planes inclined to reference planes.

UNIT - III

Projections & Sections of solids – projections of prisms – cylinders – cones - pyramids – solid axis inclined to one plane, simple sections- prism, cylinder, pyramid and cone. AutoCAD Fundamentals.

UNIT - IV

Isometric projections: Isometric drawing of simple objects through AutoCAD

UNIT - V

Orthographic projections: Conversion of Pictorial view into orthographic view using AUtoCAD and Conventional.

TEXT BOOKS :

1. N.D.Bhatt, "Engineering Drawing", 49th ed., Charotar Publication, 2007.
2. K. Venugopal, "Engineering Drawing through Auto CAD", 1st ed., New Age Publication, 2008.

REFERENCES::

1. Jhole, "Engineering Drawing", 2nd ed., Tata McGraw Hill, 2008.
2. K.L. Narayana, "Engineering drawing" 2nd ed., Scitech Publications, 2008.

ME 105 WORKSHOP PRACTICE

L	T	P	To	C
-	-	3	3	2

Course description and Objectives :

To provide the hands on experience to the students on basic workshop skills.

Course Outcomes:

After completion of this course, students will be able to identify various tools connected to all the trades. They are also able to make various objects to the given dimension by using various types of tools.

Trades for exercises:

1. Carpentry:
2. Fitting
3. Tin Smithy & Black smithy4. House wiring
5. Foundry & Welding (Demonstration)
6. Machine shop & CNC (Demonstration)
7. IT Workshop
8. Study of discrete components of computer and networking (1 session)
9. Demonstration of assembling a computer, disk partitioning and installation of system and application software. installation of modem etc. (2 sessions)

Note: In each trade, the students has to perform at least two jobs

TEXT BOOKS :

1. S.K. Hazra Choudhury, Elements of workshop Technology, 11th Edition, Media Promoters, 1997
2. Gopal, T.V., Kumar, T., and Murali, G., A first course on workshop practice – Theory, Practice and Work Book, Suma Publications, Chennai, 2005.
3. Venkatachalapathy, V. S., First year Engineering Workshop Practice, Ramalinga Publications, Madurai, 1999.

VFSTR UNIVERSITY

II Year - B.Tech

SYLLABUS

I SEM & II SEM

II Year I Semester

L	T	P	T	C
4	0	-	4	4

AE211 MANUFACTURING PROCESS FOR AUTOMOTIVE COMPONENTS

Course Description & Objectives:

To understand the basic theory of metal working and metal cutting principles such as foundary, welding, metal forming and metal cutting including CNC machine tools powder metallurgy and surface finishing process.

Course Outcomes:

Students undergoing this course are able to

1. *to follow the concept of foundry useful for automobile manufacturing components*
2. *understand the concept of welding and its types*
3. *know the process of metal cutting process for automobile component manufacture*
4. *knderstand the concept of metal forming & powder metallurgy.*
5. *know the process involved in manufacturing surface coating and plastics*

UNIT – I Casting:

Casting terminology, Moulding sand, types of patterns, pattern materials, pattern allowances, cores – Elements of gating system. Investment casting, die casting, centrifugal casting, casting defects.

UNIT – II Forging:

Forging : Types of forging, drop forging, press and machine forging, forging defects. **Sheet material operations :**Shearing, blanking, piercing, spinning, drawing, bending. **Welding:** Gas welding, Arc welding, TIG, MIG, Soldering and brazing.

UNIT – III Metal Cutting :

Elements of metal casting, Chip formation, Types of chips, Tool geometry speed, Feed, Depth of cut. **Lathe**: Working principle of lathe, Principle parts of lathe work holders, Turning operations. **Shaper:** Working principle, Principle part of shaper, Shaping operations.

UNIT – IV Milling & Grinding:

Milling: Principle of working, Column and knee type milling machine, Milling operations and cutters, Indexing Methods **Grinding :** Theory of grinding, Cylindrical and surface grinding, Lapping and Honing.

UNIT – V Numerical Control:

NC elements, structure of CNC Machine tools, CNC part programming, Manual part programming, Computer Aided part programming, DNC machine tools.

TEXT BOOKS:

1. P.C. Sarma, “Production Technology”, 3rd ed., S. Chand, 2009.
2. M.P. Groover, “Automation, Production Systems and Computer Integrated Manufacturing”, 3rd ed., PHI Publications, 2008.

REFERENCES :

1. H.N. Gupta, R.C. Gupta and Arun Mittal, “Manufacturing Processes”, 2nd ed., New Age International, 2009.
2. AmitabaGhosh and A.KumarMallik, “Manufacturing Science”, 1st ed., East West Publishers, 2009.
3. Kalpakjian, “Manufacturing Engineering and Technology”, 4th ed., Pearson Education, 2005.

II Year I Semester	L	T	P	To	C
	3	1	-	4	4

ME219 THERMODYNAMICS

Course Description & Objectives:

To understand the nature of the thermodynamic properties of matter. Students will learn to recognize and understand the different forms of energy and restrictions imposed by the First Law of Thermodynamics on conversion from one form to another.

Course Outcomes:

After completion of the course, the student would be:

1. *able to distinguish thermodynamic properties with their S.I units and fundamental understanding of zeroth law of thermodynamics*
2. *understanding the first and second laws of thermodynamics and their application to systems under different kinds of interactions with surroundings.*
3. *abile to distinguish between a open and closed system, boundaries of the system, work and heat interactions;*
4. *developing an understanding of various kinds of work interaction over processes, cycles and subsequently apply first and second law of thermodynamics*
5. *able to evaluate entropy changes in a wide range of processes and determine the reversibility or irreversibility of a process from such calculations.*
6. *understanding the concept of ideal and real gases, the gas laws, maxwells relations and subsequently apply first and second laws of*

thermodynamics for an ideal gas and gas mixtures and ideal gases undergoing power and refrigeration cycles.

UNIT – I: Basic Concepts and First Lawof Thermodynamics:

Concept of Continuum, Thermodynamic equilibrium, system, boundary and surroundings, State, Property, Process, Cycle, Reversibility, Quasi–static Process, Irreversible Process, Causes of Irreversibility, Work and Heat, Point and Path function, Zeroth Law of Thermodynamics, Concept of quality of Temperature, PMM-I Joule's Experiments, First law of Thermodynamics – Corollaries – First law applied to a Process – applied toa flow system – Steady Flow Energy Equation.

UNIT – II: Second Law of Thermodynamics, Entropy and Availability:

Limitations of the First Law, Thermal Reservoir, Heat Engine, Heat pump, Parameters of performance, Second Law of Thermodynamics, Kelvin-Planck and Clausius Statements - Corollaries, PMM-II, Carnot's principle, Carnot cycle, Clausius Inequality, Entropy, Principle of Entropy Increase, Availability and Irreversibility, Thermodynamic Potentials, Gibbs and Helmholtz Functions, Elementary Treatment of the Third Law of Thermodynamics.

UNIT – III: Properties of Pure Substances:

Pure Substances, p-V-T- surfaces, T-S and h-s diagrams, Phase - Transformations, Triple point at critical state properties during change of phase, Dryness Fraction. Mollier charts, Various Thermodynamic processes and energy Transfer.

UNIT – IV: Ideal and Real Gases, Gas Mixtures:

Perfect Gas Law, Equation of State, specific and Universal Gas constants, Vander Waals Equation of State – Compressibility charts variable specific Heats – Gas Tables. Gas mixtures – Avagadro's law. Dalton's law of partial pressure, T-D relations, Maxwell relations, Clausius Clapeyron equations, Joule Thomson Coefficient.

UNIT – V: Power Cycles:

Otto, Diesel, Dual, Ericsson, Stirling Cycles–Description and representation on P–V and T-S diagram, Thermal Efficiency, Mean Effective Pressures on Air standard basis – comparison of Cycles.

TEXT BOOKS :

1. G F C Rogers and Y R Mayhew, "Engineering Thermodynamics Work and Heat Transfer" 4thed., Pearson, 2003.
2. P.K Nag, "Engineering Thermodynamics", 3rd ed., Tata McGraw Hill, 2005.

REFERENCES :

1. Y. A. Cengel and M. A. Boles, "Thermodynamics, An Engineering Approach", 4th ed., Tata McGraw Hill, 2003.
2. Yunus Cengel& Boles, "Thermodynamics – An Engineering Approach", 4th ed., Tata McGraw Hill, 2002.

II Year I Semester

L	T	P	To	C
3	1	-	4	4

ME221 MECHANICS OF SOLIDS

Course Description & Objective:

To establish an understanding of the fundamental concepts of mechanics of deformable solids; including static equilibrium, geometry of deformation, and material constitutive behavior.

To provide students with exposure to the systematic methods for solving engineering problems in solid mechanics.

To discuss the basic mechanical principles underlying modern approaches for design of various types of structural members subjected to axial load, torsion, bending, transverse shear, and combined loading.

Course Outcomes:

On completion of the course, the student will:

1. *Understand the concepts of stress and strain at a point as well as the stress-strain relationships for homogenous, isotropic materials.*
2. *To establish relation between shear load and shear force. And draw shear force and bending moment diagram*
3. *Derive flexural formula for simple bending and able to calculate variation shear stress – shear stress distribution for various cross sections*
4. *Calculate the stresses and strains associated with thin-wall spherical and cylindrical pressure vessels.*
5. *Determine the deflections and rotations produced by the three fundamental types of loads: axial, torsional, and flexural.*

UNIT – I: Stress and strain:

Types, Stress – strain diagram for ductile and Brittle materials, salient points. Elastic Constants- relations strain energy, Simple and compound bars Thermal Stresses - Stress on an inclined plane, principle stresses – Mohr circle

UNIT – II: Transverse Loading on Beams:

Types of loads and beams - Relation between shear load, shear force and bending moment -Shear force and bending moment diagrams - Cantilevers – Simply supported beams and over-hanging beams-point of contra flexure - For point loads and UDL.

UNIT – III: Bending stresses in Beams:

Theory of simple bending – Flexural formula- Bending stresses in beams for various cross sections. Shear stresses in beams-Introduction-derivation for variation of shear stress shear stress distribution for various cross sections.

UNIT – IV: Torsion: Introduction:

Torsion equation-shear stress distribution for circular solid and hollow shafts -Stepped shafts - Shafts fixed at both the ends. Thin Cylindrical Shells: Introduction-hoop and longitudinal stresses- strains thin spherical shell—stresses.

UNIT – V: Deflection of Beams:

Introduction-deflection equation for elastic curve of a beam –deflection, slope for cantilever beam and simply supported beams - for point loads and UDL. Double integration method - Macaulay's method - Area moment methods.

TEXT BOOKS:.

1. Egor P. Popov, " Engineering Mechanics of Solids", 3rd ed., Prentice Hall of India, 1997.
2. Srinath L.N., "Advanced Mechanics of Solids", 2nd ed., Tata McGraw Hill Publication, 2005.

REFERENCES :

1. Bhavikatti, "Strength of Materials", 3rd ed., New Age International Publishers, 1998.
2. S.Thinshenko "Strength of Materials", 2nd ed., D.Van Nostrand Company, 1978.
3. Arthur P. Borsei, "Advanced Mechanics of Materials", 6th ed., John Wiley & Sons Inc., 2003.

II Year I Semester	**L**	**T**	**P**	**To**	**C**
	4	-	-	4	4

ME217 MATERIAL SCIENCE & METALLURGY

Course Description Oobjectives:

To familiarize the students with the fundamentals of crystallography, metallurgy, heat treatment and metal properties.

Course Outcomes:

The student will be able to:

1. *understand and create the areas and domains in Materials & Metallurgical Engineering on the basis of his/her interest and opportunity available in present industrial scenario.*

2. *understand the basic principles of selection of materials and challenges to entrepreneurs in metallurgy*
3. *apply knowledge of basic, advanced science and engineering principles to problems in materials engineering.*
4. *design and conduct experiments as well as analyze and interpret data involving materials applications*
5. *possess the skills to utilize modern technical equipment and computational tools in the exercise of materials engineering practice.*
6. *process and select a material to meet desired needs.*

UNIT – I: Iron -Iron carbide diagram, constitution, microstructures & properties:

Cast Iron and Steels: Constitution, properties of gray, white, malleable and spherodial graphite cast irons. Effect of Silicon, Manganese, Sulphur, Phosphorous and other elements on the properties of Cast Iron. Effect of alloying elements such as Manganese, Nickel, Chromium, Molybdenum, anadium, Tungsten, Cobalt and Boron on steels, Plain Carbon Steels, Stainless Steel.

UNIT – II: Heat treatment of steel:

Types of Annealing, Normalizing, Hardening, Carburizing, Nitriding, Cyaniding, Induction hardening, Flame hardening, Aging, Hardenability, Controlled atmosphere in heat treatments, TTT and CCT Diagrams, Age hardening.

UNIT – III: Strengthening mechanisms:

Strengthening by grain-size reduction, solid solution strengthening, strain hardening, Recovery, recrystallization and grain growth, dispersion hardening. **Powder Metallurgy:** Introduction to powder metallurgy, advantages of powder metallurgy, manufacturing processes, production of powder compacting, sintering, products of powder metallurgy.

UNIT – IV: Ceramics:

Ceramic as a class of material, classification of ceramics, bonding and structure of various ceramic materials-AX type, Amxp type, AmBnXp type crystal structures; Pauling Rules, Zachariasen Rules, Stanworth rules, structure of silicates; defects in ceramics.

UNIT – V: Composites:

Introduction to Composites, Types of composites based on matrix and reinforcement, influence of fiber length, orientation and concentration, fracture behavior of fiber reinforced composites, toughness of composites. Manufacturing methods for composites: MMC's: liquid-metal infiltration, stir casting PMC: Extrusion, Injection moulding.

TEXT BOOKS:

1. Avner, "Introduction to Physical Metallurgy", McGraw Hill International Book Company, 1994.
2. William D. Callister, " Materials Science and Engineering an Introduction",Eigth edition - John Wiley & Sons, Inc.

REFERENCES :

1. Kodgire UD, "Material Science &Matellurgy", 12thed., Everest Publishing House.
2. Raghavan, V., " Mate rials Science and Engineering ", Prentice Hall of India Pvt. Ltd., 1999.
3. Muralidhara M.K., "Materials Science and Processes", DanpatRaiPublishingCo., 1998.
4. George E. Diter, " Mechanical Metallurgy", SI Metric edition-McGraw-Hill Book Company.

II Year I Semester	**L**	**T**	**P**	**To**	**C**
	3	1	-	4	4

ME216 FLUID MECHANICS AND HYDRAULIC MACHINES

Course Description & Objectives:

To familiarize the students with the properties of fluids and also enable themto various hydraulic machines.

Course Outcomes:

On completion of the course, the student would be able to:

1. *measure discharge in pipes determine the energy loss in conduits*
2. *demonstrate the characteristics curves of pumps*
3. *demonstrate the characteristics curves of turbines*
4. *carry out discharge measurements in open channel*
5. *select, operate and maintain fluid machinery based on fluid laws and characteristics*

UNIT – I: Basics of Fluid &Fluid Statics:

Units and Dimensions - Properties of fluids - density, specific gravity, specific weight, viscosity, compressibility, vapour pressure, Capillarity and surface tension. Forces on immersed surfaces. Introduction about center of pressure and buoyancy. Piezometer, U-tube & Differential Manometers.

UNIT – II: Fluid Kinematics & Dynamics:

Flow characteristics, concepts of system and control volume -Continuity equation - application of control volume to continuity - Energy equation – Euler equation - Bernoulli equation and Momentum equation.

UNIT – III: Flow Through Circular Conduits:

Laminar flow through circular tubes and boundary layer concepts -Boundary layer thickness – Hydraulic and energy gradient - Darcy equation on pipe roughness - Friction factor - Minor losses – Flow through pipes in series and in parallel.

UNIT – IV: Rotodynamic Machines:

Impact of jets -fixed and moving vanes-classification of turbines, impulse and reaction turbines, Pelton wheel, Francis turbine, Kaplan turbine-working proportions, work done, efficiencies, draft tube theory efficiency.

UNIT – V: Centrifugal and Reciprocating Pumps:

Classification, working Principles - Manometric head losses and efficiencies-specific speed-pumps in series and parallel. Reciprocating pumps-working-Discharge-slip-indicator diagram, Air vessels.

TEXT BOOKS :

1. Kumar K.L., “Engineering Fluid Mechanics “, 7th ed., Eurasia Publishing House (P) Ltd.,New Delhi,1995.
2. P.N.Modi and Seth, “Fluid Mechanics and Hydraulic Machines”,15th ed., Standard Book House, 2002.

REFERENCES :

1. R.K.Rajput, “A Text Book of Fluid Mechanics & Hydraulic Machines”, 3rd ed., S. Chand,2006.
2. Bansal R.K., “Fluid Mechanics and Hydraulic Machines”, 5th ed., Laxmi Publications (P)Ltd., New Delhi, 1995
3. Roberson J.A. & Crowe C.T., “Engineering Fluid Mechanics”, 4th ed., M/s Jaico PublishingCo., 1998.

II Year I Semester	**L**	**T**	**P**	**To**	**C**
	-	-	3	3	2

ME224 FLUID MECHANICS AND HYDRAULIC MACHINARY LAB

Course Description & Objectives:

To create awareness in students about the factors related to determination of efficiencies of hydraulic pumps and turbines.

Course Outcomes:

Upon the successful completion of the course, learners will be able to identify *and obtain the fluid properties and relationship between them, explain the principles of continuity, momentum, and energy equations as applied to fluid motions and analyze the different types of fluid flow though pipes and dimensional characteristics.*

List of Experiments:

1. Impact of jets on Vanes.
2. Performance Test on Pelton Wheel.
3. Performance Test on Francis Turbine.
4. Performance Test on Kaplan Turbine.
5. Performance Test on Single Stage Centrifugal Pump.
6. Performance Test on Multi Stage Centrifugal Pump.
7. Performance Test on Reciprocating Pump.
8. Calibration of Venturimeter.
9. Calibration of Orifice meter.
10. Determination of friction factor for a given pipe line.
11. Determination of loss of head due to sudden contraction in a pipeline
12. Verification of Bernoullie's equation

	L	T	P	To	C
II Year I Semester	**L**	**T**	**P**	**To**	**C**
	-	-	3	3	2

AE215 MECHANICS OF SOLIDS & MATERIALS LAB

Course Description & Objectives:

To create awareness in students about the methodology to find the mechanical properties of materials and to analyse the detailed structures.

Course Outcomes:

On completion of the lab course, the students would be able to perform the basic experiments on bending, torsion, compression and hardness test. They will also be able to identify the structure of various metals and alloys.

List of experiments: Mechanics of Solids Lab

1. Direct tension test
2. Bending test on

   a) Simply supported from   b) Cantilever beam
3. Torsion test
4. Hardness test

   a) Brinells hardness test   b) Rockwell hardness test
5. Test on springs
6. Compression test on cube
7. Impact test

List of experiments: Materials Lab

1. Preparation and study of the Micro Structure of pure metals like Iron, Cu and Al.
2. Preparation and study of the Microstructure of Mild steels, low carbonsteels, high – C steels.
3. Study of the Micro Structures of Cast Irons.
4. Study of the Micro Structures of Non-Ferrous alloys.
5. Study of the Micro structures of Heat treated steels.
6. Hardenability of steels by Jominy End Quench Test.
7. To find out the hardness of various treated and untreated steels.

II Year I Semester

L	T	P	To	C
-	-	3	3	2

AE213 THERMODYNAMICS LAB

Course Description & Objectives:

To create awareness in students about the thermodynamic properties of both liquid fuels and steam.

Course Outcomes:

The student would be able to perform experiments on flash/fire point apparatus, efficiency of condenser, blade etc, and calorific value of fuel.

List of experiments:

1. Test on grease penetrometer and dropping point apparatus
2. Test on redwood viscometer
3. Test on aniline point apparatus
4. Test on carbon residue, cloud and pour point apparatus
5. Test on flash & fire point apparatus
6. Study / demonstration on water tube & fire tube boilers
7. Study / demonstration of boiler mountings & accessories
8. Test on steam calorimeter to find dryness fraction of steam
9. Test on steam condenser to find condenser efficiency
10. Test on steam turbine to find blade efficiency
11. Trial on steam boiler
12. Estimation of calorific value of fuel

II Year II Semester

L	T	P	To	C
4	0	-	4	4

CS218 DATA STRUCTURES

Course Description & Objectives:

The main objective of this course is to provide an introduction to basic data structures and manipulating them, by using C programming language.

Course Outcomes:

Having successfully completed this course, the student will be able to:

1. *apply advance C programming techniques such as pointers, dynamic memory allocation, structures to developing solutions for particular problems;*
2. *design and implement abstract data types such as linked list, stack, queue and tree by using C as the programming language using static or dynamic implementations;*
3. *evaluate and choose appropriate abstract data types to solve particular problems;*
4. *design and implement C programs that apply abstract data types.*

Unit I: Introduction to data structures:

Introduction – Data, Data type, Data Structures – Primitive and Non-primitive, Storage structures – Sequential and linked storage representations, File structures, Abstract Data Type (ADT). Overview of Structures-arrays, operations on arrays(retrieval of an element, search an element, insertion deletion of an element), manipulations on arrays such as finding the sum of elements of an array, adding two arrays, and reversing an array. Maximum sub sequence problem, Multi dimensional arrays.

Unit II: Lists:

Linked Lists: Types of Linked Lists Singly Linked List, Doubly Linked List, Circular Linked List. Operations on linked lists-insertion, deletion, traversing forward/reverse order. Multi lists, Applications of Linked Lists.

Unit III: Array:

Stacks – ADT, array and linked representations, Implementation and their applications. Queues – ADT, array and linked representations, Implementation of linear, circular and doubly-ended queues, and their applications.

Unit IV: Binary:

Preliminaries –Binary Tree – ADT, array and linked representations, Binary

tree properties, tree traversal, Implementation, Expression trees. The Search Tree ADT –
Binary Search Trees, Implementation. AVL Trees – Single Rotations, Double rotations.

Unit V: Graphs and applications:

Graphs – ADT, definitions and properties, modeling problems as graphs, representation – adjacency matrix and adjacency list, basic graph traversals – breath first search and depth first search. Applications of graphs.

TEXT BOOKS:

1. Richard F.Gilberg, Behrouz A. Forouzan, Data Structures - A Pseudo code Approach with C, Second Edition, Cengage Learning.
2. Y.Langsam, M.J.Augeustein and A.M.Tenenbaum, “Data Structures Using C”, Pearson Education Asia.

REFERENCES :

1. Mark Allen Weiss, “Data Structures and Algorithm Analysis in C”, Second Edition, Pearson Education.
2. Sartaj Sahni, Data Structures, Algorithms and Applications in C++ , Universities Press, Second Edition, 2005
3. Jean Paul Tremblay and Paul G. Sorenson, An Introduction to Data Structures with Applications,Tata Mc-Graw Hill, Second Edition, 26th Reprint 2004
4. KRUSE, Data Structures and Programming Design-PHI

II Year II Semester	L	T	P	To	C
	3	1	-	4	4

HS213 PROBABILITY & STATISTICS

Course Description & Objectives:

To enable the student to acquire skills in handling situations involving more than one random variable and functions of random variables. To introduce to the notion of sampling distributions and they will acquired knowledge of statistical techniques useful in making rational decision in management problems.

Course Outcomes:

The students will understand the use of:

1. *statistical techniques like regressions, Correlation, probability*

distribution.

2. *test of hypothesis, useful in their research work, academics and applications*
3. *techniques at work places as well as in their real life.*

Unit – I: Probability:

Axiomatic definition, conditional probability, Baye's theorem, Dependent and independent events, Random variables. Distribution function, probability mass and density functions, expectation, Chebyshev's inequality

Unit-II: Distributions types:

Bernoulli, binomial, Poisson, uniform, exponential, independence of random variables normal and Poisson approximations to binomial

Unit – III: Estimation and Sampling Distributions:

Population, sample, parameters, point estimation, unbiasedness, consistency. Comparing two estimators, confidence interval estimation for mean. Difference of means, variance, proportions, sample size problem

Unit – IV: Hypotheses test:

Test of hypotheses- test of means, variance, two sample problems, test of proportions, relation between confidence interval and Test of hypotheses, chi-square goodness of fit, F- test, T-test

Unit-V: Correlation & Regression:

Correlation & Regression - Simple linear regression, curve fitting. Covariance correlation tests for slope and correlation, analysis of variance, regression analysis

TEXT BOOKS:

1. S.C. Gupta and V.K. Kapoor, "Fundamentals of Mathematical Statistics", 12th ed., Sultan Chand & Co., New Delhi, 2005.
2. Shanaz bahthul, "Probability & Statistics", Unitech Publishers, 2008.

REFERENCES :

1. G.S.S. Bhismarao, "Probability and statistics for engineers", 4th ed., SciTech publications, 2010.
2. B.V. Ramana, "Engineering Mathematics", 3rd ed., Tata McGraw Hill, 2008.
3. Miller and Freund, "Probability & Statistics for Engineering", pearson, 2001.
4. Kumar and Sah , "Thermal Engineering", 2nd edition, Narosa

II Year II Semester

L	T	P	To	C
3	1	-	4	4

AE212 DESIGN OF MACHINE ELEMENTS

Course Description & Objectives:

To impart basic knowledge of engineering design against the static and dynamic loading by considering strength and rigidity.

Course Outcomes:

By completing this course, the students will have the ability to:

1. *design the components against static loading.*
2. *design the components against cyclic loading.*
3. *design the fasteners like rivets, bolts and cotter joints.*
4. *design power transmission shafts and couplings*
5. *calculate stress and load along with deformations of various types of springs*

UNIT – I: Fundamentals of Machine Design andSelection of Materials:

Meaning of Design, Mechanical Engineering Design, Principles of Design, Phases of Design, Design Considerations & Procedure, Ergonomics, Factor of safety, Principle Stresses, Theories of Failures. Designation of materials & ISI specifications, material selection, general principles of design for manufacturing & assembly, Standardization.

UNIT – II: Design for Fluctuating Loads:

Fluctuating stresses, S-N diagram for fatigue loading, Endurance limit, Endurance strength modifying factors, Stress concentration-causes and remedies, Notch sensitivity, Design for finite and infinite life under reverse stresses, Cumulative damage in fatigue failures, Soderberg and Goodman diagrams, Modified Goodman diagram.

UNIT – III: Design of Welded, Bolted & Riveted Joints: Types, stresses, joints in tension and shear, design for eccentrically loaded joints

UNIT – IV: Design of Joints and Springs:

Cotter Joint, Socket & Spigot Joint, Knuckle Joint. Types of springs, materials, stresses, deflections, Wahl's factor, design of helical spring, compound spring, leaf springs.

UNIT – V: Design of Shafts, Keys and Couplings:

Design of shafts for torsion, bending, combined loading and rigidity. Design of keys, Design of muff, flange couplings, bushed pin flexible coupling, Oldham and universal coupling.

TEXT BOOKS :

1. Bhandari V. B., "Design of Machine Elements", 2nd ed., Tata McGraw-Hill Publishing Company Ltd., New Delhi
2. Joseph E. Shigley& Larry D. Mitchell, "Mechanical Engineering Design", 6th ed., McGraw-Hill International Book Company

REFERENCES :

1. M.F. Spotts& T.E. Shoup, "Design of Machine Elements", 7th ed., Pearson Education.
2. George E. Dieter, Second ed., "Engineering Design - A Material and Processing Approach", 2nd ed., McGraw-Hill International.
3. Robert C. Junivall, "Fundamentals of Machine Component Design", 4th ed., John Wiley & Sons, 2000.
4. Paul H. Black & O. Eugene Adams Jr., "Machine Design", 3rd ed., McGraw- Hill International ed., 2004

II Year II Semester	L	T	P	To	C
	3	1	-	4	4

AE214 FUNDAMENTALS OF I.C. ENGINES

Course Description & Objectives:

To develop the basc knowledge of I.C. Engine working & how combustion takes places and to gain knowledge about the fuel system used in I.C engine. To educate the student about supercharging techiques, cooling systems & lubrication systems and its functions.

Course Outcomes:

On successful completion of this course students will be able to:

1. *Understand the constructional and working principles of SI & CI engine.*
2. *Familiarize with modern technology in fuel system of SI & CI engines.*
3. *Learn the concept of SI & CI engine combustion in microscopic level and also the basic design of combustion chambers.*
4. *Know the concept and methods of turbo charging in addition to engine performance and combustion measurement.*
5. *Understand the different types of cooling system lubrication system employed in engines.*

UNIT – I: Engine Cycles:

Otto, Diesel and Dual air standard cycles, comparison, fuel-air cycle, actual cycle, Deviation of actual cycle from air standard cycle.

Introduction to I. C. Engine: History, Basic engine components and nomenclature, Classification with respect to cycle of operation, working principle, fuel used, cylinder arrangement, cooling method, purpose, Valve timing diagram, Port timing diagram, Engine selection criteria for different applications.

UNIT – II: Engine Construction:

Cylinder head, cylinder block, crank case, sump, cooling passages, cylinder liners, piston types, piston rings, connecting rods, crank shafts, valves, valve seat inserts, valve actuating mechanisms, drive mechanisms

UNIT – III: Fuels:

Availability and properties of fuels, Octane number, Cetane number. **Bio-fuels:** Various vegetable oils for engines, esterification, performance in engines, performance and emission characteristics, bio diesel and its characteristics. (Conventional fuels, properties etc.)

UNIT – IV: Fuel Supply System in S.I. Engine :

Carburetion, Factors affecting carburetion, Mixture requirements, Principal of carburetion, simple carburetor, Calculation of air fuel ratio, limitations of carburetor, Altitude compensation, Gasoline injection- Direct, port, manifold injection, Electronic fuel injection system. **Fuel Supply System in C. I. Engine :**Requirements & types of injection systems, fuel injection pumps, injectors, governor – mechanical, pneumatic, common rail fuel injection, electronic injection system.

UNIT – V: Lubrication System:

Mechanical friction, factors affecting friction, pumping losses, blowby losses, lubrication of engine components, lubricating systems. **Cooling System:** Temperature distribution of engine components, Need of cooling system, air cooling, liquid cooling, types, comparison.

TEXT BOOKS:

1. Richard L.Bechfold, “Alternative Fuels Guide Book”, 2nd ed., SAE I nternational, Warrendale, 1997.
2. I. C. Engine Fundamentals, Heywood J.B., 2nd ed., McGraw Hill Book Co., New Delhi, 2002.
3. I.C. Engine, 3rd ed., V. Ganeshan, Tata McGraw Hill.

REFERENCES :

1. “Automobiles and Pollution” SAE Transaction, 1995.
2. V. L.Maleev, “I. C. Engine”, 2nd ed., McGraw Hill Book Co. Ltd., New Delhi.
3. Gill P. W., Smith J. H., Zurich E. J., “Fundamentals of I. C. Engine”, 3rd ed., Oxford & IBH Pub. Co., New Delhi, 1999.
4. Mathur& Sharma, “I. C. Engine”, DhanpatRai& Sons, New Delhi, 2000.

II Year II Semester

L	T	P	To	C
3	1	-	4	4

ME218 KINEMATICS OF MACHINES

Course Description & Objectives:

The students will understand the basic concepts of machines and able to understand constructional and working features of important machine elements. The students should be able to understand various parts involved in kinematics of machines for different applications.

Course Outcomes:

On completion of the course, the student would be able to:

1. *familiarize with common mechanisms used in machines and everyday life.*
2. *able to calculate mobility (number of degrees-of-freedom) and enumerate rigid links and types of joints within mechanisms.*
3. *able to conduct a complete (translational and rotational) velocity, acceleration analysis of the mechanism and to understand steering mechanism and the importance of universal (Hooke's) joint*
4. *understand various cam motion profiles and follower mechanism , their classification and design based on the prescribed follower motion (SHM , constant velocity and acceleration)*
5. *able to understand gear mechanism classification and to become familiar with gear standardization and specification in design.*
6. *understand importance gear trains and their practical applications.*
7. *know the advantages of belt drives, types and their nomenclature, relationship between belt tensions commonly used design parameters.*

UNIT – I: Introduction:

Statics and dynamics, links, classification of links, kinematic pairs-classification, degrees of freedom, constrained motion-types, kinematic chains, mechanisms, inversions of quadratic chain, single slider crank chain and double slider crank chain.

Straight line motion mechanisms: classification of straight line motion mechanisms, peaucellier's, grass hopper and Pantograph mechanisms.

UNIT – II: Velocity and acceleration in Mechanisms:

Motion of a link in machine, velocity of a point on a link – Instantaneous center – types of instantaneous centers – kennedy theorem – velocity measusrement by Instantaneous center method, Relative velocity method. **Acceleration of a**

point on a link - acceleration in slider crank mechanism, Coriolis component of accleration.

Steering gear mechanism: Davis and Ackerman steering gear, Single and Double Hook Joint analysis.

UNIT – III: Cams:

Definitions, Types of cams and followers, types of follower motion, generation of cam profiles for uniform velocity, uniform acceleration and simple harmonic motion. Maximum velocity and maximum acceleration, analysis of roller follower and circular cam with straight flanks.

UNIT – IV: Gears:

Friction wheels and toothed gears- types-law of gearing, condition of constant velocity ratio for transmission of motion- cycloidal and involute teeth profiles, velocity of sliding-interference - condition for minimum number of teeth to avoid interference- expressions for arc of contact and path of contact.

UNIT – V: Gear Trains:

Introduction, Types of Gear Trains – Simple, Compound, Reverted and epicyclic gear train, velocity ratio – epicyclic gear train with bevel gears.

Belts: Introduction, types of belts, materials, length of open & cross belt drive, slip & creep of the belt, power transmission by a belt, angle of contact, centrifugal tension, condition for maximum power transmission, initial tension.

TEXT BOOKS:

1. A.Ghosh & A.K. Mallik, "Theory of Mechanisms and Machines", 2nd ed., Affiliated EWP Press, 2007.
2. S.S. Rattan, "Theory of Machines", 3rd ed., Tata McGraw-Hill Publishing Company Limited, New Delhi, 2009.

REFERENCES :

1. Jagdish Lal, "Theory of Mechanisms and Machines", 2nd ed., Metropolitan Book Company, 1998.
2. J. E. Shigley, J. J. Uicker and G.Pennock, "Theory of Machines and Mechanisms", 4th ed., Oxford University Press, 2010.

II Year II Semester

L	T	P	To	C
-	-	3	3	2

HS217 SOFT SKILLS LAB

Course Description & Objectives:

The Soft Skills Laboratory course equips students with required skills such as interpersonal skills, communication skills, leadership skills etc. It aims at training undergraduate students on employability skills to win in the job interviews and building confidence to handle professional tasks.

Course Outcomes:

The course aims to help students to develop formal communication skills in a work place, make them acquire team skill by working in group activities and equip them with suitable language and speech patterns in a workplace. It also will enhance the ability of critical & lateral thinking while addressing the issues at any situation and enable them to present themselves confidently in job interviews

UNIT-I: Personality Development:

a) Role of language in Personality – How language reflects, impacts personality – Using gender-neutral language in MNCs – being culturally sensitive.

Activity – Appraising each other – Worksheets related to the above

b) Career Planning- job vs. career- goal setting- SWOT analysis- planning and prioritization - four quadrant time management system - time management – self-management – stress-management.

Activity: Setting a SMART goal - SWOT analysis of the self – Writing a Statement of Purpose (SOP).

c) Effective Resume-Writing: structure and presentation - planning and defining the career objective - projecting one's strengths and skill-sets – summarizing - formats and styles - covering letter.

Activity: Resume preparation –writing a covering letter.

UNIT-II: Functional English:

A) Functional English - Formal/informal context – purpose - interpersonal dynamics - ideation –content organization - initiating a conversation – responding appropriately - right body language.

Activity - Role play in different situations, - self-introduction - social background (family, home town etc.,) - role model - my future - likes/dislikes (movies, persons, places, food, music etc.,) - a mini project on functional English.

b) Vocabulary-Building: Etymology of words - word roots - prefixes & suffixes - synonyms & antonyms- collocations - one-word substitutes – analogies - idioms and phrases - contextual guessing of unfamiliar words – task-oriented learning (100 words).

Activity: Flash cards (200 words) – vocabulary exercises with hand-outs.

UNIT-3: Group discussion and interview:

a) Group Discussion: Articulation and flow of oral presentation - dynamics of group discussion – intervention – summarizing - voice modulation – content generation – Key Word Approach (KWA) – Social, Political, Economic, Legal and Technical Approach (SPELT) – View Point of Affected Part (VAP) - language relevance - fluency and coherence.

Activity: Mock sessions on four types of GD topics.

b) Facing Interviews: Interview process - understanding employer expectations - pre-interview planning - opening strategies - answering strategies – stress-based interviews - tele-interviews, video interviews-frequently asked questions (FAQs).

Activity: Writing responses to FAQs - mock interviews.

UNIT-4: Reading and listening skills:

a) Reading Comprehension: Reading as a skill- techniques for speed reading- skimming- scanning- appreciating stylistics - impediments for speed reading - eye fixation - sub-vocalisation - critical reading - reading based on purpose - reading for information - reading for inference -understanding tone.

Activity: Reading comprehension exercises with texts drawn from subject areas. (Hand-outs)

b) Listening Comprehension: Listening as skill - different types of listening - hidden data of communication - active listening - top-down approach - bottom-up approach.

Activity: Following different accents (Indian, British, American) listening comprehension exercises with audio and video excerpts.

UNIT-5: Reasoning and Analytical thinking:

a) Data Commentary: Deductive & inductive reasoning - data interpretation - tables & charts - bar charts - pie charts - line graphs - ratios & proportions – percentages - coding and decoding - reasoning by analogy - artificial language etc.,

b) Analytical Thinking: Statement and Conclusion - Data Sufficiency - Statement and Argument - Statement and Assumption - Logical Deduction - Logical Problems.

Activity: Exercises with handouts

REFERENCES :

1. Edward Holffman, Ace the Corporate Personality, McGraw Hill,2001
2. Adrian Furnham, Personality and Intelligence at Work, Psychology Press, 2008.
3. John Adair Kegan Page, “Leadership for Innovation” 1st edition, Kogan, 2007.
4. M.Ashraf Rizvi, “Effective Technical Communication”, 1st edition, Tata

McGraw Hill, 2005.

5. Krishna Mohan & NP Singh , "Speaking English Effectively" 1st edition, Macmillan, 2008.
6. Soft Skills Material of Infosys Under the Academic Initiative of Campus Connect
7. K.R. Lakshminarayana & T. Murugavel, "Managing Soft Skills", Scitech Publications. 2009
8. Dr. S.P. Dhanvel, English and Soft Skills, Orient Blackswan, 2011
9. Rajiv K. Mishra, Personality Development-, Rupa & Co. 2004.
10. R.S.Agarwal, Quantitative Aptitude, S. Chand& Co. Latest edition.
11. R.S.Agarwal, Verbal & Non-verbal Reasoning, S. Chand& Co. Latest edition.

II Year II Semester	L	T	P	To	C
	-	-	3	3	2

ME214 MACHINE DRAWING

Course Description & Objectives:

Students will learn to apply principles of technical drawing and acquire skills in the use of appropriate computer aids for effective preparation of 3D models in Machine Drawing.

Course Outcomes:

Students will have fundamental knowledge of drawing of different machine parts such as sectional views, bolts, nuts and lock nuts.

Total 12 sheets to be drawn, minimum being 10

Sheet 1	:	conversion of isometric views to orthometric views
Sheet 2	:	conversion of optometric views to isometric views
Sheet 3	:	conventions of different materials and standard components
Sheet 4	:	sectional views
Sheet 5	:	fasteners, bolts and nuts, locknuts
Sheet 6	:	keys, couplings

Assembly drawing

Sheet 7	:	stuffing box

Sheet 8	: eccentric
Sheet 9	: screw jack
Sheet 10	: connecting rod
Sheet 11	: swivel bearing
Sheet 12	: piston assembly

TEXT BOOKS:

1. K.L. Narayana, “Machine Drawing”, 3rd ed., New Age International, 2007.

REFERENCES :

1. N.D. Bhatt, “Machine Drawing”, Charotar Publishing House, 2008.
2. R.K. Dhawan, “Machine Drawing”, 2nd ed., S.Chand & Company Ltd., 1998.

II Year II Semester	**L**	**T**	**P**	**To**	**C**
	-	-	3	3	2

AE216 I.C. ENGINES LAB

Course Description & Objectives:

Students undergoing this course would gain knowledge about the working of I.C engines and will have the knowledge about the working of ignition and fuel system.

Course Outcomes:

Upon the successful completion of the course, learners will be able to:

1. *Explain the various working cycles of engine*
2. *Describe the various types of combustion in IC engines.*
3. *Illustrate the engine combustion parameters.*
4. *Describe the different types of modern engines.*
5. *Explain the modern electronic engine management system (EMS) of IC engines.*

List of experiments:

1. Construction details of I.C. engine.
2. Demonstration & plotting valve timing and port timing diagram.
3. Demonstration on ignition systems.

4. Demonstration of fuel feed pumps.
5. I.C. Engines Performance Test (4 -Stroke Diesel Engines).
6. Evaluation of Engine friction by conducting Morse test on 4-Stroke Multi cylinder Petrol Engine.
7. I.C. Engines Heat Balance.
8. I.C.Engines Air/Fuel Ratio and Volumetric Efficiency
9. Performance Test on Variable Compression Ratio Engines, economical speed test.
10. Performance Test on Reciprocating Air – Compressor Unit.
11. Study of Boilers.
12. Dis-assembly / Assembly of Engines.

VFSTR UNIVERSITY

III Year - B.Tech

SYLLABUS

I SEM & II SEM

III Year I Semester

L	T	P	To	C
3	1	-	4	4

AE 319 ADVANCED THEORY OF I.C. ENGINES

Course Description & Objectives:

The course aims to develop the students with the knowledge about the advanced theory and working of I.C engines and the phenomena of combustion and modelling.

Course Outcomes:

Upon the successful completion of the course, learners will be able to

1. *Explain the various working cycles of engine*
2. *Describe the various types of combustion in IC engines.*
3. *Illustrate the engine combustion parameters.*
4. *Describe the different types of modern engines.*
5. *Explain the modern electronic engine management system (EMS) of I.C engines.*

UNIT - I: Introduction:

Fuel air cycle and Actual cycle analysis, Properties of IC engine fuels, Refining process, chemical composition and molecular structure of fuels, octane number, cetane number. Knock rating of SI engine fuels.

UNIT - II: Combustion of Fuels:

Combustion Stoichiometry of petrol, diesel, alcohol and hydrogen fuels – Chemical energy and heating values – Chemical equilibrium and maximum temperature – SI engine combustion – Flame velocity and area of flame front –performance number – CI engine combustion. Fuel spray characteristics – droplet size, penetration and atomization.

UNIT - III: Combustion Modelling:

Basic concepts of engine simulation – Governing equations, thermodynamic models – SI engine and CI engine models.

UNIT - IV: Non-Conventional I.C. Engines:

Adiabatic and L.H.R. engines – Variable compression ratio engine – Wankel rotary combustion engine – Free piston engine - MAN combustion chamber and multi fuel engines – Stratified charge and lean burn engines – Locomotive and marine engines.

UNIT – V: Combustion Analysis in I.C. Engines:

Photographic studies of combustion processes – P-è diagrams in SI and CI engines, Rate of heat release – hot wire and laser Doppler anemometry and velocimetry for flow and combustion analysis in IC engines.

TEXT BOOKS:

1. Ganesan,V., Internal combustion engines, Tata McGraw Hill Publishing Co., 1994.
2. John,B., Heywood, Internal Combustion Engine Fundamentals, McGraw Hill Publishing Co., New York, 1990.

REFERENCES:

1. Ramalingam. K.K., Internal Combustion Engine, scitech publications, Chennai, 2003.
2. Ganesan,V., Compute Simulation of Spark Ignition engine process, Universities Press (India) Ltd., Hyderabad, 1996.
3. Benson, R.S., Whitehouse, N.D., Internal Combustion Engines, Pergamon Press, Oxford, 1979

III Year I Semester	L	T	P	To	C
	3	1	-	4	4

ME319 DYNAMICS OF MACHINES

Course Description & Objectives:

The course will focus on the study of forces, motion and inertia in machines and performance of machines under dynamic conditions and their analysis.

Course Outcomes:

On completion of the course, the students would be able to:

1. *do static and dynamic force analysis on slider crank mechanism but also on other mechanisms.*
2. *demonstrate the torque analysis on any kind of fly wheel i.e., either on engine flywheel or machine flywheel*
3. *calculate the brake force analysis on any type of four wheeler 4. Able to perform the experiment and measure the torque acting on a dynamometer*
4. *conduct experiment on the effect of the gyroscopic torque on any moving/rotating machine*
5. *demonstrate the working principle of a governor and able to identify different types of governors in actual practice*
6. *design different types of bearings.*

7. *calculate the axial force acting/required to operate any clutch.*
8. *do experiment and find out amount of balancing mass required to keep the system in dynamic equilibrium*
9. *balance various types of reciprocating engines.*
10. *understand the types of vibrations developed during functioning of any mechanical system*
11. *find the critical speed of any rotating shaft carrying weights/rotors by conducting experiment.*

UNIT – I: Static and dynamic force analysis:

Introduction, analytical methods to find displacement, velocity and acceleration of the piston, forces acting on connecting rod and crank. **Flywheel:** Turning moment diagram, determination of work done and power from turning moment diagram, fluctuation of energy, flywheels.

UNIT – II: Brakes:

Block brakes, band brakes, differential band brakes, self locking and self energizing brakes, braking force analysis of a four wheeler. **Gyroscope:** Precision motion and its effect on stability of ships, Aeroplanes, and four wheelers.

UNIT – III: Governors:

Watt, Porter and Proell governors, spring loaded governors-Hartnell and Hartung governors, terms associated with governor performance - sensitiveness, isochronism and hunting. **Clutches:** Uniform pressure and uniform wear, single plate and multiplate clutches, cone clutch.

UNIT – IV: Balancing of Rotating Masses:

Balancing of rotating masses, single and multiple masses acting at single and different planes. **Balancing of Reciprocating Masses:** primary, secondary balancing, analytical and graphical methods, unbalanced forces and couples, locomotive balancing- hammer blow, swaying couple and tractive efforts,balancing of inline engines.

UNIT – V: Longitudinal Vibrations:

Introduction – Definitions – Types of Vibrations –Free Longitudinal Vibrations – Damped Vibrations – Logarithmic Decrement – Forced Vibrations – Vibrations Isolation and Transmissibility. **Transverse & Torsional vibrations** – Whirling of Shafts – critical speeds -Free Torsional vibrations - Two rotor systems.

TEXT BOOKS:

1. J.E. Shigley, "Theory of Machines & Mechanisms", 4th ed., Oxford University Press, 2010.
2. R.S.Khurmi and J.K.Gupta, "Theory of Machines", 15th ed., Eurasia

Publishing House (Pvt.) Ltd., New Delhi, 2009.

REFERENCES:

1. William J. Thomson, "Theory of Vibrations with Applications", 5th ed., Prentice Hall, 1997.
2. J.S. Rao and R.V. Dukkipati, "Mechanism and Machine Theory", 2nd ed., New Age International, 2009.
3. S.S. Rattan, "Theory of Machines", 3rd ed., Tata Mc Graw-Hill Education Pvt. Ltd., New Delhi, 2009.

III Year I Semester	**L**	**T**	**P**	**To**	**C**
	3	1	-	4	4

AE 323 AUTOMOTIVE COMPONENTS DESIGN

Course Description & Objectives:

Course aims to equip the student to analyze the stress and strain on transmission components; and understand, identify and quantify failure modes for the parts. They would be able to demonstrate knowledge on classification /types, functions, materials used, constructional details, methods of manufacturing, Troubles & Remedies.

Course Outcomes:

Upon the successful completion of the course, learners will be able to:

1. *select and design a suitable clutch for the drive system*
2. *select suitable gear ratio and number of speeds to design the gear box for any system.*
3. *estimate the load, moment and stresses on frame members and suspension.*
4. *estimate the load, moment and stresses on front axle and steering system.*
5. *estimate the load, moment and stresses on final drive and rear axle*

UNIT – I: Spur Gears:

Force analysis, Number of teeth, Face width & Beam strength of gear tooth, Incremental dynamic tooth load, Effective load on gear tooth, Estimation of module based on beam strength and wear strength, Spur gear design for maximum power transmission.

Helical Gears: Virtual number of teeth, Tooth proportions, Force analysis, Beam strength and Wear strength of helical gears, Effective load on gear tooth, Herringbone gear.

UNIT – II: Bevel Gears:

Types, Terminology of bevel gears, Force analysis, Beam strength and Wear strength of bevel gears, Effective load on gear tooth, Spiral bevel gears. **Worm Gears**: Terminology, Force analysis, Friction in worm gears, Vector method, Strength rating and wear rating of worm gears, Thermal considerations.

UNIT – III: Gear Box Design:

Ray diagram, gear box configuration and design. **Design of Levers:** Types, Applications in Automobile, design of levers – Rocker arm lever, hand and foot levers.

UNIT – IV: Design and selection of standard components:

Design of flat pulleys, wire ropes, Selection of flat belts,V belts, chains, electric motors, oil seals and gaskets.

UNIT – V: Engine Component Design:

Design of Piston, Piston pin, Connecting Rod, Crankshaft, Cylinder liner, cylinder head.

DESIGN DATA BOOK:

1. PSG Design data book.

TEXT BOOKS:

1. Design of Machine Elements, Bhandari V. B., 2nd ed., Tata McGraw-Hill Publishing Company Ltd., New Delhi, 2000.
2. Mechanical Engineering Design, Joseph E. Shigley & Larry D. Mitchell 6th ed., McGraw-Hill International Book Company, New York.

REFERENCES:

1. M.F. Spotts& T.E. Shoup, “Design of Machine Elements”, 7th ed., Pearson Education.
2. George E. Dieter, “Engineering Design - A Material and Processing Approach”, 2nd ed., McGraw-Hill International edition.
3. Robert C. Junivall, “Fundamentals of Machine Component Design”, 4th ed., John Wiley & Sons, 2000.
4. Paul H. Black & O. Eugene Adams Jr., “Machine Design”, 3rd ed., McGraw- Hill International edition.

III Year I Semester

L	T	P	To	C
4	-	-	4	4

AE 325 AUTOMOTIVE TRANSMISSION

Course Description & Objectives:

To develop the basic knowledge of the students in mechanics, torque conversion areas. To develop the skills of the students in the areas of alternative drives and concepts. To serve as a pre-requisite course for other courses in UG and PG programs specialized studies and research.

Course Outcomes:

On successful completion of this course students will be able to:

1. *understand the concept of gear motions, drive line positions.*
2. *study about different types of gearboxes.*
3. *know about the multi stage and polyphase torque converters, performance characteristics*
4. *study about Automatic transmission*
5. *learn about the different drive systems.*

UNIT I: Vehicle Layouts:

Introduction, Classification of automobile, Types of chassis layout with reference to power plant locations and type of drive, Types of chassis- fully forward, semi forward, Truck or bus chassis, two & three wheeler chassis layout

Clutches: Principle, functions, general requirements, torque capacity, types of clutches, cone clutch, single-plate clutch, diaphragm spring clutch, multi-plate clutch, centrifugal clutch, electromagnetic clutch, lining materials, over-running clutch, Clutch control systems.

UNIT II: Gear Box and Hydrodynamic Drives:

Objective of the gear box. Problems on performance of automobile such as Resistance to motion, Tractive effort, Engine speed & power and acceleration. Determination of gear box ratios for different vehicle applications. Different types of gear boxes.

Principles, performance and limitations of fluid coupling Constructional details of a typical fluid coupling. Reduction of drag torque, Principle, construction and advantages of hydrodynamic torque converters. Performance characteristics, converter couplings. Multi-stage Torque converter and poly phase torque converter.

UNIT III: Automatic Transmission

Ford – T model gear box, Wilson gear box- Cotal electric transmission– Hydraulic control systems of automatic transmission.

UNIT IV: Hydrostatic Drive And Electric Drive

Principle of hydrostatic drive systems. Construction and working of typical drives. Advantages and limitations. Control of hydrostatic transmissions, Principle of electric drive. Early and modified Ward Leonard control systems.

UNIT V: Automatic Transmission Applications

Chevrolet "Turboglide" transmission. Toyota's Automatic transmission with Electronic control system. Continuously Variable Transmission (CVT) – types – Operations.

TEXT BOOKS:

1. Newton, Steed &Garrot, "Motor Vehicles", 13th ed., Butterworths London,2001.
2. Judge A. W., "Modern Transmission", 3rd ed., Chapman & Hall Std., London, 1989.
3. Chek Chart, "Automatic Transmission", A Harper & Raw Publications, 1998.

REFERENCES:

1. Giles J. G., "Steering, Suspension &Tyres", Lliffe Book Ltd.,London
2. Steed W., "Mechanics of Road Vehicles", Lliffe Book Ltd.
3. N K Giri, "Automotive Mechanics", 8th ed., Khanna Publishers, Delhi,
4. Heisler, "Vehicle and Engine Technology", 2nd ed., SAE International Publication.
5. Heisler, "Advanced Vehicle Technology", 2nd ed., SAE International Publication.
6. J. Reimpell H. Stoll, J. W. Betzler, "The Automotive Chassis", SAE International Publication

III Year I Semester	**L**	**T**	**P**	**To**	**C**
	4	-	-	4	4

AE 327 AUTOMOTIVE CHASSIS (DEPT. ELECTIVE - I)

Course Description & Objectives:

To understand different types of chassis and to gain knowledge about different types of steering geometry and types of front axle. To educate the students regarding the ergonomics of an automobile and to educate about modern drive line.

Course Outcomes:

On successful completion of this course students will be able to:

1. *Understand the different types of chassis frames.*
2. *Gain knowledge about different steering geometry and types of front axle.*
3. *Study about the various suspension systems*
4. *Study about modern drive line.*
5. *Learn about the different braking systems like power brake, assisted brakes, disc brakes.*

UNIT I: Introduction:

Layout with reference to power plant, steering location and drive, frames, Frameless constructional details, materials, testing of frames, integral body construction.

UNIT II: Front Axle Steering System:

Front axle type, rigid axle and split axle, Constructional Details, Materials, Front wheel geometry viz., camber, castor, kingpin inclination, toe-in and toe-out. Condition for true rolling motion of road wheels during steering. Steering geometry. Ackermann and Davis steering. Construction details of steering linkages. Different types of steering gear box. Steering linkages layout for conventional and independent suspensions. Turning radius, instantaneous centre, wheel wobble and shimmy. Over-steer and under-steer. Power and power assisted steering.

UNIT III: Drive Line Study:

Effect of driving thrust and torque –reaction .Hotchkiss drives. Torque tube drive, radius rods. Propeller shaft. Universal joints. Final drive- different types. Two speed rear axle. Rear axle construction-full floating, three quarter floating and semi-floating arrangements. Differential-conventional type, Non-slip type, Differential locks and differential housing.

UNIT IV: Braking System

Type of brakes, Principles of shoe brakes. Constructional details – materials, braking torque developed by leading and trailing shoes. Disc brake, drum brake theory, constructional details, advantages, Brake actuating systems. Factors affecting brake performance, Exhaust brakes, power and power assisted brakes. Testing of brakes.

UNIT V: Suspension Systems:

Types of suspension, Factors influencing ride comfort, Types of suspension springs-independent suspension- front and rear. Rubber, pneumatic, hydro-elastic suspension. Shock absorbers. Types of wheels. Construction of wheel assembly. Types of tyres and constructional details. Static and rolling properties of pneumatic tyres, tubeless tyres and aspect ratio of tubed tyres.

TEXT BOOKS:

1. K. Newton, W.Steeds and T.K.Garret, “The Motor Vehicle”, 13th Edition, Butterworth Heinemann, India, 2004.
2. P.M.Heldt, “Automotive Chassis”, Chilton Co., New York, 1982.
3. W.Steed, “Mechanics of Road Vehicles”, Illiffe Books Ltd., London. 1992.

REFERENCES:

1. Harban Singh Rayat, “The Automobile”, S. Chand & Co. Ltd, New Delhi, 2000.
2. G.J.Giles, “Steering Suspension and Tyres”, Illiffe Books Ltd., London, 1975.
3. Kirpal Singh, “Automobile Engineering”, Standard publishers, Distributors, Delhi, 1999.
4. G.B.S.Narang, “Automobile Engineering”, Khanna Publishers, Twelfth reprint New Delhi, 2005.
5. R.P.Sharma, “Automobile Engineering”, Dhanpat Rai & Sons, New Delhi, 2000.

III Year I Semester	L	T	P	To	C
	4	-	-	4	4

AE 329 TWO AND THREE WHEELERS TECHNOLOGY (DEPT. ELECTIVE - I)

Course Description & Objectives:

To develop the basic knowledge of the students in constructional details of two and three wheelers. To develop the skills of the students in the operating principles.

Course Outcomes:

On successful completion of this course students will be able to:

1. *understand the working of two and four stroke engines.*
2. *understand the functioning of clutch and gear box.*
3. *know the wheels, tyres, suspensions and braking systems.*
4. *familiarize the latest models of two wheelers.*
5. *understand the operations of three wheelers and latest models of three wheelers.*

UNIT I : Power Unit:

Two stroke SI engine, four stroke SI engine; merits and demerits. Symmetrical and unsymmetrical port timing diagrams. Types of scavenging processes;

merits and demerits, scavenging pumps. Rotary valve engine. Fuel system. Lubrication system. Magneto coil and battery coil spark ignition system, electronic ignition system. Starting system; Kick starter system.

UNIT II : Chassis and Sub-Systems:

Mainframe and its types. Chassis and shaft drive, Single, multiple plates and centrifugal clutches. Gear box and gear controls. Front and rear suspension systems. Shock absorbers. Panel meters and controls on handle bar.

UNIT III: Brakes, Wheels and Tyres

Drum brakes, disc brakes, front and rear brake links, layouts. Spoked wheel, cast wheel, disc wheel, disc types. Tyres and tubes.

UNIT IV: Two Wheelers:

Case study of major Indian models of motorcycles, scooters and mopeds. TVS mopeds and motorcycles, HeroHonda motorcycles, Bajaji scooters and motorcycles, Yamaha, Enfield motorcycles. Servicing and maintenance.

UNIT V: Three Wheelers:

Case study of Indian models. Auto rickshaws, pickup van, delivery van and trailer. Maintenance:& Fault tracing.

TEXT BOOKS:

1. Irving.P.E. - Motor Cycle Engineering - Temple Press Book, London – 1992.
2. The Cycle Motor Manual - Temple Press Limited, London - 1990

REFERENCES:

1. Encyclopedia of Motorcycling - 20 volume Marshall, Cavensih, UK - 1989
2. Brayant R.V,Vespa - Maintenance and Repair Series – S.Chand & Co., New Delhi - 1986.
3. Raymond Broad Lambretta - A Practical Guide to maintenance and repair – S.Chand & Co., New Delhi - 1987.

III Year I Semester	**L**	**T**	**P**	**To**	**C**
	4	-	-	4	4

ME 327 METROLOGY & INSTRUMENTATION (DEPT. ELECTIVE - I)

Course Description & Objectives:

Metrology course is aimed to provide knowledge of limits, gauges, linear and angular measurements. Different process parameters like temperature, pressure, flow rate are very much important in process industry for the quality production. Students are given sufficient exposure of these techniques through this course.

Course Outcomes:

On completion of the course, the student would acquire:

1. *sound knowledge in gauge design and gauge selection*
2. *angle measurement with various measuring instruments*
3. *different comparators working and selection, measurement of surface finish by different techniques*
4. *various transducers working and application to physical parameters by the instruments*
5. *different techniques to measure temperature force and flow.*

UNIT – I: Introduction to metrology:

Line and end standards – Theory of limits, fits and tolerances - Fundamental deviation – types – Grades of tolerances – Fits – Types of fits - Hole basis and shaft basis systems – Interchangeability and selective assembly. Limit Gauges - Taylor's principle – GO and NO GO
gauges – plug and ring gauges.

UNIT – II: Linear, Angle,Taper and Optical measurements:

Linear measurements : Slip gauges – Dial indicators – Micrometer. **Angle and Taper measurement :** Bevel protractor – Angle slip gauges —sine bar – Taper determination using Rollers and spheres. **Optical Measurements:** Optical flats – NPL Interferometer.

UNIT – III: Comporators & Surface roughness measurement:

Comporators : Mechanical – Electrical – Pneumatic comparators. **Surface roughness measurement :** Surface roughness and surface texture – Numerical assessment of surface finish – CLA – RMS- Ten point height of irregularity - Measuring Instruments - Profilograph – Talysurf.

UNIT – IV: Introduction to Instrumentation & Displacement measurements:

Generalized configuration and functional description of measuring instruments - Static and dynamic characteristics - Calibration. Displacement measurements: Theory and construction of various transducers to measure displacement - Resitance type - LVDT – Capacitive type - piezo electric type Instruments

UNIT – V: Temperature, Strain Measurements:

Temperature Measurements: various principles of temperature measurements, expansion thermometers, resistance thermometers, thermistors, thermocouples, pyrometers **Strain measurements:** Various types of strain measurements, electrical resistance strain gauge, gauge factor - configurations to measure tensile, compressive and bending strains.

TEXT BOOKS:

1. D.S.Kumar, "Mecahnical Measurements & Controls", 5th ed., Metropolitan Book Pvt. Ltd., 2012.
2. R.K.Jain, "Engineering Metrology", 20th ed., Khanna Publishers, New

Delhi, 2009.

REFERENCES:

1. R.K. Rajput, "Mechanical Measurements & Instrumentation", 3rd ed., S.K. Kataria & Sons, 2010.
2. E.O. Doebelin, "Measurement Systems", 6th ed., Tata Mc Graw Hill, New Delhi, 2011.

III Year I Semester	**L**	**T**	**P**	**To**	**C**
	-	-	3	3	2

AE 331 VEHICLE EVALUATION & MAINTENANCE LAB

Course Description & Objectives:

To develop the Practical knowledge in the field of Automobile Engine components. To impart the fundamental knowledge in evaluation & maintenance.

Course Outcomes:

On successful completion of this course students will be able to understand the complete methodology of evaluation & maintenance of automobile and develop skills in dismantling & assembling of automobile components using instruments and special tools. They would acquire knowledge and skills in the fundamental disciplines of an evaluation & maintenance concepts of an automobile components..

List of experiments:

1. Study and layout of an automobile repair, service and maintenance shop.
2. Study and preparation of different statements/records required for the repair and maintenance works.
3. Study and preparation of the list of different types of tools and instruments required.
4. Minor and major tune up of gasoline and diesel engines
5. Fault diagnosis in electrical ignition system, gasoline fuel system, diesel fuel system and rectification
6. Study of the electrical systems such as head lights, side or parking

lights, trafficator lights, electric horn system, windscreen wiper system, starter system and charging system.

7. Study and checking of wheel alignment

8. Simple tinkering, soldering works of body panels, study of door lock and window glass rising mechanisms.

9. Practice of the following:

i) Adjustment of pedal play in clutch, brake, hand brake lever and steering wheel play

ii) Air bleeding from hydraulic brakes, air bleeding of diesel fuel system

iii) Wheel bearings tightening and adjustment

10. Practice of the following

i) Adjustment of head lights beam

ii) Removal and fitting of tyre and tube

III Year I Semester	L	T	P	To	C
	-	-	3	3	2

AE 333 AUTOMOTIVE CHASSIS AND TRANSMISSION LAB

Course Description & Objectives:

To develop the practical knowledge in the field of automobile engineering by imparting the fundamental knowledge of chassis and running system.

Course Outcomes:

On successful completion of this course students will be able to understand the various types of frames and develop skills in dismantling and assembling of chassis components. They would be able to undertake minor repairs and trouble shoots the breakdowns and demonstrate front wheel steering geometry and steering system layout along with power steering, steering gear boxes etc.

List of experiments:

Chassis Lab

1. Demonstration of front wheel steering geometry and steering system layout.

2. Demonstration of power steering.
3. Demonstration of steering gear boxes.
4. Experiment on computerized wheel balancing and front wheel alignment.
5. To open the master cylinder, wheel cylinder, identify the different components, sketch & assemble.
6. Demonstration of compressed air, vacuum servo and parking brake.
7. Demonstration of conventional leaf spring suspensions of light, heavy vehicle.

Transmission Lab

1. Demonstration, study and sketching of different vehicle layouts and its comparison.
2. Demonstration, study and prepare dimensional sketch of single plate clutch.
3. Demonstration, study and prepare dimensional sketch of multiplate clutch..
4. Demonstration, study and prepare dimensional sketch of Sliding mesh gear box.
5. Demonstration, study and prepare dimensional sketch of Continuous variable transmission unit (CVT).
6. Demonstration, study and prepare dimensional sketch of differential and final drive

III Year I Semester

L	T	P	To	C
-	-	3	3	2

AE 335 TWO AND THREE WHEELERS TECHNOLOGY LABORATORY

Course Description & Objectives:

To develop the basic knowledge of the students in constructional details of two and Three Wheelers and to develop the skills of the students in the operating principles.

Course Outcomes:

On successful completion of this course students will be able to understand the working of two and four stroke engines and the functioning of clutch and gear box. They would be knowing the wheels, tyres, suspensions and braking systems and familiarize the latest models of two wheelers

List of experiments:

1. Performance test of a two wheeler using chassis dynamometer.
2. Performance test on shock absorber
3. Performance test on shock absorber
4. Two wheeler chain test
5. Brake and Clutch adjustment as per specification
6. Dismantling and assembling of two wheeler gear box and finding gear ratios
7. Dismantling and assembling of three wheeler box and finding gear ratios
8. Three wheeler brake and clutch play adjustment
9. Dismantling and assembling of three wheeler steering system.
10. Study of three wheeler chassis frame and power transmission system

III Year II Semester

L	T	P	To	C
4	-	-	4	4

AE 320 VEHICLE BODY ENGINEERING

Course Description & Objectives:

To develop the basic knowledge of the students in design of the vehicles body to give maximum comfort for the passengers and exposed to the methods of stream lining the vehicles body to minimize drag.

Course Outcomes:

On successful completion of this course students will be able to:

1. *understand the concept of car body design, passenger safety, crumple zone and crash testing.*
2. *know the concepts of wind tunnel testing and vehicle body optimization techniques to reduce drag.*
3. *familiarize the various types of bus body construction, seating layout, regulations and comfort.*
4. *understand the various heavy vehicle bodies, driver's visibility and cabin design.*
5. *know the different types of materials and painting techniques for vehicle body.*

UNIT- I: Car Body:

Types: saloon, convertibles, limousine, estate car, racing and sports car. Visibility: regulations, driver's visibility, tests for visibility, methods of improving visibility and space in cars. Safety: safety design, safety equipments for cars. Car body construction; design criteria, prototype making, initial tests, crash tests on full scale model, Dummies and Instrumentation.

UNIT-II : Vehicle Aerodynamics:

Objectives. Vehicle drag and types; various types of forces and moments, effects of forces and moments, side wind effects on forces and moments, Various body optimization techniques for minimum drag, wind tunnel testing: flow visualization techniques, scale model testing, component balance to measure forces and moments.

UNIT- III: Bus Body:

Types: mini bus, single decker, double-decker, two level and articulated bus. Bus body layout; floor height, engine location, entrance and exit location, seating dimensions. Constructional details: frame construction, double skin construction, types of metal sections used, Regulations, Conventional and integral type construction.

UNIT-IV: Commercial Vehicle:

Types of body; flat platform, drop side, fixed side, tipper body, tanker body, Light commercial vehicle body types. Dimensions of driver's seat relation to controls. Drivers cab design.

UNIT –V: Body Materials, Trim and Mechanisms:

Steel sheet, timber, plastic, GRP, properties of materials; Corrosion, anticorrosion methods. Selection of paint and painting process. Body trim items. Body mechanisms.

TEXT BOOKS:

1. Sydney F. Page, "Body Engineering", 3rd ed. Chapman & Hill Ltd., London.
2. J Fairbrother, "Fundamentals of Vehicle Body work", Hutchinson, London.
3. P.M. Heldt, "Automotive Chassis", Chilton Co. NK

REFERENCES:

1. John Fenton, "Vehicle Body Layout & Analysis", Hutchinson, London.
2. J Powloski, "Vehicle Body Engineering", Business Books Ltd., London.
3. J.G. Giles, "Body Construction and Design", Vol. 6.,llefe Books/ Butterworth & Co. London
4. Crouse W. H. &Anglin D. L., "Automotive Chassis", McGraw-Hill Int. Book Co.
5. P. L. Kohli, "Automotive Chassis & Body", Papyrus Publishing House, New Delhi.
6. Dr. V. Sumantran and Dr. Gino Sovram, "Vehicle Aerodynamics Published" SAE International, USA
7. Wolf-Heinrich Hucho, "Aerodynamics of Road Vehicles" Published by SAE International, USA
8. A. Robinson, W. A. Livesey, "The Repair of Vehicle Bodies" Published by Butterworth-Heinemann LTD.
9. John Fenton, "Handbook of Automotive Body Construction and Design Analysis" Professional Engineering Publishing.

III Year II Semester

L	T	P	To	C
3	1	-	4	4

ME 320 HEAT TRANSFER

Course Description & Objectives:

This course is designed to introduce a basic study of the phenomena of heat to develop methodologies for solving a wide variety of practical engineering problems, and to provide useful information concerning the performance and design of particular systems.

Course Outcomes:

On completion of the course, the student would be able to:

1. *understand the basic laws of heat transfer.*
2. *account for the consequence of heat transfer in thermal analyses of engineering systems.*
3. *analyze problems involving steady state heat conduction in simple geometries.*
4. *develop solutions for transient heat conduction in simple geometries.*
5. *obtain numerical solutions for conduction and radiation heat transfer problems.*
6. *understand the fundamentals of convective heat transfer process.*
7. *evaluate heat transfer coefficients for natural convection.*
8. *evaluate heat transfer coefficients for forced convection inside ducts.*
9. *evaluate heat transfer coefficients for forced convection over exterior surfaces.*
10. *analyze heat exchanger performance by using the method of log mean temperature difference.*
11. *analyze heat exchanger performance by using the method of heat exchanger effectiveness.*
12. *calculate radiation heat transfer between black body surfaces.*
13. *calculate radiation heat exchange between gray body surfaces.*

UNIT – I: Introduction:

Modes and mechanisms of heat transfer - Basic laws of heat transfer - General discussion about applications of heat transfer. Conduction Heat Transfer: Fourier's law - General heat conduction equation in Cartesian, Cylindrical and Spherical coordinates.

UNIT – II: One Dimensional Steady State Conduction Heat Transfer:

Homogeneous slabs, hollow cylinders and spheres - overall heat transfer coefficient, electrical analogy - Critical radius of insulation. systems with heat sources or Heat generation. Heat transfer through extended surfaces – rectangular fins.

UNIT – III: One Dimensional Transient Conduction Heat Transfer:

Systems with negligible internal resistance -Significance of Biot and Fourier Numbers – Chart solutions of transient conduction systems.

UNIT – IV: Convective Heat Transfer:

Concepts about Continuity, Momentum and Energy Equations. Concepts about hydrodynamic and thermal boundary layer and use of empirical correlations for convective heat transfer - Flat plates and Cylinders. Heat Exchangers: Classification of heat exchangers - overall heat transfer Coefficient and fouling factor -Concepts of LMTD and NTU methods – Heat Exchanger design using LMTD and NTU methods.

UNIT – V: Boiling and Condensation:

Pool boiling - Regimes, Calculations on Nucleate boiling, Critical Heat flux and Film boiling: Film wise and drop wise condensation - Nusselt's Theory of Condensation on a vertical plate. Radiation Heat Transfer **:** Emission characteristics and laws of black-body radiation heat exchange between two black bodies - concepts of shape factor - Emissivity - heat exchange between grey bodies -radiation shields – electrical analogy for radiation networks.

DATABOOK:

1. C. P. Kothandaraman, "Heat And Mass Transfer Data Book", 6th ed., New Age International Publishers Ltd., 2007.

TEXT BOOKS:

1. Holman J.P "Heat transfer" 10th ed., McGraw Hill, London, 2009.
2. R.K.Rajput, "Heat And Mass Transfer", 4th ed., S.Chand & Co, New Delhi, 2008.

REFERENCES:

1. R C Sachdeva. "Fundamentals of Engineering Heat and Mass Transfer". 4th Edition, New Age International Publishers Ltd., 2009.
2. Sukhatme S.P., "Heat Transfer", 4th Edition, University Press India Ltd., 2006.
3. Frank P. Incropera, David P. DeWitt, "Fundamentals of Heat and Mass Transfer", 7th Edition, Wiley Publications, 2011.
4. R Yadav "Heat Transfer", 6th Edition, McGraw Hill Publications, 2004.

   R.K. Rajput, Thermal Engineering, 8th Edition, Laxmi Publications, New Delhi, 2010.

III Year II Semester

L	T	P	To	C
4	0	-	4	4

AE 324 MODERN VEHICLE TECHNOLOGY

Course Description & Objectives:

The objectives are to familiarize with the latest Automobile accessories and equipments of modern vehicle systems with help of electronic systems.

Course Outcomes

On successful completion of this course students will be able to:

1. *know about the Modern Automobile accessories and engine management systems.*
2. *gain knowledge about various suspension systems.*
3. *understand the concept of automotive air-conditioning systems.*
4. *know about various collision warning systems.*
5. *know about passenger comfort and convenient systems.*

UNIT – I: Driver Information Systems:

Introduction, driver support systems – driver information, driver perception, driver convenience, driver monitoring. Vehicle support systems – general vehicle control, collision avoidance, vehicle status monitoring.

UNIT – II: Driver Assisting Systems:

Global positioning systems, geographical information systems, navigation systems, automotive vision system, road recognition, driver assistance systems.

UNIT – III: Safety Systems:

Active and passive safety systems, Airbags, seat belt tightening system, collision warning systems, child lock, anti lock braking systems, traction control, Electronic Stability Programme. Crash worthiness of vehicle, vehicle crash testing, testing with dummies. **Security Systems:** Anti theft technologies, smart card system, number plate coding.

UNIT – IV: Comfort Systems:

Active suspension systems, requirement and characteristics, different types, power steering, collapsible and tiltable steering column, power windows, biometric systems. **Adaptive Control Systems:** Adaptive cruise control, adaptive noise control, anti spin regulation, cylinder cut- off technology.

UNIT – V: Electronic Engine Management:

The Feedback control carburettor, single point and multipoint injection system, working of electronic fuel injector, different types of electronic fuel injection systems like L, K, KE, LU, LH and Motronic, ME & MH systems.

TEXT BOOKS:

1. LjuboVlacic, Michel Parent and Fumio Harashima, “Intelligent Vehicle Technologies”, Butterworth-Heinemann publications, Oxford, 2001.
2. Ronald K Jurgen, “Navigation and Intelligent Transportation Systems – Progress in Technology”, Automotive Electronics Series, SAE, USA, 1998.

REFERENCES:

1. William B Riddens, “Understanding Automotive Electronics”, 5th ed., Butter worth Heinemann Woburn,1998.
2. Bechhold, “Understanding Automotive Electronics”, SAE, 1998.
3. Robert Bosch, “Automotive Hand Book”, 5th ed., SAE, 2000.
4. Patent No. 20070284869, Automotive passenger restraint and protection apparatus.
5. Patent No. 20080011732, Passenger seat having occupant detector for automotive vehicle.
6. Patent No. 20070273166, System for detecting objects colliding with automotive vehicle

III Year II Semester	L	T	P	To	C
	3	1	-	4	4

AE 326 VEHICLE DYNAMICS

Course Description & Objectives:

Students undergoing this course are expected to apply fundamental knowledge of the students in automotive field in the areas of vehicle vibrations and describe the skills of the students in stability of vehicles and their effects, related with longitudinal, vertical & lateral dynamics.

Course Outcomes:

Upon the successful completion of the course, learners will be able to:

1. describe the basic fundamental of vibration.
2. analyze multi degree freedom system for mode shape in transmission linkages.
3. analyze the vehicle directional stability and roll behavior

4. enumerate the suspension systems, tyre dynamics & directional stability of the vehicle.
5. *analysis the vehicle dynamic by using statistical methods*

UNIT I: Basics of Vibration:

Classification of vibration, definitions, mechanical vibrating systems, mechanical vibration and human comfort. Modeling and simulation studies. Single degree of freedom, multi degree freedom systems, free, forced and damped vibrations. Magnification factor and transmissibility. Vibration absorber. Two degree of freedom system. Modal analysis.

UNIT II: Dynamics of Suspension & Tyres:

Requirements of suspension system. Spring mass frequency, wheel hop, Wheel wobble, wheel shimmy, choice of suspension spring rate. Calculation of effective spring rate. Vehicle suspension in fore and aft & roll axis. Human response to vibration, vehicle ride model. Tire forces and moments, rolling resistance of tires, relationship between tractive effort and longitudinal slip of tyres, cornering properties of tyres, ride properties of tyre.

UNIT III: Stability of Vehicles

Resistance, types of resistance, Load distribution, stability on a curved track slope and a banked road, calculation of tractive effort and reactions for different drives.

UNIT IV: Performance & Handling Characteristics of Vehicles:

Equation of motion and maximum tractive effort. Aerodynamics forces and moments. Power plant and transmission characteristics. Prediction of vehicle performance. Braking performance. Steering geometry. Steady state handling characteristics. Steady state response to steering input. Transient response characteristics. Directional stability of vehicle.

UNIT V: Basics of Car Aerodynamics:

Objects — Vehicle types of drag. Various types of forces and moments. Effects of forces and moments. Various body optimization techniques for minimum drag. Principle of wind tunnel technology. Flow visualization techniques. Test with scale models.

TEXT BOOKS:

1. Giri N.K – Automotive Mechanics, Khanna Publishers, 2002.
2. Rao J.S and Gupta. K "Theory and Practice of Mechanical Vibrations", Wiley Eastern Ltd., New Delhi -2, 2002.
3. J. Y. Wong, "Theory of Ground Vehicles", 3rd ed., John Willey & Sons, New York, 1997.

REFERENCES:

1. Heldt.P.M -"Automotive Chassis"- Chilton Co., New York- 1992
2. Ellis.J.R - "Vehicle Dynamics"- Business Books Ltd., London- 1991
3. Giles.J.G.Steering - "Suspension and Tyres", Illiffe Books Ltd., London-1998
4. Ham B, Pacejka - Tyre and Vehicle Dynamics - SAE Publication - 2002

III Year II Semester

L	T	P	To	C
4	0	-	4	4

AE328 SPECIAL PURPOSE VEHICLES (DEPT. ELECTIVE -II)

Course Description & Objectives:

To develop the basic knowledge of the students in design of the tractor body to give maximum comfort for the driver. To develop the skills of the students in the areas of off road vehicle safety design and operation

Course Outcomes:

On successful completion of this course students will be able to:

1. *understand the concept of general design of tractors, safety, crumple zone and crash testing.*
2. *know the concepts of cooling system, lubrication system and fuel system of a tractor.*
3. *familiarize the various types of farm tractor transmission systems*
4. *understand the various driver's visibility and cabin design.*
5. *know the different types of farm equipments.*

UNIT – I: General Design of Tractors:

Classification of tractors - Main components of tractor - Safety rules. **Fundamentals of Engine Operation :**Tractor controls and the starting of the tractor engines - Basic notions and definition - Engine cycles – Operation of multicylinder engines - General engine design – Basic engine performance characteristics.

UNIT – II: Engine Mechanism of Tractor:

Cylinder and pistons - Connecting rods and crankshafts - Engine balancing – Construction and operation of the valve mechanism - Valve mechanism components - Valve mechanism troubles.

UNIT – III: Cooling System, Lubrication System and Fuel System:

Cooling system - Classification - Liquid cooling system - Components, Lubricating system servicing and troubles - Air cleaner and turbo charger - Fuel tanks and filters – Fuel pumps.

UNIT – IV: Farm Tractor Transmission System:

Layout, Load distribution, Transmission & Drive line, Steering, Braking system, Wheels &Tyres, Hydraulic system, Auxiliary Systems, Draw bar, PTO Shaft.

UNIT – V: Farm Equipment:

Working attachments of tractors - Farm equipment - Classification – Auxiliary equipment - Trailers and body tipping mechanism.

TEXT BOOK:

1. E.L.Barger, J.B.Liljedahl,W.M.Carleton, E.G.Mckibben “Tractors & their Power Units”, 3rd ed., Chapman & Hall, 1989.

REFERENCES:

1. Rodichev and G.Rodicheva, “Tractor and Automobiles”, MIR Publishers, 1987.
2. Kolchin. A., and V. Demidov “Design of Automotive engines for tractor”, MIR Publishers, 1972

III Year II Semester	L	T	P	To	C
	4	0	-	4	4

AE 330 ELECTRONIC ENGINE MANAGEMENT SYSTEMS (DEPT. ELECTIVE - II)

Course Description & Objectives:

The objectives are to familiarize with the latest Automobile accessories and equipments

Course Outcomes:

On successful completion of this course students will be able to:

1. *know about the modern automobile accessories and engine management systems.*

2. *gain knowledge about various pid controls.*
3. *understand the concept of various sensors and actuators.*
4. *know about various si engine management systems.*
5. *know about various c.i. engine management systems.*

UNIT – I: Fundamentals of Automotive Electronics:

]Components for electronic engine management system, open and closed loop control strategies, PID control, Look up tables, introduction to modern control strategies like Fuzzy logic and adaptive control. Parameters to be controlled in SI and CI engines.

UNIT – II: Sensors and Actuators:

Inductive, Hall Effect, hot wire, thermistor, piezo electric, piezoresistive, based sensors. Throttle position, mass air flow, crank shaft position, cam position, engine and wheel speed, steering position, tire pressure, brake pressure, steering torque, fuel level, crash, exhaust oxygen level (two step and linear lambda), knock, engine temperature, manifold temperature and pressure sensors.

UNIT – III: S.I. Engine Management:

Three way catalytic converter, conversion efficiency versus lambda. Layout and working of SI engine management systems like Bosch Monojetronic, L-Jetronic and LH-Jetronic. Group and sequential injection techniques. Working of the fuel system components.Advantages of electronic ignition systems.Types of solid state ignition systems and their principle of operation, Contactless electronic ignition system, Electronic spark timing control.

UNIT – IV: C.I. Engine Management:

Fuel injection system parameters affecting combustion, noise and emissions in CI engines. Pilot, main, advanced post injection and retarded post injection. Electronically controlled Unit Injection system.Layout of the common rail fuel injection system.Working of components like fuel injector, fuel pump, rail pressure limiter, flow limiter, EGR valve.

UNIT – V: Digital Engine Control System:

Cold start and warm up phases, idle speed control, acceleration and full load enrichment, deceleration fuel cutoff. Fuel control maps, open loop control of fuel injection and closed loop lambda control – Integrated engine control system, Exhaust emission control engineering, Electromagnetic compatibility – EMI Suppression techniques – Electronic dash board instruments – Onboard diagnosis system.

TEXT BOOKS:

1. William B Ribbens. Understanding Automotive Electronics, SAE 1998.

REFERENCES:

1. Robert Bosch. Diesel Engine Management, SAE Publications.

2. Robert Bosch. Gasoline Engine Managemen, SAE Publications.
Eric Chowanietz. Automobile Electronics by SAE Publications.

III Year II Semester	**L**	**T**	**P**	**To**	**C**
	4	0	-	4	4

AE 332 AUTOMOTIVE SAFETY (DEPT. ELECTIVE - II)

Course Description & Objectives:

To provide good exposure to automotive safety aspects including the understanding of the various safety equipments.

Course Outcomes:

On completion of the course, the students would be exposed to:

1. *various comfort features*
2. *recent technologies in automobile field*
3. *exterior and interior safety features and their necessity*

UNIT I: Introduction:

Design of the body for safety, energy equation, engine location, deceleration of vehicle inside passenger compartment, deceleration on impact with stationary and movable obstacle, concept of crumble zone, safety sandwich construction.

UNIT II: Safety Concepts:

Active safety: driving safety, conditional safety, perceptibility safety, operating safety, passive safety: exterior safety, interior safety, deformation behaviour of vehicle body, speed and acceleration characteristics of passenger compartment on impact.

UNIT III: Safety Equipments:

Seat belt, regulations, automatic seat belt tightener system, collapsible steering column, tiltable steering wheel, air bags, electronic system for activating air bags, bumper design for safety. **UNIT IV: Collision Warning and Avoidance:**

Collision warning system, causes of rear end collision, frontal object detection, rear vehicle object detection system, object detection system with braking system interactions.

UNIT V: Comfort and Convenience System:

Steering and mirror adjustment, central locking system , Garage door opening system, tyre pressure control system, rain sensor system, environment information system

TEXT BOOKS:

1. Bosch, "Automotive Handbook", 8th Edition, SAE publication, 2011.
2. Powloski. J., "Vehicle Body Engineering", Business books limited, London, 1969.

REFERENCES:

1. Ronald.K.Jurgen, "Automotive Electronics Handbook", 2nd Edition, McGraw-Hill Inc., 1999.

III Year II Semester

L	T	P	To	C
-	-	3	3	2

AE334 MINI PROJECT

Course Description & Objectives:

Objective of the mini project is to enable student analytical and practical exposure by giving hands on experience with learned knowledge through different courses. It prepares the student to efficiently handle the main project for better output.

Course Outcomes:

By undergoing this course, the student will try to integrate and apply the knowledge gained through different courses into practical problems and to analyse the system for its productivity and feasibility.

III Year II Semester

L	T	P	To	C
-	-	3	3	2

ME439 HEAT TRANSFER LAB

Course Description & Objectives:

Through this course, students will study about the various heat transfer processes, so as to train the students practically to utilize this knowledge in industry.

Course Outcomes:

On completion of the course, the students would be able to perform experiments on heat conduction, convection and radiation. They will be able to identify the heat exchange properties of various metals.

List of experiments

1. Composite Slab Apparatus - Overall heat transfer co-efficient.
2. Heat Transfer through lagged pipe.
3. Heat Transfer through a Concentric Sphere.
4. Thermal Conductivity of given metal rod.
5. Heat transfer through pin-fin
6. Experiment on Transient Heat Conduction.
7. Heat transfer in forced convection apparatus.
8. Heat transfer in natural convection.
9. Parallel and counter flow heat exchanger.
10. Emissivity apparatus.
11. Stefan Boltzman Apparatus.
12. Heat transfer in drop and film wise condensation.
13. Critical Heat flux apparatus.
14. Study of heat pipe and its demonstration.
15. Shell and tube heat exchanger.

III Year II Semester

L	T	P	To	C
-	-	3	3	2

HS304 PROFESSIONAL COMMUNICATION LABORATORY

Course Description & Objectives:

The course is aimed at improving written communication skills of undergraduate students and preparing them to meet professional challenges in the work spheres. This course will work on the relationship between professional writing and a personality that is able to meet the goals of an organization in creative and innovative ways.

Course Outcomes:

To enable students to write logical sentences and paragraphs, use appropriate diction, grammar and punctuation and to expose them to the world of business and business register. It also aims to make them compose clear and concise business messages and to produce business documents for mailing to external recipients or intra-organizational circulation. It aims to enable them to speak business English for handling various business situations.

UNIT – 1: Technical Writing:

Elements of Technical Writing : Sentence structure - reducing verbosity - arranging ideas logically – building coherence - paragraph level and document level - topic sentence - cohesive devices – transitionals – paraphrasing – précis-writing. Mechanics of Writing: Stylistic elements – the rapporteur- the purpose- the reader (audience) -elementary rules of grammar- choice of diction - elementary principles of composition - matters of form – punctuation - conventions of business communication -language and tone - weak links in business correspondence - ethical concerns in business writing.

UNIT-II: Reports:

Parts of the Report: Writing an abstract - features of a good abstract – approach - compare and contrast - cause and effect. Types of Technical Reports : Drafting a technical proposal - formal and informal proposals - factual reports, feasibility reports, survey reports – parts of a report - title page –declaration – acknowledgements – table of contents - abstract – introduction – conclusion – citations – references - appendices - oral reports and presentations.

UNIT-III: Letter-Writing:

Formal and informal letters - structure of formal letters - expressions of salutations, introductory and concluding paragraphs - different types of letters - sales letter - complaint letter - adjustment letter - letter to the editor - covering letter - claim letter – letter of condolence.

UNIT-IV: Business Correspondence:

E-mail – nature and scope - e-mail etiquette – Common Errors in composing e-mails – Quotations - Inviting quotations - sending quotations –placing orders. Office Communication - agenda - notice – circular. Effective Resume-Writing: Structure and presentation - defining career objective - projecting one's strengths and skill-sets. Summarizing - formats and styles - covering letter.

UNIT-V: Business Proposals:

Drafting business proposals - calculating profit and loss-averages - ratios and proportions – partnership - simple interest - compound interest - calculating volumes and areas. course of action - cause and effect- theme detection - making judgments - logical deductions - analyzing arguments – syllogisms - Venn diagrams - matching definitions -verbal reasoning - numerical reasoning - working out justifications.

REFERENCES:

1. Strunk , William, Jr.*The Elements of Style*, Fourth Edition,
2. Rozakis, Laurie, Ph.D, (2003). *English Grammar for the Utterly Confused*, McGraw-Hill
3. Sharma. C. (1978) *Business Correspondence & Report Writing*, Tata McGraw-Hill
4. Kirkman, John. *Good Style: Writing for science & technology*, Routledge Study Guides, second edition.
5. Monippally, Matthukutty. M. 2001. *Business Communication Strategies*. 11th Reprint. Tata McGraw-Hill. New Delhi.

IV Year

Semester - I

Code	Subject	L	T	P	T	C
AE401	Autotronics	3	1	-	4	4
AE403	Automotive Emission & Control	3	1	-	4	4
AE405	Automotive System Design	3	1	-	4	4
AE407	Industrial Economics & Management	3	1	-	4	4
	Dept. Elective - II	3	1	-	4	4
AE409	Automotive Aerodynamics					
AE411	Finite Element Methods					
AE413	Product Data Management & Collaborative Product Commerce					
	Minor- V	3	1	-	4	4
	Labs:					
AE415	Project – I	-	-	2	2	2
AE417	Autotronics Lab.	-	-	3	3	2
AE419	Design Analysis and Simulation Lab.	-	-	3	3	2
TOTAL		**18**	**6**	**8**	**32**	**30**

IV Year

Semester - II

Code	Subject	L	T	P	T	C
AE402	Automotive Airconditioning	3	1	-	4	4
	Dept. Elective - III	3	1	-	4	4
AE404	Alternative Fuels and Energy systems					
AE406	Micro Machining and Micro Sensors					
AE408	Transport Management					
	Interdisciplinary Subject	3	1	-	4	4
EE206	Control Systems					
ME407	Mechatronics					
ME411	Nano Technology					
AE410	Project - II	-	-	10	10	10
TOTAL		**9**	**3**	**10**	**22**	**22**

L = Lecture ; **T** = Tutorial ; **P** = Practicals ; **To** = Total ; **C** = Credits

IV Year B.Tech. Automobile Engg. I-Semester

L	T	P	To	C
3	1	-	4	4

AE401 AUTOTRONICS

Objective of the Course:

This subject introduces the student to the various electronic systems used to operate and integrate the sub systems of an automobile. Also the subject gives an idea about measurement and display various automotive engine parameters and communication of these parameters among the subsystems of the automobile.

UNIT - I

Introduction to automotive electrical systems : Automotive generation, storage & distribution systems, wiring harness, circuit diagrams and symbols, 12/24/42 volt system, positive earth and negative earth, earth return and insulated return systems, Multiplexed wiring systems, Electromagnetic compatibility, Electromagnetic interference, Controlled Area Networks (CAN)

Battery : Types, Principle of lead acid battery, Constructional details, Recharging the battery, Battery ratings, Battery Performance, Battery capacities, Battery efficiency, Battery tests, Battery failures, Alkaline battery, maintenance free batteries, hybrid batteries

UNIT - II

Charging Systems & Regulators: D.C. Generators, A. C. Generators, Magnetos Constant current & voltage systems, Current & voltage regulator, Semi conductor type regulator, Regulator for alternators

Starting Systems: Requirements of Starting system, starting system layout, selection of motor, matching battery, Drive mechanisms, Permanent magnet motors

UNIT - III

Ignition systems: Introduction, types, Ignition coil, Distributor, Cam angle & Contact angle gap, Advance mechanisms, Ballast Resistance, Limitations of coil ignition, Transistorized Ignition systems, Spark plugs, types, construction

Lighting systems: Fundamentals, Headlight, types, lighting circuits, interior lighting, signaling, LED lighting, Gas discharge lighting

UNIT - IV

Automotive Equipments & Accessories : Fuel gauge, oil pressure gauge Temperature gauges, Speedometer, Warning Lights, Electric Horn, Horn Relay Wind Shield wipers, Heaters & defrosters, Electric windows.

Automotive Sensors & Actuators: Actuators, Air-flow rate sensor, angular position sensor, Throttle angle sensor, Temperature sensor, Knock sensor Pressure sensor. Feedback for engine control, Solenoid actuators, motorized actuators.

UNIT - V

Automotive Electronic Systems : Electronic Ignition systems, Electronic injection systems, Antilock brake system circuit, Traction control, Electronic control of automobile transmission, Active suspension, Engine management system, ESP 06.

Electric and hybrid vehicles: Types, Energy sources – batteries, Fuel cells Solar and Hydrogen, Electric machines and controllers, Design considerations challenges and recent developments.

TEXT BOOKS:

1. Tom Denton, 'Automobile Electrical & Electronic Systems', SAE International
2. Young, Griffithe, 'Automobile Electrical & Electronic Equipments', The English Language Book Co., London.
3. Bechfold SAE 1998, 'Understanding Automotive Electronics'.

REFERENCE BOOKS:

1. V.A.W.Hilliers, 'Fundamentals of Automotive Electronics', 2nd ed Hatchin, London, 1997.
2. Tomwather J. R., Cland Hunter, 'Automotive Computer & Control System', Prentice Inc. NJ.
3. Robert N. Brandy, 'Automotive Computers & Digital Instrumentation' 3rd ed., Prentice Hall Eaglewood, Cliffs, NJ., 1998.
4. P. L. Kohli, 'Automotive Electrical Equipments', 3rd ed., Tata McGraw Hill Pub. Co. Ltd., 2000

IV Year B.Tech. Automobile Engg. I-Semester

L	T	P	To	C
3	1	-	4	4

AE403 AUTOMOTIVE EMISSION & CONTROL

Objective of the Course:

This subject gives an idea about the various kinds of pollution caused by the automobiles(emissions, noise,vibrations etc.,), the various ways of detecting,measuring these pollution and controlling it.

UNIT – I

Introduction: Emissions - sources of emission, effect of pollution on human health. Emission norms - Euro & Bharat emission regulations and emission test cycles.

UNIT - II

Emissions From SI and CI Engines: Emission formation in SI and CI engines – causes for emissions, engine modifications to reduce emissions, role of fuels in engine emission, effect of fuel properties and additives on emissions emissions from LPG, CNG, alcohols, bio fuels.

UNIT - III

Emission Measurement and Control Techniques: Crank case emission control, fuel evaporation & control, EGR, intake temp control, air injected exhaust, thermal reactors, SCR, catalytic converters – types, catalytic mechanism, tuning of mechanical systems - A/F ratio control. NDIR analyzer, flame ionization detectors, chemiliuminescent analyzer, smoke meters, gas chromatograph.

UNIT - IV

Noise Control: Identification of noise sources, quantification, control of air borne noise - use of noise absorber, barrier, different materials, criteria for the selection of materials, control of structure borne noise - treatments for vibration damping materials for hood liner and head liner, resonance and ill effects of resonance. Characteristics of vehicle noise, sources of vehicle noise, engine noise, techniques for locating and measuring engine noise, engine noise control techniques, inlet and exhaust noise mechanism and control, noise from cooling system, transmission noise and tyre noise. Anechoi chamber.

UNIT - V

Vibration Control: Introduction, vibration analysis, sources of vibration, damping of vibration, rubber mountings, vibration isolation and absorption.

Constrained and extensive layer dampings. Engine and drivetrain vibrations vehicle and chassis vibration. Application of plastics and composites in automobiles.

TEXT BOOKS:

1. John B Heywood, "Internal Combustion Engine Fundamentals", 2nd ed McGraw Hill International ed.s, 1988.
2. Matthew Harrison, "Vehicle Refinement – Controlling Noise and Vibration in Road Vehicles", 4th ed., Elsevier Butterworth-Heinemann, Burlington 2004.

REFERENCE BOOKS:

1. Heinz Heisler, "Advanced Engine Technology", SAE 1995.
2. Robert Hickling and Mounir M. Kamal, "Engine Noise – Excitation Vibration and Radiation", 2nd ed., Plenum press, New York, 1982.
3. "Automobiles and pollution" SAE Transaction, 1995.
4. Springer and Patterson, "Engine Emission", 2nd ed., Plenum Press, 199
5. White R G and Walkar J G, "Noise and Vibration", 4th ed., Ellis Horwood Ltd., 2000.

IV Year B.Tech. Automobile Engg. I-Semester	L	T	P	To
	3	1	-	4

AE405 AUTOMOTIVE SYSTEM DESIGN

Objective of the Course:

To provide basic knowledge in the design of automotive systems

UNIT - I

Statistical Considerations in Design: Statistics in design, design for natu tolerances, statistical analysis, mechanical reliability.

Design of Clutches: Design requirements of friction clutches, selection criter torque transmission capacity, lining materials, Design of single plate clut multi-plate clutch and centrifugal clutch.

UNIT - II

Design of Gearbox: Selection of gear ratios & final drive ratio, Design of gea shafts, splines and housing, selection of bearings.

Final Drive Design : Design of final drive & differential gearing. Selection of wheels and tyres.

UNIT - III

Brake Systems: Design of Hydraulic Braking System, Internal Expanding Shoe Brake and Disc Brake.

Design of Axles & Propeller Shafts: Design of front & rear axles. Design of Propeller shafts for bending, torsion & rigidity. Design of universal joints and slip joints.

UNIT - IV

Design of Suspension System: General design considerations of suspension system, Design of leaf springs for automobile suspension system. Design considerations of Belleville springs, Elastomeric springs, Air (Pneumatic) springs.

UNIT - V

Optimization: Introduction to design optimization of mechanical elements adequate & optimum design, methods of optimization, Johnson's method of optimum design-Simple problems in optimum design like axially loaded members, shaft subjected to torsional and bending moments and other machine elements.

TEXT BOOKS :

1. Joseph E. Shigley & Larry D. Mitchell, 'Mechanical Engineering Design' Fourth ed., McGraw-Hill International Book Company, 2007.
2. R.C. Johnson, 'Optimum Design of Mechanical Elements', 2nd ed., John Wiley & Sons, 1997.

REFERENCE BOOKS :

1. Patil S.P., 'Mechanical System Design', 2nd ed., Jaico Publishers, 1997
2. M. F. Spotts & T.E. Shoup, 'Design of Machine Elements', Seventh ed. Pearson Education.
3. Bhandari V. B., 'Design of Machine Elements', 2nd ed., Tata McGraw-Hill Publishing Company Ltd., New Delhi, 2000.
4. Julian Happian – Smith, 'An Introduction to Modern Vehicle Design', Butterworth Heinemann
5. Pandya N.C.& Shah C.S., 'Elements of Machine Design', Twelth ed., 1994, Charotar Publishing House.
6. J.S. Arora, 'Introduction to Optimum Design', 2nd ed., McGraw-Hill Book Company Ltd., 1998.

IV Year B Tech Automobile Engg. I Semester

L	T	P	To	C
3	1		4	4

AE407 INDUSTRIAL ECONOMICS & MANAGEMENT

Objective of the Course:

To equip the student to make decisions in the industry considering the economic managerial aspects This subject exposes the student to the various aspects other than technical like financial marketing,industrial safety and labour acts that play a critical role in the successful product delivery

UNIT - I

Functions of Management: Definition of Management, Characteristics Objectives, hierarchy, Importance, Forecasting, Organizing – Process & Principles, types. Human Resource management functions. Douglas Mc Gregor's Theory X and Theory Y, Maslow's hierarchy of human needs.

UNIT - II

Engineering Economics: Introduction to basic economics terms such as demand and supply, Time value of money, cash flows, depreciation, Types of depreciation, reasons for depreciation, Methods of computing depreciation sinking fund method, Declining balance method, Investment decisions for capital assets, evaluation criteria for Investment decisions, Payback period, average rate of return.

UNIT - III

Financial Management: Sources of Finance, financial statements, Balance sheet and P & L Account, Break even Analysis and its applications, accounting ratios.

Marketing: Marketing Concepts – Objective –Types of markets, Market Segmentation, Market strategy- 4 P's of market, Market Research, Advertising

UNIT - IV

Production Management: Selection of site, plant layout – objectives, principles, types, merits & demerits of different types of layout, PERT / CPM, Work Study, Method study, Work Management.

UNIT - V

Materials Management: Scope, advantages, functions of materials management, Purchasing objectives, Functions of Purchase department, Purchasing cycle, Purchase procedure, Inventory Control - ABC Analysis, EOQ.

TEXT BOOKS:

1. Gene Burton and Manab. Thakur, "Management. Today – Principles and Practice" 2nd ed., Tata McGraw Hill Publishing Company, New Delhi 2000.
2. O.P. Khanna, "Industrial Engineering & Management", 8th ed., Dhanpat Rai & Sons, New Khanna Publishers, New Delhi, 2006

REFERENCE BOOKS:

1. Keith Davis, "Human Behavior at Work Organizational Behavior", 2nd ed., Tata McGraw Hill Publishing Company, New Delhi, 2000
2. J.P.Bose, S. Talukdar, "Business Management", 3rd ed., New Central Agencies (P) Ltd., 2007.
3. Philip Kotler, "Marketing Management", 2nd ed., Prentice Hall of India New Delhi.
4. Jawahar Lal, "Costing & Cost Control", 4th ed., Tata McGraw Hill, 2006.

IV Year B.Tech. Automobile Engg. I-Semester

L	T	P	To	C
3	1	-	4	4

AE409 AUTOMOTIVE AERODYNAMICS
(DEPT. ELECTIVE - II)

Objective of the Course:

This subject gives an idea about design and optimisation of automobile shape by considering the aerodynamic aspects. It gives the frame work for aerodynamic shaping of the automobile considering the fluid mechanics knowledge. Also the knowledge about validation of the design by wind tunnel testing is given.

UNIT - I

Introduction: Scope, historical developments, fundamentals of fluid mechanics, flow phenomenon related to vehicles, external and Internal flow problem, resistance to vehicle motion, performance, fuel consumption and performance potential of vehicle aerodynamics, engine cooling requirement, air flow to passenger compartment, duct for air conditioning, cooling of transverse engine and rear engine.

UNIT - II

Aerodynamic drag of Cars: Cars as a bluff body, flow field around car, drag force, types of drag force, analysis of aerodynamic drag, drag coefficient of cars, strategies for aerodynamic development, low drag profiles.

UNIT - III

Shape Optimization of Cars: Front end modification, front and rear wind shield angle, boat tailing, hatch back, fast back and square back, dust flow patterns at the rear, effects of gap configuration, effect of fasteners.

UNIT - IV

Vehicle Handling: Origin of forces and moments on a vehicle, lateral stability problems, methods to calculate forces and moments – vehicle dynamics under side winds, the effects of forces and moments, characteristics of forces and moments, dirt accumulation on the vehicle, wind noise, drag reduction in commercial vehicles.

UNIT - V

Wind Tunnels for Automotive Aerodynamics: Introduction, principle of wind tunnel technology, limitation of simulation, stress with scale models, full scale wind tunnels, measurement techniques, equipment and transducers, road testing methods, numerical methods.

TEXT BOOK:

1. Hucho W H, "Aerodynamic of Road vehicles", 2nd ed., Butterworth Co. Ltd., 1997.

REFERENCES BOOKS:

1. Pope A, "Wind Tunnel Testing ", John Wiley & Sons, 2nd ed., New York, 1974.
2. Automotive Aerodynamic: Update SP-706, SAE, 1987.
3. Vehicle Aerodynamic, SP-1145, SAE, 1996.

IV Year B.Tech. Automobile Engg. I-Semester

L	T	P	To	C
3	1		4	4

AE411 FINITE ELEMENT METHODS
(DEPT. ELECTIVE - II)

Objective of the Course:

This course deals with the theory and application of the finite element methods for analyzing structural systems and heat transfer problems.

UNIT - I

Finite Element Analysis : Historical background - weighted residual methods-basic concept of fem - variational formulation of B.V.P.- Ritz method-finite element modeling - element equations - linear and quadratic shape functions - bar, beam elements - applications to heat transfer.

UNIT - II

Finite Element Analysis of 2D Problems : Basic boundary value problems in 2 dimensions-triangular, quadrilateral, higher order elements - poissons and laplace equation - weak formulation - element matrices and vectors-application to solid mechanics, heat transfer, fluid mechanics.

UNIT - III

ISO-Parametric Formulation : Natural co-ordinate systems - lagrangian interpolation polynomials - isoparametric elements – formulation - numerical integration - 1D, 2D, triangular elements - rectangular elements - illustrative examples.

UNIT - IV

Solution to Plane Elasticity Problems : Introduction to theory of elasticity-plane stress-plane strain and axisymmetric formulation principles of virtual work, consistent and lumped formulation-use of local co-ordinates, element matrices using energy approach.

UNIT - V

Special Topics : Dynamic analysis – equation of motion - mass matrices - free vibration analysis - natural frequencies of longitudinal - transverse and torsional vibration - introduction to transient field problem - non linear analysis - use of softwares - h and p elements - special element formulation.

TEXT BOOKS:

1. Chandraputla, Ashok and Belegundu , "Introduction to Finite Elements in Engineering", 3rd ed., PHI Publishers, 2009.
2. S.S. Rao, "The Finite Element Methods in Engineering", 4th ed., Pergamon, 2005.

REFERENCE BOOKS:

1. J.N. Reddy, "An introduction to Finite Element Method", 3rd ed., Mc Graw Hill, 2005.
2. Alavala, "Finite Element Methods", 2nd ed., PHI, 2008.
3. Kenneth H. Huebner, Donald L. Dewhirst, "The Finite Element Method for Engineers", 4th ed., John Wiley & Sons (ASIA), 2007.
4. C.S. Krishna Murthy, "Finite Element Analysis", 2nd ed., Tata MC graw Hill, 2005.

IV Year B.Tech. Automobile Engg. I-Semester	L	T	P	To	C
	3	1	-	4	4

AE413 PRODUCT DATA MANAGEMENT & COLLABORATIVE PRODUCT COMMERCE
(DEPT. ELECTIVE - II)

Objective of the Course:

The subject introduces the various concepts involved in the successful launch of a new product starting from design to delivery and also the services required over the entire life cycle of an automobile product in particular. Things like automation, collaborative datamanagement over internet, ERP systems and their utilization in the automobile industry are introduced.

UNIT - I

INTRODUCTION: Product development process and functions-present market constraints-need for collaboration use of internet class technologies and data transfer, variants of e-commerce.

UNIT - II

PRODUCT LIFE CYCLE: Concept of product life cycle management and the benefits, value addition to customer. Lifecycle models, concepts on roles, users and project management, system administration, access control and its use in life cycle.

UNIT - III`

Automating Business Process : Work flows, life cycle-work flow integration, product configuration, product structure. configuration management and change management.

UNIT - IV

CAD Integration in PDM : use of CAD neutral visualization tools in product development, Examples, tools used for integration of CAD systems with PDM/ PLM systems.

UNIT - V

ERP System : Integration with PDM – use of I middleware in integrating business applications in product development.

Software : PDM/CPC/PLM softwares and their comparison.

TEXT BOOKS:

1. Michael Grieves, "Product Life Cycle Management", 3rd ed., Tata Mc Graw Hill, 2006.
2. David S Linthicum, "B2B Application Integration", 1st ed., Addison Wesley, England, 2001.
3. Faisal Hogue, "E-Enterprise Business Models Architecture and Components", 1st ed., Cambridge University Press, United Kingdom, 2000.

REFERENCES BOOKS :

1. Alexis Leon, "Enterprise Resource Planning", 2nd ed., Tata McGraw Hill, New Delhi, 2007.
2. Danier Amor, "The E-Business Revolution", 2nd ed., Pearson Education Asia, New Delhi, PHI, 2002.
3. John W Gosnay and Christine M Mears, "Business Intelligence with Cold Fusion", 2nd ed., Prentice Hall India, New Jersey, 2000.

IV Year B.Tech. Automobile Engg. I-Semester

L	T	P	To	C
-	-	2	2	2

AE415 PROJECT – I

B.Tech Project - I

The evaluation details of Project - I are given in section 4.3 in Rules and Regulations.

IV Year B.Tech. Automobile Engg. I-Semester

L	T	P	To	C
-	-	3	3	2

AE417 AUTOTRONICS LAB

Objective of the Course:

To train and familiarize students in the working of electronic systems that help in the operation, control of modern automotive vehicles.

1. Demonstration of automotive electrical and electronic systems layout
2. Demonstration of battery charging & battery testing
3. Demonstration and testing of alternators
4. Demonstration & testing of starting motors
5. Demonstration of electronic ignition system
6. Demonstration of dash board panel instruments & controls
7. Demonstration of headlight beam alignment
8. Testing of auto electrical components on multifunction tester
9. Testing of CDI coil, spark plug and armature
10. Demonstration of microcontroller 8051
11. Demonstration of electric bike and hybrid vehicle
12. Demonstration of ECU diagnostic system

IV Year B.Tech. Automobile Engg. I-Semester

L	T	P	To	C
-	-	3	3	2

AE419 DESIGN ANALYSIS AND SIMULATION LAB

Objective of the Course:

To give students a complete hands on experience in the modeling and analysis of various machine components using computers. Students are trained to perform structural, thermal analysis on components modelled by them

1. **Drafting :** Development of part drawings for various components in the form of orthographic and isometric. Representation of Dimensioning and tolerances scanning and plotting. Study of script, DXE AND IGES FILES
2. **Part Modeling :** Generation of various 3D Models through Protrusion, revolve, shell sweep. Creation of various features. Study of parent child relation. Feature based and Boolean based modeling surface and Assembly Modeling. Study of various standard Translators. Design simple components.
3. a) Determination of deflection and stresses in 2D and 3D trusses and beams.
   b) Determination of deflections component and principal and Von-mises stresses in plane stress, plane strain and Axisymmetric components.
   c) Determination of stresses in 3D and shell structures (at least one example in each case)
   d) Estimation of natural frequencies and mode shapes, Harmonic response of 2D beam.
   e) Steady state heat transfer Analysis of plane and Axisymmetric components.
4. a) Development of process sheets for various components based on tooling Machines.
   b) Development of manufacturing and tool management systems.
   c) Study of various post processors used in NC Machines.
   d) Development of NC code for free form and sculptured surfaces using CAM packages.
   e) Machining of simple components on NC lathe and Mill by transferring NC Code / from a CAM package. Through RS 232.
   f) Quality Control and inspection.

IV Year B.Tech. Automobile Engg. II-Semester

L	T	P	To	C
3	1	-	4	4

AE402 AUTOMOTIVE AIRCONDITIONING

Objective of the Course :

The subject aims to discuss principles and the various processes of air conditioning , the thermodynamics involved.Optimal design of the various subsytems and methods to distribute conditioned air in the space are studied.

UNIT - I

Review of Thermodynamics: Laws, General equations, Processes, Equations applied to processes, definitions & methods of refrigeration.

Basic Refrigeration Cycles: Carnot cycle, Reversed Carnot cycle, Simple Vapour compression cycle, sub-cooling, superheating, Liquid to suction vapour heat exchanger, Calculations and performance of above cycles, Actual vapor compression cycle.

UNIT - II

Refrigerants: Classification, requirements of refrigerants like Thermodynamic, physical, & chemical. Comparison among commonly used refrigerants, Selection of Refrigerants, Effect on Ozone depletion and global warming, Alternative Refrigerants.

Refrigeration Equipments:
Compressor, Condenser, Evaporator, Expansion devices, Types & performance characteristics, selection, methods of charging and leak testing.

UNIT - III

Psychrometry: Moist air as a working substance, Psychrometric properties of air, Use of Psychrometric tables and charts, Processes, Combinations and Calculations, ADP, Coil Condition line, Sensible heat factor, Bypass factor.

Comfort: Thermal exchange between human body and environment, factors affecting comfort, effective temperature comfort chart, ventilation requirements, outside & inside design conditions.

UNIT - IV

Heating and Cooling Load Calculation: Representation of actual air conditioning process by layouts and on psychrometric charts, Load analysis RSHF, GSHF, ESHF, Enumeration and brief explanation of the factors forming the load on refrigeration and air conditioning systems, load calculation of automobile vehicle for comfort and transport air conditioning. Energy conservation in air conditioning systems.

UNIT - V

Air Distribution System: Re-circulated air, Ventilation air, duct system, principle of duct sizing and air distribution, it's norms, diffusers, dampers, layout duct systems.

TEXT BOOKS:

1. S.C. Arora & Domkundwar, "A Course in Refrigeration and Air Conditioning", 2nd ed., Dhanpatrai & Sons, 2009.
2. Dossat, "Principles of Refrigerations", 2nd ed., Wiley Eastern, 2006.

REFERENCE BOOKS:

1. Manohar Prasad, "Refrigeration and Air Conditioning", 2nd ed., New Age, 2002.
2. C.P. Arora, "Refrigeration and Air Conditioning", 3rd ed., Tata McGraw Hill 2009.

IV Year B.Tech. Automobile Engg. II-Semester	L	T	P	To	C
	3	1	-	4	4

AE404 ALTERNATIVE FUELS AND ENERGY SYSTEMS
(DEPT. ELECTIVE – III)

Objective of the Course :

This subject gives an idea about the depleting nature of the fossil fuels and the importance of tapping some alternatives to that and the various alternatives like solar, windenergy and the energy generation from hydrogen, fuel cells, bio conversion are introduced and a study about their production is given.

UNIT - I

Fossil fuel : Impact of fossil fuel based systems, World scenario of Energy Resources, Indian Scenario of Energy Resources - new and renewable energy – sources and features.

Introduction to Alternate Fuels: Need for alternate fuel, availability and properties of alternate fuels, general use of alcohols, LPG, hydrogen, CNG .

UNIT - II

Use of alternative fuels: Modification of engines required for use of alternative fuels. Engine performance and emission characteristics, Limitations and advantages.

Solar Thermal System: Solar potential, Solar radiation spectrum, Solar radiation geometry, Solar radiation data, Radiation measurement, Technologies of thermal energy collection, Types of Solar Collectors, Collection efficiency.

UNIT - III

Hydrogen: Properties of hydrogen with respect to its utilization as renewable forms of energy, sources of hydrogen, production, transportation, storage, application & economics of hydrogen.

Fuel cells : Principle, Types, Full cell for Automotive application (PEM), PEM fuel cell stack construction, performance.

UNIT - IV

Solar Photovoltaic systems: Operating Principle, Photovoltaic cell concepts, Photo-cell materials, Cell module array, Series and parallel connections, Applications & applications related to automobiles. Hybrid vehicles.

UNIT - V

Wind Energy: Wind parameters and wind data, Power from wind, Site selection, Wind energy conversion systems and their classification, Construction and working of typical wind mill, characteristics of wind generators, Design considerations for wind mills.

Bioconversion: Introduction, biological & biochemical conversion, Energy plantation, Combustion and fermentation, anaerobic digester, Biomass gasification, Pyrolysis, various applications of Biomass energy, Bio-fuel – Relevance, types, and applications.

TEXT BOOKS:

1. B. P. Pundir, "Engine Emissions", 2nd ed., Narosa Publications, 1998.
2. E.F. Oberts, "Internal Combustion Engine and Air Pollution", 3rd ed., Harper & Row Publisher, New York, 2000.
3. J.G. Giles, "Vehicle Operation & Testing" (Automotive Vehicle Technology Vol. 7), Mc Graw Hill, 1997.

REFERENCE BOOKS :

1. A.W. Judge, "Carburation and Fuel Injection System", 4th ed., Motor Manual, Vol. 2, The Caxton Pub. Co. Ltd., London.
2. H.H. Willard and Others, "Instrumental Method of Analysis", 2nd ed., CBS Publishers & Distributors, Delhi, 2002.
3. G.B.S. Narang, "Automobile Engineering", 4th ed., CBS Publishers & Distributors, Delhi, 2004.
4. John k Pearson," Improving air quality".
5. Richard L.Bechfold, "Alternative Fuels Guide Book", SAE International Warrendale, 1997.

IV Year B.Tech. Automobile Engg. II-Semester

L	T	P	To	C
3	1	-	4	4

AE406 MICRO MACHINING AND MICRO SENSORS
(DEPT. ELECTIVE – III)

Objective of the Course :

Give an introduction to MEMS and micro systems used in the micro machining and fabrication.Ideas about scaling làws and materials involved in the design of these micro systems are to be given.Also the knowledge about micro packaging and various technologies involved is to be introduced.

UNIT – I

MEMS and Microsystems : MEMS and microsystem products. Evaluation of microfabrication. Microsystems and microelectronics. Applications of microsystems. Working principles of microsystems - microsensors, micro actuators, MEMS and microactuators, microaccelerometers.

Scaling Laws in Miniaturization : Introduction. Scaling in geometry. Scaling in rigid body dynamics. The Trimmer force scaling vector – scaling in electrostatic forces, electromagnetic forces, scaling in electricity and fluidic dynamics, scaling in heat conducting and heat convection.

UNIT – II

Materials for MEMS and Microsystems : Substrates and wafers. Silicon as a substrate material. Ideal substrates for MEMS. Single crystal Silicon and wafers crystal structure. Mechanical properties of Si. Silicon compounds - SiO_2, SiC, Si_3N_4 and polycrystalline Silicon. Silicon piezoresistors. Gallium arsenside. Quartz – piezoelectric crystals. Polymers for MEMS. Conductive polymers.

UNIT – III

Microsystem Fabrication Process : Photolithography. Photoresist and applications. Light sources. Ion implanation. Diffusion process. Oxidation – thermal oxidation. Silicon diode. Thermal oxidation rates. Oxide thickness by colour. Chemical vapour deposition – principle, reactants in CVD. Enhanced CVD physical vapour deposition. Sputtering. Deposition by epitaxy. Etching – chemical and plasma etching.

UNIT – IV

Micro Devices : Sensors – classification of sensors – signal conversion – ideal characterisation of sensors – mechanical sensors – measurands – displacement sensors – pressure and flow sensors.

UNIT – V

Micromanufacturing and Microsystem Packaging : Bulk micromachining. Isotropic and anisotropic etching - wet etchants, etch stops, dry etching comparison of wet and dry etching. Dry etching – physical etching – reactive ion etching, comparison of wet and dry etching. Surface micromachining - process in general, problems associated in surface micromachining. The LIGA process – description, materials for substrates and photoresists, electroplating, the SLIGA process. Microsystem packaging - General considerations. The three levels of microsystem packaging – die level, device level and system level. Essential packaging technologies – die preparation – surface bonding, wire bonding and sealing. Three dimensional packaging. Assembly of microsystem – selection of packaging materials.

TEXT BOOKS:

1. Tai-Ran Hsu, "MEMS and Microsystems Design and Manufacture", 2nd ed., Tata McGraw Hill Publishing Co. Ltd., New Delhi, 2002.
2. Julian W Gardner, "Microsensors: Principles and Applications", 2nd ed., John Wiley and Sons, New York, 2001.

REFERENCE BOOKS :

1. Chang C Y and Sze S M, "VLSI Technology", 4th ed., Mc Graw Hill, New York, 2000.
2. Kovacs G T A, "Micromachined Transducers Sourcebook", 4th ed., McGraw Hill, New York, 1998.
3. Mark Madou "Fundamentals of Microfabrication", 3rd ed., CRC Press, New York, 1997.
4. Sze SM, "Semiconductor Sensors", 2nd ed., McGraw Hill, New York, 1994.

IV Year B.Tech. Automobile Engg. II-Semester

L	T	P	To	C
3	1	-	4	4

AE408 TRANSPORT MANAGEMENT
(DEPT. ELECTIVE – III)

Objective of the Course :

Objective :The subject aims at giving the knowledge to the student about the complete fleet management by giving the kowledge about the motor vehicle acts,insurance & taxation regulations,optimum bus and crew sheduling and goods transport management and advanced techniques in traffic navigation systems.

UNIT - I

Motor Vehicle Act: Short titles & definitions, Laws governing to use of motor vehicle & vehicle transport, Licensing of drivers & conductors, Registration of vehicle, State & interstate permits, Different types of RTO forms, Rules regarding construction of motor vehicles, Central Motor Vehicle Rules & amendments, Government administration structure - Organization & management of motor vehicle department, Traffic rules, Signals & controls, responsibility of driver, Public relations & public authorities, Accidents, Causes & analysis, Liabilities & preventive measures, Offences, penalties & procedures, Personnel, Authorities & duties.

UNIT - II

Taxation : Objectives, Bombay Motor Vehicle Taxation Act, Structure & methods of laving taxation, Onetime tax, Tax exemption & tax renewal

Insurance : Significance & types of insurance, Comprehensive, Third party insurance, Furnishing of particulars of vehicles involved in accident, Award of the claims tribunal, MACT (Motor Accident Claims Tribunal), Solatium Fund, Hit & run case, accident claims & survey report including post accident procedures, Duty of driver in case of accident, Surveyor & Loss Assessor.

UNIT - III

Passenger Transport Operation: Structure of passenger transport organizations, introduction to road corporation act, Typical depot layouts, requirements, Problems on fleet management, Fleet maintenance, Bus & Crew Scheduling, significance of Motor Transport Workers act, personnel & training - training for drivers & conductors, Public relations, passenger amenities, advertisement work, Theory of fares, Basic principles of fare charging, Differential rates for different types of services, Depreciation & debt charges, operation cost, Revenues, Economics & records. Management Information System (MIS) in passenger transport operation.

UNIT - IV

Goods Transport Operation: Structure of goods transport organizations, scheduling of goods transport, Freight calculations, Management Information System (MIS) in goods transport operation, storage & transportation of petroleum products.

UNIT - V

Advance Techniques in Traffic Management : Vehicle & traffic navigation system, global positioning system, advanced traffic control devices, Intelligent Transport System.

TEXT BOOKS:

1. Motor Vehicle Act - Govt. of India Publications.
2. Santosh Sharma, "Productivity in Road Transport", 2nd ed., Association of State Road Transport Undertakings, New Delhi.
3. P.G.Patankar, "Road Passenger Transport in India", 2nd ed., CIRT, Pune 2008.

REFERENCE BOOKS :

1. S.K. Shrivastava, "Economics of Transport"
2. "Transport Development in India", S. Chand & Co. Pvt. Ltd., New Delhi.
3. Gupte & Dighe, "Motor Vehicle Laws in Maharashtra", Hind Publications.
4. Bus Transport operation, L. Kitchin.

	L	T	P	To	C
IV Year B.Tech. Automobile Engg. II-Semester	3	1	-	4	4

EE206 CONTROL SYSTEMS
(INTERDISCIPLINARY SUBJECT)

Objective of the Course:

This course enables mathematical modelling of physical systems (electrical, mechanical, chemical ,thermal ,pneumatic systems) and presents different methods of analysis and design of physical systems.

UNIT - I

Introduction: Concepts of Control Systems - Open Loop and closed loop control systems and their differences - Different examples of control systems - Clasification of control systems.

Mathematical Models of Physical Systems : Differentical equations - transfer functions and block diagram representation of systems considering electrical systems as examples Block diagram algebra -Representation by Signal flow graph - reduction using Mason's gain formula - translational and rotational mechanical systems.

UNIT - II

Feed-Back Characteristics : What is Feedback? Effects of feedback - reduction of parameter variations by use of feedback-Control over system dynamics - by the use of feedback.

Elements of Control Systems : DC Servo motor - AC Servo motor - Synchro transmitter and Receiver

UNIT - III

Time Response Analysis : Standard test signals - Time response of first order systems - Characteristic Equation of Feedback control systems, Transient response of second order systems - Time domain specifications - Steady state response - Steady state errors and error constant - Effects of proportional derivative, proportional integral systems.

Concepts of stability : The concept of stability, Routh stability criterion - qualitative stability and conditional stability.

UNIT - IV

Root Locus Technique : The root locus concept - construction of root loci - effect of adding poles and zeros to G(s)H(s) on the root loci

Frequency Response Analysis : Introduction, Frequency domain specifications - Bode diagrams - Determination of Frequency domain specifications and transfer function from the Bode Diagram - Phase margin and Gain margin - Stability Analysis from Bode Plots. Polar Plots, Nyquist Plots and applications of Nyquist stability criterion.

UNIT - V

Design and Compensation Technique : Introduction and Preliminary design considerations - Lead, Lag, Lead-lag - compensation Based on frequency response approach. PID controller.

State Space Analysis of Continuous Systems : Concepts of state, state variables and state model, derivation of state models from block diagrams, Diagonalization - Solving the Time Invariant state Equations - State Transition Matrix.

TEXT BOOKS :

1. I. J. Nagrath and M. Gopal, "Control Systems Engineering", 2nd ed., New Age International (P) Limited.
2. B. C. Kuo, "Automatic Control Systems", 8th ed., John wiley and son's, 2003.
3. Katsuhiko Ogata, "Modern Control Engineering", 3rd ed., Prentice Hall of India Pvt. Ltd., 1998.

REFERENCE BOOKS :

1. N.K.Sinha,"Control Systems", 3rd ed., New Age International (P) Limited Publishers, 1998.
2. John wiley, "Control Systems Engg.", 3rd ed., NISE.

IV Year B.Tech. Automobile Engg. II-Semester

L	T	P	To	C
3	1	-	4	4

ME407 MECHATRONICS
(INTERDISCIPLINARY SUBJECT)

Objective of the Course:

This course gives an overview of Mechatronics systems and their components for evolving hybrid technologies in various applications.

UNIT - I

Introduction: Introduction to Mechatronics - Multi disciplinary Scenarios Systems for Measurement and Control. Microprocessor based controllers Response of Systems.

UNIT - II

Signal Conditioning, the op-amp, protection, filtering, Wheatstone bridge, digital signals, multiplexers, Data acquisition, Digital signal processing, pulse modulation, displays, magnetic recording, measurement systems, Testing calibration.

UNIT - III

System Modeling & Dynamic Response of Systems Introduction to Mathematical Modeling, Building Blocks of Mechanical Systems. Electrical Systems, Fluid Systems and thermal systems. Engineering Systems: Rotational, translational, Electro-Mechanical & Hydraulic- Mechanical. Performance measures of first order & second order systems, Transfer function.

UNIT - IV

Actuation to Hydraulic and Pneumatic Systems, Mechanical Systems, Electrical Systems, Mechanical Switches, Solid State Switches, Operation of Solenoids AC, DC & Stepper Motors.

UNIT - V

Microprocessors & PLC's: Introduction to digital logic - logic gates - applications of logic gates - sequential logic - Applications - Basic structure of PLCs - selection of a PLC - case studies of mechatronics systems - Microprocessor systems - microcontrollers.

TEXT BOOKS :

1. W. Bolton, "Mechatronics Electronic Control Systems in Mechanical and Electrical Engineering" 3rd ed., Pearson Education, 2009.
2. Appuu Kuttan K K, "Introduction to Mechatronics" 2nd ed., Oxford Press, 2009.

REFERENCE BOOKS :

1. Nitaigour Premchand Mahalik, "Mechatronics Principles, Concepts and Applications" 2nd ed., Tata McGraw Hill, 2008.
2. David G Alciators, Michael B. Histand, "Mechatronics and Measurement Systems" 3rd ed., Tata McGraw Hill, 2009.

IV Year B.Tech. Automobile Engg. II-Semester

L	T	P	To	C
3	1	-	4	4

ME411 NANO TECHNOLOGY
(INTERDISCIPLINARY SUBJECT)

Objective of the Course :

This course is intended to develop interest among the students in the area of nano technology and to initiate research inclination.

UNIT - I

Genesis of Nano Technology : Introduction - Nano Science - Nano technology - Nano materials - Scope of applications - topics from nature - Basic principles of Nano science and technology - Basics of quantum mechanics - Quantum Nano structures.

UNIT - II

Fabrication of Nano Materials : Introduction - Nano materials - Properties of Nano materials - Techniques used in Nano technology - Top - Down approach - Bottoms-up approach - Tools used in Nano technology - Electron Micro Scope - Atomic Force Microscope (AFM). Synthesis of Nano materials.

UNIT - III

Carbon Nano Tubes (CNT) : Introduction - Preparation - Properties - Classification - Fullerens - Applications of Carbon Nano Tubes.

UNIT - IV

Domain Application of Nano Technology : Introduction - Applications of Nano technology - Environment and Energy - Textiles - Agriculture - Electronics & Communication - Computers - Medicine - Space technology.

UNIT - V

Projected use & Implications of Nano Technology : Introduction - Assessment of opportunities - Bottlenecks in implementation of Nano technology - Exploration and Economical concerns of Nano technology - Current research activity.

TEXT BOOKS:

1. Mark Ratner, "Nano technology", 3rd ed., Pearson Education, 2008.
2. Manasi Karkare, "Nano Technology Fundamentals and Applications", 1st ed., I.K. International Publishing House, 2008.

REFERENCE BOOKS:

1. T. Pradeep, "Nano The Essentials", 3rd Reprint, McGraw-Hill Education, 2009.
2. A.K. Badyopadhyay, "Nano materials", 1st ed., New age International Publications, 2009.

IV Year B.Tech. Automobile Engg. II-Semester

L	T	P	To	C
-	-	10	10	10

AE410 PROJECT - II

B.Tech Project - II

The evaluation details of Project - II are given in section 4.3 in Rules and Regulations.

HS 111 ENGINEERING MATHEMATICS - I

L	T	P	To	C
3	1	-	4	4

Course Description & Objectives :

Without mathematics not a single day of an engineer will pass! All the topics of this course are relevant to all branches of engineering. Differential equations are used in various places. Laplace transformations are used, for example, for conversion of domains, from time domain to frequency domain. These are also used to solve ordinary differential equations. When data is given at only a finite points, we use numerical methods for find the approximate values of functions, also to solve differential equations approximately etc. Maxima, minima of a function has got many applications.

Course Outcomes:

1. *Students will understand that Mathematics which they learn can be used at different levels in their Engineering course irrespective of their branches.*
2. *This course will help to sketch the graph of a differential equation and its direction mixing fields*
3. *Laplace transform used to compute solutions of equations involving impulse functions*
4. *They will be able to use Laplace transformations for conversion of domains from time domain to frequency domain.*
5. *Differential Equations help them to find approximate values of function.*
6. *They will be able to analyze and use them in different applications.*
7. *Eigen values and Eigen vectors play a prominent role in the study of ordinary differential equations and in many applications of physical sciences.*

UNIT I - Ordinary Differential Equations & Differential Equations of Second Order :

Differential Equations of First Order : Definiton, Order and degree of a differential equation, Formation of differential equations, Solution of a differential equation, Differential equations of first order and first degree : variables separable, Homogenous equations, Linear equations, Exact differential equations.

Differential Equations of Second Order : Linear differential equations of second order with constant coefficients, Methods for finding the complementary functions and particular integral, General method of finding the particular integral of any function.

UNIT II - Applications of Differential Equations and Laplace Transformations

Applications of Differential Equations : Newton's law of cooling, Natural law of growth, Orthogonal trajectiories**.**

Laplace transformations : Definition, Properties, Convolution theorem, Inverse Laplace transformation, Solving differential equations using Laplace Transformation.

UNIT III - Numerical Methods

Taylor's Method, Picard Method, Euler Method, Modified Euler Method, Runga-Kutta Methods.

Interpolation by Lagrange and Newton methods.

UNIT IV - Matrices

Rank of a matrix, finding rank of a matrix using Echelon form, Normal form, triangular form, PAQ form, inverse of a matrixEigen values, Eigen vectors, properties, Cayley-Hamilton theorem (without proofs), Diagonalisation of a matrix.

Solving System of equations (Gauss-Siedal method only)

UNIT V - Maxima and Minima & Jacobians

Maxima and Minima : Review of partial differentiation: Partial derivatives, Partial derivatives of higher order, Homogeneous function, Euler's theorem, Total differential coefficient,

Maxima and Minima of a function of two variables, Conditions for extreme values, Lagrange method of undetermined multipliers.

Jacobians : Definition, Properties, Jacobian of implicit functions, Partial derivaties of Implicit functions using Jacobian.

TEXT BOOKS :

1. H. K. Dass and Er. Rajnish Verma, Higher Engineering Mathematics, S. Chand & Co., New Delhi, 2011.
2. B.S. Grewal, "Higher Engineering Mathematics", 40th edition, Khanna Publishers, 2009.

REFERENCES:

1. B.V. Ramana, "Higher Engineering Mathematics", 3rd Edition, Tata McGraw-Hill Publishing Co, 2008.
2. R K Jain, S R K Iyengar, "Advanced Engineering Mathematics", 2nd Edition, Narosa Publishing House.
3. Erwin Kreyszig, "Advanced Engineering Mathematics", 8th Edition, John Wiley & Sons (Asia) Pvt. Ltd. 2001.

HS 113 ENGINEERING PHYSICS

L	T	P	To	C
3	1	-	4	4

Course Description & Objectives :

There is a symbiotic relation between physics and engineering. Broadly speaking, engineering is mainly applied physics. Recent technical developments have been the result of joint efforts of physicists and engineers. A proper study of physics is therefore indispensable for an engineering student to excel in his field. The purpose of this course is to present the principles and concepts of physics as relevant to an engineer.

Course Outcomes:

The students will be made to get acquainted to the following learning outcomes:

1. *Concepts of Physical optics, devices and applications.*
2. *Ultrasonic waves, production, applications in NDT.*
3. *Introduction to Quantum mechanics in relevance to that of modern physics.*
4 *Exposure to latest inventions like lasers, fibers and applications*
5. *Insight into nano technology and applications, solar energy to combat energy crisis.*

UNIT I - Physical Optics

Interference – Types - Interference in thin films (Reflection) – Newton's Rings – Michelson's Interferometer, Fabry-perot interferomenter – Applications.

Diffraction – Fraunhoffer Diffraction at single slit – Diffraction grating

Polarization – Production of plane polarized light – Nicol prism – Optical activity – photo elasticity.

UNIT II - Ultrasonics & NDT

Ultrasonics : Introduction – production of ultrasonic waves – piezoelectric method – Properties of ultrasonic waves – Types of ultrasonic waves – Determination of Velocity of ultrasonic waves in solids and liquids – Applications.

NDT : Introduction - Types – Theory and practice of Ultrasonic Testing – Ultrasonic Testing Systems – Ultrasonic Testing Methods – X-Ray Radiography.

UNIT - III Quantum Mechanics & Free electron theory of metals

Quantum Mechanics : Matter waves - Schroedinger's time independent wave equation - Physical significance of the wave function - Particle in one dimensional potential well – tunneling phenomenon.

Free electron theory of metals : Introduction – Classical free electron theory – Electrical conductivity of metal – Fermi - Dirac distribution function and its variation with temperature – Quantum free electron theory.

UNIT IV - Lasers & Fiber Optics:

Lasers: Characteristics of Laser light – Spontaneous and Stimulated emission of radiation – Low power and High power lasers, He-Ne Laser – CO_2 Laser – Nd-Yag laser - Applications of Lasers, Holography and Applications

Fiber Optics: Principle of optical fiber - materials – Numerical Aperture – Types of fibers – Dispersion and Attenuation in optical fibers – Optical sensors – Optical fiber communication system.

UNIT V - Solar Energy & NanoScience and Technology

Solar Energy : Solar radiation – Photovoltaic effect – solar cells – Efficiency of solar cell – Solar thermal energy conversion systems.

NanoScience & Technology : Introduction to nano meterials – Basic principles of nanoscience & Technology – Fabrication of nanomaterials – Physical & Chemical properties of nanomaterials – Applications of nanotechnology.

TEXT BOOKS :

1. M.R.Srinivasan, “Physics for Engineers” New Age International, 2002-2003.
2. M.N. Avadhanulu & P.G. Kshirasagar, “Engineering Physics”, 1st edition, S. Chand & Company Ltd, 1992.

REFERENCES:

1. Halliday, Resnic and Walker, “Fundamentals of Physics”, 6th edition, John Willey publishers, 2003.
2. Grawfor F.S., Berkley Physics courses, “Waves and Oscillations”, Volume III McGraw Hill, 1992.
3. V. Raghavan, “Materials Science and Engineering”, 5th edition, Prentice-Hall India, 2004.
4. S.O.Pillai, “Solid State Physics”, 6th edition, New Age International Publications, Revised, 2005.
5. V.Rajendran, “Engineering Physics”, 1st edition, TMH Publications, 2010.

EE 111 FUNDAMENTALS OF ELECTRICAL ENGINEERING

L	T	P	To	C
4	0	-	4	4

Course Description & Objectives :

To understand the basic concepts, laws, techniques in analyzing various DC and AC circuits and concepts in coupled circuits. Study of construction details, working of various electrical machines and Semiconductor Devices and operation

Course Outcomes:

1. *Able to explain the notation and components of electric circuits*
2. *Able to analyze DC and single phase and three phase AC circuits using different methods and theorems*
3. *Able to operate various electrical machines.*
4. *Able to explain the concepts of Semiconductor Devices and operation*

UNIT I - Fundamentals Of DC Circuits

Circuit Concepts: Concepts of network, Active and passive elements, voltage and current sources, concept of linearity and linear network, unilateral and bilateral elements, R, L and C as linear elements. Ohm's Law – Kirchhoff's Laws –application to simple series, parallel circuits, mesh and nodal analysis of simple resistive circuits.(simple numerical problems).

UNIT II - Fundamentals of A.C. Circuits:

Generation of A.C. voltage - frequency, average value, R.M.S. value, form factor, peak factor for sinusoidal only - phasor representation of alternating quantities. Analysis of simple series and parallel A.C. circuits-(simple numerical problems)

Balanced Three phase systems – relation between phase and line quantities of voltages and currents in star and delta connected systems (Elementary treatment only)

UNIT III - Fundamentals of Electromagnetism and Transformers:

Concepts of Magneto motive force, reluctance, flux and flux density , concept of Self Inductance and Mutual Inductance, Coefficient of coupling-only elementary treatment. (simple numerical problems).

Transformers: Principle of operation of single phase transformer – constructional features – EMF equation (simple numerical problems)

UNIT IV - Electrical Machines:

DC Machines: Constructional details of a D.C. Machine.

D.C. Generator – Principle of operation – EMF equation – types of D.C. generators (simple numerical problems)

D.C. Motor – Principle of operation – Torque equation – types of D.C. motors (simple numerical problems)

A.C Machines: Principle of operation of three phase induction motors – slip ring and squirrel cage motors – Torque equation derivation, Constructional details of synchronous machines.

UNIT V - Semiconductor Devices:

Classification of solids based on energy band theory - Intrinsic semiconductors - Extrinsic semiconductors - P type and N type semiconductors - P-N junction diode and its characteristics –Half and Full wave rectifiers- Zener diode and its characteristics - Voltage regulator. Bipolar junction transistor – Operation-Types- Applications.

TEXT BOOKS:

1. Mittle, V.N., "Basic Electrical Engineering", 2nd ed., TMH, New - Delhi, 1990.
2. V.K.Mehta,"Principles of Electrical Engineering and Electronics", 3rd ed., S. Chand Publications, New Delhi, 2010.

REFERENCES:

1. Millman & Halkias, "Integrated Electronics", McGraw Hill, 1979.
2. A.K. Thereja & B.L. Thereja, "Electrical Technology", Vol. – II, S.Chand Publications, 2007.
3.. U.Bakshi & A.Bakshi, "Basic Electrical Engineering", 1st ed., Technical Publications, Pune, 2005.
4. U.Bakshi & A.Bakshi, "Basic Electrical Engineering", 1st ed., Technical Publications, Pune, 2005.

HS 114 TECHNICAL ENGLISH COMMUNICATION

L	T	P	To	C
3	2	-	5	5

Course Description & Objectives :

To introduce students to the specific use of language for the purposes of Technical Communication which would be an essential prerequisite for success in the areas of writing and speech. The teaching efforts in this course will be directed towards making students develop their technical and non-technical writing abilities using the fundamental principles that apply to the correct use of the English language free of grammatical and other related errors.

Course Outcomes:

Students shall achieve the ability to write and demonstrate college-level proficiency in the following:

1. *Clear and effective communication of meaning in speaking and writing.*
2. *The ability to perform effectively the essential steps of the writing process (Note making, organizing, composing, revising, and editing).*
3. *The ability to explain, develop, and criticize ideas effectively.*
4. *Effective organization within the paragraph and the essay.*
5. *Accuracy, variety, and clarity of sentences.*
6. *Appropriate diction.*
7. *Control of conventional mechanics (e.g., punctuation, spelling)*

UNIT - I

- Text : Environmental Consciousness (Climate Change – Green Cover – Pollution)
- Grammar : Articles – Prepositions – Sentence Types and Construction
- Vocabulary : Root – Prefixes - Suffixes
- Composition : Paragraph Writing (Descriptive & Narrative)
- Lab Practice : Introduction to Phonetics (Organs of Speech; Consonants, Vowels & Diphthongs; Syllable, Stress & Intonation)

UNIT - II

- Text : Emerging Technologies
  (Solar Power – Cloud Computing – Nanotechnology)
- Grammar : Time and Tense (Present-Past-Future; Helping Verbs; Modals)
- Vocabulary : Synonyms – Antonyms
- Composition : Note-making
- Lab Practice : Grammar Practice (Speaking of past, present & future)

UNIT - III

- Text : Energy
  (Renewable and Non-renewable Sources – Alternative Sources – Conservation – Nuclear Energy)
- Grammar : Subject-Verb Agreement - Sentence Construction
  (Characteristics of Technical Writing)
- Vocabulary : Idioms & Phrases
- Composition : Summarizing
- Lab Practice : Situational Conversations – Role-Plays
  (Introducing; Greeting; Enquiring; Informing; Requesting; Inviting)

UNIT - IV

- Text : Engineering Ethics
  (Challenger Disaster – Biotechnology – Genetic Engineering – Protection from Natural Calamities)
- Grammar : Sentence Transformation (Degrees, Voice, Speech & Synthesis)
- Vocabulary : Phrasal Verbs
- Composition : Letter Writing (Informal)
- Lab Practice : Situational Conversations – Role-Plays
  (Emotions; Directions; Descriptions; Agreements; Refusals; Suggestions)

UNIT - V

- Text : Travel and Tourism
  (Advantages and Disadvantages of Travel-Tourism – Atithi Devo bhava – Tourism in India)
- Grammar : Common Errors
- Vocabulary : One-word Substitutes
- Composition : Letter Writing (Formal)
- Lab Practice : Group Discussions

TEXT BOOKS :

Mindscapes - English for Technologists and Engineers, Orient Black Swan, 2012.

REFERENCES:

1. V. R. Narayana Swamy***, "Strengthen Your Writing",*** 1st edition, Orient Longman, 2003.
2. Thomas Elliott Berry***, "The Most Common Mistakes in English Usage",*** 1st edition, Tata McGraw Hill, 2004.
3. T. Balasubramanyam, ***A Textbook of English Phonetics for Indian Students***, Macmillan Ltd., 2000.
4. Sasikumar.V and P.V. Dhamija,. ***Spoken English: A Self-Learning Guide to Conversation Practice,*** 34th Reprint, Tata McGraw Hill, New Delhi, 1993.
5. Margaret M Maison, **"Examine your English",** 1st edition**,** Orient Longman, 1999.
6. Ashraf Rizwi, "***Technical English Communication***", Tata McGraw Hill, Latest Edition.

CS 101 PROBLEM SOLVING AND COMPUTER PROGRAMMING

L	T	P	To	C
4	1	-	5	5

Course Description & Objectives :

Aim of this course is to introduce the techniques of problem solving and concepts of programming language to the students. Because of its popularity and suitability to develop different types of applications, 'C' language has become the de-facto programming language to engineers. A comprehensive introduction of C language is offered through this course to enable the students to write diversified programs.

Course Outcomes:

On Completion of this course student should be able to

1. *Able to understand the basic terminology used in computer programming and to write, compile and debug programs in C language.*
2. *Use different data types in a computer program and design programs involving decision structures, loops and functions.*
3. *Able to understand the allocation of dynamic memory using pointers*
4. *Use different data types to create/update basic data files.*

UNIT I - Fundamentals of computers

Basic functional units and discrete components of a computer, computer networks, networking components, Binary representation of integers and real numbers, ASCII, EBCDIC, Unicode, Generations of computer languages.

UNIT II - Problem Solving Steps and Basic of C Language

Problem understanding, Formulating a mathematical model, Development of an algorithm, Representation of an algorithm, Flow chart and Pseudo code, Coding, Testing and Debugging, Comments, Processor statement, Function header statement, Variable declaration statement and Executable statement, C Character Set, constants, identifiers, operators, punctuations, keywords, Basic data types, modifiers, identifiers, variables, C scopes, type qualifiers, storage class specifiers, variable initializations, constants, reading and writing characters, formatted I/O.

UNIT III – Preliminaries of C

Assignment, arithmetic , relational, logical, bitwise, ternary, address, indirection, sizeof, dot, arrow, and parentheses operators, Expressions Precedence of operators

and associatively, Category of Statements, Selection, Iteration, jump, label, expression and block, Function declaration, prototype, definition, calling by value and address, standard library functions and recursive functions.

UNIT IV - Arrays and Pointers

Declaration, initialization, reading, writing, accessing and passing as a parameter to functions, Multidimensional arrays and String functions, pointer expressions, pointer and arrays, multiple indirection, initializing pointers, pointer to functions, Dynamic memory allocation functions.

UNIT V - Structures and File Processing

declaration, initialization and accessing, array of structures and passing structures to functions, structure pointers, arrays and structures within structures, unions, bit-fields, typedef and enumerations, I/O and processing operations on text and binary files. pre-processor directives.

TEXT BOOKS :

1. Reema Thareja, “Introduction to C Programming”, Oxford University Press, India, 2013
2. Herbert Schildt, C: “The Complete Reference”, 4th Edition, Tata McGraw-Hill, 2000.

REFERENCES:

1. E. Balagurusamy, “ Programming in ANSI C”, 4TH Edition, Tata McGraw- Hill, 2008.
2. R Ravichandran and T Jeyapoovan, “ Computer Programming with C”, Soni Graphics, India, 2014.

HS 115 ENGINEERING MATHEMATICS - II

L	T	P	To	C
3	1	-	4	4

Course Description & Objectives :

Without mathematics not a single day of an engineer will pass! All the topics of this course are relevant to all branches of engineering. In real life, many quantities are dependent on more than one quantity. Hence study of functions of several variables is crucial. In this course, we study partial differentiation, partial differential equations, multiple integrals all involving functions of two variables. We also study Fourier series and Z-transformations and difference equations.

Course Outcomes:

1. *The students will understand that many quantities are dependent on more than one quantity so they learn functions of several variables.*
2. *They will be able to solve Partial Differential Equations, multiple integrals which are involving functions of two variables.*
3. *They can apply Z – transforms to solve difference equations.*
4. *They will be able to calculate areas and volumes.*
5. *The student will enable to locate the maxima and minima of a function is an important task which arises often in applications of mathematics to problems in engineering and science.*
6. *Vector differentiation and integration used to find the arc lengths and curvatures of space curves*

UNIT I - Partial Differential Equations :

Formation of Partial Differential Equations, Linear (Lagrange) Equations, Method of multipliers, Non-linear partial differential equations (Types), Charpit's method.

Second order linear equations, classifications, Solution by method of separation of variables.

UNIT II - Fourier Series :

Periodic functions, Fourier series, Dirichlet's conditions, Determination of Fourier coefficients, Discontinuous functions, even and odd functions, Half-range series, Functions having arbitrary period.

UNIT III - Z-transformations & Applications :

Z-transformations : Sequences, Z-transformation, Properties, Inverse Z-transformation, Multiplication and division by k, Initial and final value theorems,

Convolution, Determination of inverse Z-transformation.

Applications : Solutions of difference equations using Z-transformations.

UNIT IV - Multiple Integrals :

Double integrals, Evaluation, Evaluation in Polar coordinates, Change of order of integration, Change of variables, Applications to Area in Cartesian coordinates and polar coordinates.

Triple integrals, Fundamentals, Evaluation of triple integrals.

UNIT V - Vector Differentiation and Integration

Vector Function, Differentiation, Scalor and Vector point function, Gradient, Normal, Divergence, Directional Derivate, Curl, Vector identities.

Line Integral, Surface Integral, Volume integral, Green's theorem, Stoke's theorem, Gauss theorem of divergence (without proofs).

TEXT BOOKS :

1. H. K. Dass and Er. Rajnish Verma, Higher Engineering Mathematics, S. Chand & Co., New Delhi, 2011.
2. B.S. Grewal, "Higher Engineering Mathematics", 40th edition, Khanna Publishers, 2009.

REFERENCES:

1. B.V. Ramana, "Higher Engineering Mathematics", 3rd Edition, Tata McGraw-Hill Publishing Co, 2008.
2. R K Jain, S R K Iyengar, "Advanced Engineering Mathematics", 2nd Edition, Narosa Publishing House.
3. Erwin Kreyszig, "Advanced Engineering Mathematics", 8th Edition, John Wiley & Sons (Asia) Pvt. Ltd. 2001.

HS 117 ENGINEERING CHEMISTRY

L	T	P	To	C
4	0	-	4	4

Course Description & Objectives :

Chemistry is the backbone in designing and understanding the nature and properties of various engineering materials. Currently, the electronics and computer engineers are waiting for suitable polymers for using miniature super computers. So this subject develops fundamental knowledge about new engineering materials and their significance in technical fields and industrial sectors. Water is an essential element for the existence of human, plant and animal lives, besides that it has greater industrial applications. The knowledge about water is the basic requirement for a professional student. Characterization of materials with instrumental techniques is essential for engineers.

Course Outcomes:

1. *Differentiate between soft and hard water. Understand the disadvantages of using hard water domestically and industrially. Select and apply suitable softening methods (Soda-lime, zeolite, ion-exchange methods, etc.) to soften the hard water for industrial and domestic applications.*
2. *Acquaintance of primary and secondary cells, Hydrogen-Oxygen and Methanol fuel cells, dry and wet corrosions, corrosion controlling methods*
3. *Acquaintance of the properties and engineering applications of Ceramics, Refractories, Glasses, Cement, Abrasives, Lubricants*
4. *Acquaintance of Preparation, properties and applications of different polymers (Polyethylene, PVC, Tefflon, Bakelite,Urea-Formaldehyde, Silicones, Rubber – Vulcanization, Synthetic Rubbers-(Buna-S, Buna-N, Neoprene); treatment of membranes.*
5. *Acquaintance of various spectroscopic methods (UV-visible / IR), Beer-Lambert's Law, qualitative and quantitative analysis, block diagrams of UV and IR spectrophotometers*.

UNIT I - Water Technology :

Introduction-Hardness of water-Determination of hardness by EDTA-Disadvantages of hard water-Scales & Sludges-Caustic embrittlement-Boiler corrosion-Priming & Foaming, WHO, BIS Standards of water-Softening Methods- Lime Soda process, Zeolite process, Ion Exchange process - Desalination of brackish water-Reverse osmosis, Electro dialysis.

UNIT II - Electrochemical cells and AND Corrosion:

Electrochemical cells: primary cell-(Dry or lecalanche cell), Secondary cell-(Lead-acid storage cell, Lithium ion battery), Hydrogen-Oxygen Fuel cell, Methanol fuel cell.

Corrosion: Introduction-Dry corrosion (chemical)-Wet corrosion (electrochemical)-Mechanism of wet corrosion-Bimetallic corrosion-Concentration cell corrosion-Factors influencing corrosion-Corrosion control methods- Cathodic protection and Electroplating.

UNIT III - Engineering Materials :

Properties and engineering applications of Ceramics, Refractories, Glasses, Cement,Abrasives, Lubricants.

UNIT IV - Polymers :

Introduction –Types of polymerization-Preparation, properties and applications of Polyethylene, PVC, Tefflon, Bakelite, UreaFormaldehyde, Silicones, Rubber – Vulcanization, Synthetic Rubbers - (Buna-S, Buna-N, Neoprene). Elementary treatment of Membranes

UNIT V - Instrumental Techniques :

Interaction of radiation with matter,UV-Visible Spectroscopy-Beer –Lambert's law ,Qualitative and Quantitative Analysis,Block diagram of UV-Visible Spectrophotometer.IRSpectroscopy-Types of Vibrations,Identification of functional groups,Block diagram of IR Spectrophotometer**.**

TEXT BOOKS :

1. P.C Jain and Monica Jain, "Engineering Chemistry", 15th edition, Dhanpat Rai Publications 2009.
2. Gurudeep Raj and Chatwal Anand, "Instrumental Methods of Analysis", 5th edition, Himalaya Publications, 2007.

REFERENCES:

1. S.S.Dara, "Text book of Engineering Chemistry" 1st edition, S. Chand Publications, 2009.
2. C.V. Agarwal, C.P. Murthy, A.Naidu, "Chemistry of Engineering materials", 9th edition, BSP Publications, 2008.
3. M.R. Senapati, "Advanced Engineering Chemistry" 2nd edition, Lakshmi Publications, 2006
4. H.W. Wilard and Demerit, "Instrumental methods of Analysis", 7th edition, CBS Publications, 1986.

HS 122 ENGINEERING MATERIALS

L	T	P	To	C
4	-	-	4	4

Course Description & Objectives :

The course will help students to learn about the elementary relationships between structure and properties of materials how materials can be classified. It also reveals the engineering applications of metals, alloys, semi conductors and magnetic materials and relation between properties and engineering applications.

Course Outcomes:

The students will be made to get acquainted to the following learning outcomes:

1. *The bonding in solids. Crystal systems and their structural features*
2. *Fundamentals related to phase equilibria and relevance in Materials Science*
3. *Mechanical properties of solids, factors affecting such properties in order to gain materials information.*
4. *Classification of solids based on band theory, sources of resistivity in metals, semi conductors transport mechanism and applications.*
5. *Classification of magnetic materials, hysteresis, ferrites and applications*
6. *Super conductors, classification and their applications. Dielectric materials, types of polarization and new engineering materials and their usefulness.*

UNIT I - Bonding in Solids & Crystallography:

Bonding in Solids: Inter atomic forces – Types of bonds – Primary & Secondary bonded materials and their properties – Cohesive energy.

Crystallography: Introduction – classification of Crystal systems – SC, BCC & FCC structures –Miller indices of planes & directions – Separation between successive planes – X-ray diffraction – Bragg's Law – Powder method – Crystal imperfection – Point and line imperfections – Grain boundaries

UNIT II - Phase Equilibria & Mechanical Properties :

Phase Equilibria: Gibb's phase rule & terms involved – Reduced phase rule - Two component systems–invariant reactions – Eutectic system & Iron – Carbon system - Lever rule.

Mechanical Properties : Introduction – mechanical properties of materials – Stress-Strain relations of various solids – Elastic moduli- deformations in solids- Fracture – Creep- Fatigue – Factors affecting mechanical properties of materials.

UNIT III - Conducting Materials & Semiconductors :

Conducting Materials: Introduction – Classification of solids based on the band models - Relaxation time and electrical conductivity of a metal – Collision time & mean free path – Sources of resistivity of metals.

Semiconductors: Introduction – Generation & recombination – Intrinsic semiconductors – Extrinsic semiconductors – Drift and diffusion (Qualitative treatment) – Einstein relation – Hall effect – Direct and Indirect band gap.

UNIT IV - Magnetic Properties & Superconductivity

Magnetic Properties: Introduction – Origin of magnetic moment – Classification of magnetic materials – Domain theory of ferromagnetism – Hysteresis curve - Soft and hard magnetic materials – Ferrites and their applications.

Superconductivity – Introduction - Meissner Effect – Types of superconductors – High Temperature superconductors – Applications.

UNIT V - Dielectrics & Functional materials

Dielectrics : Introduction – Dielectric polarization – Internal electric field – Clausius – Mossotti relation – Ferro and Piezo electricity - Electrets – Applications.

Functional materials: Introduction – Metallic glasses – Biomaterials – Composites – Metal matrix composites - Fiber reinforced plastics – Conducting polymers - shape memory alloys – smart materials.

TEXT BOOKS :

1. V. Raghavan, “Materials Science and Engineering”, 3 rd ed., PHI, 1996.
2. Lawrence H. Van Vlack, “Element s of Materials Science and Engineering”, 6th ed., Wesley Publication, 1989.

REFERENCES:

1. Arumugam. M “Material Science” Anuradha Technical Book Publishers, Kumbakonam.K, 1997.
2. Manas Chandra, “Science of Engineering Materials”, Vol 1-3, Mc - Millian Company of India, Delhi.
3. Pillai, S.O, “Solid State Physics”, New Age International, 1998.
4. William F. Smith, “Principles of Materials Science and Engineering”, MGH, Publishers, 1988.
5. Structure and Properties of Materials – John Wulff – Wiley Eastern Ltd.

ME 101 ENGINEERING MECHANICS

L	T	P	To	C
3	1	-	4	4

Course Description & Objectives :

The course aims to impart the knowledge to understand the forces and their reactions on various static and dynamic conditions.

Course Outcomes:

1. *Use scalar and vector analytical techniques for analyzing forces in statically determinate structures.*
2. *Solve the engineering problems in case of equilibrium conditions and to calculate the reaction forces of various supports of different structures.*
3. *Determine the centroid, centre of gravity and moment of inertia of various surfaces and solids.*
4. *Solve the problems involving dry friction.*
5. *Apply fundamental concepts of kinematics and kinetics of particles to the analysis of simple, practicalproblems.*

UNIT I - Basic Concepts and Principles of Statics :

Introduction to Engineering Mechanics, Scalar and Vector quantities, Forces, Characteristics of a force, Definitions and examples of various types of force systems, Law of transmissibility, Definition of resultant, Composition and resolution of forces, Moment of a force, Principles of moments of force, Couples, characteristics of a couple, Transformations of a couple, Resultants of Force Systems, Possible resultants of different types of force systems, Resultant of a concurrent coplanar force system, Resultant of a non concurrent coplanar force system

UNIT II - Equilibrium of Rigid Bodies

Free body diagrams, Types of supports and their reactions, requirements of stable equilibrium, Equations of equilibrium of a concurrent coplanar force system, Equilibrium of Bodies acted on by two or three forces, Equilibrium of bodies acted on by non-concurrent coplanar force system

UNIT III - Properties of Surfaces and Solids :

Centroid and Center of Gravity: Centre of gravity of parallel forces in a plane, centroids and center of gravity of composite bodies, Distributed Loads on Beams.

Moments of Inertia: Definition, Parallel axis theorem and perpendicular axis theorem for areas, Polar Moment of inertia, Second moment of area by

integration, Radius of gyration of areas, Moments of inertia of composite areas.

UNIT IV - Friction :

Nature of friction, Laws of friction, Coefficient of friction, Angle of friction, Cone of friction, Types of Friction - Sliding Friction, Rolling Friction, Belt Friction, Ladder Friction, Wedge friction.

UNIT V - Kinematics and Kinetics :

Absolute Motion: Introduction, Recapitulation of basic terminology of mechanics, Displacement, Velocity and acceleration their relationship, Rectilinear motion of a particle

Relative Motion: Introduction to kinematics of relative motion, Relative displacement, Relative velocity

Kinetics: Introduction to Kinetics, Force, Mass and Acceleration, Newton's Laws of motion, Equation of motion for a particle, D Alembert's principle, Rectilinear translation of a rigid body, Work done by a force, Work done by a force system, Energy, Potential energy, Kinetic energy, Principle of Work and kinetic energy, Conservation of energy, Linear impulse, Linear momentum, Principle of linear impulse and linear momentum, Conservation of linear momentum.

TEXT BOOKS :

1. J. L. Meriam, L. G. Kraige, "Engineering Mechanics: Dynamics", 7th ed., John wiley & sons, 2012
2. A. K. Tayal, "Engineering Mechanics", Umesh Publications, 2005.

REFERENCES:

1. L. Singer - Harper, "Engineering Mechanics", 3rd ed., Fedinand . , Collins, 1975.
2. Timoshenko & Young, "Engineering Mechanics", 4th ed., Tata McGraw Hill, New Delhi, 2007.
3. S. S. Bhavakati & J. G. Rajasekharappa, "Engineering Mechanics", 3nd ed., New Age International Publications, New Delhi, 2008.

HS 118 ENVIRONMENTAL STUDIES

L	T	P	To	C
3	0	-	3	3

Course description and Objectives :

The objective of this course is to heighten on awareness of nature and its importance to students

and make them understand the need to make judicious use of all natural resources for long team sustenance of life on this planet.

Course Outcomes:

1. *To provide Knowledge on importance of natural resources and integrate technical "field" knowledge with analytical skills to prevent natural resources depletion*
2. *To maintain healthy and Diverse Ecosystems ,*
3. *Work together to conserve the biodiversity*
4. *Take immediate measures to control the Pollution*
5. *Adopt Ecofriendly technology.*
6. *Maintenance of hygienic conditions*

UNIT I - Environment and Natural Resources :

Environment: Definition, Scope and Importance – Need for Public Awareness

Natural Resources: Renewable and non-renewable resources – Natural resources and associated problems – Forest Resources: Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources: Use and over utilization of surface and ground water – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources - Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity–Energy resources: renewable and non-renewable energy sources, alternate energy sources. Land resources: Land as a resource, land degradation, Soil erosion – case studies - Role of an individual in conservation of natural resources.

UNIT II - Ecosystems and Biodiversity :

Ecosystem: Concept of an ecosystem. – Complete and incomplete ecosystem - Structure and functions of an ecosystem - Ecological succession. - Food chains, food webs -Structure and functional features of the following ecosystem: a. Forest ecosystem b. Grassland ecosystem c. Desert ecosystem, d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) **Biodiversity**: introduction of biodiversity, Bio-geographical classification of India - Value of biodiversity- Biodiversity at global, National and local levels - Hot-spots of biodiversity - Threats to biodiversity - Endangered and endemic species of India – Conservation of biodiversity

UNIT III - Environmental Pollution and Applications of Remote Sensing / GIS on Environment

Definition, Cause, effects and control measures of: Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution - Solid waste Management: Causes, effects and control measures of municipal and industrial wastes - Climate change, global warming, acid rain, ozone layer depletion -Case Studies - Role of an individual in prevention of pollution - Pollution case studies. – Green technology and its concept, role of green technology in controlling environmental problems.

UNIT IV - Social issues and EIA :

Sustainable development -water conservation: Cloud Seeding (Artificial rain making system), rainwater harvesting, watershed management - Disaster management: floods, earthquake, cyclone and landslides - Environment Protection Act. - Air (Prevention and Control of Pollution) Act. - Water (Prevention and control of Pollution) Act - Wildlife Protection Act - Forest Conservation Act

EIA: introduction to E.I.A.-definition of E.I.A and E.I.S – scope and objectives of E.I.A.- methods of E.I.A –CEIA, REIA, MOEF, CPCB, SPCB – Importance of E.I.A in proposed Projects / Industry /

Developmental activity - Remote sensing / GIS: Introduction of remote sensing / GIS, definition of remote sensing, applications of the remote sensing on environment (site selection, land use/land cover pattern, water/air/soil quality models, a criteria of environmental information systems)

UNIT V - Environmental Sanitation :

Food sanitation: food and drugs Act, food preservations, food borne diseases- Milk sanitation: tests for milk, pasteurization of the milk - water borne diseases-

air borne diseases-viral diseases (HIV/AIDS, SARS, bird-flu, anthrax)-maintenance of sanitary and hygienic conditions

Field Work/Environmental Visit: Visit to a local area to document environmental assets – river/ forest/ grassland / hill /mountain - Study of local environment - common plants, insects, birds - Study of simple ecosystems – pond, river, hill, slopes etc - Visits to industries, water treatment plants, effluent treatment plants

TEXT BOOKS :

1. Y. Anjaneyulu, "Introduction to Environmental Science", B S Publications, 2008.
2. Dr. M. Chandrasekhar, "A Text book of Environmental Studies", HI-TECH publications, 2006

REFERENCES:

1. Dr. M. Anji Reddy, "A Text book of environmental science and Technology", B S Publications, 2008
2. Dr. K. Mukkanti, "A Text book of Environmental Studies", S.CHAND Company Ltd, 2009.
3. EHILRS and ST, "Text book of Municipal and Rural Sanitation", M.S Hill, 1998.
4. C. S. Rao, Wiley Eastern Ltd, "Environmental Pollution Control Engineering", New Age International Ltd, 2001
5. Dr. M. Anji Reddy, "Introduction to Remote Sensing", B S Publications, 2004.
6. Kurian Joseph and R.Nagendram, "Essentials of environmental studies", Pearson Education Pt Ltd, Delhi, 2007.
7. Sharma & Kour "Text book of Environmental pollution".
8. H.C Perkins "Text book of Air Pollution".

CS 105 NETWORK SECURITY

L	T	P	To	C
2	-	-	2	-

Course description and Objectives :

This Course focuses towards the introduction of System, Information and Network security using various methodologies. It also focuses on the practical aspects that have been used to provide e_mail and web security.

Course Outcomes:

On Completion of this course student should be able to

1. *understand the Importance of Information Security*
2. *Know the ways to protect the information*
3. *understand the Firewall importance*
4. *understand the need of Virtual Private Networks.*

UNIT I - History of security :

History of security – Physical security, communications security, emissions security, computer security, network security and information security. Security process - Anti-virus software, access controls, firewalls, smart cards, biometrics, intrusion detection, policy management, vulnerability scanning, encryption, physical security mechanisms.

UNIT II - Access attacks

Snooping, eavesdropping, interception; Modification attacks - Changes, insertion and deletion; Denial of service attacks- Denial of access to information, applications, systems and communication; Repudiation attacks - Masquerading and denying an event. Hacking - Hacker motivation, historical hacking techniques, IP spoofing and malicious code.

UNIT - III

Confidentiality of files, information in transmission and traffic flow, integrity, availability and accountability; Integrity of files and information during transmission; Availability - backups, failover and disaster recovery; Accountability – identification and authentication, and audit.

UNIT - IV

Concepts of firewalls, Application layer and packet filtering firewalls; Virtual Private Networks.

UNIT - V

Basic encryption concepts, Private Key encryption standards-DES, triple DES and AES. Public key encryption – RSA. Concepts of digital signatures.

TEXT BOOKS :

1. Eric Maiwald, Fundamentals of Network security, Dreamtech Press, 2007.

REFERENCES:

1. William Stallings, "Cryptography and Network security", 4th edition, Pearson Education, 2010.

HS 119 PROFESSIONAL ETHICS, VALUES AND HUMAN RIGHTS

L	T	P	To	C
2	-	-	2	-

Course description and Objectives :

• *To create an awareness on Engineering Ethics and Human Values.*

• *To instill Moral and Social Values and Loyalty*

• *To appreciate the workplace rights of Others, responsibilities and Safety of others.*

Course Outcomes:

The course will enable the students to attain the following:

1. *an understanding of professional and ethical responsibility in workplace*
2. *the broad education necessary to understand the impact of engineering solutions in a global and societal context*
3. *a knowledge of contemporary issues related to human and professional interactions at workplace*
4. *an engineer's life-long commitment to serve the disadvantaged*

UNIT I - Human Values :

Morals, Values and Ethics – Integrity – Work Ethic – Service Learning – Civic Virtue – Respect for Others – Living Peacefully – Caring – Sharing – Honesty – Courage – Valuing Time – Co-operation – Commitment – Empathy – Self-Confidence – Character – Spirituality.

UNIT II - Engineering Ethics & **Engineering as social experimentation :**

Engineering Ethics : Variety of moral issues – types of inquiry moral dilemmas – moral autonomy – The problems of Many Hands – Kohlburg's theory – Gilligan's theory Impediments to Responsible Action.

Engineering as social experimentation - Codes of ethics - a balanced outlook on law - the challenger case study.

UNIT III - Engineer's Responsibility for Safety :

Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis – Reducing Risk – The Government Regulator's Approach to Risk - Chernobyl

Case Studies and Bhopal.

UNIT IV - Workplace Rights and Responsibilities & Work Environment :

Workplace Rights and Responsibilities : Engineers and Managers. Oganizational complaint procedures. Government agencies. Resolving Employee concerns. Limits on acceptable behaviour in large corporation.

Work Environment : Ethical and legal considerations, Organizational responses to offensive behaviour and harassment. Ethics in a Global Context.

UNIT V - Global Issues :

Multinational Corporations – Business Ethics - Environmental Ethics – Computer Ethics - Role in Technological Development – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Honesty – Moral Leadership – Sample Code of Conduct.

TEXT BOOKS :

1. Mike Martin and Roland Schinzinger, “Ethics in Engineering”, McGraw Hill, New York, 2005.

REFERENCES:

1. Prof. (Col) P S Bajaj and Dr. Raj Agrawal, “Business Ethics – An Indian Perspective”, Biztantra, New Delhi, 2004
2. Charles E Harris, Michael S. Protchard and Michael J Rabins, “Engineering Ethics – Concepts and Cases”, Wadsworth Thompson Learning, United States, 2000 (Indian Reprint now available)
3. Engineering Ethics-An industrial Perspective, Gail Dawn Baura
4. Charles E Harris, Michael S Pritchard and Michael J Rabins, “Engineering Ethics – Concepts and Cases”, Thompson Learning, 2000.
5. Charles E Harris, Michael S Pritchard and Michael J Rabins, “Engineering Ethics – Concepts and Cases”, Thompson Learning, 2000.
6. PSR Murthy, “Indian Culture Values and Professional Ethics”, BS Publications
7. Edmund G Seebauer and Robert L Barry, “Fundamentals of Ethics for Scientists and Engineers”, Oxford University Press, Oxford, 2001.

HS 120 ENGINEERING PHYSICS LAB

L	T	P	To	C
-	-	3	3	2

Course description and Objectives :

This lab is intended to make the students realize the theoretical concepts of physics having hands on experience in conducting the following experiments. Students may have to take up any 10 experiments from each section.

Course Outcomes:

1. *Students realize concept of resonance of sound conducting the experiment of Sonometer Melde's experiment and volume generator.*
2. *The students understand the concepts of light conducting the experiments of dispersion of light, diffraction of light, optical fibers and lasers.*
3. *The students acquire the knowledge of magnetic field theory, thermal energy and elastic properties by conducting the experiments of field along the axis of circular coil, Lee's experiment, Seebeck effect and Torsional pendulum.*

PHYSICS LAB

1. Verification of laws of transverse vibrations in stretched string - Sonometer
2. Melde's Experiment - Transverse and Longitudinal modes.
3. Determination of Rigidity modulus of a material in the form of a wire - Torsional pendulum
4. Dispersive power of the material of a Prism - Spectrometer
5. Determination of wavelength of a monochromatic light source - Diffraction Grating.
6. Field along the axis of a circular coil – stewart Gee's apparatus.
7. Volume Resonator.
8. Band gap of semiconductor
9. Hall coefficient
10. Thermal conductivity of bad conductor Lee's method
11. Optical Fiber – Determination of numerical aperture
12. Solar Cell
13. Seebeck effect

REFERENCES:

1. Vogel's Text book of qualitative Chemical Analysis J.Mendham, R.C Denney, J.D. Bares, M.Thomas & B. Siva Sankar, Pearson Publications – Volume I (2009).

EE 113 FUNDAMENTAL OF ELECTRICAL ENGG. LAB

L	T	P	To	C
-	-	3	3	2

Course description and Objectives :

To understand basic electrical elements, electrical energy its consumption and measurement. To develop practical knowledge on electrical machines, electronic devices and circuits

Out Comes :

1. *Able to realize characteristics of electrical elements.*
2. *Able to analyze given simple ac and dc networks.*
3. *Able to work on different electrical machines.*
4. *Able to reflect the knowledge of electronic devices to verify experimentally.*

List of Experiments

1. Familiarization with basic components such as Resistors, Capacitors, Diodes, Transistors
2. Familiarization with basic electrical measuring instruments
3. Verification of ohm's law
4. Verification of KVL and KCL
5. Calculation of power factor in simple RL and RC circuits
6. Magnetization characteristic of a D.C. self excited generator
7. Measurement of power and energy.
8. Measurement of transformation ratio of single phase transformer.
9. Measurement of Power, Power factor of 3-phase induction motor.
10. Characteristics of PN junction diode.
11. Characteristics of Zener diode.
12. Operation of Full wave Rectifier
13. Operation of half wave Rectifier
14. Study and Working of fluorescent lamp
15. Measurement of armature and field resistances of d c machine using voltmeter-ammeter method.

Note : Any 10 of above experiments are to be conducted.

CS 107 COMPUTER PROGRAMMING LAB

L	T	P	To	C
-	-	3	3	2

Course description and Objectives :

To familiarize the students in preparation of documents and presentations with office automation tools. A comprehensive problem solving skills through C language is offered to enable the students to write diversified solutions using this language.

Course Outcomes:

1. *Able to write, compile and debug programs in C language.*
2. *Able to formulate problems and implement algorithms in C.*
3. *Able to effectively choose programming components that efficiently solve computing problems in real-world*

List of Experiments:

1. Write A Program to find simple Interest, compound interest
2. Write A Program to covert given temperature from C to F & F to C
3. Write A Program to check Entered number is positive or zero or Negative
4. Write A Program to print given year is Leap year or not
5. Write A Program to do arithmetic operations using switch
6. Write A Program to find biggest among 3 Numbers
7. Write A Program to print grade of a student for 5 sub avg>70(A), 60-70(B), 50-60(C),<50(F)
8. Write A Program to find Roots fo Quadratic Equation
9. Write A Program to find sum of individual digits of a given number
10. Write A Program to check whether the given number is PALINDRAM or not
11. Write A Program to check whether the given number is PERFECT or not
12. Write A Program to check whether the given number is PRIME or not
13. Write A Program to check whether the given number is ARMSTRONG or not
14. Write A Program to check whether the given number is STRONG or not
15. Write A Program to find sum of Natural Numbers

16. Write A Program to print the following triangle

```
      1
    2 3
  4 5 6
7 8 9 10 etc……….
```

17. C Progrm to find Factorial of Given number using Recursive and Non Recursive Functions.
18. Write A Program to print Fibonacci Series upto given limit using recursive, Non recursive
19. Write program in C for determining the minimum and maximum and sum of elements of an array of ‘n’ elements and searching for a given element.
20. C Program for computing range, mean and standard deviation of a given numeric dataset.
21. Write A Program in C for performing addition, subtraction, multiplication and transpose operations on matrices.
22. Write program to perform the following string operations on the given string. a) string length b) string copy c) string concatenation d) string comparison e) reverse string f) sub string
23. Write A Program to read student record (no, name, marks1, marks2, marks3, marks4, marks5, calculate average and Grade) and display the student record.
24. Write A Program to do arithmetic operations using pointers.
25. Write A Program to create two data files and copy the content of these two data files as a single file in another new file?

HS 121 ENGINEERING CHEMISTRY LAB

L	T	P	To	C
-	-	3	3	2

Course description and Objectives :

This lab is intended to make the students enlighten with the theoretical concepts of chemistry. Instrumental techniques are useful for characterization of materials for future engineers.

Students may have to take up any 10 experiments from the following experiments.

Course Outcomes:

1. *To enable the students to analyse the hardness & chlorides in the potable water.*
2. *To help students to determine the Alkalinity in water used especially in industries.*
3. *To impart knowledge on polymers used as insulators.*
4. *To provide an idea about Advanced techniques in chemical analysis using conductometer and spectrophotometer.*

Volumetric Analysis:

1. Determination of total Alkalinity of water
2. Determination of Percentage purity of Washing soda
3. Determination of Fe(II) by Dichrometry
4. Determination of Percentage of available chlorine in Bleaching powder
5. Determination of chlorides by Argentometry
6. Determination of Total hardness of water

Preparations:

7. Preparation of Bakelite
8. Preparation Of Urea- Formaldehyde Resin

Instrumental methods of Analysis:

9. Determination of Viscosity of a Lubricating oil
10. Determination of Strength of acid by conductometry
11. Determination of Mn^{+7} by Colorimetry
12. Demonstration of UV-Visible Spectrophotometer with Ferrothiocyanate

REFERENCE BOOKS:

1. Vogel's Text book of qualitative Chemical Analysis J.Mendham, R.C Denney, J.D. Bares, M.Thomas & B. Siva Sankar, Pearson Publications – Volume I (2009).
2. Experiments in Applied Chemistry by Dr.Sunita Rattan. S.K. Kataria & Sons publications,2008.

ME 103 ENGINEERING GRAPHICS

L	T	P	To	C
1	-	2	3	3

Course description and Objectives :

To familiarize students with the conventional concept of engineering drawing and application through AutoCAD.

Course Outcomes:

After completion of this course, student will be able to prepare plan and elevation of any pictorial view either conventional or through AutoCAD.

UNIT - I

Introduction to Engineering drawing: Introduction to Engineering Drawing – Types of lines, lettering, dimensioning Construction of polygon & Conics. (Ellipse, Parabola & Hyperbola by general method)

UNIT - II

Orthographic Projections: Principle of projection-Planes of projections.

Projections of points:

Projection of straight lines: Inclined to one plane and both the planes.

Projections of planes: Simple planes, Planes inclined to reference planes.

UNIT - III

Projections & Sections of solids – projections of prisms – cylinders – cones - pyramids – solid axis inclined to one plane, simple sections- prism, cylinder, pyramid and cone. AutoCAD Fundamentals.

UNIT - IV

Isometric projections: Isometric drawing of simple objects through AutoCAD

UNIT - V

Orthographic projections: Conversion of Pictorial view into orthographic view using AUtoCAD and Conventional.

TEXT BOOKS :

1. N.D.Bhatt, "Engineering Drawing", 49th ed., Charotar Publication, 2007.
2. K. Venugopal, "Engineering Drawing through Auto CAD", 1st ed., New Age Publication, 2008.

REFERENCES::

1. Jhole, "Engineering Drawing", 2nd ed., Tata McGraw Hill, 2008.
2. K.L. Narayana, "Engineering drawing" 2nd ed., Scitech Publications, 2008.

ME 105 WORKSHOP PRACTICE

L	T	P	To	C
-	-	3	3	2

Course description and Objectives :

To provide the hands on experience to the students on basic workshop skills.

Course Outcomes:

After completion of this course, students will be able to identify various tools connected to all the trades. They are also able to make various objects to the given dimension by using various types of tools.

Trades for exercises:

1. Carpentry:
2. Fitting
3. Tin Smithy & Black smithy4. House wiring
5. Foundry & Welding (Demonstration)
6. Machine shop & CNC (Demonstration)
7. IT Workshop
8. Study of discrete components of computer and networking (1 session)
9. Demonstration of assembling a computer, disk partitioning and installation of system and application software. installation of modem etc. (2 sessions)

Note: In each trade, the students has to perform at least two jobs

TEXT BOOKS :

1. S.K. Hazra Choudhury, Elements of workshop Technology, 11th Edition, Media Promoters, 1997
2. Gopal, T.V., Kumar, T., and Murali, G., A first course on workshop practice – Theory, Practice and Work Book, Suma Publications, Chennai, 2005.
3. Venkatachalapathy, V. S., First year Engineering Workshop Practice, Ramalinga Publications, Madurai, 1999.

VFSTR UNIVERSITY

II Year - B.Tech

SYLLABUS

I SEM & II SEM

II Year B.Tech. Textile Technology - I - Semester

L	T	P	To	C
4	0	-	4	4

HS213 PROBABILITY & STATISTICS

Course Description & Objectives:

This course is to impart knowledge to the students concerned with the laws governing random events. The collection, analysis, interpretation, and display of numerical data and its applications in Textile Technology.

Course Outcomes:

Students who successfully complete this course should be able to demonstrate understanding of:

1. *Basic probability axioms and rules and the moments of discrete and continuous random variables as well as be familiar with common named discrete and continuous random variables.*
2. *How to derive the probability density function of transformations of random variables and use these techniques to generate data from various distributions.*
3. *How to calculate probabilities, and derive the marginal and conditional distributions of bivariate random variables.*
4. *Discrete time Markov chains and methods of finding the equilibrium probability distributions.*
5. *How to calculate probabilities of absorption and expected hitting times for discrete time Markov chains with absorbing states.*

UNIT I - Descriptive Statistics

Basic Definitions, Frequencies, Graphical Representation, Histogram, Ogive curves, Measures of Central tendency, Arithmetic mean, Median, Mode, mean deviation, standard deviation, Symmetry and Skewness, Karl Pearson's Coefficient of skewness.

UNIT II - Curve Fitting and Correlation, Regression

Least squares method, curve fitting (straight line and parabola only) Covariance, Correlation, Types, Pearson's Coefficient of correlation, Rank correlation, Spearman's rank correlation. Regression, Regression lines, multiple regression.

UNIT III - Probability

Introduction, Definition (Classical and Axiomatic approach), Addition theorem, Conditional probability, Multiplication theorem, Total probability, Bayes theorem.

UNIT IV - Distributions

Random variables, Discrete and Continuous variables, Introduction to Distributions. *Binomial distribution* : Definition, Mean and Standard deviation, Recurrence relation, Applications, Fitting of binomial distribution.

Poisson Distribution : Definition, Mean and Standard deviation, Recurrence relation, Poisson Distribution is an approximation of Binomial distribution, Applications, Fitting of Poisson distribution.

Geometric Distribution : Definition, Properties.

Normal Distribution : Definition, Normal curve, Mean and Standard deviation, Median, Mode, Normal Distribution applications, Normal Distribution is an approximation to Binomial distribution.

Exponential Distribution : Definition, Properties.

UNIT V - Sampling Methods

Population and Sampling, Parameters and Statistics, Types of sampling, Sampling Distributions, Central limit theorem, Standard Error of mean from infinite population, Standard deviation of variance.Test of hypothesis and test of significance, confidence limits, confidence interval, Test of significance of Large samples, T-distribution, Chi square test.

TEXT BOOKS :

1. *H. K. Dass* and *Er. Rajnish Verma*, Higher Engineering Mathematics, S. Chand & Co., New Delhi, 2011.
2. *Miller and Fruinds*, Fundamentals of Probability and Statistics, PHI publication.

REFERENCE BOOKS :

1. *S.C. Gupta* and *V.K .Kapoor*, "Fundamentals of Mathematical Statistics", Sultan Chand & Co., New Delhi, 2005.
2. *B.V. Ramana*, "Higher Engineering Mathematics", 3rd Edition, Tata McGraw-Hill Publishing Co, 2008.
3. *R K Jain, S R K Iyengar*, "Advanced Engineering Mathematics", 2nd Edition, Narosa Publishing House.
4. *Erwin Kreyszig*, "Advanced Engineering Mathematics", 8th Edition, John Wiley & Sons (Asia) Pvt. Ltd. 2001.

II Year B.Tech. Textile Technology - I - Semester	L	T	P	To	C
	4	0	-	4	4

TT217 NATURAL FIBERS

Course Description & Objectives:

This course deals with the extraction, properties and uses of various natural fibres. Physical and chemical properties including the structural study. The objective of this course is to through knowledge about natural fibers.

Course outcomes:

1. *Students will able to understand the importance of natural fibres in textile industry.*
2. *They will able to find the structure property relation of natural fibres*
3. *They will know the process of extraction of the natural fibres from different sources.*

UNIT I - Introduction to Textiles

Textile elements defined-Scope of Textiles in various fields –Detailed Classification of textile fibers – physical and chemical properties of textile fibers - A brief note on classification of yarns: Single, Double, Ply, Cable, Spun Yarn, filament yarn, Fancy yarn, stretch yarn and textured yarn. A brief note on Classification of fabric.

UNIT II - Cotton & Wool Fiber

Cotton: Types, Possible Counts (Spinnability), Morphology, Physical & Chemical properties, conversion of cotton fibre to fabric. A Brief note on Latest type of Cottons: Organic & Bt.

Wool: types of wool – Morphology, Physical and Chemical Properties –Brief study on frictional properties of wool, heat of wetting, warmth of wool – conversion of wool fibre to woollen and worsted yarns (Brief outline) - Development of Wool Industry in India, Role Wool Research Organisation.

UNIT III - INTRODUCTION TO SERICULTURE AND SILK FIBRE

Types of Silk, Life cycle of Silk worm, Mulberry Cultivation (Moriculture), Terminology in Silk, Grianage Centers, Introduction to rearing of silk, cocoon, stifling(Methods), Storage, Sorting, cooking, brushing, reeling (Methods and Machines), Parameters affecting the quality of reeled Silk, Quality Control and Testing of Silk, degumming and weighting – Morphology and properties of silk – A brief description of types of silk Yarns and fabrics – Flow sheet of the manufacture of spun silk. Indian Silk Industry, Marketing of Silk, Value addition of Silk goods, Role of Institutions like C S B, C S T R I , S I C, etc.,

UNIT - IV BARK FIBRES

Jute: Cultivation- Extraction & Retting methods, Properties, conversion of fibre to fabric, Significance of Jute in Packaging. **Flax:** Cultivation, Extraction of Flax fibres, Properties of Flax fibre, Conversion of Flax fibres into yarn, Conversion of Yarn onto Fabric.

UNIT V - OTHER (NATURAL) TEXTILE FIBRES

Long Vegetables fibres, Sisal, Pineapple leaf, Maize, banana, hemp: Extraction and properties.

TEXT BOOKS:

1. J.Gordon Cook, "Hand Book of Textile Fibers", Wood Head Publishers, London, Vol 1 & 2, 2005.

2. Gohl & Vilensky, "Textile Science", Mahajan Book Publishers, Ahemedabad, 2nd ed., 2003.

REFERENCE BOOKS:

1. Bernard P.Corbmann, "Textile Fiber to Fabric", Mc Graw-Hill International Education, 6th ed., 2001.
2. H.V.Sreenivasa Murthy, "Introduction Textile fibres", Textile Association of India, Bombay,1994.
3. S.P.Mishra, "Fibre Science & Technology", New Age India International Ltd. New Delhi ,1998.
4. Tammanna & N.Sonwalkar, "Handbook of Silk Technology", Wiley Easterrn Limited, NewDelhi, 2002.
5. V.A.Shenai, "Technology of Textile Processing - Textile Fibers", Sevak Publications, Mumbai, Vol 1, 2004

II Year B.Tech. Textile Technology - I - Semester	L	T	P	To	C
	4	0	-	4	4

TT 219 YARN MANUFACTURING – I

Course Description & Objectives:

This course deals with the concepts, production calculations, different types of available machines, and various developments of Blowroom, and carding, which are very essential in yarn manufacturing.

Course Outcomes:

At the completion of this course, the student should be able to

1. *Understand the different properties required for spinning different counts.*
2. *Understand Different types of Ginning & Blow Room machine principles and to aware of their merits and demerits*
3. *Design a blow room line depending on type of cotton and trash content.*

4. *Understand different concepts in Carding Machine*
5. *Calculate production capacities of carding machine*

UNIT I - Introduction To Yarn Manufacturing & Ginning

Introduction: Selection of cotton for Spinning: parameters governing the selection, Samples for testing cotton, Critical Difference, Measurement of Trash in Cotton. Cotton fibre parameters for selection of Cotton in Spinning

Ginning: Objectives, pre and post ginning equipments and working principles of Knife Roller, Saw GIN, Macarthy Gin (DR Gin), Influence of ginning on cotton fibre properties, Settings & Precautions to be taken at ginning, Factors affecting ginning performance, Pressing and baling of cotton, Characteristics of bales of various countries.

Contamination of Cotton: Possible contaminants, Preventive Measures.

UNIT II - Blow Room Part-I

Bale Management in Spinning: Need and Method, Planning for Mixing and optimization, Lot preparation, Effect of mixing on the final yarn parameters**,** Application of LPP in Cotton mixing

Mixing and Blending: Need for Mixing and Blending, objectives, Fibres commonly blended (Different types of Blends) and the Percentage of blending, determination of Blend percentage,

Introduction to Opening and Cleaning: Principles of opening and cleaning, Degree of opening and Cleaning, Beating points for cotton based on the variety, machines for Processing Cotton. Working principle of Modern mixing Equipment like Multi mixer, Aero Mixer, Uni Mixer.

UNIT III - Blow Room Part-II

Working principle and functions of various elements of Mixing Bale opener, Hopper Bale opener, Bale plucker, Hopper Feeder, Step Cleaner, Mono cylinder, UniClean, ERM & AIRJET cleaners | A brief note on Selection of Blow Room lines - Accessories in blow room (boll trap, metal detector, Heavy particle separator, cage, 2 way distributor)

SCUTCHER : Elements and their functions – Production calculations

UNIT IV - Carding Part-I

Chute feeding: Types, merits over conventional feeding system. – Accidents and Safety aspect in Blowroom, Fire diversion system etc. Latest developments in Blow room

Introduction to Carding: Objectives, regions – Principles of carding – Conventional card and role of each element

UNIT V - Carding Part-II

Stripping and grinding (Frequency of Grinding and effect on Sliver quality) - Card clothing – Card settings- Nep Study at Carding.

A brief note on Card Coiler mechanisms – High production cards – Tandem card – Auto leveling in card – Latest Developments in carding – Production calculations - Automation in Carding.

TEXT BOOKS:

1. W.Klein, "Technology of Short Staple Spinning", Wood Head Publishers, 2nd ed., 1998.
2. Jayaprakasham, "Spun Yarn Technology", SSM Institute Publications, Komarapalyam.

REFERENCE BOOKS:

1. "Cotton Ginning" The Textile Institute Publication, Textile Progress Vol. 24, No.2,1993.
4 Carl A. Lawrence "Fundamentals of Spun Yarn Technology", Taylor & Francis Publications, 2003.
5 "Blowroom and Carding", Training Programme Conducted by NCUTE, IIT, Delhi, 1998.
6. A.R. Khare, "Cotton Carding", Mahajan Book Publishers, Ahmedabad.
7. Lord & Cherian Lype, "Modern Yarn Production", Wood Head Publishers, London.
8. Ravi Chattopadhyaya, "Technology of Carding", NCUTE Programme, IIT New Delhi, 2003.

II Year B.Tech. Textile Technology - I - Semester

L	T	P	To	C
4	0	-	4	4

TT 221 FABRIC MANUFACTURING - I

Course description & objectives:

This course deals with the basics of weaving preparatory processes such as winding, warping, yarn sizing and post sizing operations. Also deals with the technological changes from conventional to non-conventional. Weaving process is begins with introduction and basics of weaving started.

Course Outcomes:

1. *Students would learn about the winding process, how the continuous length of yarn can be formed and how yarn faults removed in winding.*
2. *students would learn formation of continuous length of warp sheet and impart strength to the yarn by using sizing operation.*

UNIT I - Introduction to weaving preparatory & winding

Introduction to Fabric Manufacture (Weaving Preparatory): Need for Weaving preparatory process- Supply and End packages – Yarn preparation systems for single, double and folded yarns for mono, Multi coloured warp and weft yarns.

Principles of Winding – Mechanisms of driving and traversing of packages for Precision and Drum winding- Essentials features of Precision and drum winders- Guides Soft winding for yarn dyeing, Final winding after yarn dyeing (Unwinding Accelerators- Optimum guide distance)-Tensioners (amount of tensioning and its effect), Yarn clearers (Types of Slub catchers- Clearing efficiency, Uster Classimat), Modern clearers like Uster Quantum, Lopfe etc, Thread Stop motion, Splicing - types & quality assessment, Type of cradles, Drums (Types and material of construction, Number of grooves based on the end package requirement), Ribbon breakers- Common package faults.

Kinetics of Winding: Cone angle, angle of wind, wind per double traverse,surface speed, traverse speed, winding speed, calculations- Construction of automatic winding machines - Design features, Special features of modern winding m/c's, Production Calculations.

UNIT II - Warping

Warping: Need, Objectives, classification of warping process- (beam warping, sectional warping, ball warping)- Conventional Warping machine: Elements and their significance: Creel (Types, Creeling, Selection of Creel) arrangements guides, blow fan, Head stock - Leasing reeds, Drum, stopmotion, brake & Clutch, comb, beam handling, Full beam (Set length) stop motion – Production Calculations- Modern Beam Warping machine Planning for Patterned Warps(Sectional Warping): Need, planning for a pattern and arrangements at Creel accordingly, Calculations, Beaming arrangements, Control of Yarn tension during beaming, Modern Sectional Warpers.

UNIT III - Introduction to Yarn Sizing & Creel Zone

Introduction to sizing – Objects – Types of forms of sizing – Sizing materials(types, their percentage in size paste, selection of size recipe, concentration calculation in sizing, testing of sizing ingredients) – Size preparation equipments (Pressure cookers- Calculation of mixing and procedure of mixing ingredients (Precautions to be taken during mixing), Sample testing through Refractometer for concentration of size paste-Multi-cylinder Sizing Machine different zones – creel zone – elements – different types of creels – Positive and negative creels –brake system – Lapper formation and recording Wet Zone – Elements and construction of Sow box – controls in sow box – modern sow box - stretch control,

UNIT IV - Yarn sizing-Dry Zone & Beam winding

Dry Zone – concept of drying - Wet splitting, Modern synthetic size mixers, Effect of sizing chemicals on ETP. Methods of Drying – Cut mark motion – Drying efficiency calculation – moisture control after waxing in sizing – dry splitting – Migratory behavior of warp ends in sizing – Methods of recoding (ATIRA technique of counting of migratory ends) – Brief note on Beam winding & Beam press – Types of combs – Motion for combs – Sizing faults and remedies – Calculations in sizing – Post sizing operations - Production calculations.

UNIT V - Yarn quality requirements and Introduction to weaving

Ring Yarn defects and its influence on weaving and fabric, Introduction to weaving – Loom specification and selection of type of loom based on the sorts produced- Classification of loom motions – comparison of tappet - Dobby and jacquard shedding – positive and negative tappet shedding – kinds of sheds – heald reversing motions – early and late shedding, Principles of picking – cone under Vs over picking – intensity of picking – setting and timing of picking mechanisms – early and late picking – shuttle checking – Picking elements – Beat up- Eccentricity of sley – Significance - loom production problems.

TEXT BOOKS:

1. D.B.Ajgaonkar, "Sizing Methods Materials and Machines", Mahajan Publishers, Ahmedabad, 2006.
2. M.K.Talukdar, "Introduction to Winding & Warping", Mahajan Publishers, Ahmedabad, 2004.

REFERENCE BOOKS:

1. P.R.Lord & M.H.Mohammed, "Conversion of Yarn to Fabric", Merrow Publishers, London, 1988.
2. Azagaonker, Talukdar & Sriramulu, "Weaving,Technology, Management", Mahajan Publishers , Ahemedabad, 1998.
3. A.T.C. Robinson & R.Marks, "Principles of Weaving", Textile Institute Publishers, Manchester, London, 1986.
4. Textile Mathematics - Vol.-I & **II** by J.E. Booth.
5. A.Ormerod, "Modern Yarn Preparation & Weaving Machinery", Butterworths, London, 2006.
6. BTRA Monograph Series in Winding 1981, Warping, Sizing and Loom Shed, 1986.

II Year B.Tech. Textile Technology - I - Semester

L	T	P	To	C
4	0	-	4	4

TT223 TECHNOLOGY OF MANUFACTURED FIBRES

Course Description & Objectives:

The main objective of this course is to give comprehensive idea about the regenerated and manmade fibres. The preparation and properties of the fibres are also discussed. The importance of using manmade fibre is also discussed.

Course outcomes:

1. Students will able to understand the importance of synthetic fibres in textile industry.
2. They will know the process of manufacture of the synthetic fibres.
3. They will able to find the structure property relation of synthetic fibres

UNIT I - Principles of Man Made Fiber

Introduction to man made fibers – Distinction between Natural and Man Made Fibes for Production, Properties & End Uses - important operations in the production of synthetic fibres – fibres varying substrate and geometry – Principles of fibre forming polymers, parameters influencing the quality – glass transition temperature – Melting temperature-Principles of spinning of man made fibres.

UNIT II - Melt Spinning

Melt spinning – detailed note on elements on melt spin equipment – various zones in extruders – design of extruder – types of extruders – characteristic feature of extruder – types of spin pack assemblies – construction of spinnerets – spinneret cleaning methods – Rheology of melt spinning – variables of melt spinning High speed spinning concept (integrated spin drop process, H4 S and FDY Process) - Spin finishes – properties – application and removal – problems of application – Ideal spin finish – types of spin finish – constitution of spin finish.

UNIT III - PET & Polyamide

Polyester manufacture – trans esterification, polycondensation – technical details - chemical reactions – side reactions – properties and applications - Manufacture of Nylon – classification of polyamides – manufacture nylon 6, nylon 66, (manufacture monomers various routes for PET and nylon).

Surface modification of polyester cause and effect – recent developments in polyesters like CDP, EDP, CFDP, APP etc.

UNIT IV - Solution Spinning & Rayon Fibre

Introduction to solution spinning – salient features of solution spinning – principles of wet and dry spinning-Rheology of Wet & Dry Spinning – comparison – a brief note on dry jet wet spinning.

Manufacture of Rayons - viscose, acetate and cuprammonium – physical and chemical properties- A brief note on Recent developments in viscose manufacturing (Lyocell fibre).

UNIT V - Acrylic. PP and Other Fibers

Manufacture of acrylics, mode acrylics, PVA, PVC and polyvinyl alchohol fibres. Manufacture of polypropylene – properties and applications of acrylic and mode acrylic, PVA, PVC, PP Fibres. drawing – drawing condition phenomena of necking – drawing behavior of thermoplastic polymer – influence of drawing on structure and property. Micro fibres – detailed study of production – properties and applications of micro fibres – problems in processing of micro fibres in weaving.

TEXT BOOKS:

1. Prof. V. B. Gupta, "Technology of Manufactured Fibres", Chapmen and Hall, New York, 3rd ed., 2004.
2. Dr. H.V.Srinivasmurthy, "Textile Fibers", Textile Association of India Publication, 1988.
3. A.A.Vaidya, "Production of Synthetic Fibers", Prentice Hall of India, New Delhi, 2005.

REFERENCE BOOKS:

1. R.W. Moncrieff, "Man Made Fibers", Butterworth & Co., Manchester, 1980.
2. "High Performance Fibers", Textile Institute, 1995.
3. "Man Made Fibres", NCUTE Pilot Programme, IIT, New Delhi,2006.

II Year B.Tech. Textile Technology - I - Semester	L	T	P	To	C
	-	-	3	3	2

TT225 YARN MANUFACTURING - I LAB

Course Description & Objectives:

This course helps in building the practical concepts, production calculations, different types of available machines of Blow room, and carding, which are very essential in yarn manufacturing.

Course Outcomes:

1. *Students will able to understand the Sequence of operations and different types of machines in yarn manufacturing.*
2. *They will know the process of production calculations*
3. *They will able to understand the gearing diagrams of machines*

Introduction: Study of different types of tools and gadgets used in spinning such as various types of spanners, Calipers, Hammers, gauges, Screw driver, Pliers, Pullers, Oiling and greasing equipment etc.

Study of different types of drives and calculations based on the same. Belt drive - Flat and V,Open and Cross, Gear Drive, Simple carrier, compound carrier, Helical, Bevel. Chain and sprocket wheel drive. Worm and worm wheel drive, Timer belts. Study of various types of bearings used on spinning machines and their lubrication. Plain, Journal, Bush, Ball, Roller, Needle and others

LIST OF EXPERIMENTS

1. Introductoion to Cotton Spinning, Different types of Cotton and their Properties in relation to Openers & Cleaners.
2. Layout planning for Spinning of Cotton.
3. Study of Passage of Material through Basic Scutcher.
4. Practical Aspects of Basic Scutcher.
5. Design of cone Drums for the Cotton feed regulation.
6. Production calculations including the Production Planning Balancing.
7. Study of various types of Blow room lines for different types of fibres.
8. Study of passage of material through Carding Engine.
9. Significance of Various Zones in Carding Machine.
10. Draft Calculations in Card.
11. Production calculations in Card.
12. Study of Setting in Carding machine with respect to various zones.
13. Gearing Calculations on C 1 / 2 Crystallina Card.
14. Types card wires and their specifications (Lickerin,Cylinder,Doffer, Flats and other card elements.

II Year B.Tech. Textile Technology - I - Semester	**L**	**T**	**P**	**To**	**C**
	-	-	3	3	2

TT227 FABRIC MANUFACTURING - I LAB

Course description & objectives:

This course deals with practical experience of winding and weaving machines and their mechanisms, production calculations, which are very essential in fabric manufacturing.

Course Outcomes:

1. *To Students would learn passage of material through various weaving preparatory processes along with production calculations.*
2. *To Learn mechanism of primary and secondary motions in loom such as shedding, picking and beat-up.*

LIST OF EXPERIMENTS:

1. Passage of material through precision winding machine speed, production and efficiency calculations.
2. Passage of material through warp winding machine, speed production and efficiency calculations.
3. Determination of coil angle, coils/inch, wind in warp winding.
4. Study of slow speed pirn winding, high speed and automatic pirn winding its production calculations.
5. Study of automatic doffing and donning and Bunching – building motion and its setting in Automatic pirn winding machine.
6. Study of Beam warping and production calculations.
7. Study of sectional warping – Passage of material, speed and production calculations.
8. Passage of material through Non-automatic and Automatic looms production and loom efficiency calculations.
9. Dismantling and Assembling of shedding mechanism.
10. Dismantling and Assembling of cone-over pick mechanism.
11. Dismantling and Assembling of cone-under pick mechanism.
12. Dismantling and Assembling of side lever under pick mechanism.
13. Dismantling and Assembling of beat-up mechanism Study of eccentricity of sley. Determination 'e'.
14. Fabric analysis – calculations of plain weave fabric.

II Year B.Tech. Textile Technology - I - Semester	**L**	**T**	**P**	**To**	**C**
	-	-	3	3	2

HS217 SOFT SKILLS LAB

Course Description & Objectives:

The Soft Skills Laboratory course is aimed at training undergraduate students and enabling them to acquire employability skills. Designed to impart work related skills, the course will help trainees develop interpersonal *communication, leadership and team skills. It will give them the required competence and confidence to handle professional tasks.* communication, leadership and team skills. It will give them the required competence and confidence to handle professional tasks.

Training Methodology:

The training methodology is designed to bring about changes in attitudes through experience-based learning. Activities in simulated environments such as role plays, group discussions, micro-presentations, audio-video clippings, case studies, psychometric tests etc., will provide students insights into their strengths and weaknesses.

Learning Outcomes:

The Soft Skills course will help students develop professional and non-personal ways of approaching people and work through the correct use of language and speech in a workplace environment along with the ability to think critically on issues demanding attention. This includes enhancing self-awareness and a sense of self-worth in the students in order to improve their productivity and performance at the workplace.

UNIT I - Personality Development Skills

a) Role of language in Personality – How language reflects, impacts personality – Using gender-neutral language in MNCs – being culturally sensitive.

Activity – Appraising each other – Worksheets related to the above

b) Career Planning- job vs. career- goal setting- SWOT analysis- planning and prioritization - four quadrant time management system - time management – self-management – stress-management.

Activity: Setting a SMART goal - SWOT analysis of the self – Writing a Statement of Purpose (SOP).

c) Effective Resume-Writing: structure and presentation - planning and defining the career objective - projecting one's strengths and skill-sets – summarizing - formats and styles - covering letter.

Activity: Resume preparation –writing a covering letter.

UNIT II - Language Skills

a) Functional English - Formal/informal context – purpose - interpersonal dynamics - ideation –content organization - initiating a conversation – responding appropriately - right body language.

Activity - Role play in different situations, - self-introduction - social background (family, home town etc.,) - role model - my future - likes/dislikes (movies, persons, places, food, music etc.,) - a mini project on functional English.

b) Vocabulary-Building: Etymology of words - word roots - prefixes & suffixes - synonyms & antonyms- collocations - one-word substitutes – analogies - idioms and phrases - contextual guessing of unfamiliar words – task-oriented learning (100 words).

Activity: Flash cards (200 words) – vocabulary exercises with hand-outs.

UNIT III - Communication Skills

a) Group Discussion: Articulation and flow of oral presentation - dynamics of group discussion – intervention – summarizing - voice modulation – content generation – Key Word Approach (KWA) – Social, Political, Economic, Legal and Technical Approach (SPELT) – View Point of Affected Part (VAP) - language relevance - fluency and coherence.

Activity: Mock sessions on four types of GD topics.

b) Facing Interviews: Interview process - understanding employer expectations - pre-interview planning - opening strategies - answering strategies – stress-based interviews - tele-interviews, video interviews-frequently asked questions (FAQs).

Activity: Writing responses to FAQs - mock interviews.

UNIT IV - Comprehensive Skills

a) Reading Comprehension: Reading as a skill- techniques for speed reading-skimming- scanning- appreciating stylistics - impediments for speed reading - eye fixation - sub-vocalisation - critical reading - reading based on purpose - reading for information - reading for inference -understanding tone.

Activity: Reading comprehension exercises with texts drawn from subject areas. (Hand-outs)

b) Listening Comprehension: Listening as skill - different types of listening - hidden data of communication - active listening - top-down approach - bottom-up approach.

Activity: Following different accents (Indian, British, American) listening comprehension exercises with audio and video excerpts.

UNIT V - Analytical Skills

a) Data Commentary: Deductive & inductive reasoning - data interpretation - tables & charts - bar charts - pie charts - line graphs - ratios & proportions – percentages - coding and decoding - reasoning by analogy - artificial language etc.,

b) Analytical Thinking: Statement and Conclusion - Data Sufficiency - Statement and Argument - Statement and Assumption - Logical Deduction - Logical Problems.

Activity: Exercises with handouts.

REFERENCE BOOKS :

1. *Edward Holffman,* ***Ace the Corporate Personality****, McGraw Hill,2001*
2. Adrian Furnham, ***Personality and Intelligence at Work***, Psychology Press, 2008.
3. John Adair Kegan Page, "***Leadership for Innovation***" 1st edition, Kogan, 2007.
4. M.Ashraf Rizvi, "***Effective Technical Communication***", 1st edition, Tata McGraw Hill, 2005.
5. Krishna Mohan & NP Singh , "***Speaking English Effectively***" 1st edition, Macmillan, 2008.
6. ***Soft Skills Material*** of **Infosys** Under the Academic Initiative of Campus Connect
7. K.R. Lakshminarayana & T. Murugavel, ***"Managing Soft Skills",*** Scitech Publications. 2009
8. Dr. S.P. Dhanvel, ***English and Soft Skills,*** Orient Blackswan, 2011
9. Rajiv K. Mishra, ***Personality Development***-, Rupa & Co. 2004.

II Year B.Tech. Textile Technology - II - Semester	**L**	**T**	**P**	**To**	**C**
	4	0	-	4	4

CS218 DATA STRUCTURES

Course Description & Objectives:

The main objective of this course is to provide an introduction to basic data structures and manipulating them, by using C programming language.

The fundamental design and implementation of basic data structures. The evaluation of the data structure needs of particular problems & The design and implementation of C programs by using basic data structures.

Course Outcomes :

Having successfully completed this course, the student will be able to:

(1) Apply advance C programming techniques such as pointers, dynamic memory allocation, structures to developing solutions for particular problems;

(2) Design and implement abstract data types such as linked list, stack, queue and tree by using C as the programming language using static or dynamic implementations;

(3) Evaluate and choose appropriate abstract data types to solve particular problems;

(4) Design and implement C programs that apply abstract data types.

UNIT I - Data Types

Introduction – Data, Data type, Data Structures – Primitive and Non-primitive, Storage structures – Sequential and linked storage representations, File structures, Abstract Data Type (ADT). Overview of Structures-arrays, operations on arrays(retrieval of an element, search an element, insertion deletion of an element), manipulations on arrays such as finding the sum of elements of an array, adding two arrays, and reversing an array. Maximum sub sequence problem, Multi dimensional arrays.

UNIT II - Linked Lists

Types of Linked Lists Singly Linked List, Doubly Linked List, Circular Linked List. Operations on linked lists-insertion, deletion, traversing forward/reverse order. Multi lists, Applications of Linked Lists.

UNIT III - Stacks

Stacks – ADT, array and linked representations, Implementation and their applications. Queues – ADT, array and linked representations, Implementation of linear, circular and doubly-ended queues, and their applications.

UNIT IV - Types of Trees

Preliminaries – Binary Tree – ADT, array and linked representations, Binary tree properties, tree traversal, Implementation, Expression trees. The Search Tree ADT – Binary Search Trees, Implementation. AVL Trees – Single Rotations, Double rotations.

UNIT V - Graphs

Graphs – ADT, definitions and properties, modeling problems as graphs, representation – adjacency matrix and adjacency list, basic graph traversals – breath first search and depth first search. Applications of graphs

TEXT BOOKS :

1. Richard F.Gilberg, Behrouz A. Forouzan, Data Structures - A Pseudo code Approach with C, Second Edition, Cengage Learning.
2. Y. Langsam, M.J.Augeustein and A.M.Tenenbaum, "Data Structures Using C", Pearson Education Asia.

REFERENCE BOOKS :

1. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", Second Edition, Pearson Education.
2. Sartaj Sahni, Data Structures, Algorithms and Applications in C++ , Universities Press, Second Edition, 2005
3. Jean Paul Tremblay and Paul G. Sorenson, An Introduction to Data Structures with Applications,Tata Mc-Graw Hill, Second Edition, 26th Reprint 2004

II Year B.Tech. Textile Technology - II - Semester

L	T	P	To	C
4	0	-	4	4

TT218 YARN MANUFACTURING - II

Course Description & Objectives:

This course deals with the concepts, production calculations, different types of available machines, and various developments of draw frame, comber, simplex, ring frame & post spinning equipments, which are very essential in yarn manufacturing.

Course Outcomes:

At the completion of this course, the student should be able to

1. *Understand different concepts in Draw Frames*
2. *Understand different concepts in Combers*
3. *Understand different concepts in Speedframe*
4. *Understand different concepts in Ring Frames*
5. *Calculate production capacities of carding machine*

UNIT I - Draw Frame

Introduction to drawing – Objects, basic concepts of drawing (ideal draft and real draft, Number of Doublings, Parallelisation) – Study of conventional Draw frame. Principle of Roller drafting – Different drafting systems – methods of roller weighing – Roller eccentricity – Coiler mechanism – Draw frame setting (bottom and top rollers and other settings like scanning rollers and coiler etc) – Importance of Break draft – Study of Modern Draw frame – Auto leveling in Draw frame (open loop and closed loop) – Production calculations.

UNIT II - Comber

Introduction to combing – Hook presentation – Hooks theory –combing preparatory machines – study of sliver lap, ribbon lap and super lap formers – passage of material through comber – functions and setting of each part - Combing principle – cycle of combing (Back ward and Farward combing, Early and Late combings) – working of modern combers – production calculations, Combing efficiency.

UNIT III - Speed Frame & Introduction to Ring Frame

Principles of speed frame – detailed study of mechanisms (Drafting, Twisting and bobbin building) of speed frame – study of different speed frames role of various drafts – processing of cotton, synthetic and regenerated fibers – Recent Developments – production calculations – maintenance schedules. Introduction of Ring Spinning – Passage of material – functions of parts – Specification of R/F – Principles of ring spinning. Principles of Drawing, Types of Creel.

UNIT IV - Ring Frame

Types of various drafting systems on Ring Frame – Drafting elements and their types- Selection of drafting system & elements – weighing of drafting rollers- Principle of Twisting – Types of Twists – Twist levels and their selection for 100% cotton, P/C, P/V & 100% Synthetics – Twist Factor and its importance – Twisting arrangement – Observed and calculated twist – Twist contraction -Principles of winding, Types of builds – builder motions – Arrangements made before and after Doffing – Labor allotment.

UNIT V - Development of Ring Frame & Post Spinning

Wrapping test – Developments in ring frame – Ring data/ ISM(Individual spindle Monitoring) – Production calculations-Post spinning operations – Systems of doubling – Doubling twist – Two from one twister – Brief note on reeling, bundling and baling – machinery and process for waste spinning.

TEXT BOOKS:

1. A.R.Khare, "Cotton Combing", Mahajan Book Publishers, Ahmedabad, 2003.
2. T.K.Pattabhiraman, "Essential Facts of Practical Cotton Spinning", Mahajan Publisher, Ahmedabad, 2005.
3. "Drawing, Combing, and Roving,Ring Spinning", NCUTE Pilot Programme, IIT, New Delhi, 2004.

REFERENCE BOOKS:

1. Vekatsubrmani, "Spun Yarn Tehcnology", SSM Institute Publications, Komarapalyam, Vol. III, 2003.
2. "Tablets on Combing, Speed Frame, Ring Frame", TAI Publication, Series Editor – T.V.Ananthan, 2003.

II Year B.Tech. Textile Technology - II - Semester

L	T	P	To	C
4	0	-	4	4

TT220 FABRIC MANUFACTURING - II

Course Description & Objectives:

This course deals with the primary and auxiliary motions in weaving. Also deals with different types of shedding mechanisms used in conventional and non-conventional weaving machines. Introduction to automatic looms and cop-changing mechanism is explained.

Course Outcomes:

1. *From the above course students can learn different auxiliary motion in loom and shedding mechanisms in non-automatic and automatic looms.*
2. *Students learn introduction to automatic machines and their mechanisms.*

UNIT I - Secondary & Auxiliary motions in weaving

Classification of Loom secondary motions based on the nature of working and make of the loom.

Take-Up Motion: Types, Role played by each wheel in the train of wheels, Dividend calculations effect of teethes on ratchet, change wheel, standard wheel on dividend, effect of cloth roll diameter on dividend, Anti-crack device, cloth wind-up systems – settings for proper functioning.

Let-Off Motions: Need, types, types of tension variations during weaving, working of positive let-off, recent developments, correction of variations in warp tension during weaving- setting for proper functioning.

Auxiliary Motions: Types, selection and working of Warp protector motions (Fast & Loose Reed), Weft stop (Side & centre weft fork motions – working, setting and problems with both type of motions) and warp stop mechanisms – settings for different materials. Loom Temples: Need, types, construction of various types of Loom Temples and selection, Setting for different types of material under weaving.

UNIT II - Dobby Shedding

Introduction, need, types, selection and classification, Elements of dobby with respect to position, material of construction and function, Method of Pegging for Right and Left hand dobby- working of Keighly, Climax, Cam, Paper dobby (brief note on cross border dobby), Pick finding: Need and methods- Dobby setting: setting of T-Lever, Cylinder and Knives – defects of dobby woven fabrics and their remedies.

UNIT III - Box Motions & Jacquard Shedding

Box Motions: Need, Types,selection – Working of 4 X 1 and 4 X 4 box motions, Preparations box motion pattern chain card, Card saving device, Defects in box motion.

Jacquard Shedding: Need, Types, Selection, Specifications and Classification, Principle of a Jacquard, Elements of Jacuqard shedding: Position, material of construction and functions Principle of shed formation and Working of SLJ, DLSC, DLDC & CBJ.

UNIT IV - Preparations to Jacquard Weaving

Harness building, setting of cylinder, griffe and knives, driving mechanism for cylinder and griffe, Card cradle and its setting for single and double jacquard units, development of Jacquard design (Manual methods and Use of Software with CAD) Transfer of design on to the point paper and preparations to Card cutting, Need of card cutting and types of card cutting devices, Card less jacquard Lacing: Need, Types and Process, Card Repeaters: Need -Casting out: Need, types, selection and Process - Arrangement of figures – Harness tie ups – methods to increase figuring capacity (Working of split harness), Erection of Jacquard in loom shed (precautions to be taken).

UNIT V - Automatic Looms and their Mechanisms

Automatic Looms: Need, makes of Automatic looms, specifications.

Cop Inducing Mechanism: Feelers, Need, Types, selection, working of mechanical, Electrical and Optical feelers, performance, precautions to be taken.

Cop Change Mechanisms: Shuttle protector, Latch and Latch depressor, Bunter, Hammer, Small end disc, Thread clamp (Material of construction, function and setting), Shuttle thread eye Cutter & Temple cutter: Material of construction, functions and setting – A brief note on filament weaving.

TEXT BOOKS:

1. Robinson and Marks, "Principles of Weaving",Textile Instt. Manchester, 2004.
2. Prof. K.T.Aswani, "Plain Weaving Motions", M/s Mahajan Book Publishers, Ahmedabad, Gujarat, 2007.
3. Prof. K.T.Aswani, "Fancy Weaving Mechanism", M/s Mahajan Book Publishers, Ahmedabad, Gujarat, 2008.
4. P.R.Lord and Mohammed, "Conversion of Yarn to Fabric", Butterworths Publications, Manchester, 2000.

REFERENCE BOOKS:

1. Prof.N.N.Bannerjee & T.Banerjee, "Weaving Mechanism", New Jute Mills Publications, Calcutta, Vol –I& II, 2002.
2. "Automatic Looms", TAIRO, Baroda Industrial Research Association Publications, 2002.
3. "Automatic Looms", TAI, M/s Mahajan Book Publishers, Ahmedabad, Gujarat, 2003.
4. Textile Maths Vol.lll by J.E. Booth.

II Year B.Tech. Textile Technology - II - Semester	**L**	**T**	**P**	**To**	**C**
	4	0	-	4	4

TT222 FASHION TECHNOLOGY IN APPARELS AND MADE – UPS

Course Description & Objectives:

This course deals with the fundamental concepts required for a fashion designer. So the students undergone this course are familiar with the terminology and concepts involved in fashion designing for apparels and made –ups.

Course Outcome:

At the completion of this course, the student should be able to

2. *Understand the different concepts and terminology in Fashion Industry*
3. *Understand the different concepts and terminology in Retail Industry*
4. *Understand Different applications of computers in fashion & Retail Industry*

UNIT I - Fashion & Design

Fashion: Fashion terminology, Origin of fashion, Fashion cycle, Fashion industry, factors affecting fashion, Fashion adaptation theories. Major fashion centers of the world: Brief introduction to world fashion centers- American, European, Japanese and Indian, Fashion houses and designers, Fashion designing, apparel designing and fashion technology.

Design: Elements and principles of design: Line, colour and proportion emphasis. Design process: Designers' functions - Inspiration files, sketches, how to interpret designs, story Board / Fabric story; The design studio, sampling.

UNIT II - Fashion Theories

Fashion Theories: Fashion of direct eras, French revolutions, Psychology of clothing – first impression, role of socio – psychological and economical aspects of clothing.

UNIT III - Retailing & Fashion Forecasting

Retailing: Various types of retailers, Franchise retailing, garment retailing, private labels and others, department stores, specialty stores, chain retailers, mail order houses, shopping malls, Designer labels Vs Brands, Analysis of designer's labels, Licensing and franchising.

Fashion Information Services: Trend forecasting and auxiliary services.

Forecasting Trends: Purpose of forecasting trends, how to use forecasting services. Fashion promotion and communications: Trade fairs, Fashion shows.

UNIT IV - Drawing in Fashion Design

Anatomy for designers, Human proportion and figure constructions, Head the unit of measurement, methods of determining individual proportions, Basic drawing of the fashion figure, flat sketching, average proportions methods of determining standards of women's figure, Drawing the lay figures, Three quarter view of lay figure, proportions of the figure measuring eight heads, Sketching and illustrations of body figures & body shapes

UNIT V - Fashion Accessories

Introduction to historic costumes, Introduction to fashion accessories, history, classification and recent trends, Use of leather in apparel, Computer application in fashion designing.

TEXT BOOKS:

1. Sumathi G.J., "Elements of Fashion and Apparel Design", New Age International Publication, 2007.
2. Harold Carrl John Pomeror, "Fashion Design and Product Development" .
3. Kathryn Mckelvey and Janine Munsbw, "Instructing Fashion", R.R.Bowker Company, 1965.

REFERENCE BOOKS:

1. Gold Stein, "Art in Every Day Life" Calcutta - IBH Publication. Co. 1972.
2. Michael P. "Grover & Computer Aided Design & Manufacturing", 2nd ed., JWS, 1972.
3. Brockman, H.L., "The Theory of Fashion", John Wiley & Sons, 1965.

II Year B.Tech. Textile Technology - II - Semester

L	T	P	To	C
4	0	-	4	4

TT224 TECHNOLOGY OF KNITS & NONWOVENS

Course Description & Objectives:

This subject covers the basic knowledge about alternate fabric manufacturing process that is nonwoven and knitting manufacturing technology.

Course Outcomes:

1. Students will able to understand manufacturing and applications knitting and nonwovens.
2. The student will be able to understand different knitted structure and their properties.
3. The student will be able to understand different types of nonwoven and their properties.

UNIT I - Introduction to Kiniting

Introduction to Knitting: Comparision of woven, nonwoven and knitted fabrics, fundamental terms of knitting technology, elements of knitting machine, various zones in knitting machine and their significance. Classification of weft knitting structures and machines, production and properties of basic knitting structures: Plain or single jersey, rib, interlock and purl, loop and needle diagrams to illustrate basic structures. Types of Tension devices and Positive Feeders and their role in Knitting, stop motions in knitting machines, A brief note on straight bar and flat knitting machines.

UNIT II - Patterning And Quality Control In Weft Knitting

Patterning in weft knitting: scope and need, designing of knit wears, arrangements in cam for knit, miss and stitch, combination of any two to produce structures(including needle layouts, knitting sequence and needle diagram) single pique, cross miss, cortina, jersey cord, super roma, poplin, Milano rib, french and swiss pique, pinto di-roma on four feeders, pintuck, taxi-pique, Requirements for hosiery yarn-recent developments in the design of weft knitting machines.

Quality control in weft knitting and a brief note on common defects, knitting dynamics: a brief note on forces acting on the needle, linear and nonlinear cams, needle breakages.

UNIT III - Introduction To Warp Knitting

Introduction to warp knitting: elements, structure, a brief note on driving arrangements for guide-bars, needle bars and sinker bars, basic lapping movements in warp knitting, representation of warp knit structure and methods to represent lapping diagrams, Classification of Warp knitting structures, representation of common Warp knit structures, Loop formation in Tricot and Raschel knitting machines, Warp and weft knitting compared –Patterning in Warp knitting, types of yarns meant for Warp knitting, significance and calculation of runners ratio, Special Warp knit structures like: Fall plate patterning, Pile knitting and laying in Production calculations and defects in Warp knit goods.

UNIT IV - Introduction To Nonwoven And Needlepunching

Classification and definition of Nonwoven, Dry laid webs – fibre selection, fibre preparation, web formation, layering, Wet laid nonwoven – Raw materials, production process. Polymer-laid web formation –production process.

Mechanical Bonded Webs: Introduction to needle punching – passage of material through needle loom - Pre-needling and final needling compared – specification of needle-punching -Application of needle punching. Stitch bonded nonwoven – stages of production –ls -applications.

UNIT V - Bonding Techniques of Nonwovens

Hydro Entangled Nonwovens: Principle – Hydroentanglement process technology, applications.

Chemical Bonded Nonwoven: Latex binder –bonding technology – saturation, foam bonding, spray bonding, print bonding, powder bonding, application of chemical bonded nonwoven. **Thermal Bonded Nonwovens:** Binder, binding fibres, binding powder, binding webs, methods of thermal bonding – Hot calendering, belt calendering, oven bonding, ultrasonic bonding, radiant heat bonding.

Melt blown nonwovens - Meltblown fabric production –Characteristics and properties of meltblown Fabrics

TEXT BOOKS:

1. Turbak, "Nonwoven Process Performance & Testing", Tappi Press,1993. 2nd ed., Woodhead Publishing, Cambridge, 2000.
2. WB.Azagoankar, "Knitting Technology", Mahajan Textile Publishers, 5th ed., 2006.
3. David J.Spencer, "Knitting Technology", Wood Head Publishing Company, England, 2nd ed., 2008.
4. Wilhelm Albrecht, "Nonwoven Fabric Construction Synthetic Fibres", JWS Publications, 2007.
5. Horrocks A. R., Anand S.C., "Handbook of Technical Textiles",
6. Fung W., Collins & Aikman, "Textiles in Automotive Engineering", 2nd ed., Wood Head Publishing ltd., UK, 2000.
7. Kennady, Anand Miraftab, Rajandran, "Medical Textile & Biomaterials for Health Care", Wood Head Publishing Ltd., UK, 2005.
8. P.W. Harrison, "Protective Clothing, Textile Progress", Vol.22, No.2/3/4, The Textile Institute Publication, 1996.

REFERENCE BOOKS:

1. Kanna M.C., Hearle, O Hear., "Design and Manufacture of Textile Composites, Textile Progress", Manchester, April 2004.
2. NWM John, "Geo Textile", 4th ed., Blackie and Sons Ltd., London, 1987.
3. Shishoo,"Textile in sports, Textile progress", Manchester, August 2005.
4. S.M. Maini, "Barrier Fabrics for Protection Against Aerosols", The Textile Progress, Vol. 26, No.1, The Textile Inst. Publication, 2000.
5. S.K. Mukhopadhyay & J.F. Partridge, "Automotive Textiles", Textile Progress, Vol.29, No.1/2, The Textile Inst. Publication, 2000.
6. Pushpa Bajaj & A.K. Sengupta, "Industrial Application of Textile : Textiles for Filtration and Coated fabrics Textile Progress", Vol.14, No.1, The Textile Inst. Publication, 1994.

II Year B.Tech. Textile Technology - II - Semester

L	T	P	To	C
-	-	3	3	2

TT226 YARN MANUFACTURING - II LAB

Course Description & Objectives:

This course helps in building the practical concepts, production calculations, different types of available machines of Draw Frame, Simplex and ring frame, which are very essential in yarn manufacturing.

Course Outcome:

1. *Students will able to understand the Sequence of operations in draw frame, simplex and ring frame*
2. *They will know the process of production calculations*
3. *They will able to understand the gearing diagrams of machines*

LIST OF EXPERIMENTS

1. Material passage through Draw frame and functions of important parts in Draw frame.
2. Calculations of speeds of various parts like drafting rollers, coiler calendar roller, feed roller, drafts and production etc.
3. Calculations of Break Draft constant, Draft constants change pinion for different range of drafts.
4. Material passage through speed frame and functions of important parts.
5. Calculations of speeds of various rotating parts in fly frame.
6. Calculations of Total Draft, zonal Draft, Break draft, twist constant, production constant.
7. Study of Builder mechanisms and calculation of Bobbin Rail movement, No.of layers on the bobbing, coils/inch.
8. Passage of material through Ring frame with the help of line diagram.
9. Calculation of speeds of drafting rollers of ring frame with the help of diagram and draft calculation in Ring Frame.
10. Calculation of spindle speed with the help of gearing diagram and calculation of twist per inch, traveler speed.

11. Calculation of draft constant, twist constant with the help of gearing diagram and problems pertaining to draft constant and twist constant in Ring Frame.
12. Spin plan and production calculation.

II Year B.Tech. Textile Technology - II - Semester	**L**	**T**	**P**	**To**	**C**
	-	-	3	3	2

TT228 FABRIC MANUFACTURING - II LAB

Course Description & Objectives:

This course deals with the practical experience of all motions that are involved in the non-automatic and automatic looms. Dismantling, assembling, setting and timing of all motions can be performed practically. These motions are much more significance at the time of working of the machine.

Course Outcomes:

1. *Students would learn all secondary and auxiliary motions.*
2. *Student would able to assemble and setting of different take-up, let-off motions, pegging and box-motions. Pattern chain preparation for different weaves in dobby shedding Also learn various stop motions and weft changing motions in the loom.*

LIST OF EXPERIMENTS

1. Dismantling, assembling, setting and timing of 7 – Wheel take up motion and Calculation of dividend examination of relation between dividend and Train of Wheels.
2. Dismantling, assembling, setting and timing of Loose reed motion and setting for weaving of different types of warp and weft.
3. Dismantling, assembling, setting and timing of fast reed motion & Design of Flat spring.
4. Dismantling, assembling, setting and timing of Side wet fork mechanism and arrangements for weaving different types of weft yarns.

5. Dismantling, assembling, setting and timing of Centre Weft fork motion.
6. Dismantling, assembling, setting and timing of Positive let off motion.
7. Dismantling, assembling, setting and timing of Dobby and Jacquard.
8. Practice of pegging and lagging of Dobby chains.
9. Preparation of Weft patterns using Box motion chains for 4 X 1 Box motion.
10. Determination of Casting out procedure in Jacquards.
11. Dismantling, assembling, setting and timing of working of 2 x 1, 4 x 1 and 4 x 4 box motions.
12. Dismantling, assembling, setting and timing of Cop change mechanism.
13. Speed calculation, Casting out and Card cutting calculations in Single lift Single Cylinder Jacquard for a design under consideration.
14. Speed calculation of cylinder & griffe of Double lift Double cylinder jacquards Harness tie-ups calculations for different designs based on different bases.
15. Fabric analysis – calculations of given woven fabric sample.

II Year B.Tech. Textile Technology - II - Semester	L	T	P	To	C
	-	-	3	3	2

HS304 PROFESSIONAL COMMUNICATION LAB

Course description & Objectives:

The Professional Communication exposes students to conventions of corporate communication and documentation procedures involved in the day-to-day functioning of the business world. The course is aimed at improving written communication skills of undergraduate students and preparing them to meet professional challenges in the work spheres. Writing and Personality are not two exclusive spheres of influence and this course will work on the relationship between professional writing and a personality that is able to meet the goals of an organization in creative and innovative ways.

Course Outcomes:

1. *To enable students to write logical sentences and paragraphs, use appropriate diction, grammar and punctuation.*
2. *To expose them to the world of business and business register*
3. *To make them compose clear and concise business messages*
4. *To produce business documents for mailing to external recipients or intra-organizational circulation*
5. *To enable them to speak business English for handling various business situations*

UNIT I - Writing

- **Elements of Technical Writing :** Sentence structure - reducing verbosity - arranging ideas logically – building coherence - paragraph level and document level - topic sentence - cohesive devices – transitionals – paraphrasing – précis-writing.
- **Mechanics of Writing:** Stylistic elements – the rapporteur- the purpose- the reader (audience) -elementary rules of grammar- choice of diction - elementary principles of composition - matters of form – punctuation - conventions of business communication -language and tone - weak links in business correspondence - ethical concerns in business writing.

UNIT II - Reports

- **Parts of the Report:** Writing an abstract - features of a good abstract – approach - compare and contrast - cause and effect.
- **Types of Technical Reports :** Drafting a technical proposal - formal and informal proposals - factual reports, feasibility reports, survey reports – parts of a report - title page –declaration – acknowledgements – table of contents - abstract – introduction – conclusion – citations – references - appendices - oral reports and presentations

UNIT III - Letter Writing

- Letter-Writing - Formal and informal letters - structure of formal letters - expressions of salutations, introductory and concluding paragraphs - different types of letters - sales letter - complaint letter - adjustment letter - letter to the editor - covering letter - claim letter – letter of condolence.

UNIT IV - Correspondence

- **Business Correspondence :** E-mail – nature and scope - e-mail etiquette - Common Errors in composing e-mails – Quotations - Inviting quotations - sending quotations – placing orders - Office Communication - agenda - notice - circular
- **Effective Resume-Writing:** Structure and presentation - defining career objective - projecting one's strengths and skill-sets
- Summarizing - formats and styles - covering letter.

UNIT V - Drafting

- Business Proposals: Drafting business proposals - calculating profit and loss-averages - ratios and proportions – partnership - simple interest - compound interest - calculating volumes and areas
- course of action - cause and effect- theme detection - making judgments - logical deductions - analyzing arguments – syllogisms - Venn diagrams - matching definitions -verbal reasoning - numerical reasoning - working out justifications.

REFERENCE BOOKS :

1. Strunk , William, Jr.*The Elements of Style*, Fourth Edition
2. Rozakis, Laurie, Ph.D, (2003). *English Grammar for the Utterly Confused*, McGraw-Hill.
3. Sharma. C. (1978) *Business Correspondence & Report Writing*, Tata McGraw-Hill.
4. Kirkman, John. *Good Style: Writing for science & technology*, Routledge Study Guides, second edition.
5. Monippally, Matthukutty. M. 2001. *Business Communication Strategies*. 11th Reprint. Tata McGraw-Hill. New Delhi.

VFSTR UNIVERSITY

III Year - B.Tech

SYLLABUS

I SEM & II SEM

III Year B.Tech. Textile Technology I - Semester

L	T	P	To	C
4	0	-	4	4

TT317 TEXTILE TESTING–I

Course Description & Objectives:

This objective of this course is to understand different testing methods for fibres and yarns.

Course Outcomes:

1. *Students will able to understand basic testing of fibres and yarns.*
2. *The student will also understand the basic property of materials and characterization techniques.*

UNIT I - Introduction to Textile Testing:

Objectives of testing – determination of Sample size for testing & Selection of samples for testing – Sampling errors – Point estimations of mean and variance Interval estimation of mean and variance – Number of tests – Significance test: t test , Z test and ANOVA with application to textile. Random and Biased sample – Length and extent biased samples – zoning technique for raw cotton

UNIT II - Fibre Testing-I

Measurement of Regain and Moisture content – Corrections for regains – Numerical examples. Hygrometers: Hair and Digital hygrometer – Factors affecting the regain – Effect of moisture on fibre properties – Drying oven – Shirley moisture meter.**Fibre Dimensions:** Fibre length measurement – Fibre sorter methods – Analysis of Sorter diagrams – span length –Fibrograph and uniformity index | Fibre fineness –important of fineness- measurement by gravimetric, microscope, vibroscope – air flow methods – Principle – WIRA Fineness meter for cotton– Sheffield Micronaire

UNIT III - Fibre Testing-II

Determination of Maturity of cotton – Maturity ratio – Maturity count – Measurement of maturity of cotton fibres, Terminology related to Tensile properties of Textiles – Measurement principles CRL CRE and CRT –

Measurement of Fibre strength – Pendulum lever principle – Stelometer, strain gauge principle – Instron Tensile Tester. Latest Testing instruments like AFIS, HVI and their use – Measurement principle and different modules with data analysis

UNIT IV - Yarn Testing-I

Yarn Dimensions: Yarn numbering system – Measurement Linear density by skein gauge, wrap reel Beesley's yarn balance –wist factor – Effect of twist on yarn and fabric properties – Measurement of Twist by direct, continuous, tak-up twist and twist to break methods – Measurement of yarn strength by Single yarn test and lea test –CSP and RKM.Importance of yarn friction in textile industry – General mechanism of friction – laws of friction – Measurement of friction by various methods –Yarn-on-Yarn Friction – Bartlett smith and Thompon's inter fibre friction method – Uster Zweigle Friction Tester

UNIT V - Yarn Testing-II

Measurement of hairiness by Shirley yarn hairiness tester, Zweigle G565 and Uster tester 3 hairiness meter – Evenness testing of silvers - rovings and yarns – Analysis of periodic variations in mass per unit length – Index of irregularity – limit irregularity – addition of irregularities – Eveness Tester (Uster evenes teste) - Random occurring faults (Uster classimat) - Spectrogram - variance length curves analysis The causes and effects of irregularity.

TEXT BOOKS:

1. Keshavan and Angappan, "Physical Testing", Vol- I & II, SSMITT Publications, Komarapalyam,1993.
2. J.E.Booth, "Principle of Textile Testing", Butterworths Publisher, London.

REFERENCE BOOKS:

1. Arindam Basu, "Textile Testing", Sitra Publishers, Coimbatore, 2004
2. "I S I Hand book of Textile Testing" –Indian Standard Institution, New Delhi 1981.
3. "Fabric Assessment by Mechanical Sensing Methods", Textile Progress, Edited by Bishop, Vol – 28, 1996.

III Year B.Tech. Textile Technology I - Semester

L	T	P	To	C
4	0	-	4	4

TT 319 TECHNOLOGY OF PREPARATORY AND DYEING

Course Description & Objectives:

The main aim of this course is to give the detailed idea about textile wet processing. From the preparatory process to coloration of the textile fibre, yarn and fabrics are discussed in detail. The measurement of colour and whiteness is also covered.

Course Outcomes:

1. *Students will able to understand the importance of wet processing of textile yarn and fabric.*
2. *They will able to find the effect of different process chemistry and machine related to the process.*
3. *They will know the characterization of the processed fabrics.*

UNIT I - Introduction, Singeing & Desizing

Introduction to Wet Processing: Requirements of water for dye house, calculation based on fabric G S M, Wetting, contact angle, detergency, types of surface active agents | **Singeing:** Objects, need, sorts signed, methods, problems | **Desizing:** objects, methods: conventional and enzymatic.

UNIT II - Scouring & Bleaching

Scouring: Objects, scouring loss % and its effect on fabric properties, conventional and modern methods. Scope of quality control aspects in textile wet processing

Bleaching: Need and sorts bleached, objects, methods, combined scouring and bleaching, machines & quality control, Washing machines, recycling of water.

UNIT III - Mercerizing & Dyeing

Mercerization: Need and sorts mercerized, Parameters and their effect on the product changes in cellulose after mercerization, methods of mercerization, Liquid ammonia mercerization - quality control aspects.

Introduction to Dyeing: Chemical constitution colour and its elements, Physical chemistry of dyeing, parameters of dyeing, theories of dyeing, Kinetics of dyeing Classification of dyes.

UNIT IV - Dyeing Process & Effuelent Treatment

Dyeing of Natural & Man Made Fibres: Dyeing of 100 % fibres selection of dyes and dye shade, effect of parameters of dyeing on fabric properties, application of Direct, Reactive, Basic, Acid, metal complex, Dyeing with Disperse, Vat, Sulphur dyes (dyeing procedures only).

Processing of Textile Effluents: Need for effluent treatment, collection, examination, characteristics of effluents arising of cotton, wool, silk and man made fibre fabrics, concepts of BOD and COD, Treatment methods, primary treatment, secondary biological treatments, tertiary treatment methods, recovery and reuse of waste water.

UNIT V - Color Theory

Colour Measurements: Relation between light and dye, dye and eye. Light, colour and electromagnetic spectrum, Theories of colour vision, Colour primaries and colour mixing – Additive and subtractive, Colour specification – Munsell colour order system, Ostawald colour system, CIE system, CIE lab System, Hunter lab, Tristimulus values, Standard observer, Metamerism and Dichroism. Sample preparation for CCM Application to textile processing, Advantages & limitations of CCM, Colour difference, Assessment of whiteness, yellowness and brightness, Recipe formulation

TEXT BOOKS:

1. V. A. Shenai, "Technology of Mercerising", M/s Mahajan Books Publishers, Ahmedabad, Gujarat, 1997.
2. A K Roy Choudhury, "Textile Preparation and Dyeing" Science Publishers, January 9, 2006.

REFERENCE BOOKS:

1. E.R.Trotman, "Dyeing and Chemical Technology of Textile Fibres", 3rd ed., Griffin Publications, SBT Bomboy, Ahmedabad, 1992.
2. V.A.Shenai, "Technology of Bleaching", Vol - 3, Sevak Publication, Bombay, 1984.

III Year B.Tech. Textile Technology I - Semester

L	T	P	To	C
4	0	-	4	4

TT 321 FABRIC STRUCTURE AND DESIGN

Course Description & Objectives:

The main aim of this course is to understand and indentify various structure of the fabric with their applications.

Course Outcome:

1. *Students will able know and identify variety of fabrics with its loom equipment planning accordingly.*
2. *Students will also be able to understand various structure of the fabric in detail.*

UNIT I - Introduction To Fabric Structure

Method of weave notation – elements of fabric structure –Fabric Structure & Texture compared- Warp faced,weft faced, equi faced weaves, fabrics, constructions Selection of Reed and its importance-design, draft, denting and peg plan – their inter relation – classification of weaves – modification of plain: as warp rib, weft rib, matt, fancy matte, stitched hopsack – classification of plain clothes.

UNIT II - Twills & Fancy Structures

Characteristics of Twills, twill angle, twist and twill interaction, Twill modification: wavy, herringbone, combined, broken, steep, flat, skip twills, sateen and satin, modification of Floating weaves – fancy weaves: honey comb-Huck-A-Back-Mock-leno: Basic designs, distorted thread effects (warp and weft way).

UNIT III - Fabric Structure & Design

Crepe Weave:Different methods of construction – colour and weave effects: Theories of colour, Effect produced by simple colour and weave combinations– classification of advanced fabrics – extra thread figuring – bed fords and welts or piques – backed cloths: reversible and wadded backed cloths.

UNIT IV - Advance Fabric Structures-I

Double Clothes: Principles of stitching, reversible, wadded, inter changeable double cloths - treble cloths: principle of stitching – weft piles: plushes & corduroys, A brief note on Warp plies, Velvets.

UNIT V - Advance Fabric Structures-II

Terry Piles: Terry motion, Terry ornamentation, Dobby striped & Check effects in Terry-Gauze & Leno: principle, Sheds formed in Leno, Designs for simple leno - Damasks and brocades: twilling jacquard, method of developing a design for Damask (Planning for Loom production).

TEXT BOOKS:

1. Z.J. Groscicki, "Watson's Textile Design and Colour", Newness – Butter & Worths, M/s Mahajan Book Publishers, Ahmedabad,Gujarat, 2006.
2. Robinson and Marks, "Woven Cloth Construction", M/s Mahajan Book Publishers, Ahmedabad, Gujarat, 2008.

REFERENCE BOOKS:

1. Kibbe, "Fabric Structure and Design", E.L.B.S.Publications, Moscow, 2008.
2. John Reed, "Fabric Structure and Design", Veritas Publications,Hong Kong, 2007.
3. Nisbeth, "Grammar of Textile Design", M/s Mahajan Book Publishers, Ahmedabad, Gujarat, 2007.

	L	T	P	To	C
III Year B.Tech. Textile Technology I - Semester	**4**	**0**	**-**	**4**	**4**

TT 323 ADVANCED YARN MANUFACTURING

Course Description & Objectives:

This Course Teaches The Students About Fundamental Concepts Of Different New Spinning Techniques And Texturising Methods.

Course Outcomes:

At the completion of this course, the student should be able to

1. Understand the concepts and differentiate the advantages of new spinning processes.
2. Evaluate the different spinning systems w.r.t yarn structures and properties.

UNIT I - Rotor Spinning

Limitations of ring spinning – principles of open end spinning – principles of rotor spinning – opening roller specifications for cotton and synthetics – Tangential and radial feeding – back doubling concept - external and internal suction device – rotor groove geometry – their influence on design parameters and dimensions of rotor – spinning performance doffing tube and false twist effect – take up and package formation – auto piecing systems – rotor yarn properties – calculation of twist, machine constant and production.

UNIT II - Twistless, Self Twist & Airjet

Twist-less spinning – Tekja process – TNO, TWILO. **Self twist spinning** – Repcospinning – developments

Air-jet / Vortex spinning – principle of formation of wild, core wild, wrapper, wrapper wild fibers – machinery details – yarn structure and properties.

UNIT III - Friction, Siro Spinning

FRICTION SPINNING: Introduction – frictional forces – mechanism of friction spinning – DREF-I, II , III, V, 2000 and 3000. Yarn structures, properties and end uses.

Comparison between Ring, rotor, Air-jet and friction yarns

SIRO SPINNING principle – comparison between SIRO yarn and double yarn.

COMPACT SPINNING – methods – yarn structure and properties

UNIT IV - Texturising Part-I

Texturing – Objects – importance – textured filament and spun yarns comparison.

Methods of texturising – false twisting principles – process variables – study of draw texturing machines – raw material POY – quality – creel zone – twisting zone and winding zone – role of draw ratio and D/Y ratio and their selection – properties of draw textured yarns Stuffer box crimping – Edge crimping – knit & de-knit process – gear crimping – friction texturing.

UNIT V - Texturising Part -II

Air texturing – methods and developments – Properties and applications of air textured yarns.

Texturamat and dynafil – M.Thermal stress tester – quality control in texturising – textured yarn defects.

TEXT BOOKS:

1. C.W .Lawrence, "Technology of Yarn Production", Wood Head Publishers, London, 2000.
2. P.R.Lord & Cherian Iype, "Theory of Yarn Production",Wood Head Publishers,Wales,U.K, 2005.

REFERENCE BOOKS:

1. W..Klein, "NEW SPINNING SYSTEMS", Textile Institute Manchester, 1990.
2. J W S Hearle, L Hollick and D K Wilson, "Yarn texturing technology", CRC Press, Woodhead Publishing, 2000, ISBN 0-8493-1310-4.

III Year B.Tech. Textile Technology I - Semester	L	T	P	To	C
	4	0	-	4	4

TT325 PHYSICAL PROPERTIES OF TEXTILE FIBRES (ELECTIVE-I)

Course Description & Objectives:

Physics plays a large part in textile technology and study of the structure and physical properties of fibres, yarns, and fabrics forms is called textile physics, which is an essential part of the education of any textile technologist. The present course deals only with the fibre properties, augmented by an introduction to fibre structure.

Course Outcomes:

1. *Students will able to understand the importance of fibres characterization.*
2. *They will know different fibre characterization technique.*
3. *They will able to know the effect of different external effect on structure and property of fibres.*

UNIT I - Fibre Structure

Introduction to fiber structure – Micellar theory, continuous theory, fringed micelles theory, fringed fibrils theory, modified fringed micellar theory – fine structure of natural, fine structure and cross-section of regenerated and synthetic fibres, Importance of studying fine structure, requirements for fibre formation (Definitions of parameters which characterize most important features) – Degree of order, degree of localization of order, length/width ratio of localized units, degree of orientation, Degree of polymerization

UNIT II - Characterization Techniques And Density

Brief introduction of Methods of investigating textiles – X – Ray diffraction, IR, NMR, Thermal Analysis, Optical microscopy, Electron microscopy, Scanning Electron microscopy.

Fibre density – Measurement, Relation between density and order - Equilibrium absorption of water, Relation between regain and RH, Comparison of relation between regain and RH of various textile fibres (influence of temperature)- Heat of sorption – measurement of sorption.

UNIT III - Moisture And Tensile Properties

Diffusion of moisture, penetration into a dry fibre, conditioning of mass of fibres, Retention of liquid water, Swelling – introduction to theories of moisture sorption, effect of hydrophilic groups – Absorption in crystalline and non-crystalline regions, Hysteresis – a molecular explanation. Tensile properties – factors determining the results of tensile experiments, load elongation and stress-strain curves.

UNITIV - Mechanical Conditioning And Static Electricity

Effects of variability – Introduction to elastic recovery – Mechanical conditioning, time effect – Creep, Flexural, Torsional Rigidity – Significance of Dielectric Properties for Textiles-measurements-effect of moisture and temperature - static electricity-significance.

UNIT V - Heat Setting

Heat Setting of Textile Fibres: Introduction to heat Setting, need, objectives, types of setting, mechanism of temporary and permanent set, physics of setting, set between fibres, set with in the fibres, synthetic fibre structure and setting, measuring efficacy of setting. Thermal conductivity- structural changes in fibre on heating.

TEXT BOOKS:

1. W.E.Morton and J W S Hearle, "Physical Properties of Textile Fibers", The Textile Institute, Manchester, 1994.
2. J.E.Booth, "Principles of Textile Testing", Butterworths, London, 1987.

REFERENCE BOOKS:

1. J.Happy, "Fiber Structure", Elsevear Edition, Amsterdam, (Vol 3), 1984.
2. J.W.S.Hearle, "Moisture Relations in Textiles", The Textile Institute Manchester, 1976.
3. J W S Hwarle and L W C Mdes, "The Setting of Fibers and Fabries", Merrow Publications, Manchester, 1973.
4. S.K. Mukhopadhyay, "Advances in Fiber Science", Published by the Textile Institute, 1992.

III Year B.Tech. Textile Technology I - Semester	L	T	P	To	C
	4	0	-	4	4

TT327 PROCESS & QUALITY MANAGEMENT IN TEXTILES (ELECTIVE-I)

Course Description & Objectives:

With increasing the demand of quality and higher production, it is very important to control the process parameters. The course deals with the identification of key variable and their control.

Course Outcomes:

1. *From this course students would be able to learn process control at different departments in textile industry to achieve better quality of fabric.*
2. *To understand the need of PQC*

UNIT I - Process Control In Blow Room, Card & Draw Frame

Introduction to Process Control: Meaning, Applications to whole Textile Production from fibre to fabric – Process Parameters controlling production, quality – Introduction to quality control: Tools available, selection and interpretation.

PQC in Blow Room, Card & Draw Frame: Raw Material Management: Importance, need of instrumental evaluation, traditional methods of cotton selection, importance of cost in raw material, cotton marketing, linear programming for mixing, bale management yarn engineering & raw material. Blow Room: Control of mixing quality – control of yarn realization (Records and Accounting) – Control of waste and Waste extraction study - cleaning in Blow room (Individual and Overall cleaning efficiency of Blow room). Card: Waste extraction at card, Nep study & control, Snap Study card. Draw Frame: Breakage study, Stop motion checking, Use of NILO meter, Drafting rollers pressure checking (Carbon paper technique).

UNIT II - Process Control In Comber, Simplex & Ring Frame

Comber & Comber Preparatory: Significance & importance of good lap for comber, evaluation of comber performance, fractionating efficiency of comber, comber waste analysis, influence of various factors on combing performance-5 minute test, headwise and Overall waste at Comber. Speed Frame: Breakage study at Simplex. Ring Frame: Breakage study, Snap study, & Idle spindle study, Analysis of Snap efficiency and reasons for low snap efficiency. Measurement and analysis of productivity means to improve productivity, control of yarn quality: count, strength and their variability, yarn unevenness and imperfections, yarn faults and package defects, implementation of process control in cotton spinning.

UNIT - III PQC WINDING, WARPING & PIRN WINDING:

Process & Quality Control in Winding Scope, Optimizing of Yarn tensioning and clearing (settings for different kinds of yarns) Producing good package, Snap and breakage study, unwinding tension and optimum guide distance, Breakage and snap study in Auto coner (formats) Approach to control of productivity, Requirements of dye package.

Process & Quality Control in Warping: Scope, breakage study, Effort to minimize the breakage rate, quality of warper beams, breakage study in warping (norms), productivity, warping defects and remedies. Process & Quality Control in Pirn Winding: Scope, GO-NOGO gauge, Minimizing the end breaks, improving the build of the yarn, control of speed, productivity – Pirn quality checking report.

UNIT IV - Pqc In Sizing & Loom Shed

Process & Quality Control in Sizing: Scope, choice of size receipe and measurement of size pick up, control in size preparation, Lappers study, breakage study, control of size pick up, controlling sizing conditions, stretch control in various zones, moisture control, Migratory behavior study (ATIRA technique) quality of sized beams, positive feed to sow box, productivity, Dead loss and its control, hard waste and its control, Testing of Size Ingredients, testing of sized yarn - Selection of reeds and healds, care of reeds, effect of reed parameters on weaving performance.

Approach to Process & Quality Control in Loom Shed: (Non– auto and Auto loom shed) scope, control of speed, breakage and snap study in loom shed, determination of labour allotment (ATIRA procedure) Norms for breakage rate, No. of looms/operative, control of efficiency (concept of calculated and expected efficiency), control of loom stoppages (due to warp and weft break, shuttle change etc.)

UNIT V - Process & Quality Control In Chemical Processing

Scope, functions of control house, grey cloth inspection, Process control measures in Bleaching and mercerizing (method to estimate the concentration of caustic and silica in peroxide bleach, absorbency of bleached cloth, Cuprammonium fluidity, ash content, barium activity no. luster no. fastness of bleaching), Process control in dye house: parameters for process control in different forms of dyeing (yarn and fabric), test method to determine the caustic and Hydros conc. In vat dye liquor, Process control in Printing and Finishing: Scope, Approach to process control, test for the suitability of thickner in the print paste formation, iodine absorption test for the evaluation of degree of resign cross linking, fastness properties of dyed and printed goods to wash, light perspiration and water, Fastness to rubbing, hot press, Optimal brightness test for the uniformity of cross linking, assessment of degree of heat setting in polyester by Iodine absorption method.

TEXT BOOKS:

1. Process and Quality Control in Spinning – ATIRA
2. Process and Quality Control in Weaving – ATIRA
3. V. A. Shenai, "Evaluation of Textile Chemicals", Sevak Publications, 1980.

REFERENCE BOOKS:

1. Dr. V. K. Kothari, "Testing & Quality Management", AFL Publication, 2006.
2. Mairio Bona, "Textile Quality Physical Method of Product & Process Control", COMMETT Program of EEC.
3. "Quality Control in Spinning" – SITRA Publication.
4. Monograph Series - BTRA.
5. Dr. K. R. Salhotra, "Process Control in Spinning", Institute of Textile Technology, 2002.
6. End Breaks in Ring Spinning – ATIRA
7. A. Barella, "Yarn Hairiness", Textile Progress, Vol 13, No 1, Textile Institute, 2006
8. "Tablets on Chemical Processing", TAI Publication.

III Year B.Tech. Textile Technology I - Semester	L	T	P	To	C
	4	0	-	4	4

TT329 MECHANICS OF TEXTILE MACHINERY (ELECTIVE-I)

Course Description & Objectives:

This course deals with the mechanisms of textile machinery and humidification of the textile plants.

Course Outcomes:

At the completion of this course, the student should be able to

1. *Understand the different Concepts in various services required in Textile manufacturing.*

2. *Understand different gearing mechanisms and calculate the output speeds through various channels*
3. *Understand and design Cams and tappets for different applications*
4. *Understand terminology and concepts in Humidification systems*
5. *Understand terminology and concepts in Compressor systems*

UNIT I - Introduction to mechanics

Introduction – equations of motion – motion in a circle – transmission of motion by wheel gearing – Textile applications from fibre to finished fabric – Balancing of revolving and reciprocating masses. Belt drives – Flat and V-belts comparison – belt slippage, effect of belt thickness – effect of initial tension – effect of centrifugal force – horsepower transmitted – rope and chain drives – brief note on fast and loose pulley , jockey or rider pulley , grooved pulleys etc

.

UNIT II - Mechanisms & its applications in Textiles

Determination of speed ratio in planetary mechanisms – applications in textile industry – stepped pulleys – designing method – applications in textile industry – Mechanics of yarn winding – study on breaks and clutches – Applications of clutch and break in textile production. Feed regulation motion in Scutcher , - designing of cone drums for blow room and speed frame – construction of displacement – velocity and acceleration diagrams – kinetics of shedding – picking power for picking, picking as an elastic mechanism and beat – up: eccentricity of slay , derivation for 'e', displacement, velocity and acceleration of slay .

UNIT III - Cams & Secondary motions

Construction of cams and tappets – heart shaped, 3 leaved – plain, twill tappets – derivation to show that the frictional force 'F' is directly Proportional to the distance of weight from the fulcrum in negative let off motion – Backrest mechanisms – angular velocity of warp beam.

UNIT IV - Humidification

Humidification in Textile Mills: Need for humidification in T extile Mills, Ambient conditions required in various departments of a textile mill, Psychrometry - definition, use of psychrometric charts, various psychrometric processes like cooling, heating, humidification, dehumidification, etc. Aspects of evaporating cooling method & refrigerative cooling method, S tudy of arrangement s & layout of standard humidification methods for spinning, weaving & knitting processes – Return air ducts, Return Air Plenum, Filters, Return Air fans, Dampers, Supply Air Fans, Washers, Eliminators, Supply Air Plenum, Supply Air Duct, Diffusers etc. Study of the construction of each component, Return Air & Supply Air openings in the department, Automatic controls in humidification plants, Study of recent developments in humidification plant used in spinning, weaving, knitting departments.

UNIT V - Pumps, Compressors & Fans used in Textile Mill

Pimps: Classification & characteristics of various types of pumps, Study of types of pumps used in textile mills.

Compressors: Compression methods, intermittent, continuous, Classification of compressors & brief study of construction, working, advantages, limitations of each type, Compressed air requirement in Textile mills, Compressor accessories such as reservoir, dryer, lubrication system, filters, cooling towers, etc.

Fans: - Classification, construction & working of different classes of fans, Centrifugal, Axial flow & Radial flow, Fan capacity , power & efficiency , Fan selection, Pneumatic conveying of materials in textile mills.

TEXT BOOKS:

1. J.E.Booth, "Textile Mathematics", Vol. I, II, & III , The Textile Institute, Manchester , 1976.
2. W.A.Hanton, "Mechanics for Textile Students", Butterworths, London, 1976.

REFERENCE BOOKS:

1. W.A.Hanton, "Mechanisms of Textile Machinery", Ellis Horwood Limited, London 1976.
2. Sengupta, "Weaving Calculations", Mahajan Publishers, Ahemdabad, 1976.
3. Keshavan, "Fabric Formation", SSMITT Publications, Komarapalyam 1988.
4. Arora & Domkundwar, "Conditioning & Refrigeration", 2nd ed.,MGH, 1959.
5. G. B. Ramakrishnani, "Manual of Humidification", Batliboi Ltd., 1963.

III Year B.Tech. Textile Technology - I - Semester

L	T	P	To	C
-	-	3	3	2

TT 331 TEXTILE TESTING– I LAB

Course Description & Objectives:

This objective of this course is to understand practical concepts of different testing methods for fibres and yarns.

Course Outcomes:

1. *Students will able to perform basic testing of fibres and yarns.*
2. *The student will observe various fibre and yarn properties practically*

LIST OF EXPERIMENTS

1. Identification of textile fibers under microscope (Demonstration).
2. Determination of fiber maturity by NaOH swelling method and differential dyeing techniques.
3. Determination of fiber length by Bear Sorter and Interpretations by other methods.
4. Determination of fiber fineness by ATIRA fineness tester.
5. Determination of fiber strength by Stelometer.
6. Determination of yarn count by Beesley's yarn balance.
7. Determination of yarn count by Wrap reel.
8. Determination of single and plied yarn twists.
9. Determination of moisture content of cotton material.
10. Determination of Single Yarn Strength.
11. Determination of CSP and CCSP of Yarns
12. Determination of Regain of different fibers.
13. Determination of ginning percentage.
14. Determination of fiber length by Hallo and Butterfly Method.

III Year B.Tech. Textile Technology - I - Semester

L	T	P	To	C
-	-	3	3	2

TT 333 TECHNOLOGY OF PREPARATORY AND DYEING LAB

Course Description & Objectives:

The main aim of this course is to make coloured fabric from grey fabric. This process includes different preparatory as well as dyeing of different fabric by different dyes. The students will perform experiments of their own to make coloured fabric.

Course Outcomes:

1. *Students will able to understand the importance of wet processing of textile yarn and fabric.*
2. *They will able to find the effect of different process chemistry and machine related to the process.*
3. *They will know the characterization of the processed fabrics.*

LIST OF EXPERIMENTS

1. Grey Fabric Inspection and defect Analysis from Processing point of view.
2. Conventional & Enzymatic Desizing of cotton and effect of desizing fabric properties.
3. Conventional Scouring of cotton and effect on fabric properties.
4. Bleaching and Optical Whitening agents treatment of cotton and effect on fabric properties.
5. Combined desizing, scouring and bleaching of cotton fabric
6. Bleaching and Optical Whitening agents treatment of wool and effect on fabric properties.
7. Mercerisation of cotton and effect on fabric properties.
8. Dyeing of Cotton with direct dyes and effect on fabric properties.
9. Dyeing of Cotton with reactive dyes and effect on fabric properties.
10. Dyeing of silk and Wool with acid dyes and effect on fabric properties.
11. Dyeing of polyester with disperse dyes and effect on fabric properties.
12. Dyeing of acrylic with basic dyes and effect on fabric properties.

III Year B.Tech. Textile Technology - I - Semester	**L**	**T**	**P**	**To**	**C**
	-	**-**	**3**	**3**	**2**

TT 335 FABRIC STRUCTURE AND DESIGN LAB

Course Description & Objectives:

The main aim of this course is to understand and indentify various structure of the fabric.

Course Outcomes:

1. *Students will able know and identify variety of fabrics with its loom equipment planning accordingly.*
2. *Students will also be able to identify different structure of the fabric.*

LIST OF EXPERIEMENTS

1. Identification of basic features of fabrics and Need for Analysis.
2. Analysis of different types of warp faced, weft faced and equifaced plain fabrics.
3. Analysis of different types of Twill fabrics.
4. Analysis of different types of Sateen fabrics.
5. Selection of Reed and Pick for different simple fabrics.
6. Application and Identification of ISI standards.
7. Preparation of simple patterns using Pigment and Light theory of color on geometric base.
8. Preparation of complex patterns using Pigment and Light theory of color on all over base.
9. Preparation of stripes and checks using 2 or more colors with and without plain weave.
10. Preparing of designs for shirting and Suiting from different blended materials.
11. Preparation of patterns for bed sheet, upholstery, furnishing fabrics.
12. Preparing of curtain clothes on all over concept with different basis using drop devices.
13. Analysis of data for compound structures.
14. Planning of loom equipment to produce simple and complex fabrics.
15. Analysis of plain, dobby patterns using computer aided textile design.
16. Analysis of extra warp and extra weft and other complex structures.

III Year B.Tech. Textile Technology II - Semester

L	T	P	To	C
4	0	-	4	4

TT322 TEXTILE TESTING – II

Course Description & Objectives:

This objective of this course is to understand different basic and advanced testing methods for fabric.

Course Outcomes:

1. *Students will able to understand basic testing of fabric with some special test of technical fabric.*
2. *The student will also understand the basic property of materials and characterization techniques.*

UNIT I - Fabric Diamensions And Strength

Scope of fabric testing – Importance of fabric testing – Standards for tests – classification of fabric properties, Properties of fabrics as Tailor made – Fabric dimensions like length, width, fabric weight, threads/inch (Densimeter) – crimp measurements– Measurement of thickness. **Tensile Testing of and Fabrics:**, classification of Tensile testers and working along with adjustments to suit the material under test – Automation in tensile testers –Methods for testing tensile strength of fabric – Tearing and factor affecting tearing strength– The Elmendorf tearing tester,

UNIT II - Fabric Abrasion And Stifness

Methods for testing burst strength by Hydraulic diaphragm method, Factors affecting abrasion resistance – The Martindale abrasion tester– Pilling resistance of fabrics – ICI pilling box tester –pilling evaluation subjective and objective (by image capturing). Fabric stiffness: Bending, shear and compression properties of fabrics –Methods for testing fabric shearing compression– Measurement of bending by Shirley stiffness tester and hanging loop method

UNIT III - Fabric Handle And Comfort

Fabric drape and handle – Measurement of Drape by drapameter– Crease and wrinkle behavior – Measurement of crease recovery. Air permeability – –

Air, water and water vapour transmission through fabrics – measurement of WVT by cup method and sweating garded hot plate method – Wicking Test: longitudinal and traverse – Wettability of textile fabrics. Water repellency: spray rating– Bundesmann water repellency test –WIRA shower test .

UNIT IV - Thermal Resistance And Fastness Of Fabric

Thermal resistance of fabrics – Togmeter – Fabric Friction tester. Fabric Friction measurement by simple and i nclined plane test– Flammability – Terminology related with flammability – Measurement of flammability by inclined plane method-Assessment of color fastness – Measurement of Fastness to Washing, Light, Perspiration, Rubbing for dyed goods.

UNIT V - Advance Testing

Diamensional stability: Hygral expansion, relaxation shrinkage, swelling shrinkage, Felting shrinkage, Measurement of Dimensional stability- – Fabric low stress mechanical properties, FAST and KES-F. Brief Introduction to special tests for technical textiles: moisture management tester – Wet Barrier Tester–Puncture Test–Cone Drop Test–Tension creep–Radiant Heat Transmission Tester–Thermal insulation tester TIV –Limited Oxygen Index Tester–Instrument for Run test–Surface Resistance Tester.

TEXT BOOKS:

1. J.E.Booth, "Principle of Textile Testing", Butterworths Publisher, London.
2. Arindam Basu, "Textile Testing", Sitra Publishers, Coimbatore, 2004.

REFERENCE BOOKS:

1. V.K.Kothari, "Developments in Textile Testing", I B Publishers , NewDelhi.
2. Jinlian HU, "Fabric testing", The Textile Institute, Woodhead Publishing Limited, 2008.
3. "I S I Hand book of Textile Testing" –Indian Standard Institution, N. Delhi 1981.
4. "Fabric Assessment by Mechanical Sensing Methods", Textile Progress, Edited by Bishop, Vol – 28, 1996.
5. W.E.Morton and J.W.S. Hearle, "Physical Properties of Textile Tribunes", The Textile Institute, Manchester, 1994.

III Year B.Tech. Textile Technology II - Semester

L	T	P	To	C
4	0	-	4	4

TT 324 TECHNOLOGY OF PRINTING AND FINISHING

Course Description & Objectives:

Main objective of this course is to study thoroughly the printing and finishing of textile fabric. Different methods and style of printing has been discussed. The after finishing becomes the final product. The evolution and durability of the process is also discussed.

Course Outcomes:

1. *Students will able to understand the importance of printing and finishing (value addition) of textile yarn and fabric.*
2. *They will able to find the effect of different process chemistry and machine related to the process.*
3. *They will know the characterization of the processed fabrics.*

UNIT I - Textile Printing And Process

Introduction of Printing: Differences between printing and dyeing styles of printing Direct, Discharge and Resist styles of printing Methods of printing, Block , roller, screen and transfer methods Defects in printing and their remedies.

Printing Paste: essential ingredients and their functions, Types and properties of thickening agents Rheology of printing paste, methods of measuring it.

Printing Procedure: preparation of fabric for printing, preparation of printing paste, printing, drying after printing, dyestuff fixation final treatment (washing off).

UNIT II - Style Of Printing

Brief discussion on printing recipes direct, discharge and resist styles of printing, Printing of cotton and viscose Rayons, Wool and Natural Silk, Nylon, Polyester and its blends, Arcylics.

UNIT III - Textile Finishing And Easy Care Finish

Introduction to Finishing: Objectives of finishing, drying of textile with emphasis on stenter drying, calendaring, different types, raising and shearing.

Shrinking Process: Mechanism of shrinkage pre shrinking of cotton goods and machines used.

Crease: Mechanism for crease formation. Wash and wear finish, Durable press finish, Brief description of DMU, DMEU, DMDHEU and DMEDHEU, Dimethylol ethyl carbonate, Dimethlolethyl triozone, non formaldehyde anti crease agents.

UNIT IV - Softening And Special Finish

Special Finishes: water proof finishes, water repellent finishes, flame proof, flame retardant finishes, moth proof, mildew finish, softening and silicon finishes. stiffening agents, Soil release finish, Anti static finish, Anti pilling finish.

UNIT V - Finishing Of Wool And Colour Fastness

Finishing of woolen goods, felting of wool, milling, defelting of wool, setting of woolen goods, crabbing, potting, decatising and heat setting of synthetic fibres.

Colour Fastness of Dyed and Printed Goods: General Principle of colour fastness testing, sample preparation, multifibres, grey scale, conditions of viewing and illumination. Colour Fastness to washing, Rubbing, Perspiration, Light, Sublimation, Bleaching with hypochlorite and Peroxide, atmospheric ozone, Dry-cleaning and saliva.

TEXT BOOKS:

1. V.A.Shenai, "Technology of Printing", Sevak Publication, 1998.
2. A K Roy Choudhury, "Textile Preparation and Dyeing" Science Publishers, January 9, 2006.

REFERENCE BOOKS:

1. J.T.Marsh, "Introduction to Textile Finishing", Textile Trade Press, England,1996.
2. L.W.C.Miles, "Textile Printing", Dyers Company Publication Trust, 1998.
3. V.A.Shenai, "Technology of Finishing", Sevak Publication,1996.
4. R.S.Prayag, "Technology of Finishing", Shree J.Printers,1998.

III Year B.Tech. Textile Technology II - Semester

L	T	P	To	C
4	0	-	4	4

TT326 TECHNICAL TEXTILES

Course Description & Objectives:

Main objective of this course is to study new evolving field of textiles for its technical applications.

Course Outcomes:

1. *Students will able to understand utilization of textiles for functional use.*
2. *They will know in detail the manufacturing, property and application of textile other than apparel*

UNIT I - General Technical Textiles

Classification of textiles according to tailor made, brief note on technical yarns, fabrics, and fabric structures, scope of industrial textiles, influence of man-made fibre, manufacturing techniques of industrial textiles, Industrial sewing threads and their manufacture, Nomenclature, textiles in agriculture, diary and horticultural applications, textiles in cigarettes, Paper machine clothing, structure and manufacture of former, drier and wet felts, Requirements of these felts, Textiles in conveyor belting, power transmission.

UNIT II - Textiles For Defense & Survival

Requirements, parade clothing, Canvas for defence, Combat clothing, Water vapour permeable clothing, Breathable clothing, Camouflage systems, Deceptions, Decoys, Types and methods, Colour and patterns, Camouflage for UV, IR, antiradar and multiple spectral camouflages, cut resistant Conductive Textiles, Protective clothing for extremely cold region, sleeping bags, Ballistic protective armours and accessories, Aerospace Textiles, Fabrics for nuclear, biological and chemical protection.

UNIT III - Medical & Transportation Textiles

Brief study of applications of textiles in medical field : Classification, Sutures, surgical drapes, masks, Hospital textiles, Textiles for Orthopeadcs, Intelligent bio medical textiles, Textiles in Transportaion: tyre cord ,cross section of passenger tyre, Manufacture of tyre cords, types of tyres, Textiles in automobiles, Textiles in electrical and parachute applications, hose canvas, duck fabrics, Air bags.

UNIT – IV - Advance Textiles-I

High Performance Fibres: Manufacture, properties and applications of Basalt, ultra high modulus fibres like aramid and carbon. **Textiles in Filtration and Sports:** Textiles in filtration media, methods of filtration, selection of textiles for filtration, Coated fabrics and high performance coated fabrics, fabric structure for coated fabrics, coating materials and methods, Textiles in acoustical applications, Textile materials in sports and recreations: scope,

UNIT V - Advance Textiles-II

Textiles in Construction: Geotextiles, Requirements, Properties, Functions - Applications, biodegradable Geo Textiles, testing of Geo Textiles. Architectural fabrics: Building structure, application of GT in vertical dams, Roofing materials, Awnings and Canopies. **Textiles in Composites:** Textile Reinforced Composites, Knitted fabric reinforcements, High performance pp composites, Hybrid yarns for composites.

TEXT BOOKS:

1. Horrocks A. R., Anand S.C., "Handbook of Technical Textiles", 2nd ed., Woodhead Publishing, Cambridge, 2000.
2. Adanur S., "Handbook of Industrial Textiles", 2nd ed., Technomic Publication, Lancaster, 2001.

REFERENCE BOOKS:

1. Kanna M.C., Hearle, O Hear., "Design and Manufacture of Textile Compo ites, Textile Progress", Manchester, April 2004.
2. Scott, "Textile for Production, Textile Progress", Manchester, October 2005.
3. Shishoo,"Textile in sports, Textile progress", Manchester, August 2005.
4. I. Holme, "Electrostatic Charging of Textiles", Textile Progress Vol.28, No.1, The Textile Institute Publication, 2000.
5. S.M. Maini, "Barrier Fabrics for Protection Against Aerosols", The Textile Progress, Vol. 26, No.1, The Textile Inst. Publication, 2000.
6. Fung W., Collins & Aikman, "Textiles in Automotive Engineering", 2nd ed., Wood Head Publishing ltd., UK, 2000.

III Year B.Tech. Textile Technology II - Semester

L	T	P	To	C
4	0	-	4	4

TT328 SHUTTLE LESS WEAVING

Course Description & Objectives:

This course deals with the shuttleless weaving machines and their technologies. Now a day's industries are using shuttle less weaving machines which have good features.

Course Outcomes:

1. *At the completion of this course, the student should be able to:*
2. *Understand shuttleless weaving machines such as projectile, rapier, air&water jet weaving and multiphase weaving.*
3. *Understand their technological changes*
4. *Understand how the these machines effect on productivity and quality etc.*

UNIT I - Introduction to Shuttleless weaving

Introduction: Limitations of shuttle loom with respect to weaving process, engineering aspects & environmental aspects, Classification of shuttleless weaving machines based on the weft insertion rate – selection of looms based on the sorts and quality required - conditions required for high speed weft insertion – requirements for shuttles weaving in Winding, Warping, Sizing and Post Sizing operations - Selvedges and their requirements, (Different types of selvedges found on modern looms)- Techno - economic aspects of modern weaving – Common types of shedding motions, let-off motions, take-up motions found on modern looms.

UNIT II - Projectile & Rapier Weaving

Projectile Weaving Machine: Weft insertion stages – tuckin selvedge formation - Projectile picking concept, picking motion, picking phases, Projectile acceleration & retardation, torsion rod details, Projectile preparation for picking, selvedge motion, Receiving unit, MIS, pick finding, Multi colour weft insertion, weft stop, warp stop, whip roller, weft brake etc. Fabric defects & remedies.

Rapier Weaving Machine: Classification of rapiers – Makes of rapiers and classification - Concept of Dewas & Gabler rapier systems – Principles of different single & double rapier weft insertion systems (Drives), their comparison, Study of rapier heads, Rapier motion drive details, Details of rapier tape, head, guiding elements, Gripper openers, cutters, stroke adjustment, Specifications of rapier & head for various applications, Fabric defects & remedies, weft waste during selvedge formation.

UNIT III - Jet Weaving

Air Jet weft Insertion: Introduction & history, Classification of air jet weft insertion - stages of weft insertion - main nozzles designs, relay nozzle designs, configurations, Loom settings, Air supply & energy consumption, Air flow in nozzles & guide channel, performance of yarns in air jet insertion, Influence of yarn characteristics on weft insertion, application of air jet weaving, features of modern air jet weaving machines, Quality of Air.

Water Jet Weft Insertion: Introduction, Design, Requirements, Picking mechanism, weft insertion elements, loom settings, influence of yarn characteristics, features of water jet looms, applications of water jet weft insertion system, Comparison with air jet.

UNIT IV - Multiphase weaving

Introduction to Multiphase Weaving, features of modern multiphase weaving machines e.g. M 8300, Introduction to Circular Weaving &Triaxial Weaving, Properties & applications of tri-axial woven fabrics.

UNIT V - Narrow fabric weaving & Lables

Technology of Narrow Fabric Weaving: Shuttle looms, needle looms, warp feed systems from beams, creel, for elastomeric yarns, shedding, weft insertion systems, take up Applications of narrow fabrics, Manufacture of Labels.

TEXT BOOKS:

1.Marks A.T.C. & Robinson, "Principles of Weaving", The Textile Institute, 1976.

2.Prof. M.K. Talukdar & Prof.D.B. Ajgaonkar, "Weaving Machines, Materials & Methods", Textile Institute, 1998.

REFERENCE BOOKS:

1. S.C Adanur, "Handbook of Weaving", CRC, Publications, 2008.

2. A.Ormerod, "Modern Preparation & Weaving Machines", BWE Pub.,1983.

III Year B.Tech. Textile Technology II - Semester

L	T	P	To	C
4	0	-	4	4

TT 330 INTELLECTUAL PROPERTY RIGHTS (ELECTIVE - II)

Course Description & Objectives:

This Course deals the fundamentals of IPR, need and how to use different tools of IPR in fashion and textile business. Patents, copyrights, trademarks, trade secrets etc are covered.

Course Outcomes:

1. *Students will able know the various tools of IPR*
2. *Understand the effect of IP*
3. *Various concepts and methods used by IPR Team in industries.*

UNIT I - Patent

Introduction to Intellectual Property Law – The Evolutionary Past - The IPR Tool Kit- Para -Legal Tasks in Intellectual Property Law Patents – introduction, economic impact of patent on system – Patent document – rights of a Patent – patent drafting – Patent duration - patent Registration Process – Post registration Procedures – Patent maintenance.

UNIT II - Copyright

Introduction to Copyrights – – Principles of Copyright Principles -The subjects Matter of Copy right – The Rights Afforded by Copyright Law – Copy right Ownership, Transfer and duration – Right to prepare Derivative works – Rights of Distribution – Rights of Perform the work Publicity Copyright Formalities and Registrations - Limitions - Copyright disputes and International Copyright Law.

UNIT III - Trademark

Introduction to Trade mark – Trade mark Registration Process – Post registration Procedures – Trade mark maintenance - Transfer of Rights - Inter partes Proceeding – Infringement - Dilution Ownership of Trade mark – Likelihood of confusion - Trademarks claims – Trademarks Litigations – International Trade mark Law.

UNIT IV - Trade Secret

Introduction to Trade Secret – Maintaining Trade Secret – Physical Secrurity – Employee Limitation - Employee confidentiality agreement - Trade Secret Law - Unfair Competation – Trade Secret Letigation – Breach of Contract – Applying State Law Geographical Indication – Introduction - Need – Clauses – Case studies.

UNIT V - Licensing & Franchising

IP Transactions - Transaction Opportunities and relevance of IP - Patent Brokering and acquisition - Due diligence LICENSING – Meaning, Types of Licensing, Important factors to consider when preparing a licensing agreement FRANCHISING - Meaning, Types of franchise system, Traditional licensing Vs Franchising, Advantages and disadvantages, Important factors to consider when preparing franchise agreement MERCHANDISING - Merchandising Vs Merchandising rights, Character and personality merchandising.

TEXT BOOKS:

1. Debirag E.Bouchoux: "Intellectual Property". Cengage learning , New Delhi
2. M.Ashok Kumar and Mohd.Iqbal Ali: "Intellectual Property Right" Serials Publications.

REFERENCES:

1. Cyber Law. Texts & Cases, South-Western's Special Topics Collections
2. Prabhuddha Ganguli: ' Intellectual Property Rights" Tata Mc-Graw –Hill, New Delhi.
3. T. M Murray and M.J. Mehlman,Encyclopedia of Ethical, Legal and Policy issues in Biotechnology, John Wiley & Sons 2000
4. P.N. Cheremisinoff, R.P. Ouellette and R.M.Bartholomew,Biotechnology Applications and Research, Technomic Publishing Co., Inc. USA, 1985
5. D.Balasubramaniam, C.F.A.Bryce,K. Dharmalingam, J. Green and K. Jayaraman, Concepts in Biotechnology, University Press (Orient Longman Ltd.), 2002
6. Ajit Parulekar and Sarita D' Souza, Indian Patents Law – Legal & Business Implications; Macmillan India ltd, 2006.

III Year B.Tech. Textile Technology II - Semester

L	T	P	To	C
4	0	-	4	4

TT332 PERSONNEL MANAGEMENT & INDUSTRIAL RELATIONS (ELECTIVE - II)

Course Description & Objectives:

Main objective of this course is to understand about industry and individual psychology.

Course Outcomes:

1. *Students will able know the tasks and the effect of personnel management.*
2. *Understand the effect of industrial relations*
3. *Various concepts and methods used by personnel management in industries.*

UNIT I - Introduction

The field of personnel management: challenge of human relations, problem of human relations, scope of personnel management: managerial phases operative phases of personnel work; objectives, responsibility for personnel management, Personnel executive, education of personnel managers.

Perspective of personnel management: Importance of Perspective. Historical Changes. Cultural and Social Background, Technological Changes. The Role of Government, relations of Labor to Management. Concepts of Labor.

UNIT II - Personnel Problem And Policies

Present and Future Prospects: Approaches to Personnel Problems. Obstacles in the Path of Personnel Management, Factors Contributing to Better Relations; A Changing Philosophy.

Personnel Programming: Scope and Importance of Personnel Programming; Objectives: The Importance of Objectives. Classes of Personnel Objectives. Functions: Nature of Functions. Assignment of Responsibility. Personnel Policies: Nature. Example of Policies. Principles of Personnel Management: Nature. Suggested Principles. Application of Principles. Research Needs of Programming.

UNIT III - Industrial Psychology And Motivation

Introduction to Industrial Psychology: Industrial Psychology defined, meaning scope. Engineering Psychology : Tailors Scientific Management as a base for Engg. Psychology, Work culture and Ergonomics, Industrial Fatigue and methods to overcome.

Motivation: Meaning, Types of Motives, Maslow's and Herzberg's theory of Motivation. Morale: Meaning, Measurement, relation with Motivation, Morale Vs Production, Tips for Morale improvement. Attitudes & Job Satisfaction: Meaning of Attitudes and methods to find employee attitude: Meaning of Job Satisfaction, it s relation to productivity, job satisfaction and interpersonal, factors relating to job satisfaction and job dis-satisfaction.

UNIT IV - Counselling

Personnel Counselling: Meaning, need for counseling, Objective of counseling, Extent of counseling, Forms of Counselling, Steps in Counselling, Techniques of counseling.

Psychological Aspects of Labour Relations: Meaning, concept of Group dynamics, Impact of Hawthorne Experiments. Supervision & Leadership: Supervision: Roles and functions of supervisor, Tasks and processes of supervision, Leadership: Defined, Styles of Leadership, Blacke & Moutan's Managerial Grid, impact of leadership on production.

UNIT V - Industrial Relations And Laws

Industrial Relations: Terminology, Human relation, Industrial relation Vs Human relation, steps to improve human relation in industry.

Industrial Unrest: Manifestation of Unrest in organized and un-organised sector. Trade Union: Def, structure of trade union, objectives and functions of trade union, multi unionism and its pros and cons.

Labour laws: Trade union act 1926, Industrial disputes act 1957, Indian factories act 1948, Minimum wages act, Standing Orders etc. I L O: Objectives, Scope, functions, Structure, Contribution to labour world, Disciplinary Action Against a Worker, McGregor's Hot stove rule.

TEXT BOOKS:

1. Michael J. Jucius, "Personnel Management", The OHIO state university, Columbus, third edition, 1955.

2. Mike Martin and Roland Schinzinger, "Ethics in Engineering", McGraw-Hill, New York 1996.

REFERENCE BOOKS:

1. Govindarajan M, Natarajan S, Senthil Kumar V. S, "Engineering Ethics", Prentice Hall of India, New Delhi, 2004.
2. Somasekhar B.V. and Dr. Rajmouli, "Textile Laws and Policy", A, PMR Publications, Secunderabad, 1997.
3. Charles D. Fleddermann, "Engineering Ethics", Pearson Education, Prentice Hall, New Jersey, 2004 (Indian Reprint).
4. Charles E Harris, Michael S. Protchard and Michael J Rabins, "Engineering Ethics – Concepts and Cases", Wadsworth Thompson Learning, United States, 2000.
5. John R Boatright, "Ethics and the Conduct of Business", Pearson Education, New Delhi, 2003.

III Year B.Tech. Textile Technology II - Semester	L	T	P	To	C
	4	0	-	4	4

TT334 LEAN AND SIX SIGMA FOR TEXTILES AND APPARELS (ELECTIVE - II)

Course Description & Objectives:

Main objective of this course is to understand lean and six sigma techniques along with various statistical tools for textiles and apparels.

Course Outcomes:

1. *Students will able know the quality and quality control process.*
2. *Lean and six sigma in any process as well as textile industry will also be covered.*
3. *The student will also know the use of statistical advance technique to reduce cost and improve quality.*

UNIT I - Introduction

Introduction: Definitions: quality, quality control, quality planning, quality assurance, quality management, Total Quality Management (TQM) as per

ISO 8402 - Overview on TQM. The TQM axioms-Commitment, Scientific knowledge, Involvement and consequences of total quality.

Tools and Techniques In TQM: Statistical Quality Control – process capability and performance. Seven quality improvement tools. Taguchi method.

UNIT II – Basics Of Six Sigma

The Basics of Six Sigma: The Problem Solving Strategy Y = f(x), Critical to Quality Characteristics (CTQ's) Cost of Poor Quality (COPQ) Pareto Analysis (80:20 rule) steps to six sigma. Quality circles. Benchmarking – types. Quality Function Deployment (QFD). 5 S concept. Applications in Textiles in Apparel industries.

UNIT III – Lean

Essentials of Lean (6s) Strategies, Background, Statistical Theory of Lean (6s) Strategies, Normal and standard normal distribution, Lean Six Sigma and Principles: Elements of Lean Performance Measurements, Mathematical Modeling of Lean Six Sigma Relations. Creation of Six Sigma Infrastructure.

UNIT IV – Use of Six Sigma

Road Map to Lean (6s) Continuous Improvement: Continuous Improvement Engineering, Definition and Measurement: Phase 0 and Phase 1, Evaluation of Existing Process Sigma/Baseline Sigma, Data Analysis, Optimization and Improvement, Evaluation of New Sigma, Process Control.

UNIT V – Evolution of Integrated Lean Six Sigma

Evolution of integrated Lean Six Sigma Origin of implementing Lean Six Sigma, Six Sigma concepts in textile industry, Lean Six Sigma through ISO 9001:2008 standard based QMS in textile industry, L6QMS-2008 model, Case study in Lean Six Sigma for textile industry.

TEXT BOOKS:

1. Logothetics N, "Managing for Total Quality - From Deming to Taguchi and SPC", Prentice all Ltd., New Delhi, 1997.

2. Salman Taghizadegan, "Essentials of Lean Six Sigma" Elsevier, (2006).

REFERENCES:

1. S. Karthi, S.R. Devadasan, K. Selvaraju, N.M. Sivaram, C.G. Sreenivasa, "Implementation of Lean Six Sigma through ISO 9001:2008 based QMS: a case study in a textile mill" The Journal of The Textile Institute, 104:10, 1089-1100.

2. Salor J H, "TQM-FIeld Manual," McGraw Hill, New York, 1992

III Year B.Tech. Textile Technology - II - Semester	L	T	P	To	C
	-	-	3	3	2

TT336 TEXTILE TESTING - II LAB

Course Description & Objectives:

This objective of this course is to understand different basic testing methods for fabric.

Course Outcome:

1. *Students will able to perform basic testing of fabric.*
2. *The student will observe various fabric properties practically.*

LIST OF EXPERIMENTS

1. Testing the fabrics for bursting strength.
2. Determination of crease recovery angle of cotton, man-made and silk fabrics.
3. Determination of Drape co-efficient for textile fabrics.
4. Determination of fabric Tensile strength and elongation.
5. Determination of fabric Tear strength.
6. Determination of Ballistic strength of fabrics.
7. Testing of fabrics for pilling.
8. Determination of stiffness parameters of fabrics.
9. Study of dimensional stability of woven fabrics.
10. Determination of Air permeability of woven fabrics.
11. Wash fastness for different dyed and printed fabrics.
12. Determination of abrasion resistance of fabrics.
13. Blend analysis of fabric by chemical methods.

III Year B.Tech. Textile Technology - II - Semester

L	T	P	To	C
-	-	3	3	2

TT 338 TECHNOLOGY OF PRINTING AND FINISHING LAB

Course Description & Objectives:

The main aim of this course is to make finished fabric from pre-treated fabric. This process includes different printing as well as finishing of different fabric by different dyes and chemicals. The students will perform experiments of their own to make finished fabric.

Course Outcomes:

1. *Students will able to understand the importance of printing and finishing (value addition) of textile yarn and fabric.*
2. *They will able to find the effect of different process chemistry and machine related to the process.*
3. *They will know the characterization of the processed fabrics.*

LIST OF EXPERIMENTS

1. Printing of cotton with reactive dyes by using screen printing
2. Printing of cotton with pigment colour by using screen printing
3. To print cotton fabric with resist style of printing using reactive dye as background
4. To print cotton fabric with discharge style of printing using reactive dye as background
5. To print polyester with disperse dye
6. To print Acrylic with basic dye
7. To modify the feel of a fabric by treatment with softening and stiffening agent
8. To impart crease recovery property to cotton by DMDHEU based finish and formaldehyde free system
9. Demonstration of dyeing of cotton on Jigger, winch, Padding mangle, Package dyeing, soft flow dyeing machine and garment dyeing machine.
10. Evaluation of light, wash, rubbing and fastness.
11. Demonstration of computer colour matching system.

IV Year B.Tech. Textile Technology I-Semester

L	T	P	To	C
3	1	-	4	4

(TT413) MAINTENANCE OF TEXTILE MACHINES

UNIT - I

Maintenance: Meaning, need concept, importance, objectives of maintenance, Types of Maintenance: Breakdown & planned maintenance sub classification of planned maintenance, Procedure for planning, schedules for preventive maintenance.

House Keeping: Meaning ,Need, scope, Types and Equipment available today and cost of maintenance, Type of Hose keeping required from fibre processing to Garment production in Textile & Apparel Industry-Requirements of Export houses with respect to House keeping – I S O recommendations for House keeping -Impact on the Psychological aspects of worker and intern effect on Production, Precautions to be taken while spinning too trashy cottons , Dust prone sections in Spinning.

UNIT - II

Maintenance of Spinning Preparatory Machines: Schedules, staff, precautions & methods to be followed during maintenance activities, tools & gauges used for maintenance.

UNIT - III

Maintenance of Ringframe & Compact Spinning Mechanisms: Schedules, staff, precautions & methods to be followed, Tools & gauges used, Maintenance of Rotor Spinning Machines, Schedules, Precautions, Methods etc., Study of aprons & cots used in spinning & their maintenance.

UNIT - IV

SQC Synchronization with Maintenance: SQC activities useful for maintenance in various departments of spinning, Basic concept of lubrication, types of lubricants used for textile machines, Lubricant storage handling, precautions, Maintenance of weaving preparatory machines, schedules, critical points of maintenance, precautions to be taken during maintenance operations.

VIGNAN UNIVERSITY

UNIT - V

Maintenance of Plain & Auto Loom: Schedules, critical points, precautions, auditing of plain & auto loom.

Maintenance of Shuttleless Weaving Machines: Approach towards maintenance of latest weaving machines, Critical maintenance points of various shuttleless weaving machines, Recording of maintenance activities & its importance.

Machine Audit: Concept and auditing of all Textile and Apparel machines, Energy conservation Textiles & Apparels.

TEXT BOOK:

1. BTRA, “Maintenance Manuals for Various Spinning & Weaving Machines”, 2nd ed., 1990.

REFERENCE BOOKS:

1. SITRA, “Spinning Machinery Maintenance”, 2nd ed., SITRA Publications, 1996.
2. SITRA, “Maintenance Manuals of Different Machinery Manufacturers of Spinning & Weaving Machines”, 2nd ed., SITRA Publications, 1996.

IV Year B.Tech. Textile Technology I-Semester

L	T	P	To	C
3	1	-	4	4

(TT411) HOME TEXTILES

UNIT - I

Textile for Seating: Upholstery fabrics for domestic applications – scope, fixed upholstery, non-stretch loose covers, stretch covers, Upholstery fabrics for contract use – general, automotive applications, Commercial applications.

Window Textiles: Sun filters (Sheers and nets), Semi-sheers, Reflective textiles, curtain fabrics & drapes, Blinds.

UNIT - II

Bed Textiles: Sheets & Pillow Cases, Quilted Textile, Blankets & Rugs - Jacquard blankets, Printed blankets, Fire proof blankets, Baby blankets, Bed Spreads, Mattress covers (Ticking).

Towels: Types of towels, Bath robes, Beech Towels, Kitchen Towels, Terry towels, Napkins - Construction, weave, pile height, patterning, production, dyeing, finishing, etc.

UNIT - III

Fabrics for Wall Covering, Textile Art: Tapestries, Wall hangings, Textiles for screens & Room Dividers.

Bathroom Textiles: General shower curtains, Terry Toweling.

Accessories: Scatter Cushions, Floor Cushions, Lampshade fabrics.

Table Textiles: Tablecloths – Colour – Woven & Printed type, jacquard types, embroidered types, non-woven types. Table mats – Colour -woven, Printed jacquard, embroidered.

UNIT - IV

Textile Floor Coverings: Introduction, Pile Fibres, Backing fibres & fabrics, Tufted carpets, Needle felt backings, woven carpet, Woven Carpet Manufacture, Wilton weaving, shedding mechanism, Aximinster, Tufted Carpet Manufacture, Broadloom machinery, Hand tufting, Ancillary equipments Needle felt Manufacture, Needling machinery, textured & patterned needle felts, thermo-bonded products, Unconventional methods for making carpets, Bonding, knitted carpet, stitch bonding, flocking.

UNIT - V

Velour: Types of velvets – Jacquard, Dobby, Plain, Printed – Manufacture & construction, Methods of velour making by cutting and shearing.

Kitchen Textiles: Aprons, Dish cloth, Teacosy, Bread bag, Mittens, Pot Holders, Table Mats, Construction & manufacturing details.

General: Hand / machine embroidered scarves, stoles, shawls, Madeups used in hospitals, etc., Textiles care labeling & Design aids.

TEXT BOOKS:

1. Mortimer O.Shea, "Interior Furnishing", Vol.11, No.1, The Textile Institute, Publication, 1996.
2. G.H. Crawshaw, "Textile Floor Covering", Vol.9, No.2, The Textile Institute, Publication, 1994.

REFERENCE BOOKS:

1. L Cegielka MA, "Carpets : Back to Front", Vol.19, No.3, The Textile Inst. Publication, 1985.
2. G.H. Crawshaw, "Textile Floor Coverings", Vol.9, No.2, The Textile Inst. Publisher, 2000.
3. Mortimer O.Shea, "Interior Furnishings", Vol.11, No.1, The Textile Inst. Publication, 1996.

IV Year B.Tech. Textile Technology II-Semester

L	T	P	To	C
3	1	-	4	4

(TT410) GARMENT PROCESSING

UNIT - I

Introduction: Aim and scope of readymade garment field with special reference to textile wet processing, Brief introduction to various departments in a garment export house, General overview of various fabric materials used in garment making.

Garment Processing: Concept of pre garment stage and garment stage processing. Concept of garment finishing, general precaution to be taken during finishing of cotton, wool, silk, rayon, woven and knitted materials. Fabric and sewing thread selection, Process Sequence, Flow Chart.

UNIT - II

Garment Processing Machines: Pedal dyeing machines, winch dyeing machines, soft overflow dyeing machines, tumble dryers, relax dryers, table printing, garment flat bed printing machines with no. of printing stations, transfer printing, digital printing, washing machines.

Speciality Finishes on Garments: Finishing of woven / knitted garments – Stoneless stone wash effects – mud wash, Ion wash, chalk wash etc., various softening treatments, water resistant breathable finish, Bio polishing, Leathery Finish, Protective Finishes – Antimicrobial, Deodorizing etc., Functional Finishes – Cool finish, Thermocat finishes, Wrinkle free finishes.

UNIT - III

Wash Down Effects on Denim: Stone Wash, Enzyme Wash, Combined enzyme and stone wash, acid wash, antique wash, ball blast, whiskering, Sand blast, Ice wash.

Laundering: Objective, Laundering procedures for various fibre fabrics i.e. cotton & linen, woolen, silks and synthetics, various laundry equipments used in commercial laundering.

UNIT - IV

Functional Finishes: Cool Finish (Snocool), Thermocat Finishing, UV Protective Finish, Peach Skin Effect, AquaTex Finish, Feather touch & ultra soft touch, Rubbery touch, Non-stick Teflon spray.

Stain Removal: Object (with reference to garment processing), general procedure of stain removal, Classification of stains, Principles of stain removing, Classification of stain removers, Application techniques for stain removers, i) Local Application II) Bulk Application.

UNIT - V

Dry Cleaning: General introduction, objective and principle of the dry cleaning process, dry cleaning chemicals, detailed description of dry cleaning operations (sequential steps).

Printing: Special print recipes for fashion & garments**.** Khadi, Metallic, Floc, Plastizol, Reflective, Pearl, Fluorescent Printing, High Density Printing, Puff Printing, Foil Printing, Plastic Printing, Label Printing Defects - Garment defects, Pressing Defects, Packing Defects.

TEXT BOOKS:

1. S.S.Satsangi, "Garment Finishing & Care Labelling", Usha Publishers, 53-B/AC-IV, Shalimar Bagh, New Delhi, 1998.
2. S.S.Satsangi, "Stain Removing Techniques", Usha Publishers, 53-B/AC-IV, Shalimar Bagh, New Delhi, 1998.
3. Noemia D'souza, "Fabric Care", 1st ed., New Age International Publishers, Daryagang, New Delhi, 1996.

REFERENCE BOOKS:

1. Marks Atlas & Wooding, "Chemical After Treatments of Textile", 1st ed., PHI, 1996.
2. A.J. Hall, "Textile Finishing", 2nd ed., McGraw Hill, 1995.
3. J.T. Marsh, "Introduction to Textile Finishing" Vol - II, New Age, 1996.
4. Dr. V.A. Shenai, "Technology of Finishing", Vol. X, Usha, 1998.
5. R.M. Mittal and S.S. Trivedi, "Chemical Processing of Polyester/ Cellulosic Blends", 2nd ed., Tata McGraw Hill, 2000.
6. Prof. M.L. Gulrajani, "Silk Dyeing, Printing and Finishing", 2nd ed., New Age, 1996.

IV Year B.Tech. Textile Technology I-Semester

L	T	P	To	C
3	1	-	4	4

(TT409) FASHION TECHNOLOGY IN APPARELS & MADE - UPS

UNIT - I

Fashion: Fashion terminology, Origin of fashion, Fashion cycle, Fashion industry, factors affecting fashion, Fashion adaptation theories. Major fashion centers of the world: Brief introduction to world fashion centers-American, European, Japanese and Indian, Fashion houses and designers, Fashion designing, apparel designing and fashion technology.
Design: Elements and principles of design: Line, colour and proportion emphasis. Design process: Designers' functions - Inspiration files, sketches, how to interpret designs, story Board / Fabric story; The design studio, sampling.

UNIT - II

Fashion Theories: Fashion of direct eras, French revolutions, Psychology of clothing – first impression, role of socio – psychological and economical aspects of clothing.

UNIT - III

Retailing: Various types of retailers, Franchise retailing, garment retailing, private labels and others, department stores, specialty stores, chain retailers, mail order houses, shopping malls, Designer labels Vs Brands, Analysis of designer's labels, Licensing and franchising.
Fashion Information Services: Trend forecasting and auxiliary services.
Forecasting Trends: Purpose of forecasting trends, how to use forecasting services. Fashion promotion and communications: Trade fairs, Fashion shows.

UNIT - IV

Anatomy for designers, Human proportion and figure constructions, Head the unit of measurement, methods of determining individual proportions, Basic drawing of the fashion figure, flat sketching, average proportions methods of determining standards of women's figure, Drawing the lay figures, Three quarter view of lay figure, proportions of the figure measuring eight heads, Sketching and illustrations of body figures & body shapes.

UNIT - V

Introduction to historic costumes, Introduction to fashion accessories, history, classification and recent trends, Use of leather in apparel, Computer application in fashion designing.

TEXT BOOKS:

1. Sumathi G.J., "Elements of Fashion and Apparel Design", New Age International Publication, 2007.
2. Harold Carrl John Pomeror, "Fashion Design and Product Development".
3. Kathryn Mckelvey and Janine Munsbw, "Instructing Fashion", R.R.Bowker Company, 1965.

REFERENCE BOOKS:

1. Gold Stein, "Art in Every Day Life" Calcutta - IBH Publication. Co. 1972.
2. Tate "Inside Fashion Design", Sharon Lee, 1977.
3. Michael P. "Grover & Computer Aided Design & Manufacturing", 2nd ed., JWS, 1972.
4. Brockman, H.L., "The Theory of Fashion", John Wiley & Sons, 1965.
5. Kawashima, Masazki,"Fundamentals of Men's Fashion Design", 2nd ed., Fairchilds Publications, 1976.
6. Jarnow, J.A., and Judelle B., "Inside the Fashion Business", 2nd ed., JWS, 1974.
7. Barton, Roger " Advertising Handbook", 1st ed., Prentice Hall Inc, 1956.
8. Swinney, John B, "Merchandising of Fashion", 1st ed., Ronald Press, 1942.
9. Jacob Solinger., "Apparel Manufacturing Handbook", 3rd ed., Van Nostrand Reinhold Company, 1980.

IV Year B.Tech. Textile Technology II-Semester

L	T	P	To	C
3	1	-	4	4

(TT408) ETHICS & INDUSTIAL RELATIONS IN TEXTILES

UNIT - I

Introduction to Ethics: Need for Engineers & Technologists, Meaning and Scope.

Human Values: Morals, Values and Ethics – Integrity – Work Ethic – Service Learning – Civic Virtue – Respect for Others – Living Peacefully – caring – Sharing – Honesty – Courage – Valuing Time – Co-operation – Commitment – Empathy – Self-Confidence – Character – Spirituality.

Engineering Ethics: Senses of 'Engineering Ethics' - variety of moral issued - types of inquiry - moral dilemmas - moral autonomy - Kohlberg's theory - Gilligan's theory - consensus and controversy – Models of Professional Roles - theories about right action - Self-interest - customs and religion - uses of ethical theories.

UNIT - II

Engineering as Social Experimentation: Engineering as experimentation - engineers as responsible experimenters - codes of ethics - a balanced outlook on law - the challenger case study.

Safety, Responsibilities and Rights: Safety and risk - assessment of safety and risk - risk benefit analysis and reducing risk - the three mile island and chernobyl case studies.

Collegiality and loyalty - respect for authority - collective bargaining - confidentiality - conflicts of interest - occupational crime - professional rights - employee rights - Intellectual Property Rights (IPR) - discrimination.

Global Issues: Multinational corporations - Environmental ethics - computer ethics - weapons development - engineers as managers-consulting engineers-engineers as expert witnesses and advisors -moral leadership-sample code of Ethics.

UNIT - III

Introduction to Industrial Psychology: Industrial Psychology defined, meaning scope. Engineering Psychology : Tailors Scientific Management as a base for Engg. Psychology, Work culture and Ergonomics, Industrial Fatigue and methods to overcome.

Motivation: Meaning, Types of Motives, Maslow's and Herzberg's theory of Motivation and their relevance to present scenario.

Morale: Meaning, Measurement, relation with Motivation, Morale Vs Production, Tips for Morale improvement.

Attitudes & Job Satisfaction: Meaning of Attitudes and methods to find employee attitude: Meaning of Job Satisfaction, its relation to productivity, job

satisfaction and interpersonal, factors relating to job satisfaction and job dis-satisfaction.

UNIT - IV

Personnel Counselling: Meaning, need for counseling, Objective of counseling, Extent of counseling, Forms of Counselling, Steps in Counselling, Techniques of counseling.

Psychological Aspects of Labour Relations: Meaning, concept of Group dynamics, Impact of Hawthorne Experiments.

Supervision & Leadership:

Supervision: Roles and functions of supervisor, Tasks and processes of supervision, **Leadership:** Defined, Styles of Leadership, Blacke & Moutan's Managerial Grid, impact of leadership on production.

UNIT - V

Industrial Relations: Terminology, Human relation, Industrial relation Vs Human relation, steps to improve human relation in industry.

Industrial Unrest: Manifestation of Unrest in organized and un-organised sector.

Trade Union: Def, structure of trade union, objectives and functions of trade union, multi unionism and its pros and cons.

Labour laws: Trade union act 1926, Industrial disputes act 1957, Indian factories act 1948,Minimum wages act, Standing Orders etc.

I L O: Objectives, Scope, functions, Structure , Contribution to labour world, Disciplinary Action Against a Worker, McGregor's Hot stove rule.

TEXT BOOKS:

1. Mike Martin and Roland Schinzinger, "Ethics in Engineering", McGraw-Hill, New York 1996.
2. Govindarajan M, Natarajan S, Senthil Kumar V. S, "Engineering Ethics", Prentice Hall of India, New Delhi, 2004.
3. Somasekhar B.V. and Dr.Rajmouli, "Textile Laws and Policy", A, PMR Publications, Secunderabad, 1997.

REFERENCE BOOKS:

1. Charles D. Fleddermann, "Engineering Ethics", Pearson Education, Prentice Hall, New Jersey, 2004 (Indian Reprint).
2. Charles E Harris, Michael S. Protchard and Michael J Rabins, "Engineering Ethics – Concepts and Cases", Wadsworth Thompson Learning, United States, 2000.
3. John R Boatright, "Ethics and the Conduct of Business", Pearson Education, New Delhi, 2003.
4. Edmund G Seebauer and Robert L Barry, "Fundamentals of Ethics for Scientists and Engineers", Oxford University Press, Oxford, 2001.

IV Year B.Tech. Textile Technology I-Semester

L	T	P	To	C
3	1	-	4	4

(TT407) INDUSTRIAL ENGINEERING FOR TEXTILES & APPAREL UNITS

UNIT – I

Introduction to Industrial Engineering: Nomenclature as Production & Operations Management, Need for Textile production, meaning, objectives, scope & its relevance to Textile Industry, Economical size of the firm, factors governing size, small scale industries - reasons for survival and optimum firm. Facilities planning: Product selection process and selection of a process, Project form. capacity planning-Def. measurement of capacity-process of capacity planning. capacity Utilisation.

UNIT – II

Plant Building: significance, considerations of building design, types of industrial building -Textile examples, Ideal building. Plant lighting: Need, types, factors governing, A brief note on Ventilation, Plant Location:Def., need, Factors governing, theories, selection of actual site, quantitative techniques, types of location like: Rural, sub-urban & Urban, merits &demerits - Examples from Textile field.

UNIT – III

Plant Layout and Material Handling: Def, need, objectives of Scientific layout, Principles of layout, Types of material flow, factors governing the layout , types of layouts, Merits and demerits, textile examples. Quantitative techniques for selection of plant layout.(brief note on QTM, Craft,Corelap) Principles of material handling – meaning &significance, types equipments for Textile production Value Engineering: Value and functions – types. Maintenance Management – Types – maintenance cost.

UNIT – IV

Types of Production Systems: Flow line, batch and job shop - Planning and Control for mass production – characteristics – Design aspects – Problem of mass production – FMS – Batch production – EBQ. Supply Chain Management: concept & tools, make or buy & factors affecting, out sourcing.

Purchasing: Fundamentals, purchase procedure – types of purchases – purchase organization introduction to material management in production system; product organization role of material management, Inventory and stores management (Brief study of EOQ, ABC analysis).

UNIT – V

Organisation for Safety: Safety, significance, Accidents classified, causes of accidents costs of accidents, safe-t-score test, various approaches of accident prevention and recording. Introduction to Work study: steps in method study, tools of record, Time study-steps, elements, allowances, work measurement (Assessment of S M V for Apparel Product) Ergonomics - Noise control - Plant Humidification in Textile mills: working of humidification Units, RH% selection.

TEXT BOOKS:

1. Chunnawala and Patel, "Production and Operations Management", Himalaya Publishing House, 1997.
2. Aswathappa, "Production & Operations Management", Himalya Publishing House, New Delhi, 2006.

REFERENCE BOOKS:

1. O.P.Khanna, "Industrial Engneering & Management", Dhanpat Rai & Sons, New Delhi, 2004.
2. Work Study – ILO
3. Work Study in Textiles – ILO
4. Samual Eilon, "Elements of Production Planning & Control", Newyork, 1962.
5. Banga Sharma, "Industrial Engineering & Management", Khanna Publications, 1992.
6. Nobert Lioyd Enrick, "Industrial Engineering Manual of Textile Industry", R.E.Krieger Publication, 1978.

IV Year B.Tech. Textile Technology II-Semester

L	T	P	To	C
3	1	-	4	4

(TT406) MERCHANDISING

UNIT - I

Apparel Industry Profile: Introduction to apparel industry - organization of the apparel industry types of exporters Business concepts applied to the apparel industry - International trade buyer classification and buying network in exports - A basic profile of industry in far east, USA, Europe, Australia and ECE - Understanding of the quota system.

Marketing: Functional organization of an apparel firm - Responsibilities of a marketing division - marketing objectives and strategies - Marketing research - Types of markets: Retails and wholesale strategies for merchandise distribution- retailers - sourcing flows and practices. Marketing plan. Labeling and licensing.

UNIT - II

Marchandising: Meaning, Requirements of purchase order, Functions of Marchandiser - Career in Marchandising - Marchandise Planning -Time Management in Marchadising.

Fashion Merchandising: Study of fashion principles, theories and fashion cycle and terminology - Introduction to fashion marketing and merchandizing principles – retail, whole sale, boutique, designer - wear, couture, pret-o-porter (ready to wear), haute couture (hi-fashion) - Study of domestic and international market – past, present and future scenario – evolution of fashion - Economic social, environmental and political influences on fashion.

UNIT - III

Sourcing: Need for sourcing - sourcing materials - manufacturing resources planning - principles of MRP – Overseas sourcing - sourcing strategies. Supply chain and demand chain analysis - Materials management for quick response - JIT technology.

Documentation: Order confirmation, various types of export documents, Pre-shipment Post - shipment documentation, Terms of sale, payment, shipment etc.Export incentives: Duty drawback, DEPB, I / E license - exchange control regulation - foreign exchange regulation acts - export management risk - export finance, WTO / GATT / MFA - Functions and objectives, successes and failures.

UNIT - IV

Logistics & Logistics Management: Definition, Scope, Concept, Components, Framework, Missions of Logistics, Functions of LM, Strategic Logistic Planning, Logistic Providers, System Trade-Off, Reverse logistics, Transportation & scheduling tasks, A Brief note on Logistics Engineering.

I.T in Logistics: Position of Information, LIS, Integrated IT, Emerging Techniques.

Organisation for Logistics: Line, Staff, Functional & matrix.

UNIT - V

Integrated Logistics: Concept, Activities, Accounting, Quality, Information system & Emerging concepts, Global Logistics: Views,& Organisation Logistics Order Processing, Logistics Packaging (concept, function forms, Problems & policy) 3 PL Vs 4PL.

Introduction to SCM: Conceptual model, Supply chain, Types (for Manufacturing & Service organizations- Examples from Textile field) Elements, Approach, Value chain, Myths of SCM, Process View of SCM.Functions of SCM - Bull whip effect-Network Design in SCM: Role, Factors, Frame work,Use of Management techniques like LPP, PBP, NPV and Demand Forecasting by Time Series - Sourcing Decisions - IT for SCM: Concept, Need, Tools, APS (Features , Concept)-Data Mining: E- Business & SCM.

TEXT BOOKS:

1. Sidney Packard, Arthur Winters, Nathan Axelrod, “Fashion Buying & Marchadising”, Fairchild Publications, New York, 1996.
2. Eliane Stone and Jean A.Samples, “Fashion Marchadising”,Mc-Graw Hill Book Company,1996.
3. David.J.Bloomberg (EEE) “Logistics”, PHI, New Delhi, 2005.
4. Donald.J.Bowersox & Davis J.Closs “Logistical Management” Printice Hall, 2002.
5. Sarika Kulkarni & Ashok Sharma “Supply Chain Management” Tata Mc-Graw Hill,New Delhi, 2004.
6. Rahul V.Altekar” Supply Chain Managemtn”,PHI, New Delhi, 2005.
7. D.K.Agarwal “A Textbook on Logistics & Supply Chain Management”,McMillan, 2006.

IV Year B.Tech. Textile Technology I-Semester

L	T	P	To	C
3	1	-	4	4

(TT405) GARMENT MANUFACTURING TECHNOLOGY

UNIT - I

The Garment Industry: Structure of the garment Industry, sectors of Industry, product types and organization, Apparel industry in India, Domestic industry, size of the industry, nature of the industry, its developments in recent years, Export industry: Size and nature of the industry. Types of Fabric Packages – Types of Fabrics – One Way – Two Way Fabrics –Their effect on spreading – Methods of Fabric spreading – Spreading equipment – Computerized spreaders – Marker making –Marker efficiency – Factors affecting marker efficiency – Marker duplicating methods – Computer aided marker making.

UNIT - II

Basic Pattern Making: Measurement Taking – Size chart and Measuring of Sizes, Definition of various garments parts & positions, Methods: Bespoke method & Industrial method (Using Blocks) – Basic block construction – Block preparation & correction. Figure analysis: Body ideals, body proportion, height, weight distribution, body parts, individual figure analysis, study of body measurement of all age groups, Preparation of basic blocks, muslin pattern, commercial pattern, sizes and its understanding, fabric preparation for garment construction, Spreading parameters, types of spreads, manual and automatic spreading.

UNIT - III

Introduction to Cutting Machines: Types and functions of cutting machines – straight knife, round knife, band knife, cutting machines – Notches, drills, die cutting machines – Computerized cutting machines –maintenance of cutting machines – common defects in cutting & their remedies. Types of needles – Parts of needles and their function – Needle size - sewing thread – properties of sewing threads – ticket number – fabric sew ability. Seam quality – effect of stitch type on seam quality. Selection of seam and stitch.

Federal classification of seam and stitches – Basic parts of sewing machine – Needle – Bobbin case /Bobbin hook, Loopers – Loop spreader – Threading fingers – Throat plate – Tongue chaining plates – Take-up devices – Tensioners – Feed dog – Pressure foot for sewing.

Sewing Technology: Feed systems, machinery and equipment, basic sewing machines, like general sewing, over locking, safety stitching, blind stitching, button holes, bartacking, & button sewing, special sewing machines like three thread overlock with a microprocessor, Sewing problems, slipped stitches, staggered stitches, stitching pucker etc.

UNIT - IV

Fusing Technology: Construction of Fusibles, Fusing process, Fusing machinery, quality control, Application of various components such as buttons, zips, underlining, Hooks and ornamental materials, fly, kissing, lap; Button and buttonholes, hooks and eye snaps, Velcro and other accessories.

Pressing Technology: Classification, components of Pressing, machinery and equipment viz. Hand irons, dry iron, electric steam iron, under pressing, top pressing, scissors press, Carousel machines, Steam dolly, tunnel finishing, controls, handling systems, boiler room.

UNIT - V

Garment Finishing and Inspection: Attaching buttons, marking, sewing labels, cleaning, final touch, fitting quality, live models, measurements, viewing the garments, quality standards.

Production Technology: Manual systems, making through, section system, progressive bundle system, straight line system, mechanical transport systems, selective conveyor belt system, unit production system, quick response sewing system. Ware Housing: Handling equipment, storage equipment, packing equipment. Use of CAD in Garment Manufacturing.

TEXT BOOKS:

1. Gerry Cooklin & Marshell, “Introduction to Clothing Manufacture”, 6th Enlarged Edition, Blackwell Publications, USA, 2007.
2. Natalie Bray, “Dress Pattern Designing”, Blackwell Publications, USA, 2007.
3. Peggali - I & Marshall Caverdesh, “The Complete Dress Maker”, Textile North Publishers, London ,2004.
4. Peggali - II & Marshall Caverdesh, “Introduction to Dress Making”, Textile North Publishers, Wales, London, 2006.
5. David .T.Tyler, “Materials Management in Clothing Production”, Blackwell Publications, USA, 2007.
6. Darlice O.Koshy., “Garment Exports; Winning Strategies”, Blackwell Publications, USA, 2007.

REFERENCE BOOKS:

1. Gerry Cooklin, “Garment Technology for Fashion Designers”, Blackwell Science, 1997.
2. Gerry Cooklin, “Introduction to Clothing Manufacturing”, Blackwell Science, 2006.
3. Dora S. Lewin, Mabel Goode Bowers, Manetta Knttunen, “Clothing Construction and Wardrobe Planning”, The Macmillan co, New York, 2006.

IV Year B.Tech. Textile Technology II-Semester

L	T	P	To	C
3	1	-	4	4

(TT404) TEXTILE MILL PLANNING & ORGANIZATION

UNIT - I

Introduction to Mill Planning: Types of Textile Industries/Activities, Introduction to Process control, Production and Productivity, Factors affecting production in different parts of textile industry, Types of **Organisaton:** Flat & Tall, Mechanistic & Organic, Principle of organization, Basics of Enterprise resource planning,Spin plan, Weave plan, Capacity Planning of a Textile Unit, factors governing the capacity, Spin plan for Cotton, P/V, P/C production-Role of Linear Programming Problem (Maximisation & Minimisation,Profit types) in Spinning, Weaving, and Processing.

UNIT – II

Central and Sate Government Schemes, Technology Up-gradation Fund Scheme (TUFS)-Textile Workers Rehabilitation Fund Scheme, Technology Mission on cotton, Group Work Shed Scheme, Integrated Scheme for Power loom Development-Group Insurance scheme - Scheme for Integrated Textile Parks, Hank Yarn Obligation(HYO) National Equity Fund Scheme - Credit Linked Capital Subsidy Scheme (CLSS), Textile policiy of Andhra Pradesh, Balancing of Machines in Textile production-Role of Assignment in Production planning (Simple, Unbalanced, profit type, formulation type) Mixing and Blending of fibres in Spinning : Application of Simplex routine (Maximisation, Minimisation, profit type) - Sequencing of Openers and Cleaners/Preparatory machines by Johnson's algorithm (n-jobs on two machines, m-jobs on n machines and 2-jobs on m-machines).

UNIT – III

Indian Textile Policy, Trade policy, Fiscal policy, NTC, STC, Textile committee, National Hand loom Development Corporation, Mills association, Research institutions, Technical Textile Units 11^{th} five year Plan Introduction to Maintenance management & energy management, need, types of problems, Maintenance of different elements of spinning, weaving, processing and testing equipments and Replacement of Items which deteriorate gradually (with and without time value of Money), and items failing suddenly, Queuing theory and its applications in Textile production - Decision theory in Textiles, Interference loss.

UNIT – IV

Material Transport in Textile Industry: Handling equipments in Spinning, Weaving, Processing with special reference to each process in these sections to minimize the cost of Transportation by applying Vogel's Approximation method and NWCR.

Inventory Management: A typical Textile Stores as referred to a Composite Mill, different types of Inventories and types of Inventory decisions, Derivation of E O Q, Simple Problems. Interest formulas, Present, Future worth ,Rate of Return and Annual Equivalent methods.

UNIT – V

Project Planning in Mill Planning: Introduction, Project Identification, Appraisal, Financing, Feasibility and Project scheduling by PERT and CPM, crashing in networks - Interest formulas, Present, Future worth, Rate of Return and Annual Equivalent methods Depreciation: Various methods, Evaluation of Public alternatives - Make or Buy Decisions, Brief note on International trade and documentation.

TEXT BOOKS:

1. Purushotham.B., "Texile Mill Planning", 1^{st} ed., Mahajan Book Publishers, Ahemedabad, 2000.
2. Roy, "Quantitative Techniques for Decision Making", 2^{nd} ed., Chand Publishing Co, New Delhi, 2003.
3. V.M.Dudeja, "Management of Textile Industry", Mahajan Publishers, Ahmedabad, 2001.
4. Dudeja V D, "Management of Textile Industry", Textile Trade Press, Ahemadabad, 1990.
5. Kapoor, "Operations Research", Sultan Chand & Co, New Delhi, 2009.

REFERENCE BOOKS:

1. B.Pannerselvam, "Engineering Economics", 4^{th}ed., PHI Publications,New Delhi, 2004.
2. Ormenod A "Textile Product Management", 1^{st} ed., The Textile Institute, Manchester 1992.
3. A. Ormerod, "Textile Project Management", The Textile Institute Publication, 1996.
4. T.R. Banga & S.C. Sharma, "Industrial Organisation & Engineering Economics", Khanna Publishers, Delhi, 2000.

IV Year B.Tech. Textile Technology I-Semester

L	T	P	To	C
3	1	-	4	4

(TT403) MECHANICS OF TEXTILE MACHINES & UTILITIES

UNIT - I

Introduction – equations of motion – motion in a circle – transmission of motion by wheel gearing – Textile applications from fibre to finished fabric – Balancing of revolving and reciprocating masses. Belt drives – Flat and V-belts comparison – belt slippage, effect of belt thickness – effect of initial tension – effect of centrifugal force – horsepower transmitted – rope and chain drives – brief note on fast and loose pulley, jockey or rider pulley, grooved pulleys etc.

UNIT - II

Determination of speed ratio in planetary mechanisms – applications in textile industry – stepped pulleys – designing method – applications in textile industry – Mechanics of yarn winding – study on breaks and clutches – Applications of clutch and break in textile production. Feed regulation motion in Scutcher, - designing of cone drums for blow room and speed frame – construction of displacement – velocity and acceleration diagrams – kinetics of shedding – picking power for picking, picking as an elastic mechanism and beat – up: eccentricity of slay, derivation for 'e', displacement, velocity and acceleration of slay.

UNIT - III

Construction of cams and tappets – heart shaped, 3 leaved – plain, twill tappets – derivation to show that the frictional force 'F' is directly Proportional to the distance of weight from the fulcrum in negative let off motion – Backrest mechanisms – angular velocity of warp beam.

UNIT - IV

Humidification in Textile Mills: Need for humidification in Textile Mills, Ambient conditions required in various departments of a textile mill, Psychrometry - definition, use of psychrometric charts, various psychrometric processes like cooling, heating, humidification, de-humidification, etc. Aspects of evaporating cooling method & refrigerative cooling method, Study of arrangements & layout of standard humidification methods for spinning, weaving & knitting processes – Return air ducts, Return Air Plenum, Filters, Return Air fans, Dampers, Supply Air Fans,

Washers, Eliminators, Supply Air Plenum, Supply Air Duct, Diffusers etc. Study of the construction of each component, Return Air & Supply Air openings in the department, Automatic controls in humidification plants, Study of recent developments in humidification plant used in spinning, weaving, knitting departments.

UNIT - V

Pumps, Compressors & Fans used in Textile Mill: Classification & characteristics of various types of pumps, Study of types of pumps used in textile mills.Compressors: Compression methods, intermittent, continuous, Classification of compressors & brief study of construction, working, advantages, limitations of each type, Compressed air requirement in Textile mills, Compressor accessories such as reservoir, dryer, lubrication system, filters, cooling towers, etc.

Fans: - Classification, construction & working of different classes of fans, Centrifugal, Axial flow & Radial flow, Fan capacity, power & efficiency, Fan selection, Pneumatic conveying of materials in textile mills.

TEXT BOOKS:

1. J.E.Booth, "Textile Mathematics", Vol. I, II, & III , The Textile Institute, Manchester, 1976.
2. W.A.Hanton, "Mechanics for Textile Students", Butterworths, London, 1976.
3. P.Grosberg, "Textile Mechanics", Toranto Publishers, New York, 1976.
4. K.Slater, "Textile Mechanics", Vol – I & II, Ellis Horwood Limited, New York, 1978.
5. Kurmi, "Theory of Machines", Dhanpat Rai & Sons, New Delhi, 1996.

REFERENCE BOOKS:

1. W.A.Hanton, "Mechanisms of Textile Machinery", Ellis Horwood Limited, London 1976.
2. Sengupta, "Weaving Calculations", Mahajan Publishers, Ahemdabad, 1976.
3. J.E.Booth, "Principles of Textile Testing", Butterworths, London, 1978.
4. Keshavan, "Fabric Formation", SSMITT Publications, Komarapalyam 1988.
5. Arora & Domkundwar, "Conditioning & Refrigeration", 2nd ed., MGH, 1959.
6. G. B. Ramakrishnani, "Manual of Humidification", Batliboi Ltd., 1963.
7. P.Arora, "Refrigeration & Air Conditioning", 3rd ed., Khanna Publications, TMH, 1992.

IV Year B.Tech. Textile Technology II-Semester

L	T	P	To	C
3	1	-	4	4

(TT402) TECHNICAL TEXTILES

UNIT – I

General Technical Textiles: Classification of textiles according to tailor made, brief note on technical yarns, fabrics, and fabric structures, scope of industrial textiles, influence of man-made fibre, manufacturing techniques of industrial textiles, Industrial sewing threads and their manufacture, Nomenclature, textiles in agriculture, diary and horticultural applications, textiles in cigarettes, Paper machine clothing, structure and manufacture of former, drier and wet felts, Requirements of these felts, Textiles in conveyor belting, power transmission.

UNIT – II

Textiles for Defense & Survival: Requirements, parade clothing, Canvas for defence, Combat clothing, Water vapour permeable clothing, Breathable clothing, Camouflage systems, Deceptions, Decoys, Types and methods, Colour and patterns, Camouflage for UV, IR, antiradar and multiple spectral camouflages, cut resistant Conductive Textiles, Protective clothing for extremely cold region, sleeping bags, Ballistic protective armours and accessories, Aerospace Textiles, Fabrics for nuclear, biological and chemical protection.

UNIT – III

Medical & Transportation Textiles: Brief study of applications of textiles in medical field : Classification, Sutures, surgical drapes, masks, Hospital textiles, Textiles for Orthopeadcs, Intelligent bio medical textiles,
Textiles in Transportaion: tyre cord ,cross section of passenger tyre, Manufacture of tyre cords, types of tyres, Textiles in Automobiles, Textiles in electrical and parachute applications, hose canvas, duck fabrics, Air bags.

UNIT – IV

High Performance Fibres: Manufacture, properties and applications of Basalt, ultra high modulus fibres like aramid and carbon.
Textiles in Filtration, Sports, Acoustics: Textiles in filtration media, methods of filtration, selection of textiles for filtration, Coated fabrics and high performance coated fabrics, fabric structure for coated fabrics, coating materials and methods, Textiles in Automation Industry, Textiles in acoustical applications, Textile materials in sports and recreations: scope, applications.

UNIT – V

Textiles in Construction, Sports: Geotextiles , Requirements, Properties, Functions - Applications, biodegradable Geo Textiles, testing of Geo Textiles.
Textiles in Aerospace and Marine Applications: Fabrics, Architectural fabrics, Building structure, application of GT in vertical dams Roofing materials, Awnings and Canopies, Flags Rubberised fabrics for flexible dams.
Textiles in Composites: Textile Reinforced Composites, Knitted fabric reinforcements, High performance pp composites, Hybrid yarns for composites.

TEXT BOOKS:

1. Horrocks A. R., Anand S.C., “Handbook of Technical Textiles”, 2nd ed., Woodhead Publishing, Cambridge, 2000.
2. Adanur S., “Handbook of Industrial Textiles”, 2nd ed., Technomic Publication, Lancaster, 2001.
3. Fung W., Collins & Aikman, “Textiles in Automotive Engineering”, 2nd ed., Wood Head Publishing ltd., UK, 2000.
4. Kennady, Anand Miraftab, Rajandran, “Medical Textile & Biomaterials for Health Care”, Wood Head Publishing Ltd., UK, 2005.
5. Jai Prakash,D.R., and Gaur R.K., “Sewing Threads”, 1st ed., NITRA, 1994.
6. S.K. Mukhopadhyay, “High Performance Fibres, Textile Progress”, Vol.25, No.3/4, Textile Institute Publication, 1996.
7. P.W. Harrison, “Protective Clothing, Textile Progress”, Vol.22, No.2/3/4, The Textile Institute Publication, 1996.

REFERENCE BOOKS:

1. Kanna M.C., Hearle, O Hear., “Design and Manufacture of Textile Composites, Textile Progress”, Manchester, April 2004.
2. Scott, “Textile for Production, Textile Progress”, Manchester, October 2005.
3. Shishoo,”Textile in sports, Textile progress”, Manchester, August 2005.
4. I. Holme, “Electrostatic Charging of Textiles”, Textile Progress Vol.28, No.1, The Textile Institute Publication, 2000.
5. S.M. Maini, “Barrier Fabrics for Protection Against Aerosols”, The Textile Progress, Vol. 26, No.1, The Textile Inst. Publication, 2000.
6. S.K. Mukhopadhyay & J.F. Partridge, “Automotive Textiles”, Textile Progress, Vol.29, No.1/2, The Textile Inst. Publication, 2000.
7. Pushpa Bajaj & A.K. Sengupta, “Industrial Application of Textile : Textiles for Filtration and Coated fabrics Textile Progress”, Vol.14, No.1, The Textile Inst. Publication, 1994.

IV Year B.Tech. Textile Technology I-Semester

L	T	P	To	C
3	1	-	4	4

(TT401) PROCESS & QUALITY MANAGEMENT IN TEXTILES

UNIT - I

Introduction to Process Control: Meaning, Applications to whole Textile Production from fibre to fabric – Process Parameters controlling production, quality – Introduction to quality control: Tools available, selection and interpretation.

PQC in Blow Room, Card & Draw Frame:

Raw Material Management: Importance, need of instrumental evaluation, traditional methods of cotton selection, importance of cost in raw material, cotton marketing, linear programming for mixing, bale management yarn engineering & raw material.

Blow Room: Control of mixing quality – control of yarn realization (Records and Accounting) – Control of waste and Waste extraction study - cleaning in Blow room (Individual and Overall cleaning efficiency of Blow room).

Card: Waste extraction at card, Nep study & control, Snap Study card.

Draw Frame: Breakage study, Stop motion checking, Use of NILO meter,Drafting rollers pressure checking (Carbon paper technique).

UNIT - II

PQC IN Comber, Simplex & Ring Frame:

Comber & Comber Preparatory: Significance & importance of good lap for comber, evaluation of comber performance, fractionating efficiency of comber, comber waste analysis, influence of various factors on combing performance-5 minute test, head wise and Overall waste at Comber.

Speed Frame: Breakage study at Simplex.

Ring Frame: Breakage study ,Snap study, & Idle spindle study , Analysis of Snap efficiency and reasons for low snap efficiency.

Measurement and analysis of productivity means to improve productivity, control of yarn quality: count, strength and their variability, yarn unevenness and imperfections, yarn faults and package defects, implementation of process control in cotton spinning.

UNIT - III

PQC Winding, Warping & Pirn Winding:

Process & Quality Control in Winding: Scope, Optimizing of Yarn tensioning and clearing (settings for different kinds of yarns) Producing good package, Snap and breakage study, unwinding tension and optimum guide distance, Breakage and snap study in Auto coner (formats) Approach to control of productivity, Requirements of dye package.

Process & Quality Control in Warping: Scope, breakage study, Effort to minimize the breakage rate, quality of warper beams, breakage study in warping (norms), productivity, warping defects and remedies.

Process & Quality Control in Pirn Winding: Scope, GO-NOGO gauge, Minimizing the end breaks, improving the build of the yarn, control of speed, productivity - Pirn quality checking report.

UNIT - IV

PQC in Sizing & Loom Shed:

Process & Quality Control in Sizing: Scope, choice of size receipe and measurement of size pick up, control in size preparation, Lappers study, breakage study, control of size pick up, controlling sizing conditions, stretch control in various zones, moisture control, Migratory behavior study (ATIRA technique) quality of sized beams, positive feed to sow box, productivity, Dead loss and its control, hard waste and its control, Testing of Size Ingredients, testing of sized yarn - Selection of reeds and healds, care of reeds, effect of reed parameters on weaving performance.

Approach to Process & Quality Control in Loom Shed: (Non– auto and Auto loom shed) scope, control of speed, breakage and snap study in loom shed, determination of labour allotment (ATIRA procedure) Norms for breakage rate, No. of looms/operative, control of efficiency (concept of calculated and expected efficiency), control of loom stoppages (due to warp and weft break, shuttle change etc.)

UNIT - V

Process & Quality Control in Chemical Processing: Scope, functions of control house, grey cloth inspection, Process control measures in Bleaching and mercerizing (method to estimate the concentration of caustic and silica in peroxide bleach, absorbency of bleached cloth, Cuprammonium fluidity, ash content, barium activity no. luster no. fastness of bleaching), Process control in dye house: parameters for process control in different forms of dyeing (yarn and fabric), test method to determine the caustic and Hydros conc. In vat dye liquor, Process control in Printing and Finishing: Scope, Approach to process control, test for the suitability of thickner in the print paste formation, iodine absorption test for the evaluation of degree of resign cross linking, fastness properties of dyed and printed goods to wash, light perspiration and water, Fastness to rubbing, hot press, Optimal brightness test for the uniformity of cross linking, assessment of degree of heat setting in polyester by Iodine absorption method.

TEXT BOOKS:

1. Process and Quality Control in Spinning – ATIRA
2. Process and Quality Control in Weaving – ATIRA
3. V.A.Shenai, "Evaluation of Textile Chemicals", Sevak Publications, 1980.
4. "Hand Book of Textile Testing" – ISI Publication.
5. "Hand Book of Methods of Tests for Cotton Fibers, Yarns and Fabrics", Circot (CTRL).
6. "Tablets on Chemical Processing", TAI Publication.

REFERENCE BOOKS:

1. Dr. V. K. Kothari, "Testing & Quality Management", AFL Publication, 2006.
2. Mairio Bona, "Textile Quality Physical Method of Product & Process Control", COMMETT Program of EEC.
3. "Quality Control in Spinning" – SITRA Publication.
4. Monograph Series - BTRA.
5. Dr. K. R. Salhotra, "Process Control in Spinning", Institute of Textile Technology, 2002.
6. End Breaks in Ring Spinning – ATIRA
7. A. Barella, "Yarn Hairiness", Textile Progress, Vol 13, No 1, Textile Institute, 2006.

VFSTR UNIVERSITY

I Year - B.Tech

SYLLABUS

I SEM & II SEM

HS 111 ENGINEERING MATHEMATICS - I

L	T	P	To	C
3	1	-	4	4

Course Description & Objectives :

Without mathematics not a single day of an engineer will pass! All the topics of this course are relevant to all branches of engineering. Differential equations are used in various places. Laplace transformations are used, for example, for conversion of domains, from time domain to frequency domain. These are also used to solve ordinary differential equations. When data is given at only a finite points, we use numerical methods for find the approximate values of functions, also to solve differential equations approximately etc. Maxima, minima of a function has got many applications.

Course Outcomes:

- *Students will understand that Mathematics which they learn can be used at different levels in their Engineering course irrespective of their branches.*
- *This course will help to sketch the graph of a differential equation and its direction mixing fields*
- *Laplace transform used to compute solutions of equations involving impulse functions*
- *They will be able to use Laplace transformations for conversion of domains from time domain to frequency domain.*
- *Differential Equations help them to find approximate values of function.*
- *They will be able to analyze and use them in different applications.*
- *Eigen values and Eigen vectors play a prominent role in the study of ordinary differential equations and in many applications of physical sciences.*

UNIT I - Ordinary Differential Equations & Differential Equations of Second Order :

Differential Equations of First Order : Definiton, Order and degree of a differential equation, Formation of differential equations, Solution of a differential equation, Differential equations of first order and first degree : variables separable, Homogenous equations, Linear equations, Exact differential equations.

Differential Equations of Second Order : Linear differential equations of second order with constant coefficients, Methods for finding the complementary functions and particular integral, General method of finding the particular integral of any function.

UNIT II - Applications of Differential Equations and Laplace Transformations

Applications of Differential Equations : Newton's law of cooling, Natural law of growth, Orthogonal trajectiories**.**

Laplace transformations : Definition, Properties, Convolution theorem, Inverse Laplace transformation, Solving differential equations using Laplace Transformation.

UNIT III - Numerical Methods

Taylor's Method, Picard Method, Euler Method, Modified Euler Method, Runga-Kutta Methods.

Interpolation by Lagrange and Newton methods.

UNIT IV - Matrices

Rank of a matrix, finding rank of a matrix using Echelon form, Normal form, triangular form, PAQ form, inverse of a matrixEigen values, Eigen vectors, properties, Cayley-Hamilton theorem (without proofs), Diagonalisation of a matrix.

Solving System of equations (Gauss-Siedal method only)

UNIT V - Maxima and Minima & Jacobians

Maxima and Minima : Review of partial differentiation: Partial derivatives, Partial derivatives of higher order, Homogeneous function, Euler's theorem, Total differential coefficient,

Maxima and Minima of a function of two variables, Conditions for extreme values, Lagrange method of undetermined multipliers.

Jacobians : Definition, Properties, Jacobian of implicit functions, Partial derivaties of Implicit functions using Jacobian.

TEXT BOOKS :

1. H. K. Dass and Er. Rajnish Verma, Higher Engineering Mathematics, S. Chand & Co., New Delhi, 2011.
2. B.S. Grewal, "Higher Engineering Mathematics", 40th edition, Khanna Publishers, 2009.

REFERENCE BOOKS :

1. B.V. Ramana, "Higher Engineering Mathematics", 3rd Edition, Tata McGraw-Hill Publishing Co, 2008.
2. R K Jain, S R K Iyengar, "Advanced Engineering Mathematics", 2nd Edition, Narosa Publishing House.
3. Erwin Kreyszig, "Advanced Engineering Mathematics", 8th Edition, John Wiley & Sons (Asia) Pvt. Ltd. 2001.

HS 113 ENGINEERING PHYSICS

L	T	P	To	C
3	1	-	4	4

Course Description & Objectives :

There is a symbiotic relation between physics and engineering. Broadly speaking, engineering is mainly applied physics. Recent technical developments have been the result of joint efforts of physicists and engineers. A proper study of physics is therefore indispensable for an engineering student to excel in his field. The purpose of this course is to present the principles and concepts of physics as relevant to an engineer.

Course Outcomes:

The students will be made to get acquainted to the following learning outcomes:

- *Concepts of Physical optics, devices and applications.*
- *Ultrasonic waves, production, applications in NDT.*
- *Introduction to Quantum mechanics in relevance to that of modern physics.*
- *Exposure to latest inventions like lasers, fibers and applications*
- *Insight into nano technology and applications, solar energy to combat energy crisis.*

UNIT I - Physical Optics

Interference – Types - Interference in thin films (Reflection) – Newton’s Rings – Michelson’s Interferometer, Fabry-perot interferomenter – Applications.

Diffraction – Fraunhoffer Diffraction at single slit – Diffraction grating

Polarization – Production of plane polarized light – Nicol prism – Optical activity – photo elasticity.

UNIT II - Ultrasonics & NDT

Ultrasonics : Introduction – production of ultrasonic waves – piezoelectric method – Properties of ultrasonic waves – Types of ultrasonic waves – Determination of Velocity of ultrasonic waves in solids and liquids – Applications.

NDT : Introduction - Types – Theory and practice of Ultrasonic Testing – Ultrasonic Testing Systems – Ultrasonic Testing Methods – X-Ray Radiography.

UNIT - III Quantum Mechanics & Free electron theory of metals

Quantum Mechanics : Matter waves - Schroedinger's time independent wave equation - Physical significance of the wave function - Particle in one dimensional potential well – tunneling phenomenon.

Free electron theory of metals : Introduction – Classical free electron theory – Electrical conductivity of metal – Fermi - Dirac distribution function and its variation with temperature – Quantum free electron theory.

UNIT IV - Lasers & Fiber Optics:

Lasers: Characteristics of Laser light – Spontaneous and Stimulated emission of radiation – Low power and High power lasers, He-Ne Laser – CO_2 Laser – Nd-Yag laser - Applications of Lasers, Holography and Applications

Fiber Optics: Principle of optical fiber - materials – Numerical Aperture – Types of fibers – Dispersion and Attenuation in optical fibers – Optical sensors – Optical fiber communication system.

UNIT V - Solar Energy & NanoScience and Technology

Solar Energy : Solar radiation – Photovoltaic effect – solar cells – Efficiency of solar cell – Solar thermal energy conversion systems.

NanoScience & Technology : Introduction to nano meterials – Basic principles of nanoscience & Technology – Fabrication of nanomaterials – Physical & Chemical properties of nanomaterials – Applications of nanotechnology.

TEXT BOOKS :

1. M.R.Srinivasan, "Physics for Engineers" New Age International, 2002-2003.
2. M.N. Avadhanulu & P.G. Kshirasagar, "Engineering Physics", 1st edition, S. Chand & Company Ltd, 1992.

REFERENCE BOOKS :

1. Halliday, Resnic and Walker, "Fundamentals of Physics", 6th edition, John Willey publishers, 2003.
2. Grawfor F.S., Berkley Physics courses, "Waves and Oscillations", Volume III McGraw Hill, 1992.
3. V. Raghavan, "Materials Science and Engineering", 5th edition, Prentice-Hall India, 2004.
4. S.O.Pillai, "Solid State Physics", 6th edition, New Age International Publications, Revised, 2005.
5. V.Rajendran, "Engineering Physics", 1st edition, TMH Publications, 2010.

EE 111 FUNDAMENTALS OF ELECTRICAL ENGINEERING

L	T	P	To	C
4	0	-	4	4

Course Description & Objectives :

To understand the basic concepts, laws, techniques in analyzing various DC and AC circuits and concepts in coupled circuits. Study of construction details, working of various electrical machines and Semiconductor Devices and operation

Course Outcomes:

- *Able to explain the notation and components of electric circuits*
- *Able to analyze DC and single phase and three phase AC circuits using different methods and theorems*
- *Able to operate various electrical machines.*
- *Able to explain the concepts of Semiconductor Devices and operation*

UNIT I - Fundamentals Of DC Circuits

Circuit Concepts: Concepts of network, Active and passive elements, voltage and current sources, concept of linearity and linear network, unilateral and bilateral elements, R, L and C as linear elements. Ohm's Law – Kirchhoff's Laws –application to simple series, parallel circuits, mesh and nodal analysis of simple resistive circuits.(simple numerical problems).

UNIT II - Fundamentals of A.C. Circuits:

Generation of A.C. voltage - frequency, average value, R.M.S. value, form factor, peak factor for sinusoidal only - phasor representation of alternating quantities. Analysis of simple series and parallel A.C. circuits-(simple numerical problems)

Balanced Three phase systems – relation between phase and line quantities of voltages and currents in star and delta connected systems (Elementary treatment only)

UNIT III - Fundamentals of Electromagnetism and Transformers:

Concepts of Magneto motive force, reluctance, flux and flux density , concept of Self Inductance and Mutual Inductance, Coefficient of coupling-only elementary treatment. (simple numerical problems).

Transformers: Principle of operation of single phase transformer – constructional features – EMF equation (simple numerical problems)

UNIT IV - Electrical Machines:

DC Machines: Constructional details of a D.C. Machine.

D.C. Generator – Principle of operation – EMF equation – types of D.C. generators (simple numerical problems)

D.C. Motor – Principle of operation – Torque equation – types of D.C. motors (simple numerical problems)

A.C Machines: Principle of operation of three phase induction motors – slip ring and squirrel cage motors – Torque equation derivation, Constructional details of synchronous machines.

UNIT V - Semiconductor Devices:

Classification of solids based on energy band theory - Intrinsic semiconductors - Extrinsic semiconductors - P type and N type semiconductors - P-N junction diode and its characteristics –Half and Full wave rectifiers- Zener diode and its characteristics - Voltage regulator. Bipolar junction transistor – Operation-Types- Applications.

TEXT BOOKS:

1. Mittle, V.N., “Basic Electrical Engineering”, 2nd ed., TMH, New - Delhi, 1990.
2. V.K.Mehta,”Principles of Electrical Engineering and Electronics”, 3rd ed., S. Chand Publications, New Delhi, 2010.

REFERENCE BOOKS:

1. Millman & Halkias, “Integrated Electronics”, McGraw Hill, 1979.
2. A.K. Thereja & B.L. Thereja, “Electrical Technology”, Vol. – II, S.Chand Publications, 2007.
3.. U.Bakshi & A.Bakshi, “Basic Electrical Engineering”, 1st ed., Technical Publications, Pune, 2005.
4. U.Bakshi & A.Bakshi, “Basic Electrical Engineering”, 1st ed., Technical Publications, Pune, 2005.

HS 114 TECHNICAL ENGLISH COMMUNICATION

L	T	P	To	C
3	2	-	5	5

Course Description & Objectives :

To introduce students to the specific use of language for the purposes of Technical Communication which would be an essential prerequisite for success in the areas of writing and speech. The teaching efforts in this course will be directed towards making students develop their technical and non-technical writing abilities using the fundamental principles that apply to the correct use of the English language free of grammatical and other related errors.

Course Outcomes:

Students shall achieve the ability to write and demonstrate college-level proficiency in the following:

- *Clear and effective communication of meaning in speaking and writing.*
- *The ability to perform effectively the essential steps of the writing process (Note making, organizing, composing, revising, and editing).*
- *The ability to explain, develop, and criticize ideas effectively.*
- *Effective organization within the paragraph and the essay.*
- *Accuracy, variety, and clarity of sentences.*
- *Appropriate diction.*
- *Control of conventional mechanics (e.g., punctuation, spelling)*

UNIT - I

- Text : Environmental Consciousness (Climate Change – Green Cover – Pollution)
- Grammar : Articles – Prepositions – Sentence Types and Construction
- Vocabulary : Root – Prefixes - Suffixes
- Composition : Paragraph Writing (Descriptive & Narrative)
- Lab Practice : Introduction to Phonetics (Organs of Speech; Consonants, Vowels & Diphthongs; Syllable, Stress & Intonation)

UNIT - II

- Text : Emerging Technologies
  (Solar Power – Cloud Computing – Nanotechnology)
- Grammar : Time and Tense (Present-Past-Future; Helping Verbs; Modals)
- Vocabulary : Synonyms – Antonyms
- Composition : Note-making
- Lab Practice : Grammar Practice (Speaking of past, present & future)

UNIT - III

- Text : Energy
  (Renewable and Non-renewable Sources – Alternative Sources – Conservation – Nuclear Energy)
- Grammar : Subject-Verb Agreement - Sentence Construction
  (Characteristics of Technical Writing)
- Vocabulary : Idioms & Phrases
- Composition : Summarizing
- Lab Practice : Situational Conversations – Role-Plays
  (Introducing; Greeting; Enquiring; Informing; Requesting; Inviting)

UNIT - IV

- Text : Engineering Ethics
  (Challenger Disaster – Biotechnology – Genetic Engineering – Protection from Natural Calamities)
- Grammar : Sentence Transformation (Degrees, Voice, Speech & Synthesis)
- Vocabulary : Phrasal Verbs
- Composition : Letter Writing (Informal)
- Lab Practice : Situational Conversations – Role-Plays
  (Emotions; Directions; Descriptions; Agreements; Refusals; Suggestions)

UNIT - V

- Text : Travel and Tourism
  (Advantages and Disadvantages of Travel-Tourism – Atithi Devo bhava – Tourism in India)
- Grammar : Common Errors
- Vocabulary : One-word Substitutes
- Composition : Letter Writing (Formal)
- Lab Practice : Group Discussions

TEXT BOOKS :

Mindscapes - English for Technologists and Engineers, Orient Black Swan, 2012.

REFERENCE BOOKS :

1. V. R. Narayana Swamy***, "Strengthen Your Writing",*** 1st edition, Orient Longman, 2003.
2. Thomas Elliott Berry***, "The Most Common Mistakes in English Usage",*** 1st edition, Tata McGraw Hill, 2004.
3. T. Balasubramanyam, ***A Textbook of English Phonetics for Indian Students***, Macmillan Ltd., 2000.
4. Sasikumar.V and P.V. Dhamija,. ***Spoken English: A Self-Learning Guide to Conversation Practice,*** 34th Reprint, Tata McGraw Hill, New Delhi, 1993.
5. Margaret M Maison, **"Examine your English",** 1st edition**,** Orient Longman, 1999.
6. Ashraf Rizwi, "***Technical English Communication***", Tata McGraw Hill, Latest Edition.

CS 101 PROBLEM SOLVING AND COMPUTER PROGRAMMING

L	T	P	To	C
4	1	-	5	5

Course Description & Objectives :

Aim of this course is to introduce the techniques of problem solving and concepts of programming language to the students. Because of its popularity and suitability to develop different types of applications, 'C' language has become the de-facto programming language to engineers. A comprehensive introduction of C language is offered through this course to enable the students to write diversified programs.

Course Outcomes:

On Completion of this course student should be able to

- *Able to understand the basic terminology used in computer programming and to write, compile and debug programs in C language.*
- *Use different data types in a computer program and design programs involving decision structures, loops and functions.*
- *Able to understand the allocation of dynamic memory using pointers*
- *Use different data types to create/update basic data files.*

UNIT I - Fundamentals of computers

Basic functional units and discrete components of a computer, computer networks, networking components, Binary representation of integers and real numbers, ASCII, EBCDIC, Unicode, Generations of computer languages.

UNIT II - Problem Solving Steps and Basic of C Language

Problem understanding, Formulating a mathematical model, Development of an algorithm, Representation of an algorithm, Flow chart and Pseudo code, Coding, Testing and Debugging, Comments, Processor statement, Function header statement, Variable declaration statement and Executable statement, C Character Set, constants, identifiers, operators, punctuations, keywords, Basic data types, modifiers, identifiers, variables, C scopes, type qualifiers, storage class specifiers, variable initializations, constants, reading and writing characters, formatted I/O.

UNIT III – Preliminaries of C

Assignment, arithmetic , relational, logical, bitwise, ternary, address, indirection, sizeof, dot, arrow, and parentheses operators, Expressions Precedence of operators and associatively, Category of Statements, Selection, Iteration, jump, label, expression and block, Function declaration, prototype, definition, calling by value and address, standard library functions and recursive functions.

UNIT IV - Arrays and Pointers

Declaration, initialization, reading, writing, accessing and passing as a parameter to functions, Multidimensional arrays and String functions, pointer expressions, pointer and arrays, multiple indirection, initializing pointers, pointer to functions, Dynamic memory allocation functions.

UNIT V - Structures and File Processing

declaration, initialization and accessing, array of structures and passing structures to functions, structure pointers, arrays and structures within structures, unions, bit-fields, typedef and enumerations, I/O and processing operations on text and binary files. pre-processor directives.

TEXT BOOKS :

1. Reema Thareja, “Introduction to C Programming”, Oxford University Press, India, 2013
2. Herbert Schildt, C: “The Complete Reference”, 4th Edition, Tata McGraw-Hill, 2000.

REFERENCE BOOKS :

1. E. Balagurusamy, “ Programming in ANSI C”, 4TH Edition, Tata McGraw- Hill, 2008.
2. R Ravichandran and T Jeyapoovan, “ Computer Programming with C”, Soni Graphics, India, 2014.

HS 115 ENGINEERING MATHEMATICS - II

L	T	P	To	C
3	1	-	4	4

Course Description & Objectives :

Without mathematics not a single day of an engineer will pass! All the topics of this course are relevant to all branches of engineering. In real life, many quantities are dependent on more than one quantity. Hence study of functions of several variables is crucial. In this course, we study partial differentiation, partial differential equations, multiple integrals all involving functions of two variables. We also study Fourier series and Z-transformations and difference equations.

Course Outcomes:

- *The students will understand that many quantities are dependent on more than one quantity so they learn functions of several variables.*
- *They will be able to solve Partial Differential Equations, multiple integrals which are involving functions of two variables.*
- *They can apply Z – transforms to solve difference equations.*
- *They will be able to calculate areas and volumes.*
- *The student will enable to locate the maxima and minima of a function is an important task which arises often in applications of mathematics to problems in engineering and science.*
- *Vector differentiation and integration used to find the arc lengths and curvatures of space curves*

UNIT I - Partial Differential Equations :

Formation of Partial Differential Equations, Linear (Lagrange) Equations, Method of multipliers, Non-linear partial differential equations (Types), Charpit's method.

Second order linear equations, classifications, Solution by method of separation of variables.

UNIT II - Fourier Series :

Periodic functions, Fourier series, Dirichlet's conditions, Determination of Fourier coefficients, Discontinuous functions, even and odd functions, Half-range series, Functions having arbitrary period.

UNIT III - Z-transformations & Applications :

Z-transformations : Sequences, Z-transformation, Properties, Inverse Z-transformation, Multiplication and division by k, Initial and final value theorems, Convolution, Determination of inverse Z-transformation.

Applications : Solutions of difference equations using Z-transformations.

UNIT IV - Multiple Integrals :

Double integrals, Evaluation, Evaluation in Polar coordinates, Change of order of integration, Change of variables, Applications to Area in Cartesian coordinates and polar coordinates.

Triple integrals, Fundamentals, Evaluation of triple integrals.

UNIT V - Vector Differentiation and Integration

Vector Function, Differentiation, Scalor and Vector point function, Gradient, Normal, Divergence, Directional Derivate, Curl, Vector identities.

Line Integral, Surface Integral, Volume integral, Green's theorem, Stoke's theorem, Gauss theorem of divergence (without proofs).

TEXT BOOKS :

1. H. K. Dass and Er. Rajnish Verma, Higher Engineering Mathematics, S. Chand & Co., New Delhi, 2011.
2. B.S. Grewal, "Higher Engineering Mathematics", 40th edition, Khanna Publishers, 2009.

REFERENCE BOOKS :

1. B.V. Ramana, "Higher Engineering Mathematics", 3rd Edition, Tata McGraw-Hill Publishing Co, 2008.
2. R K Jain, S R K Iyengar, "Advanced Engineering Mathematics", 2nd Edition, Narosa Publishing House.
3. Erwin Kreyszig, "Advanced Engineering Mathematics", 8th Edition, John Wiley & Sons (Asia) Pvt. Ltd. 2001.

HS 117 ENGINEERING CHEMISTRY

L	T	P	To	C
4	0	-	4	4

Course Description & Objectives :

Chemistry is the backbone in designing and understanding the nature and properties of various engineering materials. Currently, the electronics and computer engineers are waiting for suitable polymers for using miniature super computers. So this subject develops fundamental knowledge about new engineering materials and their significance in technical fields and industrial sectors. Water is an essential element for the existence of human, plant and animal lives, besides that it has greater industrial applications. The knowledge about water is the basic requirement for a professional student. Characterization of materials with instrumental techniques is essential for engineers.

Course Outcomes:

- *Differentiate between soft and hard water. Understand the disadvantages of using hard water domestically and industrially. Select and apply suitable softening methods (Soda-lime, zeolite, ion-exchange methods, etc.) to soften the hard water for industrial and domestic applications.*
- *Acquaintance of primary and secondary cells, Hydrogen-Oxygen and Methanol fuel cells, dry and wet corrosions, corrosion controlling methods*
- *Acquaintance of the properties and engineering applications of Ceramics, Refractories, Glasses, Cement, Abrasives, Lubricants*
- *Acquaintance of Preparation, properties and applications of different polymers (Polyethylene, PVC, Tefflon, Bakelite,Urea-Formaldehyde, Silicones, Rubber – Vulcanization, Synthetic Rubbers-(Buna-S, Buna-N, Neoprene); treatment of membranes.*
- *Acquaintance of various spectroscopic methods (UV-visible / IR), Beer-Lambert's Law, qualitative and quantitative analysis, block diagrams of UV and IR spectrophotometers.*

UNIT I - Water Technology :

Introduction-Hardness of water-Determination of hardness by EDTA-Disadvantages of hard water-Scales & Sludges-Caustic embrittlement-Boiler corrosion-Priming & Foaming, WHO, BIS Standards of water-Softening Methods- Lime Soda process, Zeolite process, Ion Exchange process - Desalination of brackish water-Reverse osmosis, Electro dialysis.

UNIT II - Electrochemical cells and AND Corrosion:

Electrochemical cells: primary cell-(Dry or lecalanche cell), Secondary cell-(Lead-acid storage cell, Lithium ion battery), Hydrogen-Oxygen Fuel cell, Methanol fuel cell.

Corrosion: Introduction-Dry corrosion (chemical)-Wet corrosion (electrochemical)-Mechanism of wet corrosion-Bimetallic corrosion-Concentration cell corrosion-Factors influencing corrosion-Corrosion control methods- Cathodic protection and Electroplating.

UNIT III - Engineering Materials :

Properties and engineering applications of Ceramics, Refractories, Glasses, Cement,Abrasives, Lubricants.

UNIT IV - Polymers :

Introduction –Types of polymerization-Preparation, properties and applications of Polyethylene, PVC, Tefflon, Bakelite, UreaFormaldehyde, Silicones, Rubber – Vulcanization, Synthetic Rubbers - (Buna-S, Buna-N, Neoprene). Elementary treatment of Membranes

UNIT V - Instrumental Techniques :

Interaction of radiation with matter,UV-Visible Spectroscopy-Beer –Lambert's law ,Qualitative and Quantitative Analysis,Block diagram of UV-Visible Spectrophotometer.IRSpectroscopy-Types of Vibrations,Identification of functional groups,Block diagram of IR Spectrophotometer**.**

TEXT BOOKS :

1. P.C Jain and Monica Jain, "Engineering Chemistry", 15th edition, Dhanpat Rai Publications 2009.
2. Gurudeep Raj and Chatwal Anand, "Instrumental Methods of Analysis", 5th edition, Himalaya Publications, 2007.

REFERENCE BOOKS :

1. S.S.Dara, "Text book of Engineering Chemistry" 1st edition, S. Chand Publications, 2009.
2. C.V. Agarwal, C.P. Murthy, A.Naidu, "Chemistry of Engineering materials", 9th edition, BSP Publications, 2008.
3. M.R. Senapati, "Advanced Engineering Chemistry" 2nd edition, Lakshmi Publications, 2006
4. H.W. Wilard and Demerit, "Instrumental methods of Analysis", 7th edition, CBS Publications, 1986.

HS 122 ENGINEERING MATERIALS

L	T	P	To	C
4	-	-	4	4

Course Description & Objectives :

The course will help students to learn about the elementary relationships between structure and properties of materials how materials can be classified. It also reveals the engineering applications of metals, alloys, semi conductors and magnetic materials and relation between properties and engineering applications.

Course Outcomes:

The students will be made to get acquainted to the following learning outcomes:

- *The bonding in solids. Crystal systems and their structural features*
- *Fundamentals related to phase equilibria and relevance in Materials Science*
- *Mechanical properties of solids, factors affecting such properties in order to gain materials information.*
- *Classification of solids based on band theory, sources of resistivity in metals, semi conductors transport mechanism and applications.*
- *Classification of magnetic materials, hysteresis, ferrites and applications*
- *Super conductors, classification and their applications. Dielectric materials, types of polarization and new engineering materials and their usefulness.*

UNIT I - Bonding in Solids & Crystallography:

Bonding in Solids: Inter atomic forces – Types of bonds – Primary & Secondary bonded materials and their properties – Cohesive energy.

Crystallography: Introduction – classification of Crystal systems – SC, BCC & FCC structures –Miller indices of planes & directions – Separation between successive planes – X-ray diffraction – Bragg's Law – Powder method – Crystal imperfection – Point and line imperfections – Grain boundaries

UNIT II - Phase Equilibria & Mechanical Properties :

Phase Equilibria: Gibb's phase rule & terms involved – Reduced phase rule - Two component systems–invariant reactions – Eutectic system & Iron – Carbon system - Lever rule.

Mechanical Properties : Introduction – mechanical properties of materials – Stress-Strain relations of various solids – Elastic moduli- deformations in solids- Fracture – Creep- Fatigue – Factors affecting mechanical properties of materials.

UNIT III - Conducting Materials & Semiconductors :

Conducting Materials: Introduction – Classification of solids based on the band models - Relaxation time and electrical conductivity of a metal – Collision time & mean free path – Sources of resistivity of metals.

Semiconductors: Introduction – Generation & recombination – Intrinsic semiconductors – Extrinsic semiconductors – Drift and diffusion (Qualitative treatment) – Einstein relation – Hall effect – Direct and Indirect band gap.

UNIT IV - Magnetic Properties & Superconductivity

Magnetic Properties: Introduction – Origin of magnetic moment – Classification of magnetic materials – Domain theory of ferromagnetism – Hysteresis curve - Soft and hard magnetic materials – Ferrites and their applications.

Superconductivity – Introduction - Meissner Effect – Types of superconductors – High Temperature superconductors – Applications.

UNIT V - Dielectrics & Functional materials

Dielectrics : Introduction – Dielectric polarization – Internal electric field – Clausius – Mossotti relation – Ferro and Piezo electricity - Electrets – Applications.

Functional materials: Introduction – Metallic glasses – Biomaterials – Composites – Metal matrix composites - Fiber reinforced plastics – Conducting polymers - shape memory alloys – smart materials.

TEXT BOOKS :

1. V. Raghavan, “Materials Science and Engineering”, 3 rd ed., PHI, 1996.
2. Lawrence H. Van Vlack, “Element s of Materials Science and Engineering”, 6^{th} ed., Wesley Publication, 1989.

REFERENCE BOOKS :

1. Arumugam. M “Material Science” Anuradha Technical Book Publishers, Kumbakonam.K, 1997.
2. Manas Chandra, “Science of Engineering Materials”, Vol 1-3, Mc - Millian Company of India, Delhi.
3. Pillai, S.O, “Solid State Physics”, New Age International, 1998.
4. William F. Smith, “Principles of Materials Science and Engineering”, MGH, Publishers, 1988.
5. Structure and Properties of Materials – John Wulff – Wiley Eastern Ltd.

ME 101 ENGINEERING MECHANICS

L	T	P	To	C
3	1	-	4	4

Course Description & Objectives :

The course aims to impart the knowledge to understand the forces and their reactions on various static and dynamic conditions.

Course Outcomes:

- *Use scalar and vector analytical techniques for analyzing forces in statically determinate structures.*
- *Solve the engineering problems in case of equilibrium conditions and to calculate the reaction forces of various supports of different structures.*
- *Determine the centroid, centre of gravity and moment of inertia of various surfaces and solids.*
- *Solve the problems involving dry friction.*
- *Apply fundamental concepts of kinematics and kinetics of particles to the analysis of simple, practicalproblems.*

UNIT I - Basic Concepts and Principles of Statics :

Introduction to Engineering Mechanics, Scalar and Vector quantities, Forces, Characteristics of a force, Definitions and examples of various types of force systems, Law of transmissibility, Definition of resultant, Composition and resolution of forces, Moment of a force, Principles of moments of force, Couples, characteristics of a couple, Transformations of a couple, Resultants of Force Systems, Possible resultants of different types of force systems, Resultant of a concurrent coplanar force system, Resultant of a non concurrent coplanar force system

UNIT II - Equilibrium of Rigid Bodies

Free body diagrams, Types of supports and their reactions, requirements of stable equilibrium, Equations of equilibrium of a concurrent coplanar force system, Equilibrium of Bodies acted on by two or three forces, Equilibrium of bodies acted on by non-concurrent coplanar force system

UNIT III - Properties of Surfaces and Solids :

Centroid and Center of Gravity: Centre of gravity of parallel forces in a plane, centroids and center of gravity of composite bodies, Distributed Loads on Beams.

Moments of Inertia: Definition, Parallel axis theorem and perpendicular axis theorem for areas, Polar Moment of inertia, Second moment of area by

integration, Radius of gyration of areas, Moments of inertia of composite areas.

UNIT IV - Friction :

Nature of friction, Laws of friction, Coefficient of friction, Angle of friction, Cone of friction, Types of Friction - Sliding Friction, Rolling Friction, Belt Friction, Ladder Friction, Wedge friction.

UNIT V - Kinematics and Kinetics :

Absolute Motion: Introduction, Recapitulation of basic terminology of mechanics, Displacement, Velocity and acceleration their relationship, Rectilinear motion of a particle

Relative Motion: Introduction to kinematics of relative motion, Relative displacement, Relative velocity

Kinetics: Introduction to Kinetics, Force, Mass and Acceleration, Newton's Laws of motion, Equation of motion for a particle, D Alembert's principle, Rectilinear translation of a rigid body, Work done by a force, Work done by a force system, Energy, Potential energy, Kinetic energy, Principle of Work and kinetic energy, Conservation of energy, Linear impulse, Linear momentum, Principle of linear impulse and linear momentum, Conservation of linear momentum.

TEXT BOOKS :

1. J. L. Meriam, L. G. Kraige, "Engineering Mechanics: Dynamics", 7th ed., John wiley & sons, 2012
2. A. K. Tayal, "Engineering Mechanics", Umesh Publications, 2005.

REFERENCE BOOKS :

1. L. Singer - Harper, "Engineering Mechanics", 3rd ed., Fedinand . , Collins, 1975.
2. Timoshenko & Young, "Engineering Mechanics", 4th ed., Tata McGraw Hill, New Delhi, 2007.
3. S. S. Bhavakati & J. G. Rajasekharappa, "Engineering Mechanics", 3nd ed., New Age International Publications, New Delhi, 2008.

HS 118 ENVIRONMENTAL STUDIES

L	T	P	To	C
3	0	-	3	3

Course description and Objectives :

The objective of this course is to heighten on awareness of nature and its importance to students

and make them understand the need to make judicious use of all natural resources for long team sustenance of life on this planet.

Course Outcomes:

= To provide Knowledge on importance of natural resources and integrate technical "field" knowledge with analytical skills to prevent natural resources depletion

= To maintain healthy and Diverse Ecosystems ,

= Work together to conserve the biodiversity

= Take immediate measures to control the Pollution

= Adopt Ecofriendly technology.

= Maintenance of hygienic conditions

UNIT I - Environment and Natural Resources :

Environment: Definition, Scope and Importance – Need for Public Awareness

Natural Resources: Renewable and non-renewable resources – Natural resources and associated problems – Forest Resources: Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources: Use and over utilization of surface and ground water – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources - Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity–Energy resources: renewable and non-renewable energy sources, alternate energy sources. Land resources: Land as a resource, land degradation, Soil erosion – case studies - Role of an individual in conservation of natural resources.

UNIT II - Ecosystems and Biodiversity :

Ecosystem: Concept of an ecosystem. – Complete and incomplete ecosystem - Structure and functions of an ecosystem - Ecological succession. - Food chains, food webs -Structure and functional features of the following ecosystem: a. Forest ecosystem b. Grassland ecosystem c. Desert ecosystem, d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) **Biodiversity**: introduction of biodiversity, Bio-geographical classification of India - Value of biodiversity- Biodiversity at global, National and local levels - Hot-spots of biodiversity - Threats to biodiversity - Endangered and endemic species of India – Conservation of biodiversity

UNIT III - Environmental Pollution and Applications of Remote Sensing / GIS on Environment

Definition, Cause, effects and control measures of: Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution - Solid waste Management: Causes, effects and control measures of municipal and industrial wastes - Climate change, global warming, acid rain, ozone layer depletion -Case Studies - Role of an individual in prevention of pollution - Pollution case studies. – Green technology and its concept, role of green technology in controlling environmental problems.

UNIT IV - Social issues and EIA :

Sustainable development -water conservation: Cloud Seeding (Artificial rain making system), rainwater harvesting, watershed management - Disaster management: floods, earthquake, cyclone and landslides - Environment Protection Act. - Air (Prevention and Control of Pollution) Act. - Water (Prevention and control of Pollution) Act - Wildlife Protection Act - Forest Conservation Act

EIA: introduction to E.I.A.-definition of E.I.A and E.I.S – scope and objectives of E.I.A.- methods of E.I.A –CEIA, REIA, MOEF, CPCB, SPCB – Importance of E.I.A in proposed Projects / Industry /

Developmental activity - Remote sensing / GIS: Introduction of remote sensing / GIS, definition of remote sensing, applications of the remote sensing on environment (site selection, land use/land cover pattern, water/air/soil quality models, a criteria of environmental information systems)

UNIT V - Environmental Sanitation :

Food sanitation: food and drugs Act, food preservations, food borne diseases- Milk sanitation: tests for milk, pasteurization of the milk - water borne diseases-

air borne diseases-viral diseases (HIV/AIDS, SARS, bird-flu, anthrax)-maintenance of sanitary and hygienic conditions

Field Work/Environmental Visit: Visit to a local area to document environmental assets – river/ forest/ grassland / hill /mountain - Study of local environment - common plants, insects, birds - Study of simple ecosystems – pond, river, hill, slopes etc - Visits to industries, water treatment plants, effluent treatment plants

TEXT BOOKS :

1. Y. Anjaneyulu, "Introduction to Environmental Science", B S Publications, 2008.
2. Dr. M. Chandrasekhar, "A Text book of Environmental Studies", HI-TECH publications, 2006

REFERENCE BOOKS :

1. Dr. M. Anji Reddy, "A Text book of environmental science and Technology", B S Publications, 2008
2. Dr. K. Mukkanti, "A Text book of Environmental Studies", S.CHAND Company Ltd, 2009.
3. EHILRS and ST, "Text book of Municipal and Rural Sanitation", M.S Hill, 1998.
4. C. S. Rao, Wiley Eastern Ltd, "Environmental Pollution Control Engineering", New Age International Ltd, 2001
5. Dr. M. Anji Reddy, "Introduction to Remote Sensing", B S Publications, 2004.
6. Kurian Joseph and R.Nagendram, "Essentials of environmental studies", Pearson Education Pt Ltd, Delhi, 2007.
7. Sharma & Kour "Text book of Environmental pollution".
8. H.C Perkins "Text book of Air Pollution".

CS 105 NETWORK SECURITY

L	T	P	To	C
2	-	-	2	-

Course description and Objectives :

This Course focuses towards the introduction of System, Information and Network security using various methodologies. It also focuses on the practical aspects that have been used to provide e_mail and web security.

Course Outcomes:

On Completion of this course student should be able to

- *understand the Importance of Information Security*
- *Know the ways to protect the information*
- *understand the Firewall importance*
- *understand the need of Virtual Private Networks.*

UNIT I - History of security :

History of security – Physical security, communications security, emissions security, computer security, network security and information security. Security process - Anti-virus software, access controls, firewalls, smart cards, biometrics, intrusion detection, policy management, vulnerability scanning, encryption, physical security mechanisms.

UNIT II - Access attacks

Snooping, eavesdropping, interception; Modification attacks - Changes, insertion and deletion; Denial of service attacks- Denial of access to information, applications, systems and communication; Repudiation attacks - Masquerading and denying an event. Hacking - Hacker motivation, historical hacking techniques, IP spoofing and malicious code.

UNIT - III

Confidentiality of files, information in transmission and traffic flow, integrity, availability and accountability; Integrity of files and information during transmission; Availability - backups, failover and disaster recovery; Accountability – identification and authentication, and audit.

UNIT - IV

Concepts of firewalls, Application layer and packet filtering firewalls; Virtual Private Networks.

UNIT - V

Basic encryption concepts, Private Key encryption standards-DES, triple DES and AES. Public key encryption – RSA. Concepts of digital signatures.

TEXT BOOKS :

1. Eric Maiwald, Fundamentals of Network security, Dreamtech Press, 2007.

REFERENCE BOOKS :

1. William Stallings, "Cryptography and Network security", 4^{th} edition, Pearson Education, 2010.

HS 119 PROFESSIONAL ETHICS, VALUES AND HUMAN RIGHTS

L	T	P	To	C
2	-	-	2	-

Course description and Objectives :

• To create an awareness on Engineering Ethics and Human Values.

• To instill Moral and Social Values and Loyalty

• To appreciate the workplace rights of Others, responsibilities and Safety of others.

Course Outcomes:

The course will enable the students to attain the following:

- *an understanding of professional and ethical responsibility in workplace*
- *the broad education necessary to understand the impact of engineering solutions in a global and societal context*
- *a knowledge of contemporary issues related to human and professional interactions at workplace*
- *an engineer's life-long commitment to serve the disadvantaged*

UNIT I - Human Values :

Morals, Values and Ethics – Integrity – Work Ethic – Service Learning – Civic Virtue – Respect for Others – Living Peacefully – Caring – Sharing – Honesty – Courage – Valuing Time – Co-operation – Commitment – Empathy – Self-Confidence – Character – Spirituality.

UNIT II - Engineering Ethics & **Engineering as social experimentation :**

Engineering Ethics : Variety of moral issues – types of inquiry moral dilemmas – moral autonomy – The problems of Many Hands – Kohlburg's theory – Gilligan's theory Impediments to Responsible Action.

Engineering as social experimentation - Codes of ethics - a balanced outlook on law - the challenger case study.

UNIT III - Engineer's Responsibility for Safety :

Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis – Reducing Risk – The Government Regulator's Approach to Risk - Chernobyl

Case Studies and Bhopal.

UNIT IV - Workplace Rights and Responsibilities & Work Environment :

Workplace Rights and Responsibilities : Engineers and Managers. Oganizational complaint procedures. Government agencies. Resolving Employee concerns. Limits on acceptable behaviour in large corporation.

Work Environment : Ethical and legal considerations, Organizational responses to offensive behaviour and harassment. Ethics in a Global Context.

UNIT V - Global Issues :

Multinational Corporations – Business Ethics - Environmental Ethics – Computer Ethics - Role in Technological Development – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Honesty – Moral Leadership – Sample Code of Conduct.

TEXT BOOKS :

1. Mike Martin and Roland Schinzinger, “Ethics in Engineering”, McGraw Hill, New York, 2005.

REFERENCE BOOKS :

1. Prof. (Col) P S Bajaj and Dr. Raj Agrawal, “Business Ethics – An Indian Perspective”, Biztantra, New Delhi, 2004
2. Charles E Harris, Michael S. Protchard and Michael J Rabins, “Engineering Ethics – Concepts and Cases”, Wadsworth Thompson Learning, United States, 2000 (Indian Reprint now available)
3. Engineering Ethics-An industrial Perspective, Gail Dawn Baura
4. Charles E Harris, Michael S Pritchard and Michael J Rabins, “Engineering Ethics – Concepts and Cases”, Thompson Learning, 2000.
5. Charles E Harris, Michael S Pritchard and Michael J Rabins, “Engineering Ethics – Concepts and Cases”, Thompson Learning, 2000.
6. PSR Murthy, “Indian Culture Values and Professional Ethics”, BS Publications
7. Edmund G Seebauer and Robert L Barry, “Fundamentals of Ethics for Scientists and Engineers”, Oxford University Press, Oxford, 2001.

HS 120 ENGINEERING PHYSICS LAB

L	T	P	To	C
-	-	3	3	2

Course description and Objectives :

This lab is intended to make the students realize the theoretical concepts of physics having hands on experience in conducting the following experiments. Students may have to take up any 10 experiments from each section.

Course Outcomes:

- *Students realize concept of resonance of sound conducting the experiment of Sonometer Melde's experiment and volume generator.*
- *The students understand the concepts of light conducting the experiments of dispersion of light, diffraction of light, optical fibers and lasers.*
- *The students acquire the knowledge of magnetic field theory, thermal energy and elastic properties by conducting the experiments of field along the axis of circular coil, Lee's experiment, Seebeck effect and Torsional pendulum.*

PHYSICS LAB

1. Verification of laws of transverse vibrations in stretched string - Sonometer
2. Melde's Experiment - Transverse and Longitudinal modes.
3. Determination of Rigidity modulus of a material in the form of a wire - Torsional pendulum
4. Dispersive power of the material of a Prism - Spectrometer
5. Determination of wavelength of a monochromatic light source - Diffraction Grating.
6. Field along the axis of a circular coil – stewart Gee's apparatus.
7. Volume Resonator.
8. Band gap of semiconductor
9. Hall coefficient
10. Thermal conductivity of bad conductor Lee's method
11. Optical Fiber – Determination of numerical aperture
12. Solar Cell
13. Seebeck effect

REFERENCE BOOKS:

1. Vogel's Text book of qualitative Chemical Analysis J.Mendham, R.C Denney, J.D. Bares, M.Thomas & B. Siva Sankar, Pearson Publications – Volume I (2009).

EE 113 FUNDAMENTAL OF ELECTRICAL ENGG. LAB

L	T	P	To	C
-	-	3	3	2

Course description and Objectives :

To understand basic electrical elements, electrical energy its consumption and measurement. To develop practical knowledge on electrical machines, electronic devices and circuits

Out Comes :

- *Able to realize characteristics of electrical elements.*
- *Able to analyze given simple ac and dc networks.*
- *Able to work on different electrical machines.*
- *Able to reflect the knowledge of electronic devices to verify experimentally.*

List of Experiments

1. Familiarization with basic components such as Resistors, Capacitors, Diodes, Transistors
2. Familiarization with basic electrical measuring instruments
3. Verification of ohm's law
4. Verification of KVL and KCL
5. Calculation of power factor in simple RL and RC circuits
6. Magnetization characteristic of a D.C. self excited generator
7. Measurement of power and energy.
8. Measurement of transformation ratio of single phase transformer.
9. Measurement of Power, Power factor of 3-phase induction motor.
10. Characteristics of PN junction diode.
11. Characteristics of Zener diode.
12. Operation of Full wave Rectifier
13. Operation of half wave Rectifier
14. Study and Working of fluorescent lamp
15. Measurement of armature and field resistances of d c machine using voltmeter-ammeter method.

Note : Any 10 of above experiments are to be conducted.

CS 107 COMPUTER PROGRAMMING LAB

L	T	P	To	C
-	-	3	3	2

Course description and Objectives :

To familiarize the students in preparation of documents and presentations with office automation tools. A comprehensive problem solving skills through C language is offered to enable the students to write diversified solutions using this language.

Course Outcomes:

- *Able to write, compile and debug programs in C language.*
- *Able to formulate problems and implement algorithms in C.*
- *Able to effectively choose programming components that efficiently solve computing problems in real-world*

1. Write A Program to find simple Interest, compound interest
2. Write A Program to covert given temperature from C to F & F to C
3. Write A Program to check Entered number is positive or zero or Negative
4. Write A Program to print given year is Leap year or not
5. Write A Program to do arithmetic operations using switch
6. Write A Program to find biggest among 3 Numbers
7. Write A Program to print grade of a student for 5 sub avg>70(A), 60-70(B), 50-60(C),<50(F)
8. Write A Program to find Roots fo Quadratic Equation
9. Write A Program to find sum of individual digits of a given number
10. Write A Program to check whether the given number is PALINDRAM or not
11. Write A Program to check whether the given number is PERFECT or not
12. Write A Program to check whether the given number is PRIME or not
13. Write A Program to check whether the given number is ARMSTRONG or not
14. Write A Program to check whether the given number is STRONG or not
15. Write A Program to find sum of Natural Numbers

16. Write A Program to print the following triangle

```
      1
    2   3
  4   5   6
7   8   9   10 etc……….
```

17. C Progrm to find Factorial of Given number using Recursive and Non Recursive Functions.
18. Write A Program to print Fibonacci Series upto given limit using recursive, Non recursive
19. Write program in C for determining the minimum and maximum and sum of elements of an array of ‘n’ elements and searching for a given element.
20. C Program for computing range, mean and standard deviation of a given numeric dataset.
21. Write A Program in C for performing addition, subtraction, multiplication and transpose operations on matrices.
22. Write program to perform the following string operations on the given string. a) string length b) string copy c) string concatenation d) string comparison e) reverse string f) sub string
23. Write A Program to read student record (no, name, marks1, marks2, marks3, marks4, marks5, calculate average and Grade) and display the student record.
24. Write A Program to do arithmetic operations using pointers.
25. Write A Program to create two data files and copy the content of these two data files as a single file in another new file?

HS 121 ENGINEERING CHEMISTRY LAB

L	T	P	To	C
-	-	3	3	2

Course description and Objectives :

This lab is intended to make the students enlighten with the theoretical concepts of chemistry. Instrumental techniques are useful for characterization of materials for future engineers.

Students may have to take up any 10 experiments from the following experiments.

Course Outcomes:

- *To enable the students to analyse the hardness & chlorides in the potable water.*
- *To help students to determine the Alkalinity in water used especially in industries.*
- *To impart knowledge on polymers used as insulators.*
- *To provide an idea about Advanced techniques in chemical analysis using conductometer and spectrophotometer.*

Volumetric Analysis:

1. Determination of total Alkalinity of water
2. Determination of Percentage purity of Washing soda
3. Determination of Fe(II) by Dichrometry
4. Determination of Percentage of available chlorine in Bleaching powder
5. Determination of chlorides by Argentometry
6. Determination of Total hardness of water

Preparations:

7. Preparation of Bakelite
8. Preparation Of Urea- Formaldehyde Resin

Instrumental methods of Analysis:

9. Determination of Viscosity of a Lubricating oil
10. Determination of Strength of acid by conductometry
11. Determination of Mn^{+7} by Colorimetry
12. Demonstration of UV-Visible Spectrophotometer with Ferrothiocyanate

REFERENCE BOOKS:

1. Vogel’s Text book of qualitative Chemical Analysis J.Mendham, R.C Denney, J.D. Bares, M.Thomas & B. Siva Sankar, Pearson Publications – Volume I (2009).
2. Experiments in Applied Chemistry by Dr.Sunita Rattan. S.K. Kataria & Sons publications,2008.

ME 103 ENGINEERING GRAPHICS

L	T	P	To	C
1	-	2	3	3

Course description and Objectives :

To familiarize students with the conventional concept of engineering drawing and application through AutoCAD.

Course Outcomes:

After completion of this course, student will be able to prepare plan and elevation of any pictorial view either conventional or through AutoCAD.

UNIT - I

Introduction to Engineering drawing: Introduction to Engineering Drawing – Types of lines, lettering, dimensioning Construction of polygon & Conics. (Ellipse, Parabola & Hyperbola by general method)

UNIT - II

Orthographic Projections: Principle of projection-Planes of projections.

Projections of points:

Projection of straight lines: Inclined to one plane and both the planes.

Projections of planes: Simple planes, Planes inclined to reference planes.

UNIT - III

Projections & Sections of solids – projections of prisms – cylinders – cones - pyramids – solid axis inclined to one plane, simple sections- prism, cylinder, pyramid and cone. AutoCAD Fundamentals.

UNIT - IV

Isometric projections: Isometric drawing of simple objects through AutoCAD

UNIT - V

Orthographic projections: Conversion of Pictorial view into orthographic view using AUtoCAD and Conventional.

TEXT BOOKS :

1. N.D.Bhatt, “Engineering Drawing”, 49th ed., Charotar Publication, 2007.
2. K. Venugopal, “Engineering Drawing through Auto CAD”, 1st ed., New Age Publication, 2008.

REFERENCE BOOKS :

1. Jhole, “Engineering Drawing”, 2nd ed., Tata McGraw Hill, 2008.
2. K.L. Narayana, “Engineering drawing” 2nd ed., Scitech Publications, 2008.

ME 105 WORKSHOP PRACTICE

L	T	P	To	C
-	-	3	3	2

Course description and Objectives :

To provide the hands on experience to the students on basic workshop skills.

Course Outcomes:

After completion of this course, students will be able to identify various tools connected to all the trades. They are also able to make various objects to the given dimension by using various types of tools.

Trades for exercises:

1. Carpentry:
2. Fitting
3. Tin Smithy & Black smithy4. House wiring
5. Foundry & Welding (Demonstration)
6. Machine shop & CNC (Demonstration)
7. IT Workshop
8. Study of discrete components of computer and networking (1 session)
9. Demonstration of assembling a computer, disk partitioning and installation of system and application software. installation of modem etc. (2 sessions)

Note: In each trade, the students has to perform at least two jobs

TEXT BOOKS :

1. S.K. Hazra Choudhury, Elements of workshop Technology, 11th Edition, Media Promoters, 1997
2. Gopal, T.V., Kumar, T., and Murali, G., A first course on workshop practice – Theory, Practice and Work Book, Suma Publications, Chennai, 2005.
3. Venkatachalapathy, V. S., First year Engineering Workshop Practice, Ramalinga Publications, Madurai, 1999.

VFSTR UNIVERSITY

II Year - B.Tech

SYLLABUS

I SEM & II SEM

II Year I Semester

L	T	P	To	C
4	0	-	4	4

AG 201 Engineering Properties of Biological Materials and Food Quality

Course Description & Objectives:

Introductory course to processing of food materials. Students, after taking this course, will be able to understand the basic properties of food materials for better preservation and use.

Course Outcomes:

After completion of this course students will be able to:

1. *concentrate on basic properties of food materials*
2. *apply the properties on industrial scale*
3. *have basic knowledge about food laws*
4. *use the food laws in different food industries.*

Unit I: Physical and Thermal Properties:

Importance of engineering properties of biological materials, Study of different physical and thermal characteristics of important biological materials like shape, size, volume, density, roundness, sphericity, surface area, specific heat, thermal conductivity, thermal diffusivity, etc.

Unit II: Rheological and Aerodynamic Properties:

Measurement of colour, flavour, consistency, viscosity, texture and their relationship with food quality and composition. Rheological characteristics like stress, strain time effects, rheological models and their equations. Aerodynamic characteristics and frictional properties.

Unit III: Applications of Engineering Properties:

Application of engineering properties in handling processing machines and storage structures. Concept, objectives and need of quality, quality control, methods of quality control, sampling.

Unit IV: Quality Control and Assurance:

Purpose, sampling techniques, requirements and sampling procedures for liquid, powdered and granular materials, sensory quality control, panel selection methods, interpretation of sensory results in statistical quality control, TQM and TQC, consumer preferences and acceptance

Unit V : Food Laws:

Food Laws and Regulations in India. Food grades and standards BIS, AGMARK, PFA, FPO, CAC (Codex Alimantarious Commission), sanitation in food industry , GMP, HACCP (Hazard analysis and critical control point) and ISO 9000 Series.

TEXT BOOKS:

1. Birch G G and Paiker K. J. (1990). Control of food quality and food analysis. Elsevier applied science.
2. Rao, M.A and Rizui,S.S.H. (1986). Engineering Properties of Foods. Marcell Dekker, New York.

REFERENCES:

1. Sara, M & Carol Wallace. (1993). HACCP A Practical Approach. Chapman & Hall, U.K.
2. Singhal, O.P and Samuel, D.V.K. (2003). Engineering Properties of Biological Materials. Saroj Prakashan, Allahabad.
3. Herschdoerfer, S.N. (1980). Quality Control in Food Industry. Academic Press Inc.
4. Mohsenin, N. N. (1996). Electrical and Electro magnetic radiation properties of food and Agricultural materials. Gordon & Breach publishers Inc. U. K.
5. http://ecourses.iasri.res.in/email_authentication.aspx?Degree_Id=04

II Year I Semester

L	T	P	To	C
3	1	-	4	4

AG203 Soil and Fluid Mechanics

Course Description & Objectives:

To familiarize the students with the behaviour and properties of soil and fluids under the action of different forces.

Course Outcomes:

The students will be able to acquire:

1. *a fundamental knowledge of properties of fluids in static equilibrium*
2. *a fundamental knowledge of properties of fluids kinematic equilibrium*
3. *a fundamental knowledge of properties of fluids in dynamic equilibrium.*
4. *different theories for consolidation of soil and concept of earth pressure.*

Unit I: Soil and Soil Properties:

Introduction of soil mechanics, field of soil mechanics, phase diagram physical and index properties of soil classification of soils, general classification based on particles size, textural classification and I.S. soil classification system stress condition in soils, effective and neutral stress, elementary concept of Bousinesque and Wester guards analysis, new mark influence chart. Shear strength mohr stress circle, theoretical relationship between principle stress circle, theoretical relationship between principal stress mohr-coulomb failure theory, effective stress principle. Determination of shear parameters by direct shear to be circle, theoretical test. Numerical exercise based on various types of tests.

Unit II: Compaction and Consolidation:

Compaction composition of soils standard and modified protector test, abbot compaction and Jodhpur mini compaction text field compaction method and control. Consolidation of soil: Consolidation of soils, one dimensional consolidation spring analogy, Terzaghi's theory Laboratory consolidation text, calculation of void ratio and coefficient of volume change, Taylor' s and Casagrand's method, determination of coefficient of consolidation.

Unit III: Earth Pressure:

Earth pressure: Plastic equilibrium in soils, active and passive states, Rankine' s theory of earth pressure active and passive earth pressure for cohesive soils, simple numerical exercise. Stability of slopes: Introduction to stability analysis of infinite and finite slopes friction circles method Taylor's stability number.

Unit IV: Fluid and Fluid Properties:

Properties of fluids: Ideal and real fluid. Pressure and its measurement, Pascal' s law, pressure forces on plane and curved surfaces, centre of pressure, buoyancy, metacentre and metacentric height, condition of floatation and stability of submerged and floating bodies; Kinematics of fluid flow: Lagrangian and Eulerian description of fluid motion, continuity equation, path lines, streak lines and stream lines, stream function, velocity potential and flow net. Types of fluid flow, translation, rotation, circulation and vorticity, Vortex motion.

Unit V: Dynamics of Flow:

Dynamics of fluid flow, Bernoulli' s theorem, venturimeter, orifice-meter and nozzle, siphon; Laminar flow: Stress-strain relationships, flow between infinite parallel plates - both plates fixed, one plate moving, discharge, average velocity, shear stress and pressure gradient; Laminar and turbulent flow in pipes, general equation for head loss-Darcy, Equation, Moody' s diagram, Minor and major hydraulic losses through pipes and fittings, flow through network of pipes, hydraulic gradient and energy gradient, power transmission through pipe; Dimensional analysis and similitude: Rayleigh' s method and Buckingham' s 'Pi' theorem, types of similarities, dimensional analysis, dimensionless numbers. Introduction to fluid machinery.

TEXT BOOKS:

1. Bansal, R.K. (1998). Fluid Mechanics and Hydraulic Machines. Laxmi Publications, Madras.
2. Rao, M.A and Rizui,S.S.H. (1986). Engineering Properties of Foods. Marcell Dekker, New York.

REFERENCES:

1. Braja M. Das and G. V. Ramana (2010). Principles of Soil Dynamics, Cengage learning.
2. Modi, P.M. and Seth, S.M. (1991). Hydraulics and Fluid Mechanics. Standard Book House, New Delhi.
3. Shames, I. (1982). Mechanics of Fluids (II ed.). Mc Graw Hill International.
4. Subramanya, K. (1992). Fluid Mechanics. Tata Mc Graw Hill Pub. Co., New Delhi.
5. Frank M White. (2003). Fluid Mechanics. Tata Mc Graw Hill Publishers.
6. Grade, R.J. (1992). Fluid mechanics through problems. Wiley Eastern Ltd. Madras.
7. Henderson, F. (1996). Open Channel Flow. Macmillan, New York.
8. http://nptel.ac.in/courses/105103095/
9. http://nptel.ac.in/courses/105103097/

II Year I Semester	**L**	**T**	**P**	**To**	**C**
	3	1	-	4	4

AG205 Strength of Materials and Design of Structures

Course Description & Objectives:

To study the microstructure of various ferrous and non ferrous alloys, to evaluate the mechanical properties of materials and to analyze the structures for design capabilities.

Course Outcomes:

After course completion students would have:

1. *the understanding of the primary concepts of stress and strain for different materials in mechanics of solids and structures.*
2. *ability to determine shear forces, bending moments and axial forces.*
3. *knowledge about RCC beam as well as compression bending of beams.*

Unit I: Stress and Strain:

Elasticity–Stresses and strains Elastic limit–Elastic constants Lateral strain Composite sections Temperature stresses Volumetric strain in a body Resilience and strain energy.

Unit II: Shear force and Bending Moments:

Analysis of statically determinate beams Shear force and bending moment diagrams, Bending and shearing stresses in beams – slope and deflection of beams using double integration method, Macaulay's method, Moment area theorems and conjugate beam method.

Unit III: Columns and Beams:

Combined bending and direct stresses Columns and struts Euler's theory Empirical formulae for loads on columns; Stresses in thin cylindrical shells – Torsion of shafts and springs; Analysis of statically indeterminate beams, Propped beams, fixed and continuous beams – Analysis using superposition, Three moment equation and moment distribution methods.

Unit IV: RCC Beams:

Analysis and design of singly reinforced and doubly reinforced beams – Shear, bond and torsion – Design of T beams – Slabs – Design of one way and two way slab (IS code method only) – Columns, Foundations, Retaining walls, Silos and Ferro cement tanks.

Unit V: Riveted and Welded Joints:

Loads and use of BIS codes Design of riveted and welded connections – Design of structural steel members in tension, compression and bending.

TEXT BOOKS:

1. Bansal, R.K. (1992). Engineering Mechanics and Strength of materials. Laxmi Publications, New Delhi.
2. Punmia, B.C., Ashok Kumar Jain and Arun Kumar Jain. (1994). Reinforced Concrete Structures (Vol. I). Laxmi Publications, New Delhi.

REFERENCES:

1. Raghupathi, M. (1998). Design of Steel Structures. Tata McGraw Hill Publishers.
2. Ramamrutham, S. and Narayan, R. (1995). Design of Steel Structures. Dhanpat Rai and Sons, Delhi.
3. Ramamrutham. S. (1984). Engineering Mechanics and strength of Materials. Dhanpat Rai and Sons, Nai Sarak, NewDelhi.
4. Ramamrutham. S. and Narayan. R. (1997). Strength of Materials. Dhanpat Rai and Sons, Nai Sarak, New Delhi.
5. Sushil Kumar. (1991). Treasure of R. C. C. Design. Standard Book House, Delhi.
6. Vazirani, V. N. and Ratwani, M. M. (1991). Analysis of Structures (Vol. I and II). Khanna Publishers, Nai Sarak, New Delhi.
7. Junnarkar, S.B. (1995).Mechanics of structures (Vol. I and II). Charotar Pub. House, Anand.
8. Khurmi, R.S. (1996)Strength of Materials. S. Chand and Company Limited, New Delhi.
9. Kumar, K. L. (2003). Engineering Mechanics. Tata Mc Graw Hill Publishing Company, New Delhi.
10. Gurcharan Singh. (1986). Theory and Design of R.C.C.Structures. Standard Publishers and Distributors, New Delhi.
11. http://nptel.ac.in/courses/105105108/

II Year I Semester

L	T	P	To	C
3	1	-	4	4

HS213 Probability & Statistics

Course Description & Objectives:

To enable the student to acquire skills in handling situations involving more than one random variable and functions of random variables. To introduce to the notion of sampling distributions and they will acquired knowledge of statistical techniques useful in making rational decision in management problems.

Course Outcomes:

The students will understand the use of:

1. *statistical techniques like regressions, Correlation, probability distribution.*

2. *test of hypothesis, useful in their research work, academics and applications.*
3. *techniques at work places as well as in their real life.*

Unit – I: Probability:

Axiomatic definition, conditional probability, Baye's theorem, Dependent and independent events, Random variables. Distribution function, probability mass and density functions, expectation, Chebyshev's inequality.

Unit-II: Distributions types:

Bernoulli, binomial, Poisson, uniform, exponential, independence of random variables normal and Poisson approximations to binomial.

Unit – III: Estimation and Sampling Distributions:

Population, sample, parameters, point estimation, unbiasedness, consistency. Comparing two estimators, confidence interval estimation for mean. Difference of means, variance, proportions, sample size problem.

Unit – IV: Hypotheses test:

Test of hypotheses- test of means, variance, two sample problems, test of proportions, relation between confidence interval and Test of hypotheses, chi-square goodness of fit, F- test, T-test.

Unit-V: Correlation & Regression:

Correlation & Regression - Simple linear regression, curve fitting. Covariance correlation tests for slope and correlation, analysis of variance, regression analysis.

TEXT BOOKS:

1. S.C. Gupta and V.K.Kapoor, "Fundamentals of Mathematical Statistics", 12th ed., Sultan Chand & Co., New Delhi, 2005.
2. Shanaz bahthul, "Probability & Statistics", Unitech Publishers, 2008.

REFERENCES:

1. G.S.S. Bhismarao, "Probability and statistics for engineers", 4th ed., SciTech publications, 2010.
2. B.V. Ramana, "Engineering Mathematics", 3rd ed., Tata McGraw Hill, 2008.
3. Miller and Freund, "Probability & Statistics for Engineering", pearson, 2001.
4. Kumar and Sah , "Thermal Engineering", 2nd edition, Narosa publications, New Delhi. 2010.

II Year I Semester

L	T	P	To	C
3	1	-	4	4

AG207 Farm Power and Renewable Energy Sources

Course Description &Objectives:

Understanding the various sources of power available and its utility is required in better management of the farm practices. The course will empower the student to think of different sources of energy for farming requirements according to the area of farming.

Course Outcomes:

Students will be able to:

1. *concentrate on fundamentals of I.C. engine.*
2. *acquire basic information about use of renewable energy in agricultural field.*

Unit I: I.C. Engines:

Sources of farm power conventional & non conventional energy sources. Classification of tractors and IC engines. Review of thermodynamic principles of IC (CI & SI) engines and deviation from ideal cycle. Study of engine components their construction, operating principles and functions.

Unit II: Systems of I.C. Engine:

Engine systems: valves & valve mechanism. Fuel & air supply, cooling, lubricating, ignition, starting and electrical systems. Study of constructional details, adjustments & operating principles of these systems.

Unit III: Fuels and Fuels Test:

IC engine fuels their properties & combustion of fuels, gasoline tests and their significance, diesel fuel tests and their significance, detonation and knocking in IC engines, study of properties of coolants, anti freeze and anti corrosion materials, lubricant types & study of their properties. Engine governing systems.

Unit IV: Biomass and wind Energy:

Energy sources, Introduction, Classification, Energy from Biomass, Types of biogas plants, constructional details, Principles of combustion, pyrolysis and gasification, Types of gasifiers, Briquetting , Types of Briquetting machines, Wind energy, Types of wind mills, Constructional details and application of wind mills; Modern applications and future potential of renewable energy sources.

Unit V: Solar Energy:

Solar energy, Solar flat plate and focusing plate collectors, Solar air heaters, Solar space heating and cooling, Solar energy applications / Solar energy gadgets, Solar cookers, Solar water heating systems, solar grain dryers, Solar Refrigeration system, Solar ponds, Solar photo voltaic systems, solar lantern, Solar street lights, solar fencing, Solar pumping systems.

TEXT BOOKS:

1. Jain, S.C., and Rai, C.R. (1984). *Farm Tractor Maintenance and Repair.* Tata Mc Graw Hill Publishing Company Ltd, New Delhi.
2. J Sahay (2009). Elements of Agricultural Engineering. Standard Publishers Distributors, New Delhi.

REFERENCES:

1. Liljedahl John, B., Casleton Walter, M., Turnquist Paul, K., and Smith David, W. (1951). *Tractors and Their Power Units, .* John Wiley & Sons, New York.
2. Lysen, E.H. (1983). Introduction to Wind Energy. CWD, Netherlands.
3. Mathur, M.L., and Sharma, R.P. (1994). *A Course in Internal Combustion Engines.* Danpat Rai & Sons, Delhi.
4. Mathur,A.N and Rathore,N.S.(2007). Renewable energy and environment.Himanshu Publications.,Udaipur. Monga,G.S and Sanctis,V.J. Non conventional Energy: Growth. Resources and policies.
5. Prem.S.Satsangi and Vinayshil Gautam. (2007).Management of Rural Energy Systems. Galgotia Publications, New Delhi.
6. Sukathme, S.P. (1996). Solar Energy. Tata McGraw Hill Publishing Company Ltd., New Delhi.
7. Ballaney, P.L. (1985). Thermal Engineering. Khanna Pulishers, Delhi.
8. Donnel Hunt (1995). Farm Power Machinery and management. Iowa State University Press, Ames, USA.
9. Gill Paul, W., Smith James, H., and Ziurys Eugene, J. (1967). Fundamentals of Internal Combustion Engines. Oxford & IBE Publishing Company, New Delhi.
10. Gupta, R.B., and Gupta, B.K. (1987). Tractor Mechanic, Theory, Maintenance and Repair. Sathya Prakashan and Tech India Publications, New Delhi.
11. John Twidell and Tony Weir. (1986). *Renewable energy resources. .* E & F.N Spon Ltd., New York.
12. http://ecourses.iasri.res.in/e-Leaarningdownload3_new.aspx?Degree_Id=04

II Year I Semester

L	T	P	To	C
0	0	3	3	2

AG209 Mechanics Lab

Course Description & Objectives:

The student would be convergent with the properties determination of soils and fluids.

Course Outcomes:

The students will have thorough knowledge on different properties of soil and will be able to concentrate on use of fluid kinematics and dynamics on practical scale.

List of Experiments:

1. Determination of water content and specific gravity of soil.
2. Determination of field density of soil by core cutter and sand replacement method.
3. Grain size analysis-sieving (Dry sieve analysis) and hydrometer method.
4. Determination of liquid limit by Casagrande' s method.
5. Determination of liquid limit by cone penetrometer and plastic limit.
6. Determination of shrinkage limit.
7. Determination of permeability by constant head and variable head method.
8. Determination of compaction properties by standard proctor test.
9. Determination of shear parameters by Direct shear test.
10. Determination of unconfined compressive strength of soil.
11. Determination of shear parameters by Triaxial test.
12. Determination of consolidation properties of soils.
13. Verification of Bernoulli' s theorem.
14. Determination of coefficient of discharge of venturimeter and orifice meter.
15. Determination of coefficient of friction in pipeline.
16. Determination of coefficient of discharge for rectangular and triangular notch.
17. Determination of coefficient of discharge, coefficient of velocity and coefficient of contraction for flow through orifice.

18. Measurement of force exerted by water-jets on flat and hemispherical vanes;
19. Determination of metacentric height;
20. Determination of efficiency of hydraulic ram;
21. Performance evaluation of Pelton and Francis turbine;
22. Velocity distribution in open channels and determination of Manning' s coefficient of rugosity.

II Year I Semester

L	T	P	To	C
0	0	3	3	2

AG211 Strength of Materials and Design of Structures Lab

Course Description & Objectives:

The laboratory experiments pertaining to understanding the strength of materials and structural design will be undertaken here.

Course Outcomes:

The students will be able to gain knowledge in the area of testing of different materials and components of structural elements experimentally and would learn the fundamentals about structural components of building experimentally.

List of Experiments:

1. Tension test on metal specimen (M.S., C.I.) and observing the behaviour of materials under load.
2. Calculating the value of E, ultimate stress, permissible stress, percentage elongation etc. and to study its fracture.
3. To perform the compression test on; Concrete cylinders &cubes, C.I., M.S. & Wood specimens and to determine various physical and mechanical properties.
4. To perform the bending test on the specimens; M.S. Girder, Wooden beam, Plain concrete beams & R.C.C. beam, and to determine the various physical and mechanical properties.
5. To determine Young' s modulus of elasticity of beam with the help of deflection produced at centre due to loads placed at centre & quarter points.
6. To study the behaviour of materials (G.I. pipes, M.S., C.I.) under torsion and to evaluate various elastic constants.

7. To study load deflection and other physical properties of closely coiled helical spring in tension and compression.
8. To perform the Rockwell, Vicker' s and Brinell' s Hardness tests on the given specimens;
9. To perform the Drop Hammer Test, Izod Test and Charpay' s impact tests on the given specimens;
10. To determine compressive & tensile strength of cement after making cubes and briquettes;
11. To measure workability of concrete (slump test, compaction factor test);
12. To determine voids ratio & bulk density of cement, fine aggregates and coarse aggregates;
13. To determine fatigue strength of a given specimen;
14. Design and drawing of steel roof truss;
15. Design and drawing of RCC building;
16. Design and drawing of Retaining wall.

II Year I Semester	**L**	**T**	**P**	**To**	**C**
	0	0	3	3	2

AG213 Farm Power and Renewable Energy Sources Lab

Course Description & Objectives:

Understanding the various sources of power available and its utility is required in better management of the farm practices. The course will empower the student to think of different sources of energy for farming requirements according to the area of farming.

Course Outcomes:

Student will have practical knowledge about engine, different engine systems and renewable energy sources.

List of Experiments:

1. Introduction to different systems of an CI engine; Engine parts and functions, working principles etc;
2. Valve system – study, construction and adjustments;
3. Air cleaning system and Fuel supply system of SI engine;
4. Diesel injection system & timing;

5. Cooling system and fan performance, thermostat and radiator performance evaluation; Part load efficiencies & governing;
6. Lubricating system & adjustments;
7. Starting and electrical system and Ignition system
8. Tractor engine heat balance and engine performance curves;
9. Preparation of biomass sample and determination of calorific value;
10. Estimation of ash content and moisture content of biomass;
11. Estimation of fixed carbon and volatile matter of biomass;
12. Demonstration of down draft throatless and with throat rice husk gasifier;
13. Demonstration of working of a fixed dome type biogas plants;
14. Demonstration of working of a floating drum type biogas plants;
15. Demonstration of biodiesel preparation;
16. Measurement of basic solar parameters and demonstration of solar water heater;
17. Demonstration of solar cooker

II Year II Semester

L	T	P	To	C
3	1	-	4	4

AG202 Heat and Mass Transfer

Course Description & Objectives:

To study the basics of heat and mass transfer properties of materials. The course will make the basics of process engineering.

Course Outcomes:

After completion of this course, the student would be able to:

1. *apply principles of heat and mass transfer to basic engineering systems*
2. *analyse heat transfer by conduction and convection*
3. *analyse and design heat exchangers*
4. *analyse diffusional processes and calculate the flux in a diffusion process*

Unit I: **Basics and Conduction Heat Transfer:**

Introductory concepts, modes of heat transfer, thermal conductivity of materials, measurement. General differential equation of conduction. One dimensional steady state conduction through plane and composite walls, tubes and spheres with and without heat generation. Electrical analogy.

Unit II: Insulation and Convection Heat Transfer:

Insulation materials, critical thickness of insulation. Fins, Free and forced convection. Newton' s law of cooling, heat transfer coefficient in convection. Dimensional analysis of free and forced convection. Useful non dimensional numbers and empirical relationships for free and forced convection. Equation of laminar boundary layer on flat plate and in a tube. Laminar forced convection on a flat plate and in a tube.

Unit III: Radiation Heat Transfer:

Combined free and forced convection. Absorptivity, reflectivity and transmissivity of radiation. Black body and monochromatic radiation, Planck' s law, Stefan-Boltzman law, Kirchoff' s law, grey bodies and emissive power, solid angle, intensity of radiation.

Unit IV: Heat Exchangers:

Radiation exchange between black surfaces, geometric configuration factor. Heat transfer analysis involving conduction, convection and radiation by networks. Types of heat exchangers, fouling factor, log mean temperature difference, heat exchanger performance, transfer units.

Unit V: Mass Transfer:

Heat exchanger analysis restricted to parallel and counter flow heat exchangers. Steady state molecular diffusion in fluids at rest and in laminar flow, Flick' s law, mass transfer coefficients. Reynold' s analogy.

TEXT BOOKS:

1. Geankoplis, C.J. (1997). *Transport Processes and Unit Operations.* Prentice Hall of India, New Delhi.
2. Sachdeva R C, "Fundamentals of Engineering Heat and Mass Transfer" New Age International, 1995.

REFERENCES:

1. Treybal, R.E. (1981). *Mass transfer Operation.* McGraw Hill Book.
2. Arora, S.C and Domkundwar, S. (1984). *A Course in Heat & Mass Transfer* (3 ed.). Dhanpat Rai & Sons, Delhi.
3. Frank P. Incropera and David P. DeWitt, "Fundamentals of Heat and Mass Transfer",John Wiley and Sons, 1998.
4. Holman,J.P. (1989). *Heat Transfer S.I. Metric Edition.* McGraw Hill Book Company Ltd., New Delhi.
5. Yadav R "Heat and Mass Transfer" Central Publishing House, 1995.
6. Ozisik M.N, "Heat Transfer", McGraw-Hill Book Co., 1994.
7. Nag P.K, " Heat Transfer", Tata McGraw-Hill, New Delhi, 2002
8. http://nptel.ac.in/courses/112108149/

II Year II Semester	L	T	P	To	C
	3	1	-	4	4

AG206 Drying and Storage Engineering

Course Description & Objectives:

To study the drying technology and storage systems used for various agricultural products.

Course Outcomes:

Students will able to get basic knowledge:

1. *a bout drying and storage of farm crops*
2. *of use of different techniques for different agricultural products.*

Unit I: Introduction to Drying:

Moisture content and methods for determination, importance of EMC and methods of its determination, EMC curve and EMC model, principle of drying, theory of diffusion, mechanism of drying- falling rate, constant rate, thin layer, deep bed and their analysis, critical moisture content, drying models.

Unit II: Applications of Drying:

Calculation of drying air temperature and air flow rate, air pressure within the grain bed, Shred' s and Hukill' s curve, different methods of drying including puff drying, foam mat drying, freeze drying, etc. Study of different types of dryers- performance, energy utilization pattern and efficiency, study of drying and dehydration of agricultural products.

Unit III: Introduction to storage:

Types and causes of spoilage in storage, conditions for storage of perishable products, functional requirements of storage, control of temperature and relative humidities inside storage, calculation of refrigeration load;

Unit IV: Mechanism of Storage structure:

Modified atmospheric storage and control of its environment, air movement inside the storage, storage of grains: destructive agents, respiration of grains, moisture and temperature changes in stored grains; conditioning of environment inside storage through natural ventilation, mechanical ventilation, artificial drying.

Unit V: Storage structures:

Grain storage structures such as Bukhari, Morai, Kothar,silo, CAP, warehouse - design and control of environment. Storage of cereal grains and their products, storage of seeds, hermetically sealed and air-cooled storages-refrigerated, controlled atmosphere, modified atmospheric and frozen storages. Storage condition for various fruits and vegetables under cold and CA storage system. Economic aspects of storage.

TEXT BOOKS:

1. Majumdar, A.S. (2000). *Drying Technology in Agriculture & Food Science.*Oxford and IBH Publishing House.
2. Sahay, K.M and Singh, K.K. (1994). *Unit Operation of Agrl. Processing.* Vikas Publishing House Pvt Ltd, New Delhi.

REFERENCES:

1. Multon,J.L. (1989). *Preservation and Storage of Grains, Seeds and their By Products: Cereals, oil Seeds, Pulses and Animal Feed.* CBS Publishing and Distributions, Delhi.

2. Ooraikul, B and Stiles, M.E. (1992). *Modified atmosphere Packaging of Food.* Ellis Horwood Publication, New York.
3. Vijaya Raghavan, S. (1994). *Grain Storage Engg. & Technology.* Batra Book Service, New Delhi.
4. Mc Cab,W.L and Smith,J.C . (1990). *Unit Operation in Chemical Engg.* McGraw Hill, Tokyo.
5. Pande,P.H. (1994). *Principles of Agricultural Processing A Text Book.* Kalyani Publishers, Ludhiyana.
6. Carl.W.Hall. (1980). *Crop drying.* AVI Publishing Co. Inc.
7. FAO.1984.desgin and operation of cold stores in developing countries.FAO.
8. http://ecourses.iasri.res.in/e-Leaarningdownload3_new.aspx?Degree_Id=04

II Year II Semester

L	T	P	To	C
3	1	-	4	4

AG208 Theory of Machines

Course Description & Objectives:

The anatomy of mechanisms, machine elements and their response to static and dynamic forces are comprehensively covered in this course to empower the students to design machine elements.

Course Outcomes:

At the end of the course, the student would be:

1. *familiar with common mechanisms used in machines and everyday life.*
2. *able to calculate mobility (number of degrees-of-freedom)*
3. *able to conduct a complete (translational and rotational) velocity, acceleration analysis of the mechanism*
4. *able to understand gear mechanism, classification and to become familiar with gear standardization and specification in design.*
5. *able to do static and dynamic force analysis and balancing of masses*

   able to understand the types of vibrations developed during functioning of any mechanical system

Unit I:Introduction to Mechanisms:

Links, classifications of links, kinematic pairs - lower pairs , higher pairs, kinematic chain-inversion-four bar chain and slider crank mechanisms, Determination of Degree of freedom of simple mechanisms. Straight line motion mechanisms: Classification of straight line motion mechanisms-peaucellier's, tchebicheff's and pantograph mechanisms.

Unit II: Velocity and acceleration in Mechanisms:

Motion of a link in machine, velocity of a point on a link – Instantaneous center – types of instantaneous centers – kennedy's theorem – velocity measurement by instantaneous center method, relative velocity method. Acceleration of a point on a link - acceleration in slider crank mechanism, Coriolis component of acceleration.

Unit III: Gears and Gear Trains:

Introduction, friction wheels toothed gearing-types of gears-law of gearing-condition for constant velocity ratio for transmission-form of teeth, cycloidal and involute profiles-phenomena of interferences-condition for minimum number of teeth to avoid interference-expression for arc of contact and path of contact. Introduction to gear train-train value-simple, compound, reverted and -epicyclic gear train - method to find gear train value.

Unit IV: Balancing :

Balancing of rotating masses-primary, secondary balancing ,balancing of reciprocating masses, analytical and graphical methods - unbalanced forces and couples - hammer blow, swaying couple, variation of tractive effort.

Unit V: Mechanical Vibrations:

Basic Concepts – types of vibrations - determination of natural frequency of simple systems - vibrations of beams due to point loads-Dunkerly's method-Raleigh's method - Forced and damped vibrations - vibration isolation and transmissibility. Whirling of shafts, critical speeds - torsional vibrations of two and three rotor systems.

TEST BOOKS:

1. Thomas Bevan, "Theory of machines", 3rd ed., CBS, 2004.
2. R.L.Norton, "Kinematics and Dynamics of Machinery", 1st ed., TMH, 2009.

REFERENCES:

1. J.S.Rao and R.V.Dukkipati, "Mechanism and machine theory", 2nd ed., New Age Publications, 2007.
2. J.E.Shigley, "Theory of machines", 3rd ed., Oxford, 2009.
3. http://nptel.ac.in/courses/112104121/
4. http://nptel.ac.in/courses/112101096/

II Year II Semester

L	T	P	To	C
4	0	-	4	4

AG 210 Crop Production & Process Engg

Course Description & Objectives:

To study basic features of crop production methods including the agronomical and soil aspects. To study the processing technology of various agricultural products.

Course Outcomes:

The students will have:

1. *the necessary knowledge about production of agricultural and horticultural crops.*
2. *basic knowledge about processing and material handling of harvested crops.*

Crop Production

Unit I: Soil Science:

Soils: Nature and origin of soil; soil forming rocks and minerals, their classification and composition, soil forming processes, classification of soils – soil taxonomy orders; important soil physical properties; and their importance; soil particle distribution; soil inorganic colloids – their composition, properties and origin of charge; ion exchange in soil and nutrient availability; soil organic matter – its composition and decomposition, effect on soil fertility; soil reaction – acid, saline and sodic soils.

Unit II: Agronomy:

Agronomy: Definition and scope of agronomy. Classification of crops, Effect of different weather parameters on crop growth and development. Principles of tillage, tilth and its characteristics. Soil water plant relationship and water requirement of crops, weeds and their control, crop rotation, cropping systems, Relay cropping and mixed cropping.

Process Engineering

Unit III: Processing of Agricultural products:

Scope and importance of food processing, post harvest losses, principles and methods of food processing. Processing of farm crops; cereals, pulses, oil seeds, fruits and vegetables and theirproducts for food and feed. Processing of animal products, minimal processing, Principle of size reduction, grain shape, size reduction machines; crushers, grinders, cutting machines etc. – operation, efficiency and power requirement – Rittinger's, Kick' s and Bond' s equation, fineness modulus.

Unit IV: Mixing and Separation:

Theory of mixing, types of mixtures for dry and paste materials, rate of mixing and power requirement, mixing index. Theory of separation, size and unsized separation, types of separators, size of screens, sieve analysis, capacity and effectiveness of screens, pneumatic separation.

Unit V: Material Handling:

Microwave and Dielectric heating. Extrusion processing, Scope & importance of material handling devices, study of different types of material handling systems; belt, chain and screw conveyor, bucket elevator, pneumatic conveying, gravity conveyor design consideration, capacity and power requirement.

TEXT BOOKS:

1. Chakravarty, A. (1995). *Post Harvest technology of Cereals, Pulses and Oil Seeds.* Oxford and IBH Pub. Co., Calcutta

REFERENCES:

1. De, G.C. (1989). *Fundamentals of Agronomy.* Oxford & IBH Publishing Co Pvt Ltd, New Delhi.
2. Russel.(2002). *Soil Condition and Plant Growth.* ELBS, Longmans, U.K.
3. Pande,P.H. (1994). *Principles of Agricultural Processing A Text Book.* Kalyani Publishers, Ludhiyana.
4. Sahay, K.M and Singh, K.K. (1994). *Unit Operation of Agrl. Processing.* Vikas Publishing House Pvt Ltd, New Delhi.
5. Bose, T.K and S.K. Mitra. (1990). *Fruits, Tropical and Subtropical.* Naya Prakash, 206 Bidthan saran, Calcutta.
6. Brady, Nyle C. (1988). *The nature and properties of Soils.* Eurasia Publishing House Pvt Ltd, New Delhi.
7. Das, P.C. (1993). *Vegetable Crops of India.* Kalayani Publishers, New Delhi.
8. Earle,R.L. (1985). *Unit Operations in Food Processing.* Pergamon Press, Oxford.U.K.
9. Fellows, P. (1993). *Food Processing technology, Principles and Practice.* Ellis Horwood,USA.
10. Handerson, S.M and Perry, R.L. (1955). *Agrl. Process Engg.* John,Willey & Sons, New York.
11. http://ecourses.iasri.res.in/e-Leaarningdownload3_new.aspx?Degree_Id=04

II Year II Semester

	L	T	P	To	C
	4	0	-	4	4

CS 218 Data Structures

Course Description & Objectives:

The main objective of this course is to provide an introduction to basic data structures and manipulating them, by using C programming language.

Course Outcomes:

Having successfully completed this course, the student will be able to:

1. *apply advance C programming techniques such as pointers, dynamic memory allocation, structures to developing solutions for particular problems;*
2. *design and implement abstract data types such as linked list, stack, queue and tree by using C as the programming language using static or dynamic implementations;*
3. *evaluate and choose appropriate abstract data types to solve particular problems;*
4. *design and implement C programs that apply abstract data types.*

Unit I: Introduction to data structures:

Introduction – Data, Data type, Data Structures – Primitive and Non-primitive, Storage structures – Sequential and linked storage representations, File structures, Abstract Data Type (ADT). Overview of Structures-arrays, operations on arrays(retrieval of an element, search an element, insertion deletion of an element), manipulations on arrays such as finding the sum of elements of an array, adding two arrays, and reversing an array. Maximum sub sequence problem, Multi dimensional arrays.

Unit II: Lists:

Linked Lists: Types of Linked Lists Singly Linked List, Doubly Linked List, Circular Linked List. Operations on linked lists-insertion, deletion, traversing forward/reverse order. Multi lists, Applications of Linked Lists.

Unit III: Array:

Stacks – ADT, array and linked representations, Implementation and their applications. Queues – ADT, array and linked representations, Implementation of linear, circular and doubly-ended queues, and their applications.

Unit IV: Binary:

Preliminaries –Binary Tree – ADT, array and linked representations, Binary tree properties, tree traversal, Implementation, Expression trees. The Search Tree ADT – Binary Search Trees, Implementation. AVL Trees – Single Rotations, Double rotations.

Unit V: Graphs and applications:

Graphs – ADT, definitions and properties, modeling problems as graphs, representation – adjacency matrix and adjacency list, basic graph traversals – breath first search and depth first search. Applications of graphs.

TEXT BOOKS :

1. Richard F.Gilberg, Behrouz A. Forouzan,(2004). Data Structures - A Pseudocode Approach with C, Second Edition, Cengage Learning.

REFERENCES:

1. Mark Allen Weiss,(2004). “Data Structures and Algorithm Analysis in C”, Second Edition, Pearson Education.
2. Sartaj Sahni,(2005) Data Structures, Algorithms and Applications in C++ ,Universities Press, Second Edition.
3. Jean Paul Tremblay and Paul G. Sorenson,(2004). An Introduction to Data Structures with Applications,Tata Mc-Graw Hill, Second Edition, 26thReprint.

II Year II Semester	**L**	**T**	**P**	**To**	**C**
	0	0	3	3	2

AG 212 Crop Process, Drying & Storage Lab

Course Description & Objectives:

To study the drying methodology, and storage structure designs used in various industries. To study, design and evaluate the properties of system and to analyze the structures for design capabilities.

Course Outcomes:

After completion of this lab students will have knowledge about practical handling and processing of agricultural products after harvesting.

List of Experiments:

1. Preparation of flow and layout charts of a food processing plant;
2. Determination of fineness modulus and uniformity index;
3. Study of cleaning equipment;

4. Study of grading equipment;
5. Performance evaluation of screen pre cleaner;
6. Study of conveying equipments;
7. Performance evaluation of belt conveyor
8. Study of mechanics of drying of grains;
9. Problems using psychometric chart
10. Design of dryers
11. Design and layout of commercial bag storage facilities
12. Design and layout of commercial bulk storage facilities
13. Study of different domestic storage structures
14. Visits to commercial handling and storage facilities for grains

II Year II Semester	**L**	**T**	**P**	**To**	**C**
	0	0	3	3	2

AG 214 Surveying and Levelling Lab

Course Description & Objectives:

To understand basic surveying methods and use of various instruments for surveying of given Geographical locations.

Course Outcomes:

After completion of this course students would have acquired practical knowledge on handling basic survey instruments including leveling and development of contour map of given area

List of Experiments:

1. Chaining of a line using Chain / Tape and Recording of details along the chain line and preparation of map
2. Measurement of area – Cross staff survey
3. Traversing by compass and graphical adjustment
4. Determination of distance between two inaccessible points
5. Measurement of elevation difference between two points using any levelling Instrument
6. Elevation difference between two points by Reciprocal levelling method
7. Profile Levelling – Plotting of Profile

8. Determination of the distance between two inaccessible points by Plane table surveying
9. Plotting of a building by plane table Traversing
10. Contour survey of an area and preparation of contour map
11. Introduction of software in drawing contour
12. Measurement of horizontal and vertical angles by theodolite surveying
13. Determination of distance between two inaccessible points by theodolite surveying
14. Setting out curves by theodolite
15. Setting out a simple curve using Total Station
16. Preparation of a contour Plan/ Map using Total Station

II Year II Semester	**L**	**T**	**P**	**To**	**C**
	0	0	3	3	2

HS217 Soft Skills Laboratory

Course Description & Objectives:

The Soft Skills Laboratory course equips students with required skills such as interpersonal skills, communication skills, leadership skills etc. It aims at training undergraduate students on employability skills to win in the job interviews and building confidence to handle professional tasks.

Course Outcomes:

The course aims to help students to develop formal communication skills in a work place, make them acquire team skill by working in group activities and equip them with suitable language and speech patterns in a workplace. It also will enhance the ability of critical & lateral thinking while addressing the issues at any situation and enable them to present themselves confidently in job interviews.

UNIT-I: Personality Development:

a) Role of language in Personality – How language reflects, impacts personality – Using gender-neutral language in MNCs – being culturally sensitive.
Activity – Appraising each other – Worksheets related to the above

b) Career Planning- job vs. career- goal setting- SWOT analysis- planning and prioritization - four quadrant time management system - time management – self-management – stress-management.

Activity: Setting a SMART goal - SWOT analysis of the self – Writing a Statement of Purpose (SOP).

c) Effective Resume-Writing: structure and presentation - planning and defining the career objective - projecting one's strengths and skill-sets – summarizing - formats and styles - covering letter.
Activity: Resume preparation –writing a covering letter.

UNIT-II: Functional English:

A) Functional English - Formal/informal context – purpose - interpersonal dynamics - ideation –content organization - initiating a conversation – responding appropriately - right body language.
Activity - Role play in different situations, - self-introduction - social background (family, home town etc.,) - role model - my future - likes/dislikes (movies, persons, places, food, music etc.,) - a mini project on functional English.
b) Vocabulary-Building: Etymology of words - word roots - prefixes & suffixes - synonyms & antonyms- collocations - one-word substitutes – analogies - idioms and phrases - contextual guessing of unfamiliar words – task-oriented learning (100 words).
Activity: Flash cards (200 words) – vocabulary exercises with hand-outs.

UNIT-3: Group discussion and interview:

a) Group Discussion: Articulation and flow of oral presentation - dynamics of group discussion – intervention – summarizing - voice modulation – content generation – Key Word Approach (KWA) – Social, Political, Economic, Legal and Technical Approach (SPELT) – View Point of Affected Part (VAP) - language relevance - fluency and coherence.
Activity: Mock sessions on four types of GD topics.
b) Facing Interviews: Interview process - understanding employer expectations - pre-interview planning - opening strategies - answering strategies – stress-based interviews - tele-interviews, video interviews- frequently asked questions (FAQs).
Activity: Writing responses to FAQs - mock interviews.

UNIT-4: Reading and listening skills:

a) Reading Comprehension: Reading as a skill- techniques for speed reading- skimming- scanning- appreciating stylistics - impediments for speed reading - eye fixation - sub-vocalisation - critical reading - reading based on purpose - reading for information - reading for inference -understanding tone.
Activity: Reading comprehension exercises with texts drawn from subject areas. (Hand-outs)
b) Listening Comprehension: Listening as skill - different types of listening - hidden data of communication - active listening - top-down approach - bottom-up approach.

Activity: Following different accents (Indian, British, American) listening comprehension exercises with audio and video excerpts.

UNIT-5: Reasoning and Analytical thinking:

a) Data Commentary: Deductive & inductive reasoning - data interpretation - tables & charts - bar charts - pie charts - line graphs - ratios & proportions – percentages - coding and decoding - reasoning by analogy - artificial language etc.,

b) Analytical Thinking: Statement and Conclusion - Data Sufficiency - Statement and Argument - Statement and Assumption - Logical Deduction - Logical Problems.

Activity: Exercises with handouts.

REFERENCES:

1. Edward Holffman, Ace the Corporate Personality, McGraw Hill,2001
2. Adrian Furnham, Personality and Intelligence at Work, Psychology Press, 2008.
3. John Adair Kegan Page, “Leadership for Innovation” 1st edition, Kogan, 2007.
4. M.Ashraf Rizvi, “Effective Technical Communication”, 1st edition, Tata McGraw Hill, 2005.
5. Krishna Mohan & NP Singh , “Speaking English Effectively” 1st edition, Macmillan, 2008.
6. Soft Skills Material of Infosys Under the Academic Initiative of Campus Connect
7. K.R. Lakshminarayana & T. Murugavel, “Managing Soft Skills”, Scitech Publications. 2009
8. Dr. S.P. Dhanvel, English and Soft Skills, Orient Blackswan, 2011
9. Rajiv K. Mishra, Personality Development-, Rupa & Co. 2004.
10. R.S.Agarwal, Quantitative Aptitude, S. Chand& Co. Latest edition.2011
11. R.S.Agarwal, Verbal & Non-verbal Reasoning, S. Chand& Co. Latest edition.2012

VFSTR UNIVERSITY

III Year - B.Tech

SYLLABUS

I SEM & II SEM

III Year I Semester	L	T	P	To	C
	3	1	-	4	4

AG301 Machine Design

Course Description & Objectives:

To familiarize students with various steps involved in the design process and to make them understand the principles involved in evaluating the shape and dimensions of a component to satisfy functional and strength requirements.

Course Outcomes:

By completing this course, the students will have the ability to:

1. *design the components against static loading.*
2. *design the components against cyclic loading.*
3. *design the fasteners like rivets, bolts and cotter joints.*
4. *design power transmission shafts and couplings*
5. *calculate stress and load along with deformations of various types of springs*

Unit I: Steady Stresses and Variable Stresses in Machine Members:

Introduction to the design process - factors influencing machine design, selection of materials based on mechanical properties – Direct, Bending and Torsional stress equations.

Unit II: Design of Shafts and Couplings and Design of Fastners and Welded Joints:

Design of solid and hollow shafts based on strength, rigidity and critical speed, Design of keys and key ways - Design of rigid and flexible couplings design of knuckle joints.

Threaded fasteners, Design of bolted joints including eccentric loading, Design of welded joints for pressure vessels and structures, theory of bonded joints.

Unit III: Design of Springs and Bearings:

Design of helical, leaf, disc and torsional springs under constant loads. Design of bearings, sliding contact and rolling contact types, Cubic mean load, Design of journal bearings, Lubrication in journal bearings, Calculation of bearing dimensions.

Unit IV: Thin Cylinders & Thick Cylinders, Clutches & Brakes:

Design principles, Stresses due to internal and external pressures, Design methodology for enhanced pressure. Design of Clutches: Single plate, multi plate and cone clutches. Design of Brakes: Block and Band brakes: Self locking of brakes.

Unit V: Spur & Helical Gears:

Spur Gears: Definitions, stresses in gear tooth, Lewis equation and form factor, Design for strength. Helical Gears: Definitions, formative number of teeth, Design based on strength.

TEXT BOOKS:

1. Joseph E. Shigley and Charles R. Mischke, "Mechanical Engineering Design", 6th ed., McGraw Hill International edition, 2003,
2. V.B. Bhandari, "Design of Machine Elements", 2nd ed., Tata McGraw Hill Publishing Company Ltd., New Delhi, 2007.

REFERENCES:

1 Robert L. Norton, "Machine Design", Pearson Education Asia, 2001.
2. Hall, Holowenko, Laughlin, "Machine Design", Tata McGraw Hill Publishing Company Ltd., New Delhi, 2008.

III Year I Semester

L	T	P	To	C
3	1	-	4	4

AG303 Farm Machinery and Equipment

Course Description & Objectives:

To study the different machinery used for various agricultural operations and to understand the basics of designing and maintaining the same.

Course Outcomes:

The students will have emphasis on:

1. *Necessities of farm mechanization.*
2. *Usage of tillage, plant protection, harvesting machines.*
3. *Testing procedures and ergonomics of machines.*
4. *Uses of different machines for different purposes in the farm.*

Unit I: Farm Mechanization:

Objectives of farm mechanization. Classification of farm machines. Materials of construction & heat treatment. Principles of operation and selection of machines used for production of crops. Field capacities & economics.

Unit II: Tillage and Equipments:

Tillage; primary and secondary tillage equipment. Forces acting on tillage tools. Field operation patterns. Draft measurement of tillage equipment: Earth moving equipment their construction & working principles viz Bulldozer, Trencher, Excavators etc.; sowing, planting & transplanting equipment their calibration and adjustments.

Unit III: Plant protection Equipments:

Fertilizer application equipment. Weed control and Plant protection equipment sprayers and dusters, their calibration, selection, constructional features of different components and adjustments. Work physiology of men and women.

Unit IV: Harvesters:

Principles & types of cutting mechanisms. Construction & adjustments of shear &impact type cutting mechanisms. Crop harvesting machinery: mowers, windrowers, reapers, reaper binders and forage harvesters. Forage chopping & handling equipment. Threshing mechanics & various types of threshers. Threshers, straw combines & grain combines, maize harvesting & shelling equipment, Root crop harvesting equipment potato, groundnut etc., Cotton picking & Sugarcane harvesting equipment.

Unit V: Testing & Selection of machines:

Principles of plantation crops and fruit harvesting tools and machines. Horticultural tools and gadgets. Testing of farm machine. Test codes & procedure. Interpretation of test results. Selection and management of farm machines for optimum performance. Workplace layout for men and women.

TEXT BOOKS:

1. Donnel Hunt.(1995).*Farm Machinery and management.* Iowa State University Press, Ames, USA.
2. Srivastava, A.C. (1990). *Elements of Farm Machinery.* Oxford & IBH Publishing Co. Pvt. Ltd, New Delhi.

REFERENCES:

1. Kepner, R.A., Bainer Roy, and Barges, E.C. (1978). *Principals of Farm Machinery, .* CBS Publishers and Distributors, Delhi 17.
2. Kurtz,G.L., Thompson and Claer, P. (1984). *Design of Agricultural Machinery.* John Wiley & Sons, New York.
3. Michael, A. M. and Ojha, T.P. (1985). *Principles of Agricultural*

Engineering.(Vol. II). Jain brothers, New Delhi.

4. Smith Harris Pearson, H.E., and Lambent Herry Wilkes, M.S. (1977). *Farm Machinery and Equipment.* Tata Mc Graw Hill Publishing Company Ltd., New Delhi.
5. Kanafoshi, C.Z. and Karwawshi, T. (1976). *Agricultural Machines, Theory and Construction* (Vol. 1 and 2). USDA, Poland.
6. Ghosh, P.K, and Swain, S. (1993). *Practical Agricultural Engineering.* Naya Prokash, Calcutta.
7. Kelnin, N.I.,Popov, I.F., and Sakun, V.A. (1985). *Agricultural Machines.* Amerind Publishers, New Delhi. Bosoi, E.S. (1990). *Theory, Construction and Calculation of Agricultural Machines* (Vol. 1 and 2). Oxonion Press Pvt. Ltd., New Delhi.
8. http:agritech.tnau.ac.inagricultural_engineeringagriengg_fmp_tillagee.html
9. http://ecourses.iasri.res.ineLeaarningdownload3_new.aspx?Degree_Id=04

III Year I Semester

	L	T	P	To	C
	3	1	-	4	4

AG305 Ground Water, Wells and Pumps

Course Description & Objectives:

To study the mechanics of water storage and to understand the design and maintenance of pumps.

Course Outcomes:

At the end of course students will have:

1. *basic knowledge on different types of wells and pumps.*
2. *knowledge to acquire modelling and uses of different methods used for estimation of ground water potential.*

Unit I: Groundwater and Wells:

Occurrence and movement of ground water, aquifer and its types, classification of wells, steady and transient flow into partially, fully and non penetrating tube wells and open wells, familiarization of various types of bore wells common in the State

Unit II: Design of Wells:

Design of open well, groundwater exploration techniques, methods of drilling of wells, percussion, rotary, reverse rotary, design of assembly and gravel pack, installation of well screen, completion and development of well, groundwater hydraulics determination of aquifer parameters by different method such as Theis, Jacob and Chow' s etc. Their recovery method, well interference, multiple well systems.

Unit III: Groundwater modelling:

Surface and subsurface exploitation and estimation of ground water potential, quality of ground water, artificial groundwater recharge planning, modeling, ground water project formulation.

Unit IV: Pumps and Classification:

Pumping Systems: Water lifting devices; different types of pumping machinery, classification of pumps, component parts of centrifugal pumps; pump selection, installation and troubleshooting

Unit V: Working of Pumps:

Design of centrifugal pumps, performance curves, effect of speed on head capacity, power capacity and efficiency curves, effect of change of impeller dimensions on performance characteristics; hydraulic ram, propeller pumps, mixed flow pumps and their performance characteristics; priming, self priming devices, rotodynamic pumps for special purposes such as deep well turbine pump and submersible pump.

TEXT BOOKS:

1. Michael, A. M. (1992). *Water Well and Pump Engineering.* Tata Mc Graw Hill Pub. Co. Ltd., New Delhi.

REFERENCES:

1. Modi, P.M. and Seth, S.M. (1991). *Hydraulics and Fluid Mechanics.* Standard Book House, New Delhi .
2. Sivanappan, R.K. (1987). *Sprinkler irrigation.* Oxford & IBH Publishing Company, New Delhi.
3. Subramanhya. (1994). *Engineering Hydrology.* Tata Mc Graw Hill. New York.
4. Todd, D.K. (2004). *Ground Water Hydrology.* John Wiley & Sons, New York.
5. Chow, V.T. (1964). *Hand Book of Applied Hydrology.* Mc Graw Hill, NewYork.
6. Jack, K. and Rend, B. (1991). *Sprinkler and Trickle Irrigation.* Van NostraReinhold, New York.
7. James, L.G. (1988). *Principles of Farm Irrigation system Design.* John Wiley & Sons, New York.
8. http://nptel.ac.in/courses/105103026/
9. http://ecourses.iasri.res.in/e-Leaarningdownload3_new.aspx?Degree_Id=04

III Year I Semester

L	T	P	To	C
3	1	-	4	4

AG307 Watershed Hydrology

Course Description & Objectives:

Study of hydrological cycles, precipitation, stream flow, hydrograph and modelling of watersheds, flood routing etc.

Course Outcomes:

The students will be able to:

1. *concentrate on hydrologic cycle, hydrograph and precipitation and its parameters.*
2. *apply empirical formulae and different methods for estimating the runoff and stream flow.*

Unit I: Hydrological Cycle:

Introduction; Hydrologic cycle; Precipitation forms, Weather systems for precipitation, Characteristics of precipitation in India; Rainfall measurement, rain gauge network, optimum number; Representation of rainfall data Mass curve, hyetograph, Moving average curve etc; Mean precipitation over an area Different methods.

Unit II: Precipitation:

Frequency analysis of point rainfall, Calculation of rainfall return period and probability, plotting position; Estimation of missing data, test for consistency of rainfall records; Double mass curve technique; Abstractions from precipitation interception; Depression storage; infiltration; evaporation; evapo transpiration estimation and measurement; Reservoir evaporation methods of reduction, Infiltration indices.

Unit III: Runoff:

Geomorphology of watersheds stream number, stream length, stream area, stream slope and Horton's laws; Runoff factors affecting, measurement; Runoff characteristics of streams, estimation of peak runoff rate and volume; Rational method, Cook' s method, SCS Curve number method.

Unit IV: Hydrograph:

Stream flow measurement of stage and velocity, rating curve, extension of rating curve; Hydrograph; components, Factors affecting the shape of hydrograph, base flow separation, unit hydrograph theory – Assumptions, applications, derivation of unit hydrographs, unit hydrograph of different durations, dimensionless unit hydrograph, distribution hydrograph, synthetic unit hydrograph, uses and limitations of unit hydrograph.

Unit V: Flood and Drought:

Floods Terms and definitions, Head water flood control methods, retards and their location; flood routing – graphical methods of reservoir flood routing; Channel routing Muskinghum method; Hydrology of dry land areas drought and its classification; introduction to watershed management and planning.

TEXT BOOKS:

1. Subrahmanya, K. (1987). *Engineering Hydrology.* TataMcGrawHillPub.Co. New Delhi.
2. Singh, V. P. (1992). *Elementary Hydrology.* Prentice Hall India.

REFERENCES:

1. Chow, V.T. (1964). *Hand Book of Applied Hydrology.* Mc Graw Hill, NewYork.
2. Linsley, R.K., Kohler, M.A., and Paulhus, J.L.H. (1984). *Hydrology for Engineers.* Mc Graw Hill Pub.Co. Japan.
3. McCuen, R. H. (1989). *Hydrologic Analysis and Design.* Printice Hall.
4. Mutreja, K.N. (1990). *Applied Hydrology.* Tata Mc Graw Hill Pub. Co., NewYork.
5. Raghunath, H.M. (2006). *Hydrology Principles, Analysis and design.* New age International (P) Ltd.
6. http://nptel.ac.in/courses/105101002/
7. http://nptel.ac.in/courses/105107129/

III Year I Semester	**L**	**T**	**P**	**To**	**C**
	0	0	3	3	2

AG315 Machine Drawing

Course Description & Objectives:

Students will learn to apply principles of technical drawing and acquire skills in the use of appropriate computer aids for effective preparation of 3D models in Machine Drawing.

Course Outcomes:

Students will have fundamental knowledge of drawing of different machine parts such as sectional views, bolts, nuts and lock nuts.

Total 12 sheets to be drawn, minimum being 10

Sheet 1	:	conversion of isometric views to orthometric views
Sheet 2	:	conversion of optometric views to isometric views

Sheet 3	:	conventions of different materials and standard components
Sheet 4	:	sectional views
Sheet 5	:	fasteners, bolts and nuts, locknuts
Sheet 6	:	keys, couplings

Assembly drawing

Sheet 7	: stuffing box
Sheet 8	: eccentric
Sheet 9	: screw jack
Sheet 10	: connecting rod
Sheet 11	: swivel bearing
Sheet 12	: piston assembly

TEXT BOOKS:

1. K.L. Narayana, “Machine Drawing”, 3rd ed., New Age International, 2007.

REFERENCES:

1. N.D. Bhatt, “Machine Drawing”, Charotar Publishing House, 2008.
2. R.K. Dhawan, “Machine Drawing”, 2nd ed., S.Chand & Company Ltd., 1998.

III Year I Semester

L	T	P	To	C
0	0	3	3	2

AG319 Farm Machinery and Equipment Lab

Course Description & Objectives:

To study design features of various farm machinery and understanding them for effective use in different farming applications.

Course Outcomes:

Students will have knowledge of farm mechanization and use different machineries for agricultural operations.

List of Experiments:

1. Introduction to various farm machines
2. Field capacity and field efficiency measurement for at least two machines/ implements

3. Draft& fuel consumption measurement for different implements under different soil conditions
4. Construction details, adjustments and working of M.B. plow, disc plow and disc harrow and secondary tillage tools
5. Construction and working of rotavators and other rotary tillers, measurement of speed & working width
6. Working of seed cum fertilizer drills, planters and their calibration in field
7. Construction and Working of rice and crop transplanters for potato, sugarcane, cotton etc., and their field operation patterns
8. Weeding equipment and their use
9. Study of sprayers and dusters, measurement of nozzle discharge, field capacity etc.
10. Familiarization with various Farm machines related to harvesting, threshing, root harvesting, combine etc
11. Study of various types of mowers, constructional details, materials and working
12. Study of various types of reaper, constructional details, materials and working & performance
13. Study of various types of reaper binder, constructional details, materials and working
14. Study of various types of potato harvesters, constructional details, materials and working
15. Study of various types of groundnut harvesters, constructional details, materials and working & performance
16. Study of various types of forage harvester, constructional details, materials and working
17. Study of various types of sugarcane harvester, constructional details, materials and working

III Year I Semester

L	T	P	To	C
0	0	3	3	2

AG317 Database Management and Internet Lab

Course Description & Objectives:

Study the basics of internet usage and database management for proper collection, compilation and analysis of data in various applications.

Course Outcomes:

After completion of this lab students will have fundamental information of database management.

List of Experiments:

1. Creating a table, data base, inserting, manipulation
2. Programming using select statement
3. Programming using in and between operators
4. Programming using like operators
5. Programming using sub queries
6. Group by clause
7. Programming using aggregate function sum, min, max
8. Order by clause
9. Set operators
10. Internet applications
11. Tools required tags, attributes
12. Formatting text, heading, paragraph
13. Designing a web page background color, marquee, adding, images, and sound.

III Year II Semester

L	T	P	To	C
3	1	-	4	4

AG302 Irrigation Engineering

Course Description & Objectives:

To study the techniques of irrigation methods and understand the various technologies of irrigation.

Course Outcomes:

By completing this course, the student will be able to:

1. *acquire knowledge of irrigation water*
2. *use of irrigation water in farm lands*
3. *understand different irrigation methods*
4. *understand effective usage of water resources.*

Unit I: Introduction to Irrigation:

Irrigation Engineering: Irrigation, impact of irrigation on Human Environment, some major and medium irrigation schemes of India, purpose of irrigation, sources of irrigation water, present status of development and utilization of different water resources of the country.

Unit II: Measurement Techniques:

Measurement of irrigation water, weir, notches, flumes and orifices and other methods; waterconveyance, design of irrigation field channels, underground pipe conveyance system, irrigation structures, channel lining; land grading, different design methods and estimation ofearth work and cost;

Unit III: Soil, water and plant relationship:

Soil water plant relationship, soil water movement, infiltration, evapotranspiration, soil moisture constants, depth of irrigation, frequency of irrigation, irrigation efficiencies;

Unit IV: Irrigation Techniques:

Surface irrigation methods of water application, border, check basin, furrow and contour irrigation; sprinkler and drip irrigation method, merits, demerits, selection and design; Participatory irrigation management.

Unit V: Design of irrigation methods:

Economics of water resources utilization. Command area concepts and components, irrigation terminologies relevant to command area, on farm development works, farmer participation in water distribution, water delivery methods, design of unlined alluvial channels silt theories, design of lined channels, materials for lining.

TEXT BOOKS:

1. Michael, A.M. (1986). *Irrigation Theory and Practice.* Vikas Publishing House, New Delhi.
2. Israelson and Hassan. (1981). *Irrigation Principles and Practices.* John Wiley and sons, New York.

REFERENCES:

1. Garg,S. K. (1987). *Irrigation Engineering and Hydraulic Structures*. Khanna Publishers, New Delhi.
2. Majumdar, D. K. (2000). *Irrigation Water Management Principles and Practice.* Prentice Hall of India, New Delhi.
3. Modi, P. (1987). *Irrigation Water Resources and Water Power Engineering.* Standard Book House, New Delhi.
4. Murthy, V.V.N. (1998). *Land and Water Management.* Kalyani Publishing, New Delhi.
5. Murthy, C. S. (1997). Water Resources Engineering Principles and Practice. New Age International (P) Ltd. New Delhi.
6. James, J.G. (1988). *Principles of Farm Irrigation system Design.* John Wiley & Sons, New York.
7 Lal, R. (1983). *Irrigation Hydraulics.* Saroj Prakashan Publishers, Allahabad.

III Year II Semester	L	T	P	To	C
	3	1	-	4	4

AG304 Tractor Systems and Controls

Course Description & Objectives:

To study the basic prime mover of farming activities, its types, functions and capabilities in connecting various implements. Students would be exposed to different range of prime movers in this course.

Course Outcomes:

Students will have information about:

1. *tractor system and mechanism of different parts in the tractor.*
2. *types of brake, steering and hydraulic systems of tractor*
3. *tapping the power through different modes*
4. *application of ergonomics for better comfort and safety in tractor operation balancing techniques for tractor*

Unit I: Transmission System:

Study of transmission systems, clutches: functioning, parts and design problem on clutch system, Gear box: different types of gear box, calculation of speed ratios, design problems on gear box, Study on differential and final drive and planetary gears, Differential and final drive mechanism.

Unit II: Brakes, steering system and hydraulic system:

Familiarization of brake mechanism, Design problems. Steering geometry and adjustments Ackerman and hydraulic steering and hydraulic systems.

Unit III: Power Outlets

Tractor power outlets: P.T.O., belt pulley, drawbar, etc. Tractor chassis mechanics and design for tractor stability. Methods of finding CG of the tractor, Methods for finding moment of inertia of the tractor.

Unit IV: Ergonomics:

Ergonomic considerations and operational safety. Importance of anthropometric requirements in design. Power Tiller: Construction and working, Power transmission system

Unit V: Balancing:

Balancing of front and rear attached machinery. Importance of balancing, Techniques in balancing

TEXT BOOKS:

1. Barger, E.L., Liledahl, J.B., Carleton, W.M. and Mckibben, E.G. (1978). *Tractor and their power units.* Wiley Eastern pvt. Ltd, New York.
2. Radhey Lal and Datta, A.C. (1978). *Problems in Agricultural Engineering.* Sathya Prakashan, Allahabad.

REFERENCES:

1. Mehta, M.L., Verma, S.R., Misra, S.K., and Sharma, V.K. (1995). *Testing and Evaluation of Agricultural Machinery.* National Agricultural Technology Information Centre, Ludhiana.
2. http://ecourses.iasri.res.in/e-Leaarningdownload3_new.aspx?Degree_Id=04

III Year II Semester

	L	T	P	To	C
	3	1	-	4	4

AG306 Dairy and Food Engineering

Course Descrption & Objectives:

Understanding the basics of dairy activities, process flow in milk and related production, packaging and distribution processes involved in dairy engineering is the basic objective of this course.

Course Outcomes:

At the end of this course the student would develop the following capabilities:

1. *abroad and coherent body of knowledge of milk source and composition*
2. *an in-depth understanding of thermal treatments during dairy products manufacture and the significance of healthy and functional foods*

Unit I: Milk and Milk Processing:

Dairy development in India. Engineering, thermal and chemical properties of milk and milk products, unit operations of various dairy and food processing systems

Unit II: Thermal Treatments:

Process flow charts for product manufacture, working principles of equipment for receiving, pasteurization, sterilization, homogenization, filling & packaging, butter manufacture

Unit III: Food Preservation:

Dairy plant design and layout, composition and proximate analysis of food products. Deterioration in products and their controls. Physical, chemical and biological methods of food preservation

Unit IV: Food Processing:

Changes undergone by the food components during processing, evaporation, drying, freezing and chilling

Unit V: Processing Techniques:

Behaviour of food products in extraction, leaching, crystallization, filtration, membrane separation, thermal processing. Plant utilities requirement.

TEXT BOOKS:

1. Ahamed Tuffail. (1997). *Dairy Plant Engineering & Management.* Kitab Mahal Publishers, Allahabad.
2. Farrall, A.W. (1980). *Engineering for Dairy & Food Products.* John Wiley and Sons Inc., New York.

REFERENCES:

1. Lalat Chander. (2005). *Text Book of dairy plant layout and Design.* ICAR, New Delhi.
2. Mc cabe W.L. and Smith J.C. (1990). *Unit Operations of Chemical Engg.* McGraw Hill, Tokyo. Japan.
3. Paul Sing. (2004). *Food Engineering.* Marcel Dekker Pub.
4. Sanga, K.P.S. (2001) *Dairy Processing Technology.* Saroj Prakashan, Allahabad.
5. Sukumar De. (1997). *Outlines of Dairy Technology.* Oxford University press, Delhi.
6. Charm, S.E . (1971). *The Fundamentals of Food Engg.* AVI Pub.Co. Inc.
7. Handerson, S.M. et al. (1990). *Principles of Process Engg.* ASAE, USA.
8. http://ecourses.iasri.res.in/e-Leaarningdownload3_new.aspx?Degree_Id=04

III Year II Semester	**L**	**T**	**P**	**To**	**C**
	3	1	-	4	4

AG308 Drainage Engineering

Course Description & Objectives:

To study the importance of drainage structures and the design of different drainage mechanisms

Course Outcomes:

Students will have basic fundamentals about

1. *drainage in agricultural lands*
2. *information on different drainage systems and structures.*
3. *calculation of subsurface flow by using different equations.*

Unit I: Introduction to Drainage:

Drainage definition; Need for land drainage; History of land drainage; Design considerations for land drainage; Definitions of parameters in drainage equations: hydraulic conductivity, tansmissivity, drainable porosity, drainage coefficient.

Unit II: Subsurface Flow:

Subsurface flow to drains Steady state equations; The Hooghoudt's equation derivation, importance of equivalent depth; The Ernst equation derivation, horizontal, vertical and radial flow; Unsteady state equations The Glover Dumm equation; Comparison between Steady State and Unsteady State;

Unit III: Surface Drainage System:

Surface drainage systems Bedding, Field drains, Field laterals; Layout of field drains and laterals; Diversion or interceptor drains; Subsurface drainage systems drain materials, envelopes, filters and surrounds; Functions of envelope, envelope materials, envelope requirements in relation to soil characteristics, gravel envelopes, organic envelopes, synthetic envelopes; Layout, construction and installation of drains

Unit IV: Drainage Structures:

Drainage structures; Tubewell drainage introduction, physical and economic feasibility; Mole drainage; Hydraulics of Drainage pipes Manning's equation for pipe flow hydraulic gradient and slope; Investigations of drain design parameters through drain testing hydraulic conductivity, transmissivity, drainable porosity

Unit V: Drainage Design:

Observation wells and their installation; Recording water table data and drain discharges; Flow equations used in drainage testing steady state and non steady state conditions; Drainage design criteria and system economics.

TEXT BOOKS:

1. Dieleman P. J., Trafford B. D. (1976). Drainage Testing, Irrigation and Drainage Paper No 28. FAO.
2. Luthin, J. (1984). Drainage Engineering. John Wiley & Sons, New York.

REFERENCES:

1. Michael, A. M. and Ojha, T.P. (1985). Principles of Agricultural Engineering (Vol. II). Jain brothers, New Delhi.
2. Murthy, V. (1998). Land and Water Management. Kalyani Publishing, New Delhi.
3. Ritzema H. P. (1994). Drainage Principles and Applications (2 ed.). ILRI Publication.
4. Mathew, E.K., Nair, M.S., Raju, T.D and Jayakumaran, U. (2004). Drainage Digest. Kerala Agrl. University, Thrissur.
5. http://ecourses.iasri.res.in/e-Leaarningdownload3_new.aspx?Degree_Id=04

III Year II Semester

L	T	P	To	C
0	0	3	3	2

AG316 Irrigation and Drainage Engineering Lab

Course Description & Objectives:

The practical in relation to course like irrigation engineering and drainage engineering would be performed by the student in this laboratory.

Course Outcomes:

Students will have practical knowledge about irrigation techniques and their designs. They will have the knowledge of drainage techniques and their field uses.

List of Experiments:

1. Measurement of soil moisture by different soil moisture measuring instruments
2. Determination of soil moisture constants by pressure plate and pressure membrane apparatus
3. Measurement of irrigation water and infiltration rate
4. Computation of evapotranspiration
5. Determination of crop water requirement
6. Irrigation scheduling
7. Land grading exercises
8. Design of underground pipe line system
9. Design of drip and sprinkler irrigation
10. Measurement of uniformity coefficient of sprinkler irrigation method
11. Measurement of uniformity coefficient of drip irrigation method
12. Field problems and remedial measures for sprinkler and drip irrigation method
13. *In situ* measurement of hydraulic conductivity Auger hole method
14. Determination of drainage coefficients
15. Preparation of water contour maps
16. Measurement of hydraulic conductivity through drain testing
17. Measurement of drainable porosity through drain testing
18. Design of surface drainage systems
19. Design of subsurface drainage systems
20. Installation techniques of sub surface drainage system
21. Cost analysis of surface and sub surface drainage system

III Year II Semester

L	T	P	To	C
0	0	3	3	2

AG318 Field Operation and Maintenance of Tractors and Farm Lab

Course Description & objectives:

The methods of operation of various farming implements with tractor would be undertaken by the students in real time field o have the basic idea of mechanized farming.

Course Outcomes:

Students will have real field experience to broaden their idea about farm machinery and use of tractor for different farming operation.

List of Experiments:

1. Introduction to various systems of a tractor viz. fuel, lubrication, cooling, electrical, transmission, hydraulic and final drive system
2. Familiarization with tractor controls and learning procedure of tractor starting and stopping
3. Hitching, adjustments, settings and field operation of farm machinery
4. Familiarization with different makes and models of 4 wheeled tractors
5. Starting and stopping practice of the tractor and familiarization with instrumentation panel and controls
6. Road signs, traffic rules, road safety, driving & parking of tractor
7. Tractor driving forward & reverse driving practice
8. Tractor driving practice with two wheeled tractor trailer forward & reverse
9. Study and practicing the hitching and de hitching of implements
10. Study operation and field adjustments of M.B. plough & disk plough
11. Field operation of trailing & mounted disk harrow
12. Field operation and adjustments of seed drill/planter/sprayer
13. Familiarization with tools and equipment used for maintaining and servicing of tractors and farm machines
14. Maintenance after 10, 50, 100, 250, 500 and 1000 hours of operation, adjustment of tractor track
15. Dismantling and assembling of major engine parts

16. Visit to tractor/ engine repair workshop, injection pump injector repair shop
17. Doing minor repair of electric, mechanical and hydraulic system
18. Adjustment and maintenance of seeding and planting and transplanting machines
19. Adjustment and maintenance of reapers and threshers
20. Adjustment and maintenance of combine harvesters, straw combines, balers etc
21. Visit to small scale farm machinery manufacturers and their repair shops, seasonal repair of farm machinery

III Year II Semester	L	T	P	To	C
	0	0	3	3	2

AG320 Mini Project

Course Description & Objectives:

Objective of the mini project is to enable student analytical and practical exposure by giving hands on experience with learned knowledge through different courses. It prepares the student to efficiently handle the main project for better output.

Course Outcomes:

By undergoing this course, the student will try to integrate and apply the knowledge gained through different courses into practical problems and to analyse the system for its productivity and feasibility.

I Year B.Tech. Biotechnology I - Semester

L	T	P	To	C
4	-	-	4	4

HS112 MATHEMATICS FOR BIOTECHNOLOGISTS - I

Course description and Objectives :

Without mathematics not a single day of an engineer will pass! Aim of this course is to introduce some elementary mathematics to non mathematical students. We study progressions, binomial theorem, partial fractions, trigonometry, plane geometry etc. We also introduce basic vector algebra. Later we introduce the differentiation and integration and later differential equations, which have many applications.

Course Outcomes:

1. This course will bridge the gap of biological students to cope up with mathematics during their Engineering programme.
2. This course will help them to learn progressions, binominal theorem, partial fractions, trigonometry, and plane geometry along with vector algebra.
3. The differentiation and integration will help them to use many applications effectively and efficiently in their engineering course.
4. All the above topics will be useful in their research work as well as projects.
5. First order first degree differential equations applications will be used in law of cooling, growth and decay problems.
6. The concept of maxima-minima has many real time applications.

UNIT I - Mathematical Preliminaries

Arithmetic & geometric progression, finding n^{th} term, sum of n terms, Binomial theorem, Partial fractions, Trigonometric ratios, Sum of angles, compound angles.

UNIT II - Straight line and Vector Algebra

Cartesian co-ordinates (in XY-plane), Straight lines different forms, Angle between straight lines, Point of intersection. Vector Algebra: Vector addition, Multiplication, Representation, Geometrical resultant Vectors, Orthogonal, Parallel vectors, Angle between vectors.

UNIT III - Differential Calculus

Concept of limit, continuity, differentiation, product rule, quotient rule, differentiation of trigonometric, logarithmic, exponential functions, Introduction to partial differentiation, Euler's theorem, maxima & minima.

UNIT IV - Integral Calculus

Introduction, Integration of different functions, methods of integration, integration by parts, Concept of definite integrals, application of definite integrals, problems on areas.

UNIT V - Ordinary Differential Equations

Formation of differential equation by eliminating arbitrary constants, first order and first degree – variable separables, exact, homogeneous, linear & Bernoulli's equation.

Applications of first order ordinary differential equations to growth and decay problems.

TEXT BOOKS :

1. *P. Seshagiri Rao*, "A Text book of Remedial Mathematics", 1st Edition, Parma Med Press, Hyderabad, 2008.

2. *T.K.V. Iyengar and others*, "Engineering Mathematics" Volume-I, 9th Edition, S. Chand & Company, 2010.

REFERENCE BOOKS :

1. *B.S.Grawal*, "Higher Engineering Mathematics", 40th Edition, Khanna Publishers, 2009.

2. *H.K. Dass*, "Advanced Engineering Mathematics", S.Chand & Co, 2002.

I Year B.Tech. Biotechnology I - Semester	L	T	P	To	C
	4	-	-	4	4

HS 113 ENGINEERING PHYSICS

Course description and Objectives :

There is a symbiotic relation between physics and engineering. Broadly speaking, engineering is mainly applied physics. Recent technical developments have been the result of joint efforts of physicists and engineers. A proper study of physics is therefore indispensable for an engineering student to excel in his field. The purpose of this course is to present the principles and concepts of physics as relevant to an engineer.

Course Outcomes:

The students will be made to get acquainted to the following learning outcomes:

1. Concepts of Physical optics, devices and applications.
2. Ultrasonic waves, production, applications in NDT.
3. Introduction to Quantum mechanics in relevance to that of modern physics.
4. Exposure to latest inventions like lasers, fibers and applications
5. Insight into nano technology and applications, solar energy to combat energy crisis.

UNIT I - Physical Optics

Interference – Types - Interference in thin films (Reflection) – Newton's Rings – Michelson's Interferometer, Fabry-perot interferomenter – Applications.

Diffraction – Fraunhoffer Diffraction at single slit – Diffraction grating
Polarization – Production of plane polarized light – Nicol prism – Optical activity – photo elasticity.

UNIT II - Ultrasonics & NDT

Ultrasonics : Introduction – production of ultrasonic waves – piezoelectric method – Properties of ultrasonic waves – Types of ultrasonic waves – Determination of Velocity of ultrasonic waves in solids and liquids – Applications.

NDT : Introduction - Types – Theory and practice of Ultrasonic Testing – Ultrasonic Testing Systems – Ultrasonic Testing Methods – X-Ray Radiography.

UNIT - III Quantum Mechanics & Free electron theory of metals

Quantum Mechanics : Matter waves - Schroedinger's time independent wave equation - Physical significance of the wave function - Particle in one dimensional potential well – tunneling phenomenon.

Free electron theory of metals : Introduction – Classical free electron theory – Electrical conductivity of metal – Fermi - Dirac distribution function and its variation with temperature – Quantum free electron theory.

UNIT IV - Lasers & Fiber Optics:

Lasers: Characteristics of Laser light – Spontaneous and Stimulated emission of radiation – Low power and High power lasers, He-Ne Laser – CO_2 Laser – Nd-Yag laser - Applications of Lasers, Holography and Applications

Fiber Optics: Principle of optical fiber - materials – Numerical Aperture – Types of fibers – Dispersion and Attenuation in optical fibers – Optical sensors – Optical fiber communication system.

UNIT V - Solar Energy & NanoScience and Technology

Solar Energy : Solar radiation – Photovoltaic effect – solar cells – Efficiency of solar cell – Solar thermal energy conversion systems.

NanoScience & Technology : Introduction to nano meterials – Basic principles of nanoscience & Technology – Fabrication of nanomaterials – Physical & Chemical properties of nanomaterials – Applications of nanotechnology.

TEXT BOOKS :

1. M.R.Srinivasan, "Physics for Engineers" New Age International, 2002-2003.
2. M.N. Avadhanulu & P.G. Kshirasagar, "Engineering Physics", 1st edition, S. Chand & Company Ltd, 1992.

REFERENCE BOOKS :

1. Halliday, Resnic and Walker, "Fundamentals of Physics", 6th edition, John Willey publishers, 2003.
2. Grawfor F.S., Berkley Physics courses, "Waves and Oscillations", Volume III McGraw Hill, 1992.
3. V. Raghavan, "Materials Science and Engineering", 5th edition, Prentice-Hall India, 2004.
4. S.O.Pillai, "Solid State Physics", 6th edition, New Age International Publications, Revised, 2005.

I Year B.Tech. Biotechnology I - Semester

L	T	P	To	C
4	-	-	4	4

ME 101 ENGINEERING MECHANICS

Course description and Objectives :

The course aims to impart the knowledge to understand the forces and their reactions on various static and dynamic conditions.

Course Outcomes:

1. Use scalar and vector analytical techniques for analyzing forces in statically determinate structures.
2. Solve the engineering problems in case of equilibrium conditions and to calculate the reaction forces of various supports of different structures.
3. Determine the centroid, centre of gravity and moment of inertia of various surfaces and solids.
4. Solve the problems involving dry friction.
5. Apply fundamental concepts of kinematics and kinetics of particles to the analysis of simple, practicalproblems.

UNIT I - Basic Concepts and Principles of Statics :

Introduction to Engineering Mechanics, Scalar and Vector quantities, Forces, Characteristics of a force, Definitions and examples of various types of force systems, Law of transmissibility, Definition of resultant, Composition and resolution of forces, Moment of a force, Principles of moments of force, Couples, characteristics of a couple, Transformations of a couple, Resultants of Force Systems, Possible resultants of different types of force systems, Resultant of a concurrent coplanar force system, Resultant of a non concurrent coplanar force system

UNIT II - Equilibrium of Rigid Bodies

Free body diagrams, Types of supports and their reactions, requirements of stable equilibrium, Equations of equilibrium of a concurrent coplanar force system, Equilibrium of Bodies acted on by two or three forces, Equilibrium of bodies acted on by non-concurrent coplanar force system

UNIT III - Properties of Surfaces and Solids :

Centroid and Center of Gravity: Centre of gravity of parallel forces in a plane, centroids and center of gravity of composite bodies, Distributed Loads on Beams.

Moments of Inertia: Definition, Parallel axis theorem and perpendicular axis theorem for areas, Polar Moment of inertia, Second moment of area by integration, Radius of gyration of areas, Moments of inertia of composite areas.

UNIT IV - Friction :

Nature of friction, Laws of friction, Coefficient of friction, Angle of friction, Cone of friction, Types of Friction - Sliding Friction, Rolling Friction, Belt Friction, Ladder Friction, Wedge friction.

UNIT V - Kinematics and Kinetics :

Absolute Motion: Introduction, Recapitulation of basic terminology of mechanics, Displacement, Velocity and acceleration their relationship, Rectilinear motion of a particle

Relative Motion: Introduction to kinematics of relative motion, Relative displacement, Relative velocity

Kinetics: Introduction to Kinetics, Force, Mass and Acceleration, Newton's Laws of motion, Equation of motion for a particle, D Alembert's principle, Rectilinear translation of a rigid body, Work done by a force, Work done by a force system, Energy, Potential energy, Kinetic energy, Principle of Work and kinetic energy, Conservation of energy, Linear impulse, Linear momentum, Principle of linear impulse and linear momentum, Conservation of linear momentum.

TEXT BOOKS :

1. J. L. Meriam, L. G. Kraige, “Engineering Mechanics: Dynamics”, 7th ed., John wiley & sons, 2012
2. A. K. Tayal, “Engineering Mechanics”, Umesh Publications, 2005.

REFERENCE BOOKS :

1. L. Singer - Harper, “Engineering Mechanics”, 3rd ed., Fedinand . , Collins, 1975.
2. Timoshenko & Young, “Engineering Mechanics”, 4th ed., Tata McGraw Hill, New Delhi, 2007.
3. S. S. Bhavakati & J. G. Rajasekharappa, “Engineering Mechanics”, 3nd ed., New Age International Publications, New Delhi, 2008.

I Year B.Tech. Biotechnology I - Semester

L	T	P	To	C
3	2	-	5	5

HS 114 TECHNICAL ENGLISH COMMUNICATION

Course description and Objectives :

To introduce students to the specific use of language for the purposes of Technical Communication which would be an essential prerequisite for success in the areas of writing and speech. The teaching efforts in this course will be directed towards making students develop their technical and non-technical writing abilities using the fundamental principles that apply to the correct use of the English language free of grammatical and other related errors.

Course Outcomes:

Students shall achieve the ability to write and demonstrate college-level proficiency in the following:

1. Clear and effective communication of meaning in speaking and writing.
2. The ability to perform effectively the essential steps of the writing process (Note making, organizing, composing, revising, and editing).
3. The ability to explain, develop, and criticize ideas effectively.
4. Effective organization within the paragraph and the essay.
5. Accuracy, variety, and clarity of sentences.
6. Appropriate diction.
7. Control of conventional mechanics (e.g., punctuation, spelling)

UNIT - I

- Text : Environmental Consciousness
  (Climate Change – Green Cover – Pollution)
- Grammar : Articles – Prepositions – Sentence Types and Construction
- Vocabulary : Root – Prefixes - Suffixes
- Composition : Paragraph Writing (Descriptive & Narrative)

- Lab Practice : Introduction to Phonetics

  (Organs of Speech; Consonants, Vowels & Diphthongs; Syllable, Stress & Intonation)

UNIT - II

- Text : Emerging Technologies

  (Solar Power – Cloud Computing – Nanotechnology)
- Grammar : Time and Tense (Present-Past-Future; Helping Verbs; Modals)
- Vocabulary : Synonyms – Antonyms
- Composition : Note-making
- Lab Practice : Grammar Practice (Speaking of past, present & future)

UNIT - III

- Text : Energy

  (Renewable and Non-renewable Sources – Alternative Sources – Conservation – Nuclear Energy)
- Grammar : Subject-Verb Agreement - Sentence Construction

  (Characteristics of Technical Writing)
- Vocabulary : Idioms & Phrases
- Composition : Summarizing
- Lab Practice : Situational Conversations – Role-Plays

  (Introducing; Greeting; Enquiring; Informing; Requesting; Inviting)

UNIT - IV

- Text : Engineering Ethics

  (Challenger Disaster – Biotechnology – Genetic Engineering – Protection from Natural Calamities)
- Grammar : Sentence Transformation (Degrees, Voice, Speech & Synthesis)

- Vocabulary : Phrasal Verbs
- Composition : Letter Writing (Informal)
- Lab Practice : Situational Conversations – Role-Plays (Emotions; Directions; Descriptions; Agreements; Refusals; Suggestions)

UNIT - V

- Text : Travel and Tourism (Advantages and Disadvantages of Travel-Tourism – Atithi Devo bhava – Tourism in India)
- Grammar : Common Errors
- Vocabulary : One-word Substitutes
- Composition : Letter Writing (Formal)
- Lab Practice : Group Discussions

TEXT BOOK:

Mindscapes - English for Technologists and Engineers, Orient Black Swan, 2012.

REFERENCE BOOKS :

1. V. R. Narayana Swamy***, "Strengthen Your Writing",*** 1st edition, Orient Longman, 2003.
2. Thomas Elliott Berry***, "The Most Common Mistakes in English Usage",*** 1st edition, Tata McGraw Hill, 2004.
3. T. Balasubramanyam, ***A Textbook of English Phonetics for Indian Students***, Macmillan Ltd., 2000.
4. Sasikumar.V and P.V. Dhamija,. ***Spoken English: A Self-Learning Guide to Conversation Practice,*** 34th Reprint, Tata McGraw Hill, New Delhi, 1993.
5. Margaret M Maison, **"Examine your English",** 1st edition**,** Orient Longman, 1999.
6. Ashraf Rizwi, "***Technical English Communication***", Tata McGraw Hill, Latest Edition.i

I Year B.Tech. Biotechnology I - Semester

L	T	P	To	C
5	-	-	5	5

CS101 PROBLEM SOLVING AND COMPUTER PROGRAMMING

Course description and Objectives :

Aim of this course is to introduce the techniques of problem solving and concepts of programming language to the students. Because of its popularity and suitability to develop different types of applications, 'C' language has become the de-facto programming language to engineers. A comprehensive introduction of C language is offered through this course to enable the students to write diversified programs.

Course Outcomes:

On Completion of this course student should be able to

1. Able to understand the basic terminology used in computer programming and to write, compile and debug programs in C language.
2. Use different data types in a computer program and design programs involving decision structures, loops and functions.
3. Able to understand the allocation of dynamic memory using pointers
4. Use different data types to create/update basic data files.

UNIT I - Fundamentals of computers

Basic functional units and discrete components of a computer, computer networks, networking components, Binary representation of integers and real numbers, ASCII, EBCDIC, Unicode, Generations of computer languages.

UNIT II - Problem Solving Steps and Basic of C Language

Problem understanding, Formulating a mathematical model, Development of an algorithm, Representation of an algorithm, Flow chart and Pseudo code, Coding, Testing and Debugging, Comments, Processor statement, Function header statement, Variable declaration statement and Executable statement, C Character Set, constants, identifiers, operators, punctuations, keywords, Basic data types, modifiers, identifiers, variables, C scopes, type qualifiers, storage class specifiers, variable initializations, constants, reading and writing characters, formatted I/O.

UNIT III – Preliminaries of C

Assignment, arithmetic , relational, logical, bitwise, ternary, address, indirection, sizeof, dot, arrow, and parentheses operators, Expressions Precedence of operators and associatively, Category of Statements, Selection, Iteration, jump, label, expression and block, Function declaration, prototype, definition, calling by value and address, standard library functions and recursive functions.

UNIT IV - Arrays and Pointers

Declaration, initialization, reading, writing, accessing and passing as a parameter to functions, Multidimensional arrays and String functions, pointer expressions, pointer and arrays, multiple indirection, initializing pointers, pointer to functions, Dynamic memory allocation functions.

UNIT V - Structures and File Processing

Declaration, initialization and accessing, array of structures and passing structures to functions, structure pointers, arrays and structures within structures, unions, bit-fields, typedef and enumerations, I/O and processing operations on text and binary files. pre-processor directives.

TEXT BOOKS :

1. Reema Thareja, “Introduction to C Programming”, Oxford University Press, India, 2013
2. Herbert Schildt, C: “The Complete Reference”, 4th Edition, Tata McGraw-Hill, 2000.

REFERENCE BOOKS :

1. E. Balagurusamy, “ Programming in ANSI C”, 4TH Edition, Tata McGraw- Hill, 2008.
2. R Ravichandran and T Jeyapoovan, “ Computer Programming with C”, Soni Graphics, India, 2014.

I Year B.Tech. Biotechnology I - Semester	L	T	P	To	C
	2	-	-	2	-

CS 105 NETWORK SECURITY

Course description and Objectives :

This Course focuses towards the introduction of System, Information and Network security using various methodologies. It also focuses on the practical aspects that have been used to provide e_mail and web security.

Course Outcomes:

On Completion of this course student should be able to

1. understand the Importance of Information Security
2. Know the ways to protect the information
3. understand the Firewall importance
4. understand the need of Virtual Private Networks.

UNIT I - History of security :

History of security – Physical security, communications security, emissions security, computer security, network security and information security. Security process - Anti-virus software, access controls, firewalls, smart cards, biometrics, intrusion detection, policy management, vulnerability scanning, encryption, physical security mechanisms.

UNIT II - Access attacks

Snooping, eavesdropping, interception; Modification attacks - Changes, insertion and deletion; Denial of service attacks- Denial of access to information, applications, systems and communication; Repudiation attacks - Masquerading and denying an event. Hacking - Hacker motivation, historical hacking techniques, IP spoofing and malicious code.

UNIT - III

Confidentiality of files, information in transmission and traffic flow, integrity, availability and accountability; Integrity of files and information during transmission; Availability - backups, failover and disaster recovery; Accountability – identification and authentication, and audit.

UNIT - IV

Concepts of firewalls, Application layer and packet filtering firewalls; Virtual Private Networks.

UNIT - V

Basic encryption concepts, Private Key encryption standards-DES, triple DES and AES. Public key encryption – RSA. Concepts of digital signatures.

TEXT BOOKS :

1. Eric Maiwald, Fundamentals of Network security, Dreamtech Press, 2007.

REFERENCE BOOKS :

1. William Stallings, "Cryptography and Network security", 4th edition, Pearson Education, 2010

I Year B.Tech. Biotechnology I - Semester

L	T	P	To	C
-	-	3	3	3

CS 107 COMPUTER PROGRAMMING LAB

Course description and Objectives :

To familiarize the students in preparation of documents and presentations with office automation tools. A comprehensive problem solving skills through C language is offered to enable the students to write diversified solutions using this language.

Course Outcomes:

1. Able to write, compile and debug programs in C language.
2. Able to formulate problems and implement algorithms in C.
3. Able to effectively choose programming components that efficiently solve computing problems in real-world

List of Experiments :

1. Write A Program to find simple Interest, compound interest
2. Write A Program to covert given temperature from C to F & F to C
3. Write A Program to check Entered number is positive or zero or Negative
4. Write A Program to print given year is Leap year or not
5. Write A Program to do arithmetic operations using switch
6. Write A Program to find biggest among 3 Numbers
7. Write A Program to print grade of a student for 5 sub avg>70(A), 60-70(B), 50-60(C),<50(F)
8. Write A Program to find Roots fo Quadratic Equation
9. Write A Program to find sum of individual digits of a given number
10. Write A Program to check whether the given number is PALINDRAM or not
11. Write A Program to check whether the given number is PERFECT or not
12. Write A Program to check whether the given number is PRIME or not
13. Write A Program to check whether the given number is ARMSTRONG or not
14. Write A Program to check whether the given number is STRONG or not
15. Write A Program to find sum of Natural Numbers

16. Write A Program to print the following triangle

```
      1
    2   3
  4   5   6
7   8   9   10 etc……….
```

17. C Progrm to find Factorial of Given number using Recursive and Non Recursive Functions.
18. Write A Program to print Fibonacci Series upto given limit using recursive, Non recursive
19. Write program in C for determining the minimum and maximum and sum of elements of an array of ‘n’ elements and searching for a given element.
20. C Program for computing range, mean and standard deviation of a given numeric dataset.
21. Write A Program in C for performing addition, subtraction, multiplication and transpose operations on matrices.
22. Write program to perform the following string operations on the given string. a) string length b) string copy c) string concatenation d) string comparison e) reverse string f) sub string
23. Write A Program to read student record (no, name, marks1, marks2, marks3, marks4, marks5, calculate average and Grade) and display the student record.
24. Write A Program to do arithmetic operations using pointers.
25. Write A Program to create two data files and copy the content of these two data files as a single file in another new file?

REFERENCE BOOKS :

1. Reema Thareja, “Introduction to C Programming”, Oxford University Press, India, 2013
2. Herbert Schildt, C: “The Complete Reference”, 4th Edition, Tata McGraw-Hill, 2000.
3. E. Balagurusamy, “ Programming in ANSI C”, 4TH Edition, Tata McGraw- Hill, 2008.
4. R Ravichandran and T Jeyapoovan, “ Computer Programming with C”, Soni Graphics, India, 2014.

I Year B.Tech. Biotechnology I - Semester

L	T	P	To	C
-	-	3	3	2

ME 105 WORKSHOP PRACTICE

Course description and Objectives :

To provide the hands on experience to the students on basic workshop skills.

Course Outcomes:

After completion of this course, students will be able to identify various tools connected to all the trades. They are also able to make various objects to the given dimension by using various types of tools.

Trades for exercises:

1. Carpentry:
2. Fitting
3. Tin Smithy & Black smithy
4. House wiring
5. Foundry & Welding (Demonstration)
6. Machine shop & CNC (Demonstration)
7. IT Workshop
8. Study of discrete components of computer and networking (1 session)
9. Demonstration of assembling a computer, disk partitioning and installation of system and application software. installation of modem etc. (2 sessions)

Note: In each trade, the students has to perform at least two jobs

TEXT BOOKS :

1. S.K. Hazra Choudhury, Elements of workshop Technology, 11^{th} Edition, Media Promoters, 1997
2. Gopal, T.V., Kumar, T., and Murali, G., A first course on workshop practice – Theory, Practice and Work Book, Suma Publications, Chennai, 2005.
3. Venkatachalapathy, V. S., First year Engineering Workshop Practice, Ramalinga Publications, Madurai, 1999.

I Year B.Tech. Biotechnology I - Semester

L	T	P	To	C
-	-	3	3	2

HS 120 ENGINEERING PHYSICS LAB

Course description and Objectives :

This lab is intended to make the students realize the theoretical concepts of physics having hands on experience in conducting the following experiments. Students may have to take up any 10 experiments from each section.

Course Outcomes:

1. Students realize concept of resonance of sound conducting the experiment of Sonometer Melde's experiment and volume generator.
2. The students understand the concepts of light conducting the experiments of dispersion of light, diffraction of light, optical fibers and lasers.
3. The students acquire the knowledge of magnetic field theory, thermal energy and elastic properties by conducting the experiments of field along the axis of circular coil, Lee's experiment, Seebeck effect and Torsional pendulum.

PHYSICS LAB

1. Verification of laws of transverse vibrations in stretched string - Sonometer
2. Melde's Experiment - Transverse and Longitudinal modes.
3. Determination of Rigidity modulus of a material in the form of a wire - Torsional pendulum
4. Dispersive power of the material of a Prism - Spectrometer
5. Determination of wavelength of a monochromatic light source - Diffraction Grating.
6. Field along the axis of a circular coil – stewart Gee's apparatus.
7. Volume Resonator.
8. Band gap of semiconductor
9. Hall coefficient
10. Thermal conductivity of bad conductor Lee's method
11. Optical Fiber – Determination of numerical aperture
12. Solar Cell
13. Seebeck effect

REFERENCE BOOKS:

1. Vogel's Text book of qualitative Chemical Analysis J.Mendham, R.C Denney, J.D. Bares, M.Thomas & B. Siva Sankar, Pearson Publications – Volume I (2009).

I Year B.Tech. Biotechnology II - Semester

L	T	P	To	C
4	-	-	4	4

HS 116 MATHEMATICS FOR BIOTECHNOLOGISTS - II

Course description and Objectives :

Without mathematics not a single day of an engineer will pass! In this course we start with matrices, solving system of equations. Continue with higher order differential equations. We also study Laplace Transformations using which we can solve differential equations. When data is given at only a finite points, we use numerical methods for find the approximate values of functions, also to solve differential equations approximately etc.

Course Outcomes:

1. The students will be able to use Laplace transformations in solving differential equations.
2. Definite integrals can be evaluated using Laplace transforms.
3. They will analyze the data, when the data is given at only a finite point.
4. They will use numerical methods for finding the approximate values of functions and will solve differential equations.
5. Numerical integration can be applied in finding approximate areas.

UNIT I - Matrices :

Types of Matrices, determinants, Inverse of a square matrix, Rank of matrix, Echelon form, Solving of simultaneous equations by Cramer's method, Matrix inversion, Gauss Jordan methods, Solutions for linear equations, Eigen values & Eigen Vectors, Cayley-Hamilton theorem (without proof).

UNIT II - Higher Order O.D.E :

Non homogenous linear differential equations of second and higher order with constant coefficients with RHS term of the form e^{ax}, Sin ax, Cos ax, Polynomials in x.

UNIT III - Laplace Transforms :

Laplace transforms of some standard functions, linearity property, shifting theorems, change of scale properties, multiplication by powers of t, division by t, Inverse Laplace transforms, shifting properties, finding inverse Laplace transforms by partial fractions, multiplication by powers of s, division by Applications of L.T. for solving ordinary differential equations.

UNIT - IV : Numerical Methods – 1 : Bisection, Newton Raphson, Successive approximation methods.

Interpolation: Lagrange, Newton's forward & backward, Guass's forward & backward interpolation methods.

UNIT V - Numerical Methods – 2 :

Numerical integration by trapezoidal & Simpson's Rules.

Numerical solutions to differential equations : Euler, Runga Kutta Methods.

TEXT BOOKS :

1. *T.K.V.Iyengar, and others*, "Engineering Mathematics" Volume – I, 2009, S.Chand and Company.
2. *T.K.V. Iyengar, and others*, "Mathematical Methods, S.Chand and Company, 2009.

REFERENCE BOOKS :

1. *B.S.Grawel*, "Higher Engineering Mathematics", Khanna Publishers.
2. *Peter V.O Neil*, "Advanced Engineering Mathematics", Thomson Broocks/cole.
3. *Erwin Kreyszig*, "Advanced Engineering Mathematics", 8th Edition, John Wiley & Sons (Asia) Pvt. Ltd. 2001.

I Year B.Tech. Biotechnology II - Semester

L	T	P	To	C
3	-	-	3	3

HS 118 ENVIRONMENTAL STUDIES

Course description and Objectives :

The objective of this course is to heighten on awareness of nature and its importance to students

and make them understand the need to make judicious use of all natural resources for long team sustenance of life on this planet.

Course Outcomes:

1. To provide Knowledge on importance of natural resources and integrate technical “field” knowledge with analytical skills to prevent natural resources depletion
2. To maintain healthy and Diverse Ecosystems ,
3. Work together to conserve the biodiversity
4. Take immediate measures to control the Pollution
5. Adopt Ecofriendly technology.
6. Maintenance of hygienic conditions

UNIT I - Environment and Natural Resources :

Environment: Definition, Scope and Importance – Need for Public Awareness

Natural Resources: Renewable and non-renewable resources – Natural resources and associated problems – Forest Resources: Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources: Use and over utilization of surface and ground water – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources - Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity–Energy resources: renewable and non-renewable energy sources, alternate energy sources. Land resources: Land as a resource, land degradation, Soil erosion – case studies - Role of an individual in conservation of natural resources.

UNIT II - Ecosystems and Biodiversity :

Ecosystem: Concept of an ecosystem. – Complete and incomplete ecosystem - Structure and functions of an ecosystem - Ecological succession. - Food chains, food webs -Structure and functional features of the following ecosystem: a. Forest ecosystem b. Grassland ecosystem c. Desert ecosystem, d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) **Biodiversity**: introduction of biodiversity, Bio-geographical classification of India - Value of biodiversity- Biodiversity at global, National and local levels - Hot-spots of biodiversity - Threats to biodiversity - Endangered and endemic species of India – Conservation of biodiversity

UNIT III - Environmental Pollution and Applications of Remote Sensing / GIS on Environment

Definition, Cause, effects and control measures of: Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution - Solid waste Management: Causes, effects and control measures of municipal and industrial wastes - Climate change, global warming, acid rain, ozone layer depletion -Case Studies - Role of an individual in prevention of pollution - Pollution case studies. – Green technology and its concept, role of green technology in controlling environmental problems.

UNIT IV - Social issues and EIA :

Sustainable development -water conservation: Cloud Seeding (Artificial rain making system), rainwater harvesting, watershed management - Disaster management: floods, earthquake, cyclone and landslides - Environment Protection Act. - Air (Prevention and Control of Pollution) Act. - Water (Prevention and control of Pollution) Act - Wildlife Protection Act - Forest Conservation Act

EIA: introduction to E.I.A.-definition of E.I.A and E.I.S – scope and objectives of E.I.A.- methods of E.I.A –CEIA, REIA, MOEF, CPCB, SPCB – Importance of E.I.A in proposed Projects / Industry /

Developmental activity - Remote sensing / GIS: Introduction of remote sensing / GIS, definition of remote sensing, applications of the remote sensing on environment (site selection, land use/land cover pattern, water/air/soil quality models, a criteria of environmental information systems)

UNIT V - Environmental Sanitation :

Food sanitation: food and drugs Act, food preservations, food borne diseases-Milk sanitation: tests for milk, pasteurization of the milk - water borne diseases-air borne diseases-viral diseases (HIV/AIDS, SARS, bird-flu, anthrax)- maintenance of sanitary and hygienic conditions

Field Work/Environmental Visit: Visit to a local area to document environmental assets – river/ forest/ grassland / hill /mountain - Study of local environment - common plants, insects, birds - Study of simple ecosystems – pond, river, hill, slopes etc - Visits to industries, water treatment plants, effluent treatment plants

TEXT BOOKS :

1. Y. Anjaneyulu, “Introduction to Environmental Science”, B S Publications, 2008.
2. Dr. M. Chandrasekhar, “A Text book of Environmental Studies”, HI-TECH publications, 2006

REFERENCE BOOKS :

1. Dr. M. Anji Reddy, “A Text book of environmental science and Technology”, B S Publications, 2008
2. Dr. K. Mukkanti, “A Text book of Environmental Studies”, S.CHAND Company Ltd, 2009.
3. EHILRS and ST, “Text book of Municipal and Rural Sanitation”, M.S Hill, 1998.
4. C. S. Rao, Wiley Eastern Ltd, “Environmental Pollution Control Engineering”, New Age International Ltd, 2001
5. Dr. M. Anji Reddy, “Introduction to Remote Sensing”, B S Publications, 2004.
6. Kurian Joseph and R.Nagendram, “Essentials of environmental studies”, Pearson Education Pt Ltd, Delhi, 2007.
7. Sharma & Kour “Text book of Environmental pollution”.
8. H.C Perkins “Text book of Air Pollution”.

II Year B.Tech. Biotechnology II - Semester

L	T	P	To	C
4	-	-	4	4

EE 111 FUNDAMENTALS OF ELECTRICAL ENGINEERING

Course description and Objectives :

To understand the basic concepts, laws, techniques in analyzing various DC and AC circuits and concepts in coupled circuits. Study of construction details, working of various electrical machines and Semiconductor Devices and operation

Course Outcomes:

1. Able to explain the notation and components of electric circuits
2. Able to analyze DC and single phase and three phase AC circuits using different methods and theorems
3. Able to operate various electrical machines.
4. Able to explain the concepts of Semiconductor Devices and operation

UNIT I - Fundamentals Of DC Circuits

Circuit Concepts: Concepts of network, Active and passive elements, voltage and current sources, concept of linearity and linear network, unilateral and bilateral elements, R, L and C as linear elements. Ohm's Law – Kirchhoff's Laws –application to simple series, parallel circuits, mesh and nodal analysis of simple resistive circuits.(simple numerical problems).

UNIT II - Fundamentals of A.C. Circuits:

Generation of A.C. voltage - frequency, average value, R.M.S. value, form factor, peak factor for sinusoidal only - phasor representation of alternating quantities. Analysis of simple series and parallel A.C. circuits-(simple numerical problems)

Balanced Three phase systems – relation between phase and line quantities of voltages and currents in star and delta connected systems (Elementary treatment only)

UNIT III - Fundamentals of Electromagnetism and Transformers:

Concepts of Magneto motive force, reluctance, flux and flux density , concept of Self Inductance and Mutual Inductance, Coefficient of coupling-only elementary treatment. (simple numerical problems).

Transformers: Principle of operation of single phase transformer – constructional features – EMF equation (simple numerical problems)

UNIT IV - Electrical Machines:

DC Machines: Constructional details of a D.C. Machine.

D.C. Generator – Principle of operation – EMF equation – types of D.C. generators (simple numerical problems)

D.C. Motor – Principle of operation – Torque equation – types of D.C. motors (simple numerical problems)

A.C Machines: Principle of operation of three phase induction motors – slip ring and squirrel cage motors – Torque equation derivation, Constructional details of synchronous machines.

UNIT V - Semiconductor Devices:

Classification of solids based on energy band theory - Intrinsic semiconductors - Extrinsic semiconductors - P type and N type semiconductors - P-N junction diode and its characteristics –Half and Full wave rectifiers- Zener diode and its characteristics - Voltage regulator. Bipolar junction transistor – Operation-Types- Applications.

TEXT BOOKS:

1. Mittle, V.N., “Basic Electrical Engineering”, 2nd ed., TMH, New - Delhi, 1990.
2. V.K.Mehta,”Principles of Electrical Engineering and Electronics”, 3rd ed., S. Chand Publications, New Delhi, 2010.

REFERENCE BOOKS:

1. Millman & Halkias, “Integrated Electronics”, McGraw Hill, 1979.
2. A.K. Thereja & B.L. Thereja, “Electrical Technology”, Vol. – II, S.Chand Publications, 2007.
3.. U.Bakshi & A.Bakshi, “Basic Electrical Engineering”, 1st ed., Technical Publications, Pune, 2005.
4. U.Bakshi & A.Bakshi, “Basic Electrical Engineering”, 1st ed., Technical Publications, Pune, 2005.

I Year B.Tech. Biotechnology II - Semester	L	T	P	To	C
	4	-	-	4	4

HS 117 ENGINEERING CHEMISTRY

Course description and Objectives :

Chemistry is the backbone in designing and understanding the nature and properties of various engineering materials. Currently, the electronics and computer engineers are waiting for suitable polymers for using miniature super computers. So this subject develops fundamental knowledge about new engineering materials and their significance in technical fields and industrial sectors. Water is an essential element for the existence of human, plant and animal lives, besides that it has greater industrial applications. The knowledge about water is the basic requirement for a professional student. Characterization of materials with instrumental techniques is essential for engineers.

Course Outcomes:

1. Differentiate between soft and hard water. Understand the disadvantages of using hard water domestically and industrially. Select and apply suitable softening methods (Soda-lime, zeolite, ion-exchange methods, etc.) to soften the hard water for industrial and domestic applications.
2. Acquaintance of primary and secondary cells, Hydrogen-Oxygen and Methanol fuel cells, dry and wet corrosions, corrosion controlling methods
3. Acquaintance of the properties and engineering applications of Ceramics, Refractories, Glasses, Cement, Abrasives, Lubricants
4. Acquaintance of Preparation, properties and applications of different polymers (Polyethylene, PVC, Tefflon, Bakelite,Urea-Formaldehyde, Silicones, Rubber – Vulcanization, Synthetic Rubbers-(Buna-S, Buna-N, Neoprene); treatment of membranes.
5. Acquaintance of various spectroscopic methods (UV-visible / IR), Beer-Lambert's Law, qualitative and quantitative analysis, block diagrams of UV and IR spectrophotometers.

UNIT I - Water Technology :

Introduction-Hardness of water-Determination of hardness by EDTA-Disadvantages of hard water-Scales & Sludges-Caustic embrittlement-Boiler corrosion-Priming & Foaming, WHO, BIS Standards of water-Softening Methods- Lime Soda process, Zeolite process, Ion Exchange process - Desalination of brackish water-Reverse osmosis, Electro dialysis.

UNIT II - Electrochemical cells and AND Corrosion:

Electrochemical cells: primary cell-(Dry or lecalanche cell), Secondary cell-(Lead-acid storage cell, Lithium ion battery), Hydrogen-Oxygen Fuel cell, Methanol fuel cell.

Corrosion: Introduction-Dry corrosion (chemical)-Wet corrosion (electrochemical)-Mechanism of wet corrosion-Bimetallic corrosion-Concentration cell corrosion-Factors influencing corrosion-Corrosion control methods- Cathodic protection and Electroplating.

UNIT III - Engineering Materials :

Properties and engineering applications of Ceramics, Refractories, Glasses, Cement,Abrasives, Lubricants.

UNIT IV - Polymers :

Introduction –Types of polymerization-Preparation, properties and applications of Polyethylene, PVC, Tefflon, Bakelite, UreaFormaldehyde, Silicones, Rubber – Vulcanization, Synthetic Rubbers - (Buna-S, Buna-N, Neoprene). Elementary treatment of Membranes

UNIT V - Instrumental Techniques :

Interaction of radiation with matter,UV-Visible Spectroscopy-Beer – Lambert's law ,Qualitative and Quantitative Analysis,Block diagram of UV-Visible Spectrophotometer.IRSpectroscopy-Types of Vibrations,Identification of functional groups,Block diagram of IR Spectrophotometer.

TEXT BOOKS :

1. P.C Jain and Monica Jain, "Engineering Chemistry", 15th edition, Dhanpat Rai Publications 2009.
2. Gurudeep Raj and Chatwal Anand, "Instrumental Methods of Analysis", 5th edition, Himalaya Publications, 2007.

REFERENCE BOOKS :

I Year B.Tech. Biotechnology II - Semester	L	T	P	To	C
	4	-	-	4	4

BT 101 ELEMENTS OF BIOLOGY & BIOTECHNOLOGY

Course description and Objectives :

This course will provide fundamental aspects of Biology - Introduction and concepts abouts various biological systems, their functional metabolism and their significance in both industrial and management of natural resources (microorganisms, plants & animals) and their conservation. Biotechnology is one of the most precious and significant multidisiciplinary thrust area in the field of modern science and technology will provides the information about the concepts of developments in their -scope and importance in various fields like agriculture, health care, environment and industry, has already been visible and the efforts are now culminating into products and processes.

Course Outcomes:

The anticipated knowledge, skills and/or attitude to be developed by the student are: :

1. Be able to define the term "biotechnology" and appreciate its scope
2. Have an awareness of the global significance of biotechnology and its resultant industries, and a broad knowledge of which are represented nationally and locally
3. Be able to state the broad categories of biotechnological processes based on the products formed and/or the process or substrates used, and have detailed knowledge of examples of each of these
4. Have an understanding of the multidisciplinary nature of biotechnology and the associated role that has been played by enabling technologies in the development of biotechnology
5. Have an awareness of some of the current and future issues surrounding the relationship between biotechnology and government, investors, the environment and consumers and the impact of these on the development of future biotechnology enterprises.

UNIT I - Introduction to Biotechnology & Applications :

Biotechnology – definition, history, possible and thrust areas of biotechnology, Elements of Bio-Process Engineering, Various Biotech Industries, Basic concepts of GLP, GMP, FDA, Bioethics & IPR etc., Scope and Importance of Biotechnology and allied fields.

UNIT II - Introduction to Biological Systems :

Introduction -Diversity in biological systems,Cell biology and cell structure, Differences between Prokaryotes & Eukaryotes. Kingdom systems. Five-kingdom classification General characters, useful and harmful effects of Bacteria, Viruses, Algae, Fungi and Protozoans.

UNIT III - Plant Biology:

Classification of Plant Kingdom, Concepts of Growth, Meristems, development of different plant organs, Plant growth regulators; Photo synthesis: different types of photosynthesis, chlorophyll as trapper of solar energy, Photosynthetic reaction centers - PSI & PSII, differences in C3, C4 & CAM plants. Concepts of Plant Pathology: Brief account of Plant diseases, types, disease control measures & IPM (Integrated Pest Management) practices.

UNIT IV - Animal Biology:

Classification of Animal Kingdom, Functions, Morphology, Growth and Reproduction, Phylogeny of Invertebrata & Vertebrata Phyla & Economic importance of species. Brief account on Ecology, Concepts of Species & Ecosystem. Morphology, Nutrition, Locomotion and Reproduction. Protozoan Parasites – in man *(Plasmodium, Entamoeba histolytica),* Helminthes *(Fasciola sp., Taenia solium, Ascaris).*

UNIT V - Concepts of Human Biology :

Introduction of body as a whole, Cells and Tissue Organization, Electrolytes and Body fluids. Physiology of Blood, Digestive system, Respiratory system and Endocrine System, axons and neurons, Neuromuscular and synaptic junctions, Sensory systems - hearing, taste, smell and visual receptors.

TEXT BOOKS :

1. A.J. Lack, “An Instant notes on Plant Biology” , 1st ed., Viva Publications, 2003.
2. Richard D. Jurd “An Instant notes on Animal Biology”, VIVA Publications, 2003.

REFERENCE BOOKS :

1. John B Reece, et al., Compbell Biology, 9th Ed, Pub, Benjamin & Cummings, 2012.
2. H.K. Das, “Text Book of Biotechnology”, 3rd ed., Wiley India Publication, 2007.
3. F.B Salisbury & C.W. Ross, “Plant Physiology”, 4th ed., Thomson Wadsworth Pub., 2007.

I Year B.Tech. Biotechnology II - Semester

L	T	P	To	C
2	-	-	2	-

HS 119 PROFESSIONAL ETHICS, VALUES AND HUMAN RIGHTS

Course description and Objectives :

To create an awareness on Engineering Ethics and Human Values. To instill Moral and Social Values and Loyalty . To appreciate the workplace rights of Others, responsibilities and Safety of others.

Course Outcomes:

The course will enable the students to attain the following:

1. an understanding of professional and ethical responsibility in workplace
2. the broad education necessary to understand the impact of engineering solutions in a global and societal context
3. a knowledge of contemporary issues related to human and professional interactions at workplace
4. an engineer's life-long commitment to serve the disadvantaged

UNIT I - Human Values :

Morals, Values and Ethics – Integrity – Work Ethic – Service Learning – Civic Virtue – Respect for Others – Living Peacefully – Caring – Sharing – Honesty – Courage – Valuing Time – Co-operation – Commitment – Empathy – Self-Confidence – Character – Spirituality.

UNIT II - Engineering Ethics & **Engineering as social experimentation :**

Engineering Ethics : Variety of moral issues – types of inquiry moral dilemmas – moral autonomy – The problems of Many Hands – Kohlburg's theory – Gilligan's theory Impediments to Responsible Action.

Engineering as social experimentation - Codes of ethics - a balanced outlook on law - the challenger case study.

UNIT III - Engineer's Responsibility for Safety :

Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis – Reducing Risk – The Government Regulator's Approach to Risk - Chernobyl Case Studies and Bhopal.

UNIT IV - Workplace Rights and Responsibilities & Work Environment :

Workplace Rights and Responsibilities : Engineers and Managers. Oganizational complaint procedures. Government agencies. Resolving Employee concerns. Limits on acceptable behaviour in large corporation.

Work Environment : Ethical and legal considerations, Organizational responses to offensive behaviour and harassment. Ethics in a Global Context.

UNIT V - Global Issues :

Multinational Corporations – Business Ethics - Environmental Ethics – Computer Ethics - Role in Technological Development – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Honesty – Moral Leadership – Sample Code of Conduct.

TEXT BOOKS :

1. Mike Martin and Roland Schinzinger, “Ethics in Engineering”, McGraw Hill, New York, 2005.

REFERENCE BOOKS :

1. Prof. (Col) P S Bajaj and Dr. Raj Agrawal, “Business Ethics – An Indian Perspective”, Biztantra, New Delhi, 2004
2. Charles E Harris, Michael S. Protchard and Michael J Rabins, “Engineering Ethics – Concepts and Cases”, Wadsworth Thompson Learning, United States, 2000 (Indian Reprint now available)
3. Engineering Ethics-An industrial Perspective, Gail Dawn Baura
4. Charles E Harris, Michael S Pritchard and Michael J Rabins, “Engineering Ethics – Concepts and Cases”, Thompson Learning, 2000.
5. Charles E Harris, Michael S Pritchard and Michael J Rabins, “Engineering Ethics – Concepts and Cases”, Thompson Learning, 2000.
6. PSR Murthy, “Indian Culture Values and Professional Ethics”, BS Publications
7. Edmund G Seebauer and Robert L Barry, “Fundamentals of Ethics for Scientists and Engineers”, Oxford University Press, Oxford, 2001.

I Year B.Tech. Biotechnology II - Semester

L	T	P	To	C
-	-	3	3	2

HS 121 ENGINEERING CHEMISTRY LAB

Course description and Objectives :

This lab is intended to make the students enlighten with the theoretical concepts of chemistry. Instrumental techniques are useful for characterization of materials for future engineers.

Students may have to take up any 10 experiments from the following experiments.

Course Outcomes:

1. To enable the students to analyse the hardness & chlorides in the potable water.
2. To help students to determine the Alkalinity in water used especially in industries.
3. To impart knowledge on polymers used as insulators.
4. To provide an idea about Advanced techniques in chemical analysis using conductometer and spectrophotometer.

Volumetric Analysis:

1. Determination of total Alkalinity of water
2. Determination of Percentage purity of Washing soda
3. Determination of Fe(II) by Dichrometry
4. Determination of Percentage of available chlorine in Bleaching powder
5. Determination of chlorides by Argentometry
6. Determination of Total hardness of water

Preparations:

7. Preparation of Bakelite
8. Preparation Of Urea- Formaldehyde Resin

Instrumental methods of Analysis:

9. Determination of Viscosity of a Lubricating oil
10. Determination of Strength of acid by conductometry
11. Determination of Mn^{+7} by Colorimetry
12. Demonstration of UV-Visible Spectrophotometer with Ferrothiocyanate

TEXT BOOKS:

1. Vogel's Text book of qualitative Chemical Analysis J.Mendham, R.C Denney, J.D. Bares, M.Thomas & B. Siva Sankar, Pearson Publications – Volume I (2009).
2. Experiments in Applied Chemistry by Dr.Sunita Rattan. S.K. Kataria & Sons publications,2008.

I Year B.Tech. Biotechnology II - Semester

L	T	P	To	C
1	-	3	4	3

ME 103 ENGINEERING GRAPHICS

Course description and Objectives :

To familiarize students with the conventional concept of engineering drawing and application through AutoCAD.

Course Outcomes:

After completion of this course, student will be able to prepare plan and elevation of any pictorial view either conventional or through AutoCAD.

UNIT - I

Introduction to Engineering drawing: Introduction to Engineering Drawing – Types of lines, lettering, dimensioning Construction of polygon & Conics. (Ellipse, Parabola & Hyperbola by general method)

UNIT - II

Orthographic Projections: Principle of projection-Planes of projections.

Projections of points:

Projection of straight lines: Inclined to one plane and both the planes.

Projections of planes: Simple planes, Planes inclined to reference planes.

UNIT - III

Projections & Sections of solids – projections of prisms – cylinders – cones - pyramids – solid axis inclined to one plane, simple sections-prism, cylinder, pyramid and cone. AutoCAD Fundamentals.

UNIT - IV

Isometric projections: Isometric drawing of simple objects through AutoCAD **UNIT - V**

Orthographic projections: Conversion of Pictorial view into orthographic view using AUtoCAD and Conventional.

TEXT BOOKS :

1. N.D.Bhatt, "Engineering Drawing", 49th ed., Charotar Publication, 2007.
2. K. Venugopal, "Engineering Drawing through Auto CAD", 1st ed., New Age Publication, 2008.

REFERENCE BOOKS :

1. Jhole, "Engineering Drawing", 2nd ed., Tata McGraw Hill, 2008.
2. K.L. Narayana, "Engineering drawing" 2nd ed., Scitech Publications, 2008

II Year B.Tech. Biotechnology II - Semester	**L**	**T**	**P**	**To**	**C**
	-	-	3	3	2

EE 113 FUNDAMENTAL OF ELECTRICAL ENGG. LAB

Course description and Objectives :

To understand basic electrical elements, electrical energy its consumption and measurement. To develop practical knowledge on electrical machines, electronic devices and circuits

Out Comes :

1. Able to realize characteristics of electrical elements.
2. Able to analyze given simple ac and dc networks.
3. Able to work on different electrical machines.
4. Able to reflect the knowledge of electronic devices to verify experimentally.

List of Experiments

1. Familiarization with basic components such as Resistors, Capacitors, Diodes, Transistors
2. Familiarization with basic electrical measuring instruments
3. Verification of ohm's law
4. Verification of KVL and KCL
5. Calculation of power factor in simple RL and RC circuits
6. Magnetization characteristic of a D.C. self excited generator
7. Measurement of power and energy.
8. Measurement of transformation ratio of single phase transformer.
9. Measurement of Power, Power factor of 3-phase induction motor.
10. Characteristics of PN junction diode.
11. Characteristics of Zener diode.

12. Operation of Full wave Rectifier

13. Operation of half wave Rectifier

14. Study and Working of fluorescent lamp

15. Measurement of armature and field resistances of d c machine using voltmeter-ammeter method.

Note : Any 10 of above experiments are to be conducted.

VFSTR UNIVERSITY

II Year - B.Tech

SYLLABUS

I SEM & II SEM

II Year B.Tech. Bioinformatics I - Semester	L	T	P	To	C
	4	-	-	4	4

BI 201 CELL BIOLOGY & MICROBIOLOGY

Course Description and Objectives:

To familiarize the student to know different cell components and their functions like transport of material, cell signaling, etc. This course will provide students the knowledge about the classification, diversity and physiology of microorganisms.

Course Outcomes:

Students will demonstrate knowledge of

1. The structure of prokaryotic and eukaryotic cells.
2. Classification of microbial system.
3. The pivotal role played by cell cycle in normal functioning of cells.
4. Controlling microbial systems via various methods
5. Staining techniques for the characterization of microbes

UNIT - I : Biology of Cells:

Structure of prokaryotic and eukaryotic cells - Overview of organelles (Mitochondria, Chloroplasts, ER, Golgi, nucleus). Protein folding and processing in ER – Protein glycosylation and sorting in Golgi - Cytoskeletal proteins - contractile proteins - Actin and Myosin.

UNIT - II : Transport Across Cell Membranes :

Organization of plasma membrane – Passive and active transport, Sodium potassium pump - Ca2+ ATPase pump - Lysosomal and vacuolar membrane, ATP dependent proton pumps - co transport, symport, anti port, ion-gated and ligand gated channels - Endocytosis and exocytosis.

UNIT - III : Regulation Of Cell Cycle And Cancer :

Cell division- mitosis and meiosis – Cell cycle and regulation - Cancer- types, development and causes - Mutagenesis - Tumor suppressor genes and Oncogenes.

UNIT - IV : Microbial Systems :

Classification and nomenclature of micro organisms - light and electron microscopy - principle of different staining techniques - gram staining - acid fast and capsular staining, Physical and chemical control of microorganisms - Microbial biosensors.

UNIT - V : Microbial Nutrition, Growth and Metabolism :

Nutritional requirements of bacteria and different media used for bacterial culture - growth curve and different methods to quantitate bacterial growth - aerobic and anaerobic bioenergetics - utilization of energy for biosynthesis of important molecules.

TEXT BOOKS :

1. Verma P. S. and Agarwal V. K., “Cell Biology, Genetics and molecular Biology”, S. Chand and company, New Delhi, 2000.
2. Lodish H., Bert A., Matsudaria Kaiser C.A., Kriegar M., Scott M.P., Zipursky S.L. and Darnell 1., “Molecular cell Biology”, WH Freeman and company, New York, 2004.

REFERENCE BOOK :

1. Pelzer M. Chan E.C.S. and Krein N.R., “Microbiology”, Tata Me Graw Hill Publishers, New Delhi, 2000.

II Year B.Tech. Bioinformatics I - Semester

L	T	P	To	C
4	-	-	4	4

BI 203 BIOCHEMISTRY

Course Description and Objectives :

This course delas with the entire chemical processes associated with living cells at molecular level. This will offer them a clear-cut idea about various molecular and biochemical process governing the production of energy in the cells.

Course Outcomes:

1. Students will be able to understand structures, functions, and interactions between biological molecules.
2. Students will be able to understand various mechanism involved in the enzyme action.
3. They will acquire adequate knowledge in various pathways in intermediary metabolism and bioenergetics.
4. They will gain sufficient insights into redox biochemistry
5. They will be able to articulate, retain and apply specialized language and knowledge relevant to Biochemistry.

UNIT - I : **Structure and Properties of Carbohydrates and Lipids:**

Structure and properties of mono, di, oligo and polysaccharides, Structure and properties of fatty acids, phospholipids, sphingolipids, glycolipids and steroids.

UNIT - II : Structure and Properties of Proteins and Nucleic Acids:

Structure and properties of amino acids, peptides, proteins. Structure and properties of purines, pyrimidines, polynucleotides - rRNA, mRNA and tRNA, deoxy ribonucleic acids.

UNIT - III : Intermediary Metabolism and Bioenergetics :

Bioenergetics: redox biochemistry, energy rich compounds, respiratory chain, oxidative phosphorylation and triose phosphate cycle. Carbohydrate Metabolism: Glycolysis, pentose phosphate pathway, TCA cycle, gluconeogenesis, glycogenesis and glycogenolysis.

UNIT - IV : Metabolism of Lipids, Proteins and Nucleic Acids:

Lipid Metabolism: Biosynthesis and biodegradation of fatty acids. Biodegradation of proteins and nucleic acids. Biosynthesis and biodegradation of important amino acids- Leu, Tyr, Phe, Trp, and Cys-Urea Cycle, purines and pyrimidines, Inborn errors of their metabolism.

UNIT - V : Mechanism Of Enzyme Action :

Enzyme - Introduction, substrate specificity, Coenzymes, Rate of enzymatic reactions- chemical kinetics, inhibitio*n*, effect of pl-l,bisubstrate reactions, Michaelis menton equation.

TEXT BOOK :

1. Lehninger, A. L., Nelson, D. L. and Cox, M. M. Principles of Biochemistry Third Edition (Freeman Publishers), New York. 2000

REFERENCE BOOKS:

1. Lubert Stryer, Biochemistry, 4th Edition, WH Freeman & Co., 2000.
2. Voet and Voet, Biochemistry, 2nd Edition, John Wiley & Sons Inc., 2000.
3. Murray, RK., Granner, B.K., Mayes, P.A., Rodwell. V,W., Harper's Biochemistry Prentice Hall International., 2000.

II Year B.Tech. Bioinformatics I - Semester

L	T	P	To	C
4	-	-	4	4

BI 205 BIOINFORMATICS NETWORKS & APPLICATION

Course Description and Objective s:

This course provides the necessary basic protocols for utilization of various biological databases available on the internet. It consists of the tools utilized for biological sequential data analysis and methods of analyzing genetic and protein information.

Course outcomes:

1. Students will learn basic knowledge of modern molecular biology and genomics.
2. They will be able to perform sequence alignment and dynamic programming.
3. They will be able to perform various operations in Biological databses
4. They will understand the advantages and disadvantages of different machine learning techniques in bioinformatics.
5. They will be able to evaluate ways by which theoretical approaches can be used to model and analyze complex biological systems.

UNIT - I : Introduction To Bioinformatics and Networks :

Scope of Bioinformatics - Elementary commands and Protocols, ftp, telnet, http. Databanks - nucleotide databanks - Genbank, NCB I, EMBL, DDBJ - protein databanks - sequence databanks - PIR, SWISSPROT, TrEMBL _ structural databases - PDB, SCOP, CATH, SSEP, CADB, Pfam and GDB.

UNIT - II : Sequence Alignment and Dynamic Programming :

Introduction - Strings - Edit distance two strings - string similarity local alignment -gaps - parametric sequence alignments - suboptimal alignments - multiple alignment - common multiple alignment methods.

UNIT - III : Sequence Databases And Their Uses :

Introduction to databases - database search - Algorithms issues in database search - sequence database search - FASTA - BLAST - Amino acid substitution matrices PAM250 and BLOSUM62. GCG Sequence Analysis (Basic concepts only).

UNIT - IV : Evolutionary Trees and Phylogeny :

Basic concepts in systematics, taxonomy and phylogeny; molecular evolution; nature of data used in Taxonomy and Phylogency, Definition and description of phylogenetic trees and various types of trees- connection between multiple alignment and tree construction.

UNIT - V : Metabolic Networks and Interaction Maps :

Metabolic pathways metabolic regulation, genome proteome connection microarrays and analysis of metabolic control. Lethality and centrality in protein networks, the protein-protein interaction map of Helicobacter pylori, Global protein function prediction from protein-protein interaction networks. Oncomine maps.

TEXT BOOKS:

1. T.K.Attwood & D.Parry-Smith, Introduction to Bioinformatics, Pearson Education, 2001.

2. R.Durbin, R.Eddy, K.Anders and M.Graeme, Biological Sequence Analysis: Probabilistic Models ofProteins and Nucleic Acids, Cambridge University Press, 1997.

REFERENCE BOOKS:

1. Dan Gusfield, Algorithms on Strings Trees and Sequences, Cambridge University Press, 1997.

2. Lesk, Introduction to Bioinformatics, Oxford University Press, 2002.

II Year B.Tech. Bioinformatics I - Semester	L	T	P	To	C
	4	-	-	4	4

BI 207 BIODIVERSITY AND CONSERVATION

Course Description and Objectives :

Biodiversity conservation is an interdisciplinary field that can be approached from a variety of angles and perspectives. This course will orient students towards the complexity of biodiversity conservation.

Course outcomes:

1. Students will understand and critically apply the theories, subject content, professional methodologies, ethical frameworks and research procedures relevant to studies of biodiversity and Conservation Biology
2. They will gain adequate knowledge about the nature and historical basis of current threats to Biological Diversity .
3. They will be able to execute conservation actions that can be undertaken to mitigate these threats
4. They will be able to appreciate the relationships between studies in biodiversity and Conservation Biology and other science and non-science disciplines.
5. They will gain sufficient insights into the multidisciplinary nature of many studies in biodiversity and Conservation Biology

UNIT - I : Introduction to Geological History of Biodiversity :

Geological history of biodiversity - (global level scenario). Elements /types of biodiversity- Genetic, Species (alpha, beta, gama), ecological diversity. Hot spots of biodiversity in India (introduction of total map of hot spots) - detailed study following hot spots: western Himalaya, Western Ghats, Ganjetic planes, deccan peninsula.

UNIT - II : Fundamentals of Ecosystem :

Basic concepts and structure of ecosystems: abiotic and biotic components; climatic and edaphic regimes; nutrients and minerals; producers, consumers and decomposers. Communities, populations, groups and individuals. Functioning of ecosystem: energy flow and nutrient cycles, Systems approach to ecological functioning. History of evolutionary thought; natural selection and speciation; evolutionarily significant units. Species concepts; biological, phylogenetic, evolutionary and ecological species concepts. Macroevolution, coevolution and mutualism.

UNIT - III : Threats of Biodiversity :

Threats of biodiversity-causes & responsible factors- endangered & endemic species of plants & animals of india. Interaction of species - aquatic biodiversity - deep sea & small island biodiversity, marine biodiversity - wetlands biodiversity. Mangroves & deserts biodiversity. Study of following with reference to biodiversity; Nalsarovar – Gir lion sanctuary & national park, Wild ass wild life sanctuary (WLS), Jessor WLS, Jambughoda and Hingolgadh nature education sanctuary.

UNIT - IV : Forestry and Natural Resource Conservation:

Philosophies of science, conservation and sustainable development. Concept of conservation with special reference to forest and wildlife management, conservation verses preservation. Introduction to forestry, principles of forest management, forest and wildlife as natural resources. Conservation movement in India, socio-economic and political realities, different phases of the conservation and how it has impacted people at large. Concept of stakeholders. International conservation bodies; IUCN UNDP, FAO, WWF.

UNIT - V : Conservation Biology :

Introduction to conservation biology, values of biodiversity and conservation ethics, Patterns and process of biodiversity, losses and threats to biodiversity. Biological consequences of habitat fragmentation, covering barriers and isolation, crowding effect, local and regional extinctions, edge effects, changes in species composition and problem of climate change. Population genetics and conservation; community and ecosystem level conservation. Theories, planning and designing conservation reserves; scales of management and cultural context. Conservation outside protected areas. Control of invasive species. Significance of ecological restoration in conservation.

TEXT BOOKS:

1. Biodiversity- Mahesh Prasad singh, APH Publishing corporation. 2009. New Delhi
2. Biodiversity: principles & conservation-U.Kumar,M.J.Asija. Agrobios. 2007 Jhodhpur.

REFERENCE BOOKS:

1. Biodiversity in Indian Scenarios-N.Ramakrishnan. Daya publishing house – 2006, Delhi.
2. Environmental Biology- H.R.Singh. S.Chand& Co. Ltd. 2005, New Delhi

II Year B.Tech. Bioinformatics I - Semester

L	T	P	To	C
4	-	-	4	4

HS 213 PROBABILITY & STATISTICS

Course Description and Objectives:

The course aims to motivate students with an intrinsic interest in statistical thinking. It provides foundation and motivation for exposure to statistical ideas.

Course Outcomes:

1. Students will demonstrate the fundamental concepts in exploratory data analysis
2. They will be able to understand the basic concepts of probability and random variables.
3. They will understand the concept of the sampling distribution of a statistic, and in particular describe the behavior of the sample mean.
4. They will be able to perform multi-sample and nonparametric hypothesis testing.
5. They will be able to perform polynomial curve fitting.

UNIT - I : Probability :

Scientific notation: significant digits, rounding off, scientific notation, Error analysis; Counting and Probability: Addition rules; Permutations; Combinations; Inclusion-exclusion rule; Sampling with and without replacement; Conditional probability: Bayes' theorem; Independence.

UNIT - II : Descriptive Statistics :

Descriptive statistics and Random variables; Measures of central tendency: mean, median, mode; Expectation; Measures of spread: range, percentile, standard deviation; Higher moments: kurtosis, skew, Displaying data: Histograms, stem-and-leaf plots, box plots, frequency distributions; Discrete random variables: Bernoulli, Binomial, Poisson; Geometric distributions; Continuous random variables: Normal; Exponential distributions; Standard normal distribution.

UNIT - III : Inferential Statistics and One Sample Hypothesis Testing:

Samples and populations: Random, stratified and cluster sampling; Single- and Double-blind experiments; Point and interval estimates; Sampling alternative hypotheses, decision criteria, critical values, type I and type II errors, Meaning of tatistical significance; Power of a test; One sample hypothesis testing: Normally distributed data: *z*, *t* and chi-square tests; Binomial proportion testing. Two sample hypothesis testing,One-way ANOVA.

UNIT - IV : Multi-Sample and Nonparametric Hypothesis Testing

Two sample hypothesis testing; nonparametric methods: signed rank test, rank sum test; Kruskal-Wallis test; Analysis of variance: One-way ANOVA.

UNIT - V : Curve Fitting :

Regression and correlation: simple linear regression; Least squares method; Analysis of enzyme kinetic data; Michaelis-Menten; Lineweaver-Burk and the direct linear plot; Logistic Regression; Polynomial curve fitting.

TEXT BOOKS:

1. Bernard Rosner, Fundamentals of Biostatistics, 5th Edition, Thomson Brooks/Cole, 2000.
2. Richard A. Johnson, Probability and Statistics for Engineers, 6th Edition, Prentice Hall, 2000.

REFERENCE BOOKS:

1. Morris H. DeGroot, Mark J. Schervish, Probability and Statistics, 3rd Rev. Edition, Addison-Wesley, 2002.
2. E. Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley, 2006.

II Year B.Tech. Bioinformatics I - Semester	L	T	P	To	C
	-	-	1	1	1

SR002 SEMINAR

II Year B.Tech. Bioinformatics I - Semester

L	T	P	To	C
-	-	3	3	2

BI 209 CELL BIOLOGY & MICROBIOLOGY LAB.

Course Description and Objectives:

This course provides the students adequate skills and knowledge to operate microscopes. In addition, it aims to expose students to various isolation techniques.

Course Outcomes:

1. Students will be introduced to the concepts of microscopes
2. They will be able to utilize microscopes to visualize cells
3. They will be able to perform various staining techniques
4. They will understand the pricnciples of Gram staining
5. They will be able to perform Hanging drop method

LIST OF EXPERIMENTS :

1. Study of Microscopes.
2. Microscopical Identification of Cells in Permanent Fixed Slides.
3. Differentiation of Blood Cells using Giemsa Staining
4. Separation of Peripheral Blood Mononuclear Cells and Try pan Blue Assay for Live Cells
5. Osmosis and Tonicity Studies using Red Blood Corpuscles
6. Culture Media - Types & Preparation of Agar medium and Nutrient Broth.
7. Inoculation of micro- organisms
8. Isolation of pure culture by streak plate and pour plate technique
9. Gram staining
10. Hanging drop method.

TEXT BOOKS :

1. P. Gunasekaran, “Laboratory Manual in Microbiology”, 1st ed., New Age International Publications, 1995.
2. Arti Nigam and Archana Ayyagari , “ Lab manual in Biochemistry, Immunology and Biotechnology”, 1st ed., TATA Mc Grahill, 2007.

REFERENCE BOOK :

1. Aneja, “Experiments in Microbiology, Plant Pathology and Biotechnology”, 4 th ed., New Age International Publishers, 2007.

II Year B.Tech. Bioinformatics I - Semester	**L**	**T**	**P**	**To**	**C**
	-	**-**	**3**	**3**	**2**

BI 211 BIOCHEMISTRY LABORATORY

Course Description and Objectives :

This course aims to provide sufficient exposure to students in various methods for the quantitative and qualitative estimation of biomolecules.

Course Outcomes:

I. Students will be able to perform qualitative analysis of carbohydrates

II. They will be able to estimate various bio-molecules using specific methods

III. They will perform various chromatography techniques for the separation of biomolecules.

IV. They will be able to evaluate michaelis menton parameters.

V. They will understand the basic principles of high performance liquid chromatography.

LIST OF EXPERIMENTS :

1. Qualitative Analysis Of Carbohydrates.
2. Estimation Of Glucose By Glucose Oxidase Method.
3. Qualitative Analysis Of Amino Acids.
4. Estimation Of Protein By Lowry's Method.
5. Estimation Of Amino Acid By Ninhydrin Method.
6. Estimation Of Cholesterol By Zak's Method.
7. Identification of Amino acids by Paper Chromatography.
8. Identification of Sugars by Paper Chromatography.
9. Evaluation of Michaelis and Mentons parameters.
10. High Performance Liquid Chromatography Study.

TEXT BOOKS:

1. J. Jayaraman, "Laboratory Manaual in Biochemistry", New Age International Publications. 2000.
2. K. Wilson & J. Walker,"Principles & Techniques of Practical Biochemistry", 5th ed., Cambridge University Press, 2000.

REFERENCE BOOK :

1. I.D.Campbell and R.T.Dwek, "Biological Spectroscopy", Benjameer Cunmeib & Co., 1986.

II Year B.Tech. Bioinformatics I - Semester

L	T	P	To	C
-	-	3	3	2

HS 217 SOFT SKILLS LABORATORY

Course Description & Objectives:

The Soft Skills Laboratory course equips students with required skills such as interpersonal skills, communication skills, leadership skills etc. It aims at training undergraduate students on employability skills to win in the job interviews and building confidence to handle professional tasks.

Training Methodology:

The training methodology is designed to bring about changes in attitudes through experience-based learning. Activities in simulated environments such as role plays, group discussions, micro-presentations, audio-video clippings, case studies, psychometric tests etc., will provide students insights into their strengths and weaknesses.

Course Outcomes:

1. To help students to develop formal communication skills in a work place
2. To make them acquire team skill by working in group activities
3. To equip them with suitable language and speech patterns in a workplace
4. To enhance the ability of critical & lateral thinking while addressing the issues at any situation
5. To enable them to present themselves confidently in job interviews

Course Contents:

Personality Development Skills :

a) Role of language in Personality – How language reflects, impacts personality – Using gender-neutral language in MNCs – being culturally sensitive.

Activity – Appraising each other – Worksheets related to the above

b) Career Planning- job vs. career- goal setting- SWOT analysis- planning and prioritization - four quadrant time management system - time management – self-management – stress-management.

Activity: Setting a SMART goal - SWOT analysis of the self – Writing a Statement of Purpose (SOP).

c) Effective Resume-Writing: structure and presentation - planning and defining the career objective - projecting one's strengths and skill-sets – summarizing - formats and styles - covering letter.

Activity: Resume preparation –writing a covering letter.

Language Skills :

A) Functional English - Formal/informal context – purpose - interpersonal dynamics - ideation –content organization - initiating a conversation – responding appropriately - right body language.

Activity - Role play in different situations, - self-introduction - social background (family, home town etc.,) - role model - my future - likes/ dislikes (movies, persons, places, food, music etc.,) - a mini project on functional English.

b) Vocabulary-Building: Etymology of words - word roots - prefixes & suffixes - synonyms & antonyms- collocations - one-word substitutes – analogies - idioms and phrases - contextual guessing of unfamiliar words – task-oriented learning (100 words).

Activity: Flash cards (200 words) – vocabulary exercises with hand-outs.

Communication Skills :

a) Group Discussion: Articulation and flow of oral presentation - dynamics of group discussion – intervention – summarizing - voice modulation – content generation – Key Word Approach (KWA) – Social, Political, Economic, Legal and Technical Approach (SPELT) – View Point of Affected Part (VAP) - language relevance - fluency and coherence.

Activity: Mock sessions on four types of GD topics.

b) Facing Interviews: Interview process - understanding employer expectations - pre-interview planning - opening strategies - answering strategies – stress-based interviews - tele-interviews, video interviews-frequently asked questions (FAQs).

Activity: Writing responses to FAQs - mock interviews.

Comprehensive skills :

a) Reading Comprehension: Reading as a skill- techniques for speed reading- skimming- scanning- appreciating stylistics - impediments for speed reading - eye fixation - sub-vocalisation - critical reading - reading based on purpose - reading for information - reading for inference - understanding tone.

Activity: Reading comprehension exercises with texts drawn from subject areas. (Hand-outs)

b) Listening Comprehension: Listening as skill - different types of listening - hidden data of communication - active listening - top-down approach - bottom-up approach.

Activity: Following different accents (Indian, British, American) listening comprehension exercises with audio and video excerpts.

Analytical Skills :

a) Data Commentary: Deductive & inductive reasoning - data interpretation - tables & charts - bar charts - pie charts - line graphs - ratios & proportions – percentages - coding and decoding - reasoning by analogy - artificial language etc.,

b) Analytical Thinking: Statement and Conclusion - Data Sufficiency - Statement and Argument - Statement and Assumption - Logical Deduction - Logical Problems.

Activity: Exercises with handouts.

TEST BOOKS:

1. *Edward Holffman,* ***Ace the Corporate Personality****, McGraw Hill,2001*
2. Adrian Furnham, ***Personality and Intelligence at Work***, Psychology Press, 2008.

REFERENCE BOOKS:

1. M.Ashraf Rizvi, "***Effective Technical Communication",*** 1st edition, Tata McGraw Hill, 2005.
2. Krishna Mohan & NP Singh , "***Speaking English Effectively"*** 1st edition, Macmillan, 2008.

II Year B.Tech. Bioinformatics II - Semester

L	T	P	To	C
4	-	-	4	4

CS 218 DATA STRUCTURES

Course Description and Objectives :

The course is aimed at making students familiar with basic techniques of algorithm analysis and to implement linked data structures such as linked lists and binary trees.

Course Outcomes:

1. Students will gain the basic ability to analyze algorithms and to determine algorithm correctness and time efficiency class.
2. They will master a variety of advanced abstract data type (ADT) and data structures and their implementations.
3. They will get the ability to apply and implement learned algorithm design techniques and data structures.
4. They will be able to perform various methods of sorting.
5. They will understand various application of graphs in C

UNIT - I : Introduction To Data Structures :

Information and Meaning – Representation of Multi- Dimensional Arrays _ Review of C Programming. The Stack: Primitive operations – As an Abstract Data Type – Implementing the Stack operations in C. Infix, Postfix and Prefix: Definitions, Evaluation and Conversions using C. Recursion: Recursive Definition and Processes, Recursion in C and Recursive Implementation of Applications. Simulation of Recursion – Efficiency of Recursion.

UNIT - II : Queues and Lists :

The Queue as Abstract Data Type – Sequential Representation _Types of Queues – Operations – Implementation in C. Linked List: Operations – Implementation of Stacks, Queues and priority Queues in C. Circular Lists: Insertion, Deletion and Concatenation Operations _ Stacks and Queues as Circular Lists _ Doubly Linked Lists _Applications.

UNIT III : Binary Trees Operations and Applications :

Binary Tree Representation: Node Representation – Implicit array Representation – Choice of Representation – Binary Tree Traversal – Threaded Binary Trees and their Traversal – Trees and their Applications.

UNIT IV : Sorting :

General Background: Efficiency – The big 0 Notation – Efficiency of Sorting. Bubble Sort and Quick Sort and their Efficiency – Selection Sorting – Binary Tree Sort – Heap Sort – Insertion Sorts – Shell Sort – Address calculation Sort – Merge and Radix Sorts. Searching: Basic Searching Techniques: Dictionary as an Abstract Data Type – Algorithmic Notation – Sequential Searching and its Efficiency – Binary Search – Interpolation Search. Tree Searching: Insertion into a Binary Search Tree – Deleting from a Binary Search Tree – Efficiency of Binary Search Tree operation.

UNIT V : Graphs and Their Application :

Graphs: Application of Graphs – Representation of Graphs in C – Transitive closure – Warshall's Algorithm – Shortest Path Algorithm. Linked Representation of Graphs: Dijikstra's Algorithm – Organizing the set of Graph Nodes – Application to Scheduling and its implication. Graph Traversal and Spanning Forests – Undirected Graph and their Traversals, Applications and Efficiency – Minimal Spanning Trees –Prim's and Kruskal's Algorithms.

TEXT BOOKS :

1. Data Structures Using C and C++ Yddish Langsam, Moshe J. Augenstein and Aaron M. Tanenbaum, 2008. Prentice Hall Of India.
2. Data Structures, Richard F.Gilberg and Behrouz A. Forouzan, 2nd Edition, 2006, Cengage Learning India Pvt.Ltd.

REFERENCE BOOKS :

1. Data Structures, Algorithms and Applications with C++, Sahani, 2006 Mc-Graw Hill. Note: All Implementation are Using C Language only.
2. Data structures and Algorithm Analysis in C++, Mark Allen Weiss, 2004, Pearson Education. Ltd., Second Edition.

II Year B.Tech. Bioinformatics II - Semester

L	T	P	To	C
4	-	-	4	4

BT 214 GENETICS

Course Description and Objectives:

The main objective of the course is to provide knowledge in genetics and to enable students understand the genetic basis of diseases and prevention. to the contents of the course will provide adequate knowledge about the molecular mechanisms through which genes cause diseases.

Course outcomes:

1. Students will describe the fundamental molecular principles of genetics
2. They will understand the relationship between phenotypes and genotypes
3. They will gain knowledge about the regulation of gene expression
4. They will understand the basic concepts about mutation and gene structure
5. They will understand the basic concepts of human genetics

UNIT - I : Physical Basis of Heredity:

Basic laws of inheritance mono-hybrid, di-hybrid and tri-hybrid ratios, Modification of Mendel’s ratios due to gene interaction, Multiple alleles and lethality. Multiple factors of inheritance. The concept of linkage, crossing over and recombination. Two point and three point testcrosses and gene mapping. Mapping of genes by tetrad analysis by mitotic crossing over.

UNIT - II : Genetic material and its Organization:

Identification of the genetic materials - classical experiments-Hershey Chase, Avery McLeod etc, Packing and organization of genetic material in prokaryotes (with reference to *E.coli*), Eukaryotes. Chromosome morphology, classification, karyotyping. Special chromosomes.

UNIT - III : Bacterial genetics & Extra Chromosomal Inheritance:

Molecular mechanisms of conjugation, Transformation, Transduction. Phages and its life cycle-DNA, RNA and Retroviruses.Introduction to extra chromosomal inheritance, examples of extra chromosomal inheritance. Petite phenotypes in yeast. Uniparental inheritance in algae.

UNIT - IV : Mutation and Gene structure:

Spontaneous and induced mutations, Selection of mutants-Ames test, Chromosomal aberrations, Fine structure of genes in prokaryotes and Eukaryotes. Genetic control of development in Drosophila.

UNIT - V : Concepts of Human Genetics (Sex Determination, Linkage & Dominance) :

Introduction – Population genetics, Eugenics& Euthenics. Mechanisms of sex determination, differentiation, Sex influenced dominance, Sex linked inheritance and Sex limited gene expression. Molecular basis of genetic diseases and applications.

TEXT BOOKS :

1. P.K. Gupta, “Genetics”, 3rd ed., Rastogi Publications, 2005.
2. B.D Singh , “Fundamentals of Genetics”, 4th ed., Kalyani Pub. 2007.

REFERENCE BOOKS :

1. Strickberger, Monroe. W. “Genetics”, 3rd ed., Prentice - Hall of India Publications, 2006.
2. W illiam H Elliott and D.C.Ellioit, “Biochemistry & Molecular Biology”, 3rd ed., Oxford University Press, 2007.
3. E. J. Gardner, M.J. Simmons & D. Peter Snustad, “Principles of Genetics”, 8th ed., W illay India, 2007.
4. A.V.S.S. Sambamurty, “A Text Book of Genetics”, 2nd ed., Narosa Publications, 2006.

II Year B.Tech. Bioinformatics II - Semester	L	T	P	To	C
	4	-	-	4	4

BT 301 MOLECULAR BIOLOGY

Course Description and Objectives :

To acquaint the student about the structure, synthesis and processing of nucleic acids and protein synthesis in prokaryotes and eukaryotes. Also to make the students aware about the classification and types of mutations and how they affect the gene and its expression and how DNA will repair the damage.

Course outcomes

1. Students will understand how molecular machines are constructed and regulated so that they can accurately copy, repair, and interpret genomic information.
2. They will gain adequate knowledge about the the regulation of gene expression
3. They will learn in-depth about RNA biosynthesis and post transcriptional processing ribosomes
4. They will gain adequate knowledge about mutagenesis
5. They will understand the basic concepts behind DNA damage and repair

UNIT I : Structure of DNA and RNA:

Detailed structure of DNA, variation from Watson & Crick model, Z - DNA, A & B DNA, Denaturation & melting curves, m-RNA, r-RNA, t-RNA structures.

UNIT II : DNA Replication:

Models of DNA replication: semi conservative model, Mitochondrial (D-loop), Viral DNA (Rolling circle), Single stranded- DNA phages (M13, f 174), Mechanism of DNA replication in E.coli (bi- directional), step by step process, Inhibitors of DNA Replication. Enzymes involved in replication, Eukaryotic telomeres and its replication.

UNIT III : RNA Biosynthesis and Post transcriptional processing:

Ribosomes,Transcription apparatus, Mechanism of transcription in prokaryotes and eukaryotes, RNA polymerases and proteins involved in transcription, Inhibitors of transcription, Post transcriptional processing of RNA 's t-RNA, r-RNA, m- RNA splicing.

UNIT IV: Protein Biosynthesis in Prokaryotes and Eukaryotes:

The genetic code and Wobble Hypothesis, Protein synthesis in Prokaryotes and Eukaryotes, Differences between prokaryotic and eukaryotic protein synthesis, Post translation modifications. Inhibitors of protein synthesis.

UNIT V : Mutagenesis:

Types of mutagens and their actions, Types of mutations-spontaneous, induced, lethal, characters of mutations and applications, Site - directed mutagenesis and reverse genetics. DNA damage and repair mechanisms.

TEXT BOOKS :

1. David Friefeldur - Molecular Biology, 2nd Ed., Norasa Publishing Home 1987.
2. Channarayappa - Molecular Biotechnology Principles and Practices, 1st Edition, 2006. University Press.

REFERENCE BOOKS :

1. Lodish & Baltimore, Molecular Cell Biology, 5th Ed., W.H. Freeman & Company, 2003.
2. Benjamin Lewin - Gene – VIII, 1 st Edition,2004.
3. Gerald Karp - Cell and Molecular Biology, Concepts and Experiments, 5th Edition, John Wiley and Sons Pvt. Ltd., 2008.

II Year B.Tech. Bioinformatics II - Semester	L	T	P	To	C
	4	-	-	4	4

BI 202 INTRODUCTION TO BIOLOGICAL DATABASES

Course Description and Objectives :

The course will introduce students to some basic concepts related to databases, in particular, the types, designs, and architecture of biological databases.

Course outcomes:

1. Student will understand the utility of database systems.
2. They will have clear focus on design, development and implementation of biological database systems.
3. They will be able to perform various operations in structural databases
4. They will understand the role of various enzymes in metabolic pathways
5. They will acquire certain insights into the new directions of Bioinformatic research.

UNIT- I : Introduction To Bioinformatics :

Basic concepts:-Cell - Gene- Genome- Genetic code - Central dogma - Nucleic acids and proteins - Biological sequence data - Need for Biological Databases.

UNIT- II : Sequence Databases :

Databanks - nucleotide databanks - Genbank, NCBI, EMBL, DDBJ - protein sequence databanks - PIR, SWISSPROT, TrEMBL.

UNIT- III : Structural Databases:

Protein secondary structure- Ramachandran plot- Tertiary and quaternary structure of proteins Databases: - PDB, SCOP, CATH, SSEP, CADB, THGS, SMS, Pfam and GDB.

UNIT – IV : Pathway Databases :

Role of enzymes in Biochemical pathways- Enzyme Databases:- MEROPS, BRENDA. Pathway Databases: - CAZy. Disease Databases and Literature Databases.

UNIT – V: Special Topics In Bioinformatics:

New directions of Bioinformatics research - Essential prerequisites - Scope of Bioinformatics - Useful sites - Bioinformatics in pharmaceutical industry - Bioinformatics orientation in IT industry.

TEXT BOOK :

1. Orpita Bosu, Simminder Kaur Thukral, Bioinformatics Databases, Tools and Algorithms, Oxford University Press, 2007

REFERENCE BOOKS :

1. T.K.Attwood & D.Parry-Smith, Introduction to Bioinformatics, Pearson Education, 2001.
2. R.Durbin, R.Eddy, K.Anders and M.Graeme, Biological Sequence Analysis:Probabilistic Models of Proteins and Nucleic Acids, Cambridge University Press, 1997.

II Year B.Tech. Bioinformatics II - Semester

L	T	P	To	C
4	-	-	4	4

BI 204 MOLECULAR PHYLOGEOGRAPHY

Course Description and Objectives:

The objective of the course is to impart students the basic knowledge of linking factors responsible for geographic pattern of molecular genetic diversity.

Course outcomes:

1. Student will be able to understand India's biogeographic classification and Protected Area network
2. They will be able to utilize molecular markers to study lineage divergence and dispersal of invasive plant species
3. They will acquire the ability to test the molecular basis of adaptive variations and ecologically important traits and perform ecological niche modeling.
4. They will understand the basics of molecular evolution
5. They will be able to understand about various factors involved in conservation genetics

UNIT- I: Introduction To Biogeography :

History of biogeography. Ecology of dispersal and faunal exchange, barriers, mode of dispersal, origins and radiation; island biogeography theory. Historical biogeography, biogeographical processes, endemism, refugia. Continental drift; dispersal and vicariance, biogeography; cladistics; dispersal mechanisms and dispersal barriers; reconciling distribution of fauna and flora. Applied Biogeography; biogeographical realms, provinces and eco regions. The biogeographic affinities of the fauna and flora of the Indian subcontinent. India's biogeographic classification and Protected Area network.

UNIT-II : Phylogeography :

Phylogeography: concept and scope; use of molecular markers in phylogeography- microsatellite markers, chloroplast loci and mtDNA; genetic variation in space and time- vicariance, dispersal, lineage divergence in real time, dispersal of invasive plant species. Applications of phylogeography- determining species natural range, finding the source populations of introduced species.

UNIT-III : Molecular Evolution :

Molecular Evolution: evolutionary molecular ecology, concept of neutral evolution, molecular divergence and molecular clocks; molecular phylogenetics (concept, tools and applications). Molecular basis of adaptive variations and ecologically important traits; origin of new genes and proteins.

UNIT - IV : Conservation Genetics :

Demographic, Ecological and Genetic Factors in Conservation Biology. Conservation genetics: genetic diversity in natural populations; loss of genetic diversity as a conservation concern, conservation units; genetic diversity and population size. Metapopulations; inbreeding and outbreeding depression, genetic load, genetic restoration; molecular markers in conservation genetics.

UNIT - V : Issues Addressed by Phylogeography :

Single species phylogeographic studies, Multi-species phylogeographic studies (with any one example). Model Based methods in phylogeography - Descriptive phylogeographic inference, Comparative phylogeographic inference. Future directions for integrative comparative phylogeography - Ecological niche models, Studies of natural selection

NOTE : **Unit V – All topics in unit V must be explained with the help of any one study published in the form of research article in the relevant area.

TEXT BOOKS :

1. John C. Avise. Phylogeography: The History and Formation of Species, 2000.
2. Chapman and Reiss. Ecology Principles And Applications. 1998. Cambridge

REFERENCE BOOK :

1. Hickerson MJ, Carstens BC, Cavender-Bares J, Crandall KA, Graham CH, Johnson JB, Rissler L, Victoriano PF, Yoder AD. 2000. Phylogeography's past, present, and future: 10 years after Avise

II Year B.Tech. Bioinformatics II - Semester

L	T	P	To	C
-	-	1	1	1

SR 003 SEMINAR

II Year B.Tech. Bioinformatics II - Semester

L	T	P	To	C
-	-	3	3	2

(CS 108) DATA STRUCTURES LAB.

Course Description and Objectives :

This course provides adequate programming skill for performing various operations. The main objective of this course is to make students familiar with the applications of Data Structures.

Course Outcomes :

1. Students will be able to write program to implement the operations on stacks
2. They will be able to write a program for finding the Depth First Search of a graph, and Breadth First Search of a graph.
3. They will be able to write a program for converting a given infix expression to postfix form
4. They will be able to write a create a binary search tree and for implementing the in order, preorder, post order traversal using recursion.
5. They will be able to write a program for the representation of polynomials using circular linked list and for the addition of two such polynomials

LIST OF EXPERIMENTS :

1. Write a program to implement the operations on stacks.
2. Write a program to implement the operations on circular queues
3. Write a program for sorting a list using Bubble sort and then apply binary search
4. Write a program to create a binary search tree and for implementing the in order, preorder, post order traversal using recursion
5. Write a program for finding the Depth First Search of a graph, and Breadth First Search of a graph
6. Write a program for converting a given infix expression to postfix form.

7. Write a program for evaluating a given postfix expression
8. Write a program for implementing the operations of a dequeue
9. Write a program for the representation of polynomials using circular linked list and for the addition of two such polynomials
10. Write a program for quick sort without recursive
11. Write a program for Heap sort without recursive
12. Write a program for Merge sort without recursive

TEXT BOOK :

1. Laboratory Guide for Data Structures and Algorithms. Marius Joldo and Iosif Ignat. 2002.

II Year B.Tech. Bioinformatics II - Semester

L	T	P	To	C
-	-	3	3	2

(BI 206) BIOLOGICAL DATABASE LABORATORY

Course Description and Objectives:

This lab course deals with the utility of biological Databases and its applications. This course provides adequate skills and knowledge in utilizing the information deposited in public biological databases.

Course Outcomes:

1. Students will be able to retrieve sequence data from GenBank
2. They will be able to perform various operations in NCBI
3. The will be able to utilize various tools available in SWISS-PROT and PIR
4. They will be able to use tools embedded in SCOP and CATH
5. They will gain expertise in Pfam, PROSITE and BLOCKS

LIST OF EXPERIMENTS :

1. GenBank
2. NCBI (BLAST)
3. EMBL
4. DDBJ
5. SWISS-PROT
6. PIR
7. TrEMBL
8. PDB

9. SCOP
10. CATH
11. Pfam
12. PROSITE and BLOCKS
13. BioGrid (India)
14. UCSC

TEXT BOOK :

1. Bioinformatics: Sequence and Genome Analysis, Second Edition, David Mount, 2004.

II Year B.Tech. Bioinformatics II - Semester

L	T	P	To	C
-	-	3	3	2

(HS 304) PROFESSIONAL COMMUNICATIONS LABORATORY

Course description and Objectives:

The Professional Communication exposes students to conventions of corporate communication and documentation procedures involved in the day-to-day functioning of the business world. The

course is aimed at improving written communication skills of undergraduate students and preparing them to meet professional challenges in the work spheres. Writing and Personality are not two exclusive spheres of influence and this course will work on the relationship between professional writing and a personality that is able to meet the goals of an organization in creative and innovative ways.

Training Methodology:

The methodology is designed to give hands-on practice to students in formal and informal report writing, structure and format of letters as well as other organization related work.

Course outcomes:

1. To enable students to write logical sentences and paragraphs, use appropriate diction, grammar and punctuation.
2. To expose them to the world of business and business register
3. To make them compose clear and concise business messages
4. To produce business documents for mailing to external recipients or intra-organizational circulation
5. To enable them to speak business English for handling various business situations.

Mechanics of writing :

Elements of Technical Writing :

Sentence structure - reducing verbosity - arranging ideas logically – building coherence - paragraph level and document level - topic sentence - cohesive devices – transitionals – paraphrasing – précis - writing.

Mechanics of Writing :

Stylistic elements – the rapporteur- the purpose- the reader (audience) -elementary rules of grammar- choice of diction - elementary principles of composition - matters of form – punctuation - conventions of business communication -language and tone - weak links in business correspondence - ethical concerns in business writing.

Business Report Writing :

Parts of the Report: Writing an abstract - features of a good abstract – approach - compare and contrast - cause and effect.

Types of Technical Reports : Drafting a technical proposal - formal and informal proposals - factual reports, feasibility reports, survey reports – parts of a report - title page –declaration – acknowledgements – table of contents - abstract – introduction – conclusion – citations – references - appendices - oral reports and presentations

Business Letter Writing :

Letter-Writing - Formal and informal letters - structure of formal letters - expressions of salutations, introductory and concluding paragraphs - different types of letters - sales letter - complaint letter - adjustment letter - letter to the editor - covering letter - claim letter – letter of condolence.

Business E- writing:

E-mail – nature and scope - e-mail etiquette – Common Errors in composing e-mails – Quotations - Inviting quotations - sending quotations –placing orders.

Office Communication - agenda - notice - circular

Effective Resume-Writing: Structure and presentation - defining career objective - projecting one's strengths and skill-sets. Summarizing - formats and styles - covering letter.

Business visual presentations :

Business Proposals: Drafting business proposals - calculating profit and loss-averages - ratios and proportions – partnership - simple interest - compound interest - calculating volumes and areas.

course of action - cause and effect- theme detection - making judgments -logical deductions - analyzing arguments – syllogisms - Venn diagrams - matching definitions -verbal reasoning - numerical reasoning - working out justifications.

Test Books :

1. Strunk , William, Jr.*The Elements of Style*, Fourth Edition,
2. Rozakis, Laurie, Ph.D, (2003). *English Grammar for the Utterly Confused*, McGraw-Hill

Reference Books :

1. Sharma. C. (1978) *Business Correspondence & Report Writing*, Tata McGraw-Hill
2. Kirkman, John. *Good Style: Writing for science & technology*, Routledge Study Guides, second edition.
3. Monippally, Matthukutty. M. 2001. *Business Communication Strategies*. 11th Reprint. Tata McGraw-Hill. New Delhi

HS112 MATHEMATICS FOR BIOTECHNOLOGISTS - I

L	T	P	To	C
4	-	-	4	4

Course description and Objectives :

Without mathematics not a single day of an engineer will pass! Aim of this course is to introduce some elementary mathematics to non mathematical students. We study progressions, binomial theorem, partial fractions, trigonometry, plane geometry etc. We also introduce basic vector algebra. Later we introduce the differentiation and integration and later differential equations, which have many applications.

Course Outcomes:

- This course will bridge the gap of biological students to cope up with mathematics during their Engineering programme.
- This course will help them to learn progressions, binominal theorem, partial fractions, trigonometry, and plane geometry along with vector algebra.
- The differentiation and integration will help them to use many applications effectively and efficiently in their engineering course.
- All the above topics will be useful in their research work as well as projects.
- First order first degree differential equations applications will be used in law of cooling, growth and decay problems.
- The concept of maxima-minima has many real time applications.

UNIT I - Mathematical Preliminaries

Arithmetic & geometric progression, finding n^{th} term, sum of n terms, Binomial theorem, Partial fractions, Trigonometric ratios, Sum of angles, compound angles.

UNIT II - Straight line and Vector Algebra

Cartesian co-ordinates (in XY-plane), Straight lines different forms, Angle between straight lines, Point of intersection.

Vector Algebra: Vector addition, Multiplication, Representation, Geometrical resultant Vectors, Orthogonal, Parallel vectors, Angle between vectors.

UNIT III - Differential Calculus

Concept of limit, continuity, differentiation, product rule, quotient rule, differentiation of trigonometric, logarithmic, exponential functions, Introduction to partial differentiation, Euler's theorem, maxima & minima.

UNIT IV - Integral Calculus

Introduction, Integration of different functions, methods of integration, integration by parts, Concept of definite integrals, application of definite integrals, problems on areas.

UNIT V - Ordinary Differential Equations

Formation of differential equation by eliminating arbitrary constants, first order and first degree – variable separables, exact, homogeneous, linear & Bernoulli's equation.

Applications of first order ordinary differential equations to growth and decay problems.

TEXT BOOKS :

1. *P. Seshagiri Rao*, "A Text book of Remedial Mathematics", 1st Edition, Parma Med Press, Hyderabad, 2008.
2. *T.K.V. Iyengar and others*, "Engineering Mathematics" Volume-I, 9th Edition, S. Chand & Company, 2010.

REFERENCE BOOKS :

1. *B.S.Grawal*, "Higher Engineering Mathematics", 40th Edition, Khanna Publishers, 2009.
2. *H.K. Dass*, "Advanced Engineering Mathematics", S.Chand & Co, 2002.

HS113 ENGINEERING PHYSICS

L	T	P	To	C
4	-	-	4	4

Course description and Objectives :

There is a symbiotic relation between physics and engineering. Broadly speaking, engineering is mainly applied physics. Recent technical developments have been the result of joint efforts of physicists and engineers. A proper study of physics is therefore indispensable for an engineering student to excel in his field. The purpose of this course is to present the principles and concepts of physics as relevant to an engineer.

Course Outcomes:

The students will be made to get acquainted to the following learning outcomes:

- Concepts of Physical optics, devices and applications.
- Ultrasonic waves, production, applications in NDT.
- Introduction to Quantum mechanics in relevance to that of modern physics.
- Exposure to latest inventions like lasers, fibers and applications
- Insight into nano technology and applications, solar energy to combat energy crisis.

UNIT I - Physical Optics

Interference – Types - Interference in thin films (Reflection) – Newton's Rings – Michelson's Interferometer, Fabry-perot interferomenter – Applications.

Diffraction – Fraunhoffer Diffraction at single slit – Diffraction grating

Polarization – Production of plane polarized light – Nicol prism – Optical activity – photo elasticity.

UNIT II - Ultrasonics & NDT

Ultrasonics : Introduction – production of ultrasonic waves – piezoelectric method – Properties of ultrasonic waves – Types of ultrasonic waves – Determination of Velocity of ultrasonic waves in solids and liquids – Applications.

NDT : Introduction - Types – Theory and practice of Ultrasonic Testing – Ultrasonic Testing Systems – Ultrasonic Testing Methods – X-Ray Radiography.

UNIT - III Quantum Mechanics & Free electron theory of metals

Quantum Mechanics : Matter waves - Schroedinger's time independent wave equation - Physical significance of the wave function - Particle in one dimensional potential well – tunneling phenomenon.

Free electron theory of metals : Introduction – Classical free electron theory – Electrical conductivity of metal – Fermi - Dirac distribution function and its variation with temperature – Quantum free electron theory.

UNIT IV - Lasers & Fiber Optics:

Lasers: Characteristics of Laser light – Spontaneous and Stimulated emission of radiation – Low power and High power lasers, He-Ne Laser – CO_2 Laser – Nd-Yag laser - Applications of Lasers, Holography and Applications

Fiber Optics: Principle of optical fiber - materials – Numerical Aperture – Types of fibers – Dispersion and Attenuation in optical fibers – Optical sensors – Optical fiber communication system.

UNIT V - Solar Energy & NanoScience and Technology

Solar Energy : Solar radiation – Photovoltaic effect – solar cells – Efficiency of solar cell – Solar thermal energy conversion systems.

NanoScience & Technology : Introduction to nano meterials – Basic principles of nanoscience & Technology – Fabrication of nanomaterials – Physical & Chemical properties of nanomaterials – Applications of nanotechnology.

TEXT BOOKS :

1. M.R.Srinivasan, "Physics for Engineers" New Age International, 2002-2003.
2. M.N. Avadhanulu & P.G. Kshirasagar, "Engineering Physics", 1st edition, S. Chand & Company Ltd, 1992.

REFERENCE BOOKS :

1. Halliday, Resnic and Walker, "Fundamentals of Physics", 6th edition, John Willey publishers, 2003.
2. Grawfor F.S., Berkley Physics courses, "Waves and Oscillations", Volume III McGraw Hill, 1992.
3. V. Raghavan, "Materials Science and Engineering", 5th edition, Prentice-Hall India, 2004.
4. S.O.Pillai, "Solid State Physics", 6th edition, New Age International Publications, Revised, 2005.
5. V.Rajendran, "Engineering Physics", 1st edition, TMH Publications, 2010.

EE111 FUNDAMENTALS OF ELECTRICAL ENGINEERING

L	T	P	To	C
4	-	-	4	4

Course description and Objectives :

To understand the basic concepts, laws, techniques in analyzing various DC and AC circuits and concepts in coupled circuits. Study of construction details, working of various electrical machines and Semiconductor Devices and operation

Course Outcomes:

- Able to explain the notation and components of electric circuits
- Able to analyze DC and single phase and three phase AC circuits using different methods and theorems
- Able to operate various electrical machines.
- Able to explain the concepts of Semiconductor Devices and operation

UNIT I - Fundamentals Of DC Circuits

Circuit Concepts: Concepts of network, Active and passive elements, voltage and current sources, concept of linearity and linear network, unilateral and bilateral elements, R, L and C as linear elements. Ohm's Law – Kirchhoff's Laws –application to simple series, parallel circuits, mesh and nodal analysis of simple resistive circuits.(simple numerical problems).

UNIT II - Fundamentals of A.C. Circuits:

Generation of A.C. voltage - frequency, average value, R.M.S. value, form factor, peak factor for sinusoidal only - phasor representation of alternating quantities. Analysis of simple series and parallel A.C. circuits-(simple numerical problems)

Balanced Three phase systems – relation between phase and line quantities of voltages and currents in star and delta connected systems (Elementary treatment only)

UNIT III - Fundamentals of Electromagnetism and Transformers:

Concepts of Magneto motive force, reluctance, flux and flux density , concept of Self Inductance and Mutual Inductance, Coefficient of coupling-only elementary treatment. (simple numerical problems).

Transformers: Principle of operation of single phase transformer – constructional features – EMF equation (simple numerical problems)

UNIT IV - Electrical Machines:

DC Machines: Constructional details of a D.C. Machine.

D.C. Generator – Principle of operation – EMF equation – types of D.C. generators (simple numerical problems)

D.C. Motor – Principle of operation – Torque equation – types of D.C. motors (simple numerical problems)

A.C Machines: Principle of operation of three phase induction motors – slip ring and squirrel cage motors – Torque equation derivation, Constructional details of synchronous machines.

UNIT V - Semiconductor Devices:

Classification of solids based on energy band theory - Intrinsic semiconductors - Extrinsic semiconductors - P type and N type semiconductors - P-N junction diode and its characteristics –Half and Full wave rectifiers- Zener diode and its characteristics - Voltage regulator. Bipolar junction transistor – Operation- Types- Applications.

TEXT BOOKS:

1. Mittle, V.N., “Basic Electrical Engineering”, 2nd ed., TMH, New - Delhi, 1990.
2. V.K.Mehta,”Principles of Electrical Engineering and Electronics”, 3rd ed., S. Chand Publications, New Delhi, 2010.

REFERENCE BOOKS:

1. Millman & Halkias, “Integrated Electronics”, McGraw Hill, 1979.
2. A.K. Thereja & B.L. Thereja, “Electrical Technology”, Vol. – II, S.Chand Publications, 2007.
3.. U.Bakshi & A.Bakshi, “Basic Electrical Engineering”, 1st ed., Technical Publications, Pune, 2005.
4. U.Bakshi & A.Bakshi, “Basic Electrical Engineering”, 1st ed., Technical Publications, Pune, 2005.

HS114 TECHNICAL ENGLISH COMMUNICATION

L	T	P	To	C
3	2	-	5	5

Course description and Objectives :

To introduce students to the specific use of language for the purposes of Technical Communication which would be an essential prerequisite for success in the areas of writing and speech. The teaching efforts in this course will be directed towards making students develop their technical and non-technical writing abilities using the fundamental principles that apply to the correct use of the English language free of grammatical and other related errors.

Course Outcomes:

Students shall achieve the ability to write and demonstrate college-level proficiency in the following:

- Clear and effective communication of meaning in speaking and writing.
- The ability to perform effectively the essential steps of the writing process (Note making, organizing, composing, revising, and editing).
- The ability to explain, develop, and criticize ideas effectively.
- Effective organization within the paragraph and the essay.
- Accuracy, variety, and clarity of sentences.
- Appropriate diction.
- Control of conventional mechanics (e.g., punctuation, spelling)

UNIT - I

- Text : Environmental Consciousness (Climate Change – Green Cover – Pollution)
- Grammar : Articles – Prepositions – Sentence Types and Construction
- Vocabulary : Root – Prefixes - Suffixes
- Composition : Paragraph Writing (Descriptive & Narrative)
- Lab Practice : Introduction to Phonetics (Organs of Speech; Consonants, Vowels & Diphthongs; Syllable, Stress & Intonation)

UNIT - II

- Text : Emerging Technologies (Solar Power – Cloud Computing – Nanotechnology)
- Grammar : Time and Tense (Present-Past-Future; Helping Verbs; Modals)
- Vocabulary : Synonyms – Antonyms
- Composition : Note-making
- Lab Practice : Grammar Practice (Speaking of past, present & future)

UNIT - III

- Text : Energy (Renewable and Non-renewable Sources – Alternative Sources – Conservation – Nuclear Energy)
- Grammar : Subject-Verb Agreement - Sentence Construction (Characteristics of Technical Writing)
- Vocabulary : Idioms & Phrases
- Composition : Summarizing
- Lab Practice : Situational Conversations – Role-Plays (Introducing; Greeting; Enquiring; Informing; Requesting; Inviting)

UNIT - IV

- Text : Engineering Ethics (Challenger Disaster – Biotechnology – Genetic Engineering – Protection from Natural Calamities)
- Grammar : Sentence Transformation (Degrees, Voice, Speech & Synthesis)
- Vocabulary : Phrasal Verbs
- Composition : Letter Writing (Informal)
- Lab Practice : Situational Conversations – Role-Plays (Emotions; Directions; Descriptions; Agreements; Refusals; Suggestions)

UNIT - V

- Text : Travel and Tourism (Advantages and Disadvantages of Travel-Tourism – Atithi Devo bhava – Tourism in India)
- Grammar : Common Errors
- Vocabulary : One-word Substitutes
- Composition : Letter Writing (Formal)
- Lab Practice : Group Discussions

TEXT BOOKS :

Mindscapes - English for Technologists and Engineers, Orient Black Swan, 2012.

REFERENCE BOOKS :

1. V. R. Narayana Swamy***, "Strengthen Your Writing",*** 1st edition, Orient Longman, 2003.
2. Thomas Elliott Berry***, "The Most Common Mistakes in English Usage",*** 1st edition, Tata McGraw Hill, 2004.
3. T. Balasubramanyam, ***A Textbook of English Phonetics for Indian Students***, Macmillan Ltd., 2000.
4. Sasikumar.V and P.V. Dhamija,. ***Spoken English: A Self-Learning Guide to Conversation Practice,*** 34th Reprint, Tata McGraw Hill, New Delhi, 1993.
5. Margaret M Maison, **"Examine your English",** 1st edition**,** Orient Longman, 1999.
6. Ashraf Rizwi, "***Technical English Communication***", Tata McGraw Hill, Latest Edition.

CS101 PROBLEM SOLVING AND COMPUTER PROGRAMMING

L	T	P	To	C
4	-	-	4	4

Course description and Objectives :

Aim of this course is to introduce the techniques of problem solving and concepts of programming language to the students. Because of its popularity and suitability to develop different types of applications, 'C' language has become the de-facto programming language to engineers. A comprehensive introduction of C language is offered through this course to enable the students to write diversified programs.

Course Outcomes:

On Completion of this course student should be able to

- Able to understand the basic terminology used in computer programming and to write, compile and debug programs in C language.
- Use different data types in a computer program and design programs involving decision structures, loops and functions.
- Able to understand the allocation of dynamic memory using pointers
- Use different data types to create/update basic data files.

UNIT I - Fundamentals of computers

Basic functional units and discrete components of a computer, computer networks, networking components, Binary representation of integers and real numbers, ASCII, EBCDIC, Unicode, Generations of computer languages.

UNIT II - Problem Solving Steps and Basic of C Language

Problem understanding, Formulating a mathematical model, Development of an algorithm, Representation of an algorithm, Flow chart and Pseudo code, Coding, Testing and Debugging, Comments, Processor statement, Function header statement, Variable declaration statement and Executable statement, C Character Set, constants, identifiers, operators, punctuations, keywords, Basic data types, modifiers, identifiers, variables, C scopes, type qualifiers, storage class specifiers, variable initializations, constants, reading and writing characters, formatted I/O.

UNIT III – Preliminaries of C

Assignment, arithmetic , relational, logical, bitwise, ternary, address, indirection, sizeof, dot, arrow, and parentheses operators, Expressions Precedence of operators and associatively, Category of Statements, Selection, Iteration, jump, label, expression and block, Function declaration, prototype, definition, calling by value and address, standard library functions and recursive functions.

UNIT IV - Arrays and Pointers

Declaration, initialization, reading, writing, accessing and passing as a parameter to functions, Multidimensional arrays and String functions, pointer expressions, pointer and arrays, multiple indirection, initializing pointers, pointer to functions, Dynamic memory allocation functions.

UNIT V - Structures and File Processing

declaration, initialization and accessing, array of structures and passing structures to functions, structure pointers, arrays and structures within structures, unions, bit-fields, typedef and enumerations, I/O and processing operations on text and binary files. pre-processor directives.

TEXT BOOKS :

1. Reema Thareja, “Introduction to C Programming”, Oxford University Press, India, 2013
2. Herbert Schildt, C: “The Complete Reference”, 4th Edition, Tata McGraw-Hill, 2000.

REFERENCE BOOKS :

1. E. Balagurusamy, “ Programming in ANSI C”, 4TH Edition, Tata McGraw- Hill, 2008.
2. R Ravichandran and T Jeyapoovan, “ Computer Programming with C”, Soni Graphics, India, 2014.

HS116 MATHEMATICS FOR BIOTECHNOLOGISTS - II

L	T	P	To	C
4	-	-	4	4

Course description and Objectives :

Without mathematics not a single day of an engineer will pass! In this course we start with matrices, solving system of equations. Continue with higher order differential equations. We also study Laplace Transformations using which we can solve differential equations. When data is given at only a finite points, we use numerical methods for find the approximate values of functions, also to solve differential equations approximately etc.

Course Outcomes:

- The students will be able to use Laplace transformations in solving differential equations.
- Definite integrals can be evaluated using Laplace transforms.
- They will analyze the data, when the data is given at only a finite point.
- They will use numerical methods for finding the approximate values of functions and will solve differential equations.
- Numerical integration can be applied in finding approximate areas.

UNIT I - Matrices :

Types of Matrices, determinants, Inverse of a square matrix, Rank of matrix, Echelon form, Solving of simultaneous equations by Cramer's method, Matrix inversion, Gauss Jordan methods, Solutions for linear equations, Eigen values & Eigen Vectors, Cayley-Hamilton theorem (without proof).

UNIT II - Higher Order O.D.E :

Non homogenous linear differential equations of second and higher order with constant coefficients with RHS term of the form e^{ax}, Sin ax, Cos ax, Polynomials in x.

UNIT III - Laplace Transforms :

Laplace transforms of some standard functions, linearity property, shifting theorems, change of scale properties, multiplication by powers of t, division by t, Inverse Laplace transforms, shifting properties, finding inverse Laplace transforms by partial fractions, multiplication by powers of s, division by s, Applications of L.T. for solving ordinary differential equations.

UNIT - IV

Numerical Methods – 1 : Bisection, Newton Raphson, Successive approximation methods.

Interpolation: Lagrange, Newton's forward & backward, Guass's forward & backward interpolation methods.

UNIT V - Numerical Methods – 2 :

Numerical integration by trapezoidal & Simpson's Rules.

Numerical solutions to differential equations : Euler, Runga Kutta Methods.

TEXT BOOKS :

1. *T.K.V.Iyengar, and others*, "Engineering Mathematics" Volume – I, 2009, S.Chand and Company.
2. *T.K.V. Iyengar, and others*, "Mathematical Methods, S.Chand and Company, 2009.

REFERENCE BOOKS :

1. *B.S.Grawel*, "Higher Engineering Mathematics", Khanna Publishers.
2. *Peter V.O Neil*, "Advanced Engineering Mathematics", Thomson Broocks/ cole.
3. *Erwin Kreyszig*, "Advanced Engineering Mathematics", 8th Edition, John Wiley & Sons (Asia) Pvt. Ltd. 2001.

HS117 ENGINEERING CHEMISTRY

L	T	P	To	C
4	-	-	4	4

Course description and Objectives :

Chemistry is the backbone in designing and understanding the nature and properties of various engineering materials. Currently, the electronics and computer engineers are waiting for suitable polymers for using miniature super computers. So this subject develops fundamental knowledge about new engineering materials and their significance in technical fields and industrial sectors. Water is an essential element for the existence of human, plant and animal lives, besides that it has greater industrial applications. The knowledge about water is the basic requirement for a professional student. Characterization of materials with instrumental techniques is essential for engineers.

Course Outcomes:

= Differentiate between soft and hard water. Understand the disadvantages of using hard water domestically and industrially. Select and apply suitable softening methods (Soda-lime, zeolite, ion-exchange methods, etc.) to soften the hard water for industrial and domestic applications.

= Acquaintance of primary and secondary cells, Hydrogen-Oxygen and Methanol fuel cells, dry and wet corrosions, corrosion controlling methods

= Acquaintance of the properties and engineering applications of Ceramics, Refractories, Glasses, Cement, Abrasives, Lubricants

= Acquaintance of Preparation, properties and applications of different polymers (Polyethylene, PVC, Tefflon, Bakelite,Urea-Formaldehyde, Silicones, Rubber – Vulcanization, Synthetic Rubbers-(Buna-S, Buna-N, Neoprene); treatment of membranes.

= Acquaintance of various spectroscopic methods (UV-visible / IR), Beer-Lambert's Law, qualitative and quantitative analysis, block diagrams of UV and IR spectrophotometers.

UNIT I - Water Technology :

Introduction-Hardness of water-Determination of hardness by EDTA-Disadvantages of hard water-Scales & Sludges-Caustic embrittlement-Boiler corrosion-Priming & Foaming, WHO, BIS Standards of water-Softening Methods- Lime Soda process, Zeolite process, Ion Exchange process - Desalination of brackish water-Reverse osmosis, Electro dialysis.

UNIT II - Electrochemical cells and AND Corrosion:

Electrochemical cells: primary cell-(Dry or lecalanche cell), Secondary cell-(Lead-acid storage cell, Lithium ion battery), Hydrogen-Oxygen Fuel cell, Methanol fuel cell.

Corrosion: Introduction-Dry corrosion (chemical)-Wet corrosion (electrochemical)-Mechanism of wet corrosion-Bimetallic corrosion-Concentration cell corrosion-Factors influencing corrosion-Corrosion control methods- Cathodic protection and Electroplating.

UNIT III - Engineering Materials :

Properties and engineering applications of Ceramics, Refractories, Glasses, Cement,Abrasives, Lubricants.

UNIT IV - Polymers :

Introduction –Types of polymerization-Preparation, properties and applications of Polyethylene, PVC, Tefflon, Bakelite, UreaFormaldehyde, Silicones, Rubber – Vulcanization, Synthetic Rubbers - (Buna-S, Buna-N, Neoprene). Elementary treatment of Membranes

UNIT V - Instrumental Techniques :

Interaction of radiation with matter,UV-Visible Spectroscopy-Beer –Lambert's law ,Qualitative and Quantitative Analysis,Block diagram of UV-Visible Spectrophotometer.IRSpectroscopy-Types of Vibrations,Identification of functional groups,Block diagram of IR Spectrophotometer**.**

TEXT BOOKS :

1. P.C Jain and Monica Jain, "Engineering Chemistry", 15th edition, Dhanpat Rai Publications 2009.
2. Gurudeep Raj and Chatwal Anand, "Instrumental Methods of Analysis", 5th edition, Himalaya Publications, 2007.

REFERENCE BOOKS :

1. S.S.Dara, "Text book of Engineering Chemistry" 1st edition, S. Chand Publications, 2009.
2. C.V. Agarwal, C.P. Murthy, A.Naidu, "Chemistry of Engineering materials", 9th edition, BSP Publications, 2008.
3. M.R. Senapati, "Advanced Engineering Chemistry" 2nd edition, Lakshmi Publications, 2006
4. H.W. Wilard and Demerit, "Instrumental methods of Analysis", 7th edition, CBS Publications, 1986.

HS122 ENGINEERING MATERIALS

L	T	P	To	C
4	-	-	4	4

Course description and Objectives :

The course will help students to learn about the elementary relationships between structure and properties of materials how materials can be classified. It also reveals the engineering applications of metals, alloys, semi conductors and magnetic materials and relation between properties and engineering applications.

Course Outcomes:

The students will be made to get acquainted to the following learning outcomes:

- The bonding in solids. Crystal systems and their structural features
- Fundamentals related to phase equilibria and relevance in Materials Science
- Mechanical properties of solids, factors affecting such properties in order to gain materials information.
- Classification of solids based on band theory, sources of resistivity in metals, semi conductors transport mechanism and applications.
- Classification of magnetic materials, hysteresis, ferrites and applications
- Super conductors, classification and their applications. Dielectric materials, types of polarization and new engineering materials and their usefulness.

UNIT I - Bonding in Solids & Crystallography:

Bonding in Solids: Inter atomic forces – Types of bonds – Primary & Secondary bonded materials and their properties – Cohesive energy.

Crystallography: Introduction – classification of Crystal systems – SC, BCC & FCC structures –Miller indices of planes & directions – Separation between successive planes – X-ray diffraction – Bragg's Law – Powder method – Crystal imperfection – Point and line imperfections – Grain boundaries

UNIT II - Phase Equilibria & Mechanical Properties :

Phase Equilibria: Gibb's phase rule & terms involved – Reduced phase rule - Two component systems–invariant reactions – Eutectic system & Iron – Carbon system - Lever rule.

Mechanical Properties : Introduction – mechanical properties of materials – Stress-Strain relations of various solids – Elastic moduli- deformations in solids- Fracture – Creep- Fatigue – Factors affecting mechanical properties of materials.

UNIT III - Conducting Materials & Semiconductors :

Conducting Materials: Introduction – Classification of solids based on the band models - Relaxation time and electrical conductivity of a metal – Collision time & mean free path – Sources of resistivity of metals.

Semiconductors: Introduction – Generation & recombination – Intrinsic semiconductors – Extrinsic semiconductors – Drift and diffusion (Qualitative treatment) – Einstein relation – Hall effect – Direct and Indirect band gap.

UNIT IV - Magnetic Properties & Superconductivity

Magnetic Properties: Introduction – Origin of magnetic moment – Classification of magnetic materials – Domain theory of ferromagnetism – Hysteresis curve - Soft and hard magnetic materials – Ferrites and their applications.

Superconductivity – Introduction - Meissner Effect – Types of superconductors – High Temperature superconductors – Applications.

UNIT V - Dielectrics & Functional materials

Dielectrics : Introduction – Dielectric polarization – Internal electric field – Clausius – Mossotti relation – Ferro and Piezo electricity - Electrets – Applications.

Functional materials: Introduction – Metallic glasses – Biomaterials – Composites – Metal matrix composites - Fiber reinforced plastics – Conducting polymers - shape memory alloys – smart materials.

TEXT BOOKS :

1. V. Raghavan, “Materials Science and Engineering”, 3 rd ed., PHI, 1996.
2. Lawrence H. Van Vlack, “Element s of Materials Science and Engineering”, 6th ed., Wesley Publication, 1989.

REFERENCE BOOKS :

1. Arumugam. M “Material Science” Anuradha Technical Book Publishers, Kumbakonam.K, 1997.
2. Manas Chandra, “Science of Engineering Materials”, Vol 1-3, Mc - Millian Company of India, Delhi.
3. Pillai, S.O, “Solid State Physics”, New Age International, 1998.
4. William F. Smith, “Principles of Materials Science and Engineering”, MGH, Publishers, 1988.
5. Structure and Properties of Materials – John Wulff – Wiley Eastern Ltd.

ME101 ENGINEERING MECHANICS

L	T	P	To	C
4	-	-	4	4

Course description and Objectives :

The course aims to impart the knowledge to understand the forces and their reactions on various static and dynamic conditions.

Course Outcomes:

- Use scalar and vector analytical techniques for analyzing forces in statically determinate structures.
- Solve the engineering problems in case of equilibrium conditions and to calculate the reaction forces of various supports of different structures.
- Determine the centroid, centre of gravity and moment of inertia of various surfaces and solids.
- Solve the problems involving dry friction.
- Apply fundamental concepts of kinematics and kinetics of particles to the analysis of simple, practicalproblems.

UNIT I - Basic Concepts and Principles of Statics :

Introduction to Engineering Mechanics, Scalar and Vector quantities, Forces, Characteristics of a force, Definitions and examples of various types of force systems, Law of transmissibility, Definition of resultant, Composition and resolution of forces, Moment of a force, Principles of moments of force, Couples, characteristics of a couple, Transformations of a couple, Resultants of Force Systems, Possible resultants of different types of force systems, Resultant of a concurrent coplanar force system, Resultant of a non concurrent coplanar force system

UNIT II - Equilibrium of Rigid Bodies

Free body diagrams, Types of supports and their reactions, requirements of stable equilibrium, Equations of equilibrium of a concurrent coplanar force system, Equilibrium of Bodies acted on by two or three forces, Equilibrium of bodies acted on by non-concurrent coplanar force system

UNIT III - Properties of Surfaces and Solids :

Centroid and Center of Gravity: Centre of gravity of parallel forces in a plane, centroids and center of gravity of composite bodies, Distributed Loads on Beams.

Moments of Inertia: Definition, Parallel axis theorem and perpendicular axis theorem for areas, Polar Moment of inertia, Second moment of area by

integration, Radius of gyration of areas, Moments of inertia of composite areas.

UNIT IV - Friction :

Nature of friction, Laws of friction, Coefficient of friction, Angle of friction, Cone of friction, Types of Friction - Sliding Friction, Rolling Friction, Belt Friction, Ladder Friction, Wedge friction.

UNIT V - Kinematics and Kinetics :

Absolute Motion: Introduction, Recapitulation of basic terminology of mechanics, Displacement, Velocity and acceleration their relationship, Rectilinear motion of a particle

Relative Motion: Introduction to kinematics of relative motion, Relative displacement, Relative velocity

Kinetics: Introduction to Kinetics, Force, Mass and Acceleration, Newton's Laws of motion, Equation of motion for a particle, D Alembert's principle, Rectilinear translation of a rigid body, Work done by a force, Work done by a force system, Energy, Potential energy, Kinetic energy, Principle of Work and kinetic energy, Conservation of energy, Linear impulse, Linear momentum, Principle of linear impulse and linear momentum, Conservation of linear momentum.

TEXT BOOKS :

1. J. L. Meriam, L. G. Kraige, "Engineering Mechanics: Dynamics", 7th ed., John wiley & sons, 2012
2. A. K. Tayal, "Engineering Mechanics", Umesh Publications, 2005.

REFERENCE BOOKS :

1. L. Singer - Harper, "Engineering Mechanics", 3rd ed., Fedinand . , Collins, 1975.
2. Timoshenko & Young, "Engineering Mechanics", 4th ed., Tata McGraw Hill, New Delhi, 2007.
3. S. S. Bhavakati & J. G. Rajasekharappa, "Engineering Mechanics", 3nd ed., New Age International Publications, New Delhi, 2008.

HS118 ENVIRONMENTAL STUDIES

L	T	P	To	C
4	-	-	4	4

Course description and Objectives :

The objective of this course is to heighten on awareness of nature and its importance to students

and make them understand the need to make judicious use of all natural resources for long team sustenance of life on this planet.

Course Outcomes:

- To provide Knowledge on importance of natural resources and integrate technical "field" knowledge with analytical skills to prevent natural resources depletion
- To maintain healthy and Diverse Ecosystems ,
- Work together to conserve the biodiversity
- Take immediate measures to control the Pollution
- Adopt Ecofriendly technology.
- Maintenance of hygienic conditions

UNIT I - Environment and Natural Resources :

Environment: Definition, Scope and Importance – Need for Public Awareness

Natural Resources: Renewable and non-renewable resources – Natural resources and associated problems – Forest Resources: Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources: Use and over utilization of surface and ground water – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources - Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity–Energy resources: renewable and non-renewable energy sources, alternate energy sources. Land resources: Land as a resource, land degradation, Soil erosion – case studies - Role of an individual in conservation of natural resources.

UNIT II - Ecosystems and Biodiversity :

Ecosystem: Concept of an ecosystem. – Complete and incomplete ecosystem - Structure and functions of an ecosystem - Ecological succession. - Food chains, food webs -Structure and functional features of the following ecosystem: a. Forest ecosystem b. Grassland ecosystem c. Desert ecosystem, d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) **Biodiversity**: introduction of biodiversity, Bio-geographical classification of India - Value of biodiversity- Biodiversity at global, National and local levels - Hot-spots of biodiversity - Threats to biodiversity - Endangered and endemic species of India – Conservation of biodiversity

UNIT III - Environmental Pollution and Applications of Remote Sensing / GIS on Environment

Definition, Cause, effects and control measures of: Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution - Solid waste Management: Causes, effects and control measures of municipal and industrial wastes - Climate change, global warming, acid rain, ozone layer depletion -Case Studies - Role of an individual in prevention of pollution - Pollution case studies. – Green technology and its concept, role of green technology in controlling environmental problems.

UNIT IV - Social issues and EIA :

Sustainable development -water conservation: Cloud Seeding (Artificial rain making system), rainwater harvesting, watershed management - Disaster management: floods, earthquake, cyclone and landslides - Environment Protection Act. - Air (Prevention and Control of Pollution) Act. - Water (Prevention and control of Pollution) Act - Wildlife Protection Act - Forest Conservation Act

EIA: introduction to E.I.A.-definition of E.I.A and E.I.S – scope and objectives of E.I.A.- methods of E.I.A –CEIA, REIA, MOEF, CPCB, SPCB – Importance of E.I.A in proposed Projects / Industry /

Developmental activity - Remote sensing / GIS: Introduction of remote sensing / GIS, definition of remote sensing, applications of the remote sensing on environment (site selection, land use/land cover pattern, water/air/soil quality models, a criteria of environmental information systems)

UNIT V - Environmental Sanitation :

Food sanitation: food and drugs Act, food preservations, food borne diseases- Milk sanitation: tests for milk, pasteurization of the milk - water borne diseases-

air borne diseases-viral diseases (HIV/AIDS, SARS, bird-flu, anthrax)-maintenance of sanitary and hygienic conditions

Field Work/Environmental Visit: Visit to a local area to document environmental assets – river/ forest/ grassland / hill /mountain - Study of local environment - common plants, insects, birds - Study of simple ecosystems – pond, river, hill, slopes etc - Visits to industries, water treatment plants, effluent treatment plants

TEXT BOOKS :

1. Y. Anjaneyulu, "Introduction to Environmental Science", B S Publications, 2008.
2. Dr. M. Chandrasekhar, "A Text book of Environmental Studies", HI-TECH publications, 2006

REFERENCE BOOKS :

1. Dr. M. Anji Reddy, "A Text book of environmental science and Technology", B S Publications, 2008
2. Dr. K. Mukkanti, "A Text book of Environmental Studies", S.CHAND Company Ltd, 2009.
3. EHILRS and ST, "Text book of Municipal and Rural Sanitation", M.S Hill, 1998.
4. C. S. Rao, Wiley Eastern Ltd, "Environmental Pollution Control Engineering", New Age International Ltd, 2001
5. Dr. M. Anji Reddy, "Introduction to Remote Sensing", B S Publications, 2004.
6. Kurian Joseph and R.Nagendram, "Essentials of environmental studies", Pearson Education Pt Ltd, Delhi, 2007.
7. Sharma & Kour "Text book of Environmental pollution".
8. H.C Perkins "Text book of Air Pollution".

CS105 NETWORK SECURITY

L	T	P	To	C
2	-	-	2	-

Course description and Objectives :

This Course focuses towards the introduction of System, Information and Network security using various methodologies. It also focuses on the practical aspects that have been used to provide e_mail and web security.

Course Outcomes:

On Completion of this course student should be able to

- understand the Importance of Information Security
- Know the ways to protect the information
- understand the Firewall importance
- understand the need of Virtual Private Networks.

UNIT I - History of security :

History of security – Physical security, communications security, emissions security, computer security, network security and information security. Security process - Anti-virus software, access controls, firewalls, smart cards, biometrics, intrusion detection, policy management, vulnerability scanning, encryption, physical security mechanisms.

UNIT II - Access attacks

Snooping, eavesdropping, interception; Modification attacks - Changes, insertion and deletion; Denial of service attacks- Denial of access to information, applications, systems and communication; Repudiation attacks - Masquerading and denying an event. Hacking - Hacker motivation, historical hacking techniques, IP spoofing and malicious code.

UNIT - III

Confidentiality of files, information in transmission and traffic flow, integrity, availability and accountability; Integrity of files and information during transmission; Availability - backups, failover and disaster recovery; Accountability – identification and authentication, and audit.

UNIT - IV

Concepts of firewalls, Application layer and packet filtering firewalls; Virtual Private Networks.

UNIT - V

Basic encryption concepts, Private Key encryption standards-DES, triple DES and AES. Public key encryption – RSA. Concepts of digital signatures.

TEXT BOOKS :

1. Eric Maiwald, Fundamentals of Network security, Dreamtech Press, 2007.

REFERENCE BOOKS :

1. William Stallings, "Cryptography and Network security", 4^{th} edition, Pearson Education, 2010.

HS119 PROFESSIONAL ETHICS, VALUES AND HUMAN RIGHTS

L	T	P	To	C
2	-	-	2	-

Course description and Objectives :

• *To create an awareness on Engineering Ethics and Human Values.*

• *To instill Moral and Social Values and Loyalty*

• *To appreciate the workplace rights of Others, responsibilities and Safety of others.*

Course Outcomes:

The course will enable the students to attain the following:

= an understanding of professional and ethical responsibility in workplace

= the broad education necessary to understand the impact of engineering solutions in a global and societal context

= a knowledge of contemporary issues related to human and professional interactions at workplace

= an engineer's life-long commitment to serve the disadvantaged

UNIT I - Human Values :

Morals, Values and Ethics – Integrity – Work Ethic – Service Learning – Civic Virtue – Respect for Others – Living Peacefully – Caring – Sharing – Honesty – Courage – Valuing Time – Co-operation – Commitment – Empathy – Self-Confidence – Character – Spirituality.

UNIT II - Engineering Ethics & **Engineering as social experimentation :**

Engineering Ethics : Variety of moral issues – types of inquiry moral dilemmas – moral autonomy – The problems of Many Hands – Kohlburg's theory – Gilligan's theory Impediments to Responsible Action.

Engineering as social experimentation - Codes of ethics - a balanced outlook on law - the challenger case study.

UNIT III - Engineer's Responsibility for Safety :

Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis – Reducing Risk – The Government Regulator's Approach to Risk - Chernobyl Case Studies and Bhopal.

UNIT IV - Workplace Rights and Responsibilities & Work Environment :

Workplace Rights and Responsibilities : Engineers and Managers. Oganizational complaint procedures. Government agencies. Resolving Employee concerns. Limits on acceptable behaviour in large corporation.

Work Environment : Ethical and legal considerations, Organizational responses to offensive behaviour and harassment. Ethics in a Global Context.

UNIT V - Global Issues :

Multinational Corporations – Business Ethics - Environmental Ethics – Computer Ethics - Role in Technological Development – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Honesty – Moral Leadership – Sample Code of Conduct.

TEXT BOOKS :

1. Mike Martin and Roland Schinzinger, “Ethics in Engineering”, McGraw Hill, New York, 2005.

REFERENCE BOOKS :

1. Prof. (Col) P S Bajaj and Dr. Raj Agrawal, “Business Ethics – An Indian Perspective”, Biztantra, New Delhi, 2004
2. Charles E Harris, Michael S. Protchard and Michael J Rabins, “Engineering Ethics – Concepts and Cases”, Wadsworth Thompson Learning, United States, 2000 (Indian Reprint now available)
3. Engineering Ethics-An industrial Perspective, Gail Dawn Baura
4. Charles E Harris, Michael S Pritchard and Michael J Rabins, “Engineering Ethics – Concepts and Cases”, Thompson Learning, 2000.
5. Charles E Harris, Michael S Pritchard and Michael J Rabins, “Engineering Ethics – Concepts and Cases”, Thompson Learning, 2000.
6. PSR Murthy, “Indian Culture Values and Professional Ethics”, BS Publications
7. Edmund G Seebauer and Robert L Barry, “Fundamentals of Ethics for Scientists and Engineers”, Oxford University Press, Oxford, 2001.

HS120 ENGINEERING PHYSICS LAB

L	T	P	To	C
-	-	3	3	2

Course description and Objectives :

This lab is intended to make the students realize the theoretical concepts of physics having hands on experience in conducting the following experiments. Students may have to take up any 10 experiments from each section.

Course Outcomes:

- Students realize concept of resonance of sound conducting the experiment of Sonometer Melde's experiment and volume generator.
- The students understand the concepts of light conducting the experiments of dispersion of light, diffraction of light, optical fibers and lasers.
- The students acquire the knowledge of magnetic field theory, thermal energy and elastic properties by conducting the experiments of field along the axis of circular coil, Lee's experiment, Seebeck effect and Torsional pendulum.

PHYSICS LAB

1. Verification of laws of transverse vibrations in stretched string - Sonometer
2. Melde's Experiment - Transverse and Longitudinal modes.
3. Determination of Rigidity modulus of a material in the form of a wire - Torsional pendulum
4. Dispersive power of the material of a Prism - Spectrometer
5. Determination of wavelength of a monochromatic light source - Diffraction Grating.
6. Field along the axis of a circular coil – stewart Gee's apparatus.
7. Volume Resonator.
8. Band gap of semiconductor
9. Hall coefficient
10. Thermal conductivity of bad conductor Lee's method
11. Optical Fiber – Determination of numerical aperture
12. Solar Cell
13. Seebeck effect

REFERENCE BOOKS:

1. Vogel's Text book of qualitative Chemical Analysis J.Mendham, R.C Denney, J.D. Bares, M.Thomas & B. Siva Sankar, Pearson Publications – Volume I (2009).

EE113 FUNDAMENTAL OF ELECTRICAL ENGG. LAB

L	T	P	To	C
-	-	3	3	2

Course description and Objectives :

To understand basic electrical elements, electrical energy its consumption and measurement. To develop practical knowledge on electrical machines, electronic devices and circuits

Out Comes :

- Able to realize characteristics of electrical elements.
- Able to analyze given simple ac and dc networks.
- Able to work on different electrical machines.
- Able to reflect the knowledge of electronic devices to verify experimentally.

List of Experiments

1. Familiarization with basic components such as Resistors, Capacitors, Diodes, Transistors
2. Familiarization with basic electrical measuring instruments
3. Verification of ohm's law
4. Verification of KVL and KCL
5. Calculation of power factor in simple RL and RC circuits
6. Magnetization characteristic of a D.C. self excited generator
7. Measurement of power and energy.
8. Measurement of transformation ratio of single phase transformer.
9. Measurement of Power, Power factor of 3-phase induction motor.
10. Characteristics of PN junction diode.
11. Characteristics of Zener diode.
12. Operation of Full wave Rectifier
13. Operation of half wave Rectifier
14. Study and Working of fluorescent lamp
15. Measurement of armature and field resistances of d c machine using voltmeter-ammeter method.

Note : Any 10 of above experiments are to be conducted.

CS107 COMPUTER PROGRAMMING LAB

L	T	P	To	C
-	-	3	3	2

Course description and Objectives :

To familiarize the students in preparation of documents and presentations with office automation tools. A comprehensive problem solving skills through C language is offered to enable the students to write diversified solutions using this language.

Course Outcomes:

- Able to write, compile and debug programs in C language.
- Able to formulate problems and implement algorithms in C.
- Able to effectively choose programming components that efficiently solve computing problems in real-world

1. Write A Program to find simple Interest, compound interest
2. Write A Program to covert given temperature from C to F & F to C
3. Write A Program to check Entered number is positive or zero or Negative
4. Write A Program to print given year is Leap year or not
5. Write A Program to do arithmetic operations using switch
6. Write A Program to find biggest among 3 Numbers
7. Write A Program to print grade of a student for 5 sub avg>70(A), 60-70(B), 50-60(C),<50(F)
8. Write A Program to find Roots fo Quadratic Equation
9. Write A Program to find sum of individual digits of a given number
10. Write A Program to check whether the given number is PALINDRAM or not
11. Write A Program to check whether the given number is PERFECT or not
12. Write A Program to check whether the given number is PRIME or not
13. Write A Program to check whether the given number is ARMSTRONG or not
14. Write A Program to check whether the given number is STRONG or not
15. Write A Program to find sum of Natural Numbers

16. Write A Program to print the following triangle

```
      1
    2   3
  4   5   6
7   8   9   10 etc……….
```

17. C Progrm to find Factorial of Given number using Recursive and Non Recursive Functions.
18. Write A Program to print Fibonacci Series upto given limit using recursive, Non recursive
19. Write program in C for determining the minimum and maximum and sum of elements of an array of 'n' elements and searching for a given element.
20. C Program for computing range, mean and standard deviation of a given numeric dataset.
21. Write A Program in C for performing addition, subtraction, multiplication and transpose operations on matrices.
22. Write program to perform the following string operations on the given string. a) string length b) string copy c) string concatenation d) string comparison e) reverse string f) sub string
23. Write A Program to read student record (no, name, marks1, marks2, marks3, marks4, marks5, calculate average and Grade) and display the student record.
24. Write A Program to do arithmetic operations using pointers.
25. Write A Program to create two data files and copy the content of these two data files as a single file in another new file?

HS121 ENGINEERING CHEMISTRY LAB

L	T	P	To	C
-	-	3	3	2

Course description and Objectives :

This lab is intended to make the students enlighten with the theoretical concepts of chemistry. Instrumental techniques are useful for characterization of materials for future engineers.

Students may have to take up any 10 experiments from the following experiments.

Course Outcomes:

- To enable the students to analyse the hardness & chlorides in the potable water.
- To help students to determine the Alkalinity in water used especially in industries.
- To impart knowledge on polymers used as insulators.
- To provide an idea about Advanced techniques in chemical analysis using conductometer and spectrophotometer.

Volumetric Analysis:

1. Determination of total Alkalinity of water
2. Determination of Percentage purity of Washing soda
3. Determination of Fe(II) by Dichrometry
4. Determination of Percentage of available chlorine in Bleaching powder
5. Determination of chlorides by Argentometry
6. Determination of Total hardness of water

Preparations:

7. Preparation of Bakelite
8. Preparation Of Urea- Formaldehyde Resin

Instrumental methods of Analysis:

9. Determination of Viscosity of a Lubricating oil
10. Determination of Strength of acid by conductometry
11. Determination of Mn^{+7} by Colorimetry
12. Demonstration of UV-Visible Spectrophotometer with Ferrothiocyanate

REFERENCE BOOKS:

1. Vogel's Text book of qualitative Chemical Analysis J.Mendham, R.C Denney, J.D. Bares, M.Thomas & B. Siva Sankar, Pearson Publications – Volume I (2009).
2. Experiments in Applied Chemistry by Dr.Sunita Rattan. S.K. Kataria & Sons publications,2008.

ME103 ENGINEERING GRAPHICS

L	T	P	To	C
1	-	3	4	3

Course description and Objectives :

To familiarize students with the conventional concept of engineering drawing and application through AutoCAD.

Course Outcomes:

After completion of this course, student will be able to prepare plan and elevation of any pictorial view either conventional or through AutoCAD.

UNIT - I

Introduction to Engineering drawing: Introduction to Engineering Drawing – Types of lines, lettering, dimensioning Construction of polygon & Conics. (Ellipse, Parabola & Hyperbola by general method)

UNIT - II

Orthographic Projections: Principle of projection-Planes of projections.

Projections of points:

Projection of straight lines: Inclined to one plane and both the planes.

Projections of planes: Simple planes, Planes inclined to reference planes.

UNIT - III

Projections & Sections of solids – projections of prisms – cylinders – cones - pyramids – solid axis inclined to one plane, simple sections- prism, cylinder, pyramid and cone. AutoCAD Fundamentals.

UNIT - IV

Isometric projections: Isometric drawing of simple objects through AutoCAD

UNIT - V

Orthographic projections: Conversion of Pictorial view into orthographic view using AUtoCAD and Conventional.

TEXT BOOKS :

1. N.D.Bhatt, "Engineering Drawing", 49th ed., Charotar Publication, 2007.
2. K. Venugopal, "Engineering Drawing through Auto CAD", 1st ed., New Age Publication, 2008.

REFERENCE BOOKS :

1. Jhole, "Engineering Drawing", 2nd ed., Tata McGraw Hill, 2008.
2. K.L. Narayana, "Engineering drawing" 2nd ed., Scitech Publications, 2008.

ME105 WORKSHOP PRACTICE

L	T	P	To	C
-	-	3	3	2

Course description and Objectives :

To provide the hands on experience to the students on basic workshop skills.

Course Outcomes:

After completion of this course, students will be able to identify various tools connected to all the trades. They are also able to make various objects to the given dimension by using various types of tools.

Trades for exercises:

1. Carpentry:
2. Fitting
3. Tin Smithy & Black smithy4. House wiring
5. Foundry & Welding (Demonstration)
6. Machine shop & CNC (Demonstration)
7. IT Workshop
8. Study of discrete components of computer and networking (1 session)
9. Demonstration of assembling a computer, disk partitioning and installation of system and application software. installation of modem etc. (2 sessions).

Note: In each trade, the students has to perform at least two jobs

TEXT BOOKS :

1. S.K. Hazra Choudhury, Elements of workshop Technology, 11th Edition, Media Promoters, 1997
2. Gopal, T.V., Kumar, T., and Murali, G., A first course on workshop practice – Theory, Practice and Work Book, Suma Publications, Chennai, 2005.
3. Venkatachalapathy, V. S., First year Engineering Workshop Practice, Ramalinga Publications, Madurai, 1999.

VIGNAN'S UNIVERSITY

II Year - B.Tech

SYLLABUS

I SEM & II SEM

II Year B.Tech. Food Tech. I-Semester

L	T	P	To	C
4	0	-	4	4

HS 213 PROBABILITY & STATISTICS

Course Description & Objectives:

This course is to impart knowledge to the students concerned with the laws governing random events. The collection, analysis, interpretation, and display of numerical data and its applications in Food Science and Technology.

Course Outcomes:

Students who successfully complete this course should be able to demonstrate understanding of:

1. *Basic probability axioms and rules and the moments of discrete and continuous random variables as well as be familiar with common named discrete and continuous random variables.*
2. *How to derive the probability density function of transformations of random variables and use these techniques to generate data from various distributions.*
3. *How to calculate probabilities, and derive the marginal and conditional distributions of bivariate random variables.*
4. *Discrete time Markov chains and methods of finding the equilibrium probability distributions.*
5. *How to calculate probabilities of absorption and expected hitting times for discrete time Markov chains with absorbing states.*

UNIT I - Descriptive Statistics

Basic Definitions, Frequencies, Graphical Representation, Histogram, Ogive curves, Measures of Central tendency, Arithmetic mean, Median, Mode, mean deviation, standard deviation, Symmetry and Skewness, Karl Pearson's Coefficient of skewness.

UNIT II - Curve Fitting and Correlation, Regression

Least squares method, curve fitting (straight line and parabola only)

Covariance, Correlation, Types, Pearson's Coefficient of correlation, Rank correlation, Spearman's rank correlation. Regression, Regression lines, multiple regression.

UNIT III - Probability

Introduction, Definition (Classical and Axiomatic approach), Addition theorem, Conditional probability, Multiplication theorem, Total probability, Bayes theorem.

UNIT IV - Distributions

Random variables, Discrete and Continuous variables, Introduction to Distributions.

Binomial distribution : Definition, Mean and Standard deviation, Recurrence relation, Applications, Fitting of binomial distribution.

Poisson Distribution : Definition, Mean and Standard deviation, Recurrence relation, Poisson Distribution is an approximation of Binomial distribution, Applications, Fitting of Poisson distribution.

Geometric Distribution : Definition, Properties.

Normal Distribution : Definition, Normal curve, Mean and Standard deviation, Median, Mode, Normal Distribution applications, Normal Distribution is an approximation to Binomial distribution.

Exponential Distribution : Definition, Properties.

UNIT V - Sampling Methods

Population and Sampling, Parameters and Statistics, Types of sampling, Sampling Distributions, Central limit theorem, Standard Error of mean from infinite population, Standard deviation of variance.Test of hypothesis and test of significance, confidence limits, confidence interval, Test of significance of Large samples, T-distribution, Chi square test.

TEXT BOOKS :

1. *H. K. Dass* and *Er. Rajnish Verma*, Higher Engineering Mathematics, S. Chand & Co., New Delhi, 2011.
2. *Miller and Fruinds*, Fundamentals of Probability and Statistics, PHIP Publication.

REFERENCE BOOKS :

1. *S.C. Gupta* and *V.K .Kapoor*, "Fundamentals of Mathematical Statistics", Sultan Chand & Co., New Delhi, 2005.
2. *B.V. Ramana*, "Higher Engineering Mathematics", 3rd Edition, Tata McGraw-Hill Publishing Co, 2008.
3. *R K Jain, S R K Iyengar*, "Advanced Engineering Mathematics", 2nd Edition, Narosa Publishing House.
4. *Erwin Kreyszig*, "Advanced Engineering Mathematics", 8th Edition, John Wiley & Sons (Asia) Pvt. Ltd. 2001.

II Year B.Tech. Food Tech. I-Semester

L	T	P	To	C
4	0	-	4	4

FT201 FOOD CHEMISTRY

Course Description & Objectives:

This course will impart knowledge to the students on the chemistry of micronutrients & macronutrients and its application in food industry.

By the end of the course, the students will be able to gain knowledge on different chemical & enzymatic reactions occurring in foods, understand Industrial application of different macronutrients and apply their knowledge of biomolecules to understand the changes that occur in foods during processing

Course Outcomes:

1. *Analyse and predict how the composition and conditions within a food influence the functional properties of food molecules.*
2. *Analyze and predict how the composition of foods with regard to carbohydrates, lipids, protein and water influence their stability.*
3. *Examine and assess implications for food formulations for achieving objectives of food quality and palatability, cost and healthfulness.*
4. *Analyze and interpret the role of food chemistry in practical food situations.*

UNIT I - Introduction to Food Chemistry

Food chemistry - Definition, Introduction, Importance and History of Food Chemistry. Moisture in foods – Role and type of water in foods. Water activity and sorption isotherm - Role of water activity in enhancing the shelf life of foods -Humectants - Role of Humectants in enhancing the shelf life of foods. Dispersed systems of foods - Colloidal system - Types of colloidal system. Sols - Types of sols, lyophilic sols, lyophobic sols, Preparation, purification and Properties of sols. Gels-Types of Gels, properties of gels, Food gels. Emulsions - Types of emulsions, Preparation and properties of emulsions. Foam - Formation and structure Changes of carbohydrates on cooking - Changes in pecticsubstances,Changes in starch. Starch - Starch granules, Granule gelatinization (Gelatinization of starch), Hydrolysis of starch,Crude fibre. Browning reactions - Enzymatic browning and non-enzymatic browning.

UNIT II - Protein

Functional properties of sugars. Pure proteins of plant and animal origin with their functional characteristics. Plant proteins - cereal proteins, tuber proteins and pulse storage proteins. Milk proteins - Casein, whey proteins and colostrums. Egg proteins - Egg white proteins, Egg yolk proteins. Lipids - Introduction - Fatty acids, Acylglycerols, Phospholipids. Classification of edible fats - Milk fats, lauric acids, vegetable butters, oleic-Linoleic acids,linolenic acids, Animal fats, Marine oils. Physical aspects of lipids - Crystallization, Consistency. Chemical aspects of lipids - Lipolysis, Auto-oxidation, Thermal decomposition, polymerization Edible fats and oils - Melting properties, chemical properties. Technology of edible fats and oils - Rendering, pressing, solvent extraction.

UNIT III - Chemistry of fat and oil processing

Chemistry of fat and oil processing: Refining, Hydrogenation, Interesterification. Frying technology of edible fats and oils - Chemistry of frying, Behaviour of frying oil. Behaviour of food during frying, chemical and physical changes, Tests for assessing the quality of frying oils. Anti-oxidants-Natural and synthetic anti-oxidants, Mechanism of action, examples and mode of application. Rancidity and its types, detection techniques. Enzymes in food industry - Carbohydrases-Amylases, pectinolytic enzymes, cellulases and hemicellulases. Proteases - Endopeptidases, Metalo peptidases. Lipid hydrolyzing enzymes - Lipases, Phospholipases. Chemical reactions of interest to food processing.

UNIT IV- Micronutrient

Introduction - Definition of Micronutrient, Classification of Micronutrients, Significance and Scope. Flavor - Definition, Methods for Flavor Analysis, Taste and Nonspecific Saporous Sensations, Taste Substances; Sweet, Bitter, Sour, and Salty sensations, Structural basis of taste modalities, Non specificSaporous substances; Flavour Enhancers, Astringency, Pungency and Cooling. Flavours related to spices, fruits and vegetables. Flavour volatiles. Pigments - Introduction - Pigments in animal and plant tissue - heme compounds, Chlorophyll, carotenoids, Flavonoids and other phenols, Betalains. Flavonoids and other phenols - Anthocyanins - Structure - Color and Stability of Anthocyanins. Factors affecting stability of Anthocyanins - Structural transformation and pH – Temperature – oxygen and Ascorbic acid - Light, Sugars and their degradation products, metals, Sulfur dioxide, Co pigmentation, Enzyme reactions

UNIT V- Flavonoids

Other flavonoids - physical properties - Importance in foods. Vitamins - Introduction, Toxicity of vitamins - Different sources of vitamins – Dietary recommendations. Minerals - Introduction - Principles of mineral chemistry - Nutritional aspects of minerals - Essential mineral elements - Recommended Dietery allowances –Bioavailability. Thickeners and Stabilizers in foods - Chemical composition of Acacia gum, Agar, Alginic acid, Carrageenan, guar gum, Specific function and utilization in foods. Antinutritional factors in foods - Saponin, Phytic acid, hemagglutenins or lectins. Modification of food using enzymes. Role of endogenous enzymes in food quality - color - Texture - Flavor and aroma changes in foods - Nutritional quality. Enzymes in baking and brewing.

TEXT BOOKS:

1. HD. Belitz, Dr.W.Grasch 1987, *Food Chemistry* – Spirigerverl, Newyork.
2. Fenema O.R. Maraceladikllor, *Food Chemistry* – London.

REFERANCES:

1. Harry H. Sisler, Calvin: A.VanderWerf. *Food Chemistry*
2. N.A. Michael Eskin*Biochemistry of Foods* 2nd edition.

3. Dr. Ling HD. Belity, Dr.Ing, W.Grach 1987, *Food Chemistry* - Spirigerverl, New York.
4. Eeskin - herderson*Food Biochemistry* - Town send.
5. R. Marceladikllor, *Food Chemistry* - Fenema, London.
6. Meyer. *Food Chemistry - Food Chemistry* - HARRY H. SISLER, Calvin : A Vander werf.
7. Braverman*Introduction to the Biochemistry of Foods* - Elsevier Scientific Publishing Company
8. Sadasisivam - *Biochemical Methods*

II Year B.Tech. Foof Tech. I-Semester	**L**	**T**	**P**	**To**	**C**
	4	**0**	**-**	**4**	**4**

PRINCIPLES OF COST ACCOUNTING

Course Description & Objectives:

This course willenable the students to imbibe the fundamentals of cost accounting.

By the end of the course the students will be able to understand concerned with Ascertainment of Cost, Ascertainment of Profitability, Classification of Cost and Control of Cost that play very important role in running food industry.

Course Outcomes:

1. *After completion of this course students will be able to understand .*
2. *Basics of cost accounting, its scope and objective.*
3. *Treatment of stock practical problems on cost sheets..*
4. *Differential Piece rate system, Tailor's differential piece rate, Halsey and Rowan Plan, Labour Productivity.*
5. *Overheads and its importance, classification*

UNIT I - Introduction to cost accounting

Introduction, Evolution and Definition of Cost Accounting, Scope, Objectives and Functions of Cost Accounting, Cost concept and cost classification. Purchase procedure, material issue, operating and transport cost.

UNIT II - Stock and cost sheet

Elements of Cost, Treatment of Stock, Stock of Raw Materials, Stock of Work-in Progress, Stock of Finished Goods, Practical Problems on Cost Sheet

UNIT III- Material and costing

Material Cost- purchase procedure, fixation of stock levels, store keeping, pricing of material issue (FIFO and LIFO only), methods of costing (operating costing-transport only)

UNIT IV- Labour cost

Labour cost- Remuneration methods, time wage payments, payments, payment by results, differential Piece rate system, Tailor's differential piece rate, Halsey and Rowan Plan, Labour Productivity.

UNIT V- Introduction to overhead

Overheads: Definition of Overheads, Importance of Overhead, Classifications of Overhead, Machine hour rate

TEXTBOOKS:

1. Cost Accounting: Method & Problems-B.K.Bhar, Academic Publishers
2. Cost Accounting-A Managerial Emphasis, Horngren, Foster & Dater, Prentice Hall.

REFERANCE BOOKS:

1. A Text Book of Cost Accountancy-M.N.Arora, Vikas Publishing Pvt., Ltd.
2. Cost Accounting- N.K.Prasad&A.K.Prasad, Book Syndicate.
3. Principles and Practice of Cost Accounting- Asish Bhattacharya, Sultan Chand.
4. Fundamental Managerial Accounting Concept- Edmonds, Edmonds AndTsay, Irwin McGraw Hill.
5. Cost Accounting – Theory and Practices-Bhabatosh Banerjee, Sultan Chand & Sons.

II Year B.Tech. Food Tech. I-Semester

L	T	P	To	C
4	0	-	4	4

FT203 FOOD MICROBIOLOGY

Course Description & Objectives:

This course will impart basic knowledge about micro-organisms associated with foods

By the end of the course, the students will be able to gain knowledge on the sources, contamination and spoilage of micro-organisms, the preservation of food for future use.

Course Outcomes:

1. *Identify the important pathogens and spoilage microorganisms in foods and the conditions under which they will grow.*
2. *Identify the conditions under which the important pathogens are commonly inactivated, killed or made harmless in foods.*
3. *Utilize laboratory techniques to identify microorganisms in food.*
4. *Know the principles involving food preservation via fermentation processes.*

UNIT I - Microorganism and Food Spoilage

Microbial spoilage of foods. Cause of spoilage classification of foods by ease of spoilage. Factors affecting kinds and numbers of microorganisms in food. Factors affecting growth and survival of microorganismsinfoods. Intrinsic factors – Nutrient content, pH, buffering capacity, redo potential (En), Inhibitory substances andbiological structures (Antimicrobial barriers and constituents) water activity. Extrinsic factors – Relative Humidity, Temperature, and Gaseous Atmosphere. Chemical changes caused by microorganisms - changes in nitrogenous organic compounds, non-nitrogenous organic compounds, organic acids, other compounds, Lipids, Pectic substances. Contamination of Foods. Sources of contamination. Green plants and Fruits, Animals, Sewage, Soil, Water, Air.

UNIT II - Classification of Micro-Organism

Microorganismsimportance in Food Microbiology. Moulds - General characteristic of moulds, classificationand identification of moulds. Yeasts and Yeast like fungi - General characteristics of yeasts, classification andidentification of yeasts, yeasts of industrial importance. Bacteria - Morphological characteristics important inFood Bacteriology. Cultural and Physiological characteristics important in food bacteriology. Genera of bacteria important in Food Bacteriology groups of bacteria important in food bacteriology. Principles of FoodPreservation. Methods of Food preservation, application in food preservation. Asepsis, removal of Microorganisms. Maintenance of Anaerobic conditions.

UNIT III - Methods of Food Preservation

Food Preservation by use of high temperature. Factors affecting heat resistance (Thermal death time). Heat resistance of Microorganisms and their spores. Determination of heat resistance. Heat penetration - Pasteurization, Heating at about 100 C. Heating above 100 C, canning.Preservation by use of low temperatures. Growthmicroorganisms at low temperatures. Common or Cellar storage. Chilling or cold storage. Freezing or Frozenstorage. Sharp Freezing and quick freezing. Changes during freezing, storage and thawing. Preservation bydrying, methods of drying. Intermediate moisture foods. Preservation by food additives - The ideal antimicrobial preservatives.Organic acids and their salts, nitrites and nitrates, sulfur dioxide and sulfites. Ethylene and propylene oxide,sugar and salt. Preservation by Food Additives - Alcohol, formaldehyde, wood smoke, spices and othercondiments and other additives. Other groupings of chemical agents, antibiotics, developed preservatives. FoodPreservation by Radiation - U.V. Radiation, ionizing radiations, definition of terms, xrays, gamma rays andcathode rays, Microwave processing. High pressure processing, pascalization

UNIT IV - Microbial spoilage and preservation of milk and milk Products

Microbiology of milk and milk products. Contamination, preservation, pasteurization and ultra pasteurization,vat pasteurization. Vacreation, use of low temperatures, freezing, drying etc. Spoilage of milk and cream, gasproduction proteolysis, ropiness, changes in milk fat. Alkali production. Flavours changes & colour changes. Spoilage of milk at different temperatures. Condensed and dry milk products. Flavour defects, colour defects.Microbiology of fruits and vegetables, contamination, preservation of vegetables, asepsis, chilling, freezing,drying, preservatives, CA storage, MA storage. Spoilage of fruits and vegetables. Microbiology of cereal andcereal products contamination, preservation and spoilage of flours. Microbiology of cereal and cereal products.Spoilage-Bread, Mold, Rope, Red bread, Chaky Bread.

UNIT V- Spoilage and preservation of Meat

Microbiology of Meat and Meat Products. Contamination, preservation. Spoilage of meat and meat products. Invasion of tissues by microorganisms and growth of microorganisms in meat General types of spoilage of meats. Spoilage under anaerobic conditions, spoilage of different kinds of meats. Contamination, preservation, spoilage. Factors influencing kind and rate of spoilage, evidences of spoilage, bacteria causing spoilage. Microbiology of eggs. Contamination, preservation, spoilage. Changes during storage. Changes not caused by microorganisms and changes caused bymicroorganisms. Microbiology of canned foods. Causes of spoilage, appearance of the unopened container, types of biologicalspoilage of canned foods. Flat sour spoilage, TA spoilage, sulphide spoilage. Types of spoilage of canned foodsby bacteria, yeasts, molds. Spoilage of canned meat.

TEXTBOOKS:

1. Food Microbiology, TMH, New Delhi *by* W C Frazier & D C Westhoff
2. Modern Food Microbiology, CBS Publication, New Delhi *by* J M Jay

REFERENCE BOOKS:

1. G.L. Ganwart (1987), *Basic Food Microbiology,* AVI Publishing Co. Inc., USA. Frazier and WesUobb.
2. Adam M R and Moss M.O., *Food Microbiology,* New Age International (P) Ltd., Publishers, NewDelhi.
3. Frazer, Math and Deibel, *Laboratory Manual for Food Microbiology*, Burgers Publishers –Minnesota, USA.
4. CarlvanDerzant and Splittsoessev, *Methods for Microbial Examination of Foods*, APHAPublishers, Washington DC, USA.

II Year B.Tech. Food Tech. I-Semester	**L**	**T**	**P**	**To**	**C**
	4	0	-	4	4

FT205 BIOCHEMISTRY & NUTRITION

Course Description & Objectives:

This course will impart knowledge to the students on the fundamentals of Biochemistry to understand the concepts of Biochemistry.

By the end of the course, the students will be able to understand the structural organization of plant cell, study the chemical properties and metabolism of biomolecule and understand the biochemical reactions occurring in plant cell.

Course Outcomes:

By the end of the course, the students will be able to

1. *Understand the concepts of Biochemistry*
2. *Know the structural organization of plant cell*
3. *Study the chemical properties and metabolism of biomolecules*
4. *Understand the biochemical reactions occurring in plant cell*

UNIT I - Introduction to Carbohydrate

Introduction - Importance of biochemistry - Scope of biochemistry - Historical aspects of biochemistry andbranches of Bio-chemistry. Plant cell - Animal cell - Various organelles in plant cell and animal cell – Theirfunctions. Carbohydrates - Introduction - Definition of carbohydrates, functions, classification of carbohydrates- Monosaccharaides, disaccharides, polysaccharides. Reducing sugars - monosaccharaides, glucose, fructose,disaccharides - Maltose, Lactose, Non reducing sugars - Sucrose, trehalose, inversion of sucrose. Polysaccharides - starch, Glycogen, Cellulose, Chitin, - Structures, functions, uses.

UNIT II - Protein : classification and function

Carbohydrates physical properties - Isomerism, Structural isomerism, Stereoisomerism, optical isomerism,Enantiomers, Anomers, Mutarotation, Epimers. Chemical properties of carbohydrates - Dehydration, oxidation,reduction, formation of esters, amination, glucoside formation, formation of osazones, cyanohydrine reaction,oximes formation. Amino acids

- occurrence - classification - Protein and non-protein amino acids – essentialAndnon-essential amino acids - classification based on Hydrophobicity of R-side chain groups, based on thestructure, based on the polarity, based on the nutritional and metabolic rate. Chemical properties of amino acids- Ninhydrin - peptide bond reaction - decarboxylation - Schiff base formation - Transamination - oxidative andnon - oxidative deamination – sangers reagent - Edmans reagent - Dansyl chloride test..

UNIT III - Protein and Enzyme

Structure of proteins - primary, secondary, tertiary and quaternary structure and forces involved in thestabilizing proteins. Classification of proteins - based on solubility, function, properties of proteins -U.V.absorption Denaturation, Renaturations and immune reaction. Purification techniques of proteins – saltingin, salting out, Gel filtration, Ion exchange chromatography. Enzymes - characteristics of enzymes, chemicalnature, specificity, active site and mechanism of action - Lock and key model, Induced fit model. Measurementof enzymatic activity, factors affecting enzymes activity. Enzymatic inhibitions, Iso enzymes, co-enzymes, haloenzymes, prosthetic group classification and Nomenclature of enzymes.

UNIT IV- Lipids

Lipids - occurrence - Classification, functions and structures of saturated and unsaturated fatty acids, importanceof essential fatty acids. Chemical properties of fatty acids Rancidity, saponification, Iodine number, ReichartMeissel number, acid value. Nucleic acids - functions, structure of Nitrogen bases, Nucleosides and Nucleotides- ATP, GTP, CTP, UTP, TTP, Secondary structure of DNA. Various types of DNA and RNA. Metabolism - Anabolism - Catabolism - stages of respiration, overall metabolic view of carbohydrate, protein and lipids.Glycolysis and its energetics

UNIT V- Metabolic pathway

TCA cycle and its energetics. Gluconeogenesis. Glycogen metabolism - Glycogenesis, Glycogenolysis. Hexosemono phosphate pathway Metabolism of lipids - Anabolism of saturated fatty acids , unsaturated fatty acid.Catabolism of lipids - Triacylglycerol and W - oxidation of fatty acids in brief and â-oxidation in detail.Vitamins - occurrence, chemistry and structure of vitamins. Metabolic functions of fat. Bio chemical functions ofvitamins. Biochemical functions of Minerals

TEXTBOOKS:

1. Lehninger, A.L., Nelson, D.A and Cox, M.M. 2005. *Principles of Biochemistry*. CBS Publishers and Distributors, Delhi
2. Conn, E.E., Stumpf, P.K., Bruening, G. and Doi, R.H. 1995. *Outlines of Biochemistry.* John Wiley and Sons Inc., Singapore.

REFERENCE BOOKS:

1. Buchanan, B.B., Gruissem, W. and Jones, R.L. 2002. *Biochemistry and Molecular Biology of Plants.* JohnWiley and Sons, UK..
2. Jayaraman, J. 1980. *Laboratory Manual in Biochemistry*. Wiley Eastern Publishers, New Delhi.
3. Plummer, D.T. 1979. *An introduction to Practical Biochemistry*. Tata McGraw-Hill Publishing Co., NewDelhi.
4. Rameshwar, A. 2006. *Practical Biochemistry*. Kalyani Publishers, Ludhiana.
5. Sadasivam, S. and Manikckam, A. 1996. *Biochemical methods for Agricultural Sciences*. New AgeInternational Publisher, New Delhi

---

II Year B.Tech. Food Tech. I-Semester

L	T	P	To	C
-	-	3	3	2

HS 217 SOFT SKILLS LAB

Course Description & Objectives:

The Soft Skills Laboratory course is aimed at training undergraduate students and enabling them to acquire employability skills. Designed to impart work related skills, the course will help trainees develop interpersonal communication, leadership and team skills. It will give them the required competence and confidence to handle professional tasks.

Training Methodology:

The training methodology is designed to bring about changes in attitudes through experience-based learning. Activities in simulated environments such as role plays, group discussions, micro-presentations, audio-video clippings, case studies, psychometric tests etc., will provide students insights into their strengths and weaknesses.

Learning Outcomes:

1. *To help students to develop formal communication skills in a work place*
2. *To make them acquire team skill by working in group activities*
3. *To equip them with suitable language and speech patterns in a workplace*
4. *To enhance the ability of critical & lateral thinking while addressing the issues at any situation*
5. *To enable them to present themselves confidently in job interviews*

UNIT I - Personality Development Skills

a) Role of language in Personality – How language reflects, impacts personality – Using gender-neutral language in MNCs – being culturally sensitive.

Activity – Appraising each other – Worksheets related to the above

b) Career Planning- job vs. career- goal setting- SWOT analysis- planning and prioritization - four quadrant time management system - time management – self-management – stress-management.

Activity: Setting a SMART goal - SWOT analysis of the self – Writing a Statement of Purpose (SOP).

c) Effective Resume-Writing: structure and presentation - planning and defining the career objective - projecting one's strengths and skill-sets – summarizing - formats and styles - covering letter.

Activity: Resume preparation –writing a covering letter.

UNIT II - Language Skills

a) Functional English - Formal/informal context – purpose - interpersonal dynamics - ideation –content organization - initiating a conversation – responding appropriately - right body language.

Activity - Role play in different situations, - self-introduction - social background (family, home town etc.,) - role model - my future - likes/dislikes (movies, persons, places, food, music etc.,) - a mini project on functional English.

b) Vocabulary-Building - Etymology of words - word roots - prefixes & suffixes - synonyms & antonyms- collocations - one-word substitutes – analogies - idioms and phrases - contextual guessing of unfamiliar words – task-oriented learning (100 words).

Activity: Flash cards (200 words) – vocabulary exercises with hand-outs.

UNIT III - Communication Skills

a) Group Discussion: Articulation and flow of oral presentation - dynamics of group discussion – intervention – summarizing - voice modulation – content generation – Key Word Approach (KWA) – Social, Political, Economic, Legal and Technical Approach (SPELT) – View Point of Affected Part (VAP) - language relevance - fluency and coherence.

Activity: Mock sessions on four types of GD topics.

b) Facing Interviews: Interview process - understanding employer expectations - pre-interview planning - opening strategies - answering strategies – stress-based interviews - tele-interviews, video interviews- frequently asked questions (FAQs).

Activity: Writing responses to FAQs - mock interviews.

UNIT IV - Comprehensive Skills

a) Reading Comprehension: Reading as a skill- techniques for speed reading- skimming- scanning- appreciating stylistics - impediments for speed reading - eye fixation - sub-vocalisation - critical reading - reading based on purpose - reading for information - reading for inference -understanding tone.

Activity: Reading comprehension exercises with texts drawn from subject areas. (Hand-outs)

b) Listening Comprehension: Listening as skill - different types of listening - hidden data of communication - active listening - top-down approach - bottom-up approach.

Activity: Following different accents (Indian, British, American) listening comprehension exercises with audio and video excerpts.

UNIT V - Analytical Skills

a) Data Commentary: Deductive & inductive reasoning - data interpretation - tables & charts - bar charts - pie charts - line graphs - ratios & proportions – percentages - coding and decoding - reasoning by analogy - artificial language etc.,

b) Analytical Thinking: Statement and Conclusion - Data Sufficiency - Statement and Argument - Statement and Assumption - Logical Deduction - Logical Problems.

Activity: Exercises with handouts.

REFERENCE BOOKS :

1. *Edward Holffman, **Ace the Corporate Personality**, McGraw Hill,2001*
2. Adrian Furnham, ***Personality and Intelligence at Work***, Psychology Press, 2008.
3. John Adair Kegan Page, "***Leadership for Innovation"*** 1st edition, Kogan, 2007.
4. M.Ashraf Rizvi, "***Effective Technical Communication",*** 1st edition, Tata McGraw Hill, 2005.
5. Krishna Mohan & NP Singh , "***Speaking English Effectively"*** 1st edition, Macmillan, 2008.

II Year B.Tech. Food Tech. I-Semester

L	T	P	To	C
-	-	3	3	2

FT207 FOOD MICROBIOLOGY LAB

Course Outcomes:

This lab will impart knowledge regarding

1. *Isolation of microorganism from the food material*
2. *Identification and isolation of the micro-organism in fruits & vegetable, meat & meat product, milk, sugar spices, egg etc.*

List of Experiments:

1. Isolation of molds from foods
2. Microbial examination of cereal or cereal Products – Identification, Isolation
3. Microbial examination of vegetable – Identification, Isolation
4. Microbial examination of fruits – Identification, Isolation

5. Microbial examination of meat and meat products – Identification, Isolation
6. Microbial examination of fish and other sea foods – Identification, Isolation
7. Microbial examination of Eggs – Identification, Isolation
8. Microbial examination of milk or milk products – Identification, Isolation
9. Microbial examination of sugar and salts – Identification, Isolation
10. Microbial examination of spices – Identification, Isolation
11. Thermal Death Time determination

II Year B.Tech. Food Tech. I-Semester	L	T	P	To	C
	-	-	3	3	2

FT209 BIOCHEMISTRY LAB

Course Outcomes:

By the end of the practical exercises, the students will be able to

1. *Have clear concepts of the structures of biomolecules*
2. *Differentiate between qualitative identification and quantitative estimations, standard*
3. *Graph preparation*
4. *Understand the separation of biomolecules using various biochemical techniques*

Lit of Experiments:

1. Safety measures in the laboratory.
2. Preparation of standard acid, and alkali solutions.
3. Qualitative test for all carbohydrates - Solubility, Molisch, Anthrone, Iodine test.
4. Qualitative test for Pentoses, reducing sugars, (Bials,Fehlings, Benedicts, Barfoeds test).

5. Qualitative test for Glucose, Fructose, Sucrose (Osazone, Acid hydrolysis, Selewanoffs).
6. Quantitative test for all Amino acids, aromatic amino acids, Sulphur containing amino acids (Ninhydrin, Xanthoproteic, Nitro Prusside test)
7. Quantitative tests for peptide bonds and proteins (Biuret test &Folin Lowry test)
8. Precipitation of proteins with heavy metals, acidic reagents, organic solvents, salting out of proteins.
9. Qualitative test for lipids - Solubility test ,Translucency test, Emulsification test, litmus and Saponification test
10. Test for glycerol and Test for cholestrol
11. Separation of amino acids by Paper chromatography
12. Verification of Beer’s law using colorimeter
13. Preparation of standard graph

II Year B.Tech. Food Tech. II-Semester

L	T	P	To	C
4	0	-	4	4

CS218 DATA STRUCTURES

Course Description & Objectives:

The main objective of this course is to provide an introduction to basic data structures and manipulating them, by using C programming language.

The fundamental design and implementation of basic data structures. The evaluation of the data structure needs of particular problems & The design and implementation of C programs by using basic data structures.

Course Outcomes:

Having successfully completed this course, the student will be able to:

(1) Apply advance C programming techniques such as pointers, dynamic memory allocation, structures to developing solutions for particular problems;

(2) Design and implement abstract data types such as linked list, stack, queue and tree by using C as the programming language using static or dynamic implementations;

(3) Evaluate and choose appropriate abstract data types to solve particular problems;

(4) Design and implement C programs that apply abstract data types.

UNIT I - Data Types

Introduction – Data, Data type, Data Structures – Primitive and Non-primitive, Storage structures – Sequential and linked storage representations, File structures, Abstract Data Type (ADT). Overview of Structures-arrays, operations on arrays(retrieval of an element, search an element, insertion deletion of an element), manipulations on arrays such as finding the sum of elements of an array, adding two arrays, and reversing an array. Maximum sub sequence problem, Multi dimensional arrays.

UNIT II - Linked Lists

Linked Lists : Types of Linked Lists Singly Linked List, Doubly Linked List, Circular Linked List. Operations on linked lists-insertion, deletion, traversing forward/reverse order. Multi lists, Applications of Linked Lists.

UNIT III - Stacks

Stacks – ADT, array and linked representations, Implementation and their applications. Queues – ADT, array and linked representations, Implementation of linear, circular and doubly-ended queues, and their applications.

UNIT IV - Types of Trees

Preliminaries – Binary Tree – ADT, array and linked representations, Binary tree properties, tree traversal, Implementation, Expression trees. The Search Tree ADT – Binary Search Trees, Implementation. AVL Trees – Single Rotations, Double rotations.

UNIT V - Graphs

Graphs – ADT, definitions and properties, modeling problems as graphs, representation – adjacency matrix and adjacency list, basic graph traversals – breath first search and depth first search. Applications of graphs.

TEXT BOOKS :

1. Richard F.Gilberg, Behrouz A. Forouzan, Data Structures - A Pseudo code Approach with C, Second Edition, Cengage Learning, 2005.
2. Y. Langsam, M.J.Augeustein and A.M.Tenenbaum, “Data Structures Using C”, Pearson Education Asia, 2006.

REFERENCE BOOKS :

1. Mark Allen Weiss, “Data Structures and Algorithm Analysis in C”, Second Edition, Pearson Education, 2005
2. Sartaj Sahni, Data Structures, Algorithms and Applications in C++ , Universities Press, Second Edition, 2005.
3. Jean Paul Tremblay and Paul G. Sorenson, An Introduction to Data Structures with Applications,Tata Mc-Graw Hill, Second Edition, 26th Reprint 2004.

II Year B.Tech. Food Tech. II-Semester

L	T	P	To	C
4	0	-	4	4

FT202 PRINCIPLES OF FOOD PRESERVATION

Course Description & Objectives:

This course will impart the basic knowledge of different principles involved in food preservation and processing to the under graduate students.

By the end of the course students will be aware of different concepts involved in food spoilage and its prevention by using different food preservation principles and technologies.

Course Outcomes:

1. *To describe actions taken to maintain foods with the desired properties or nature for as long as needed*
2. *To identify quality-loss mechanisms as biological, chemical, and physical*
3. *To develop food handling practices that reduce the potential for foodborne illness (i.e., training to obtain a California Food Handler Card)*
4. *To implement preservation methods that make use of heat/cold, drying, acid, added chemicals, controlled air, pressure, and high-energy radiation.*
5. *To identify indirect approaches to food preservation: packaging, hygienic design, sanitation, GMP*
6. *To use SOPs and SSOPs during laboratory exercise*

UNIT I - Food Classification and Preservation

Sources of food, scope and benefit of industrial food preservation, perishable, non perishable food, causes of food spoilage. Preservation by salt & sugar – Principle, Method, Equipment and effect on food quality.

UNIT II - Food Preservation by Thermal Processing

Thermal processing methods of preservation – Principle and equipment, Canning, blanching, pasteurization, sterilization, evaporation. Use of low temperature – Principal, equipment and effect on quality. Chilling, cold storage, freezing.

UNIT III - Food Drying and Dehydration

Preservation by drying dehydration and concentration – Principle, Methods, Equipment and effect on quality :Difference, importance of drying & dehydration over other methods of drying and dehydration, equipments and machineries, physical and chemical changes in food during drying and dehydration. Need and Principle of concentration, methods of concentration – Thermal concentration, Freeze concentration, membrane concentration, changes in food quality by concentration.

UNIT IV- Food preservation: Irradiation and Preservatives

Preservation by radiation, chemicals & preservatives. Definition, Methods of Irradiation, Direct & Indirect effect, measurement of radiation dose, dose distribution, effect on microorganisms. Deterioration of Irradiated foodsphysical, chemical and biological; effects on quality of foods.

UNIT V-Food Fermentation and Recent Methods in Preservation

Preservation of foods by chemicals, antioxidants, mould inhibiters, antibodies, acidulates etc. Preservation by fermentation- Definition, Advantages, disadvantages, types, equipments. Recent methods in preservation: Pulsed electric field processing, high pressure processing, processing using ultrasound, dielectric, ohmic and infrared heating. Theory, equipments and effect on food quality.

TEXT BOOKS:

1. Fellows. J.P. Food Processing Technology, Principles and Practices II Edition. Wood Head Publishing, Cambridge, 1999.
2. Norman N. Potter, Joseph H. Hotchkiss , Food Science – 5th ed. Springer, 1998 - Technology & Engineering.

REFERENCE BOOKS:

1. GiridhariLal, G.S. Siddappa and G. L. Tandon, Preservation of Fruits and Vegetables; CFTRI, ICAR , New Delhi -12
2. Vijayakhadar. Text Book on Food Storage and Preservation. Kalyani publishers, Delhi.
3. Srilakshmi. B. Food Science. New Age Publishers, New Delhi.
4. Shakuntalamanay and ShadaksharSwamy. Foods, Facts and Principles. New Age Publishers, New Delhi.

II Year B.Tech. Food Tech. II-Semester

L	T	P	To	C
4	0	-	4	4

FT204 FLUID MECHANICS & HYDRAULICS

Course Description & Objectives:

This course will enable the students to design efficient water conveyance systems principles of mechanics of fluids, water measurement and regulation. By the end of the course students will be able to gain knowledge on Bernoulli's theory, Buckingham's Pi theorem, Darcy's and Chezy's theorem, and Archimedes' principles.

Course Outcomes:

By the end of the course the students will be able to

1. Gain knowledge on Bernoulli's theory, Buckingham's Pi theorem, Darcy's and Chezy's theorem
2. Gain the knowledge on mechanical gauges, flow of fluids in the pumps, and Archimedes' principles and theory
3. Understand flow through mouth pieces, flow through orifices and pumps
4. Know the measurement of fluid pressure, measurement of discharge and measurementof time
5. Know how to determine the Coefficient of discharge from the pitot tube experiment.

UNIT I - Introduction to fluids

Fluids - definitions-classification - properties, units and dimensions - fluid pressure - Introduction - Measurement of fluid pressure - Hydraulic pressure, absolute and gauge pressure - pressure head of the liquid. Pressure on vertical rectangle surfaces - Compressible - non compressible fluids – surface tension and capillarity. Pressure measuring devices- simple, micro, inclined manometers

UNIT II - Fluid flows theorem

Mechanical gauges - piezometer - floating bodies - Archimedes' principle- stability of floating bodies. Equilibrium of floating bodies - Buoyancy of flotation - metacentric height - Kinematics of fluid flow - introduction - classification of flows - steady, uniform, non uniform, laminar and turbulent - continuity of fluidflow. Bernoulli's theorem and its applications. Practical applications of Bernoulli's theorem, Venturimeter, Pitot tube, Orifice meter and rotameter.

UNIT III - Fluid flow through pipes

Flow through simple pipes - Loss of head in pipes, Darcy's formula for loss of Head in pipes, Chezy's formula for loss of head in pipes - determination of pipe diameter - determination of discharge - friction factor – critical velocity. Flow through orifices (Measurement of Discharge) - Types of orifices, Jet of water, vena contract, Hydraulic coefficients, Experimental Method for Hydraulic Coefficients, Discharge through a rectangular orifice. Flow through Mouthpieces - Types of Mouthpieces - Loss of Head of a liquid flowing in a pipe, Discharge through a Mouthpiece - flow over weirs - Types of weirs, Discharge over a weir.

UNIT IV- Fluid flow through orifice

Flow through Orifices (Measurement of Time) - Time of Emptying a square, rectangular or circular tankthrough an orifice at its bottom, Time of emptying a hemispherical tank through an orifice at its bottom. Flowthrough Weirs (Measurement of Time) - Time of Emptying a square, rectangular or circular tank through an orifice at its bottom, Time of emptying a hemispherical tank through an orifice at its bottom. Loss of head due to contraction - enlargement at entrance and exit of the pipe-water level point gauge - Hook gauge.

UNIT V- Flow over Notches

Flow over Notches - Types of Notches, Discharge over a Rectangular Notch, Triangular Notch, Stepped Notch.Time of emptying a tank over a Rectangular Notch, Triangular Notch. Dimensional analysis and similitude - Buckingham's pi theorem - Froude Number, Reynolds number, Weber number and hydraulic similitude. Pumps-classification - reciprocating - centrifugal pumps - pressure variation, work efficiency - types of chambers - selection and sizing.

TEXT BOOKS:

1. Modi, P. M. and Seth, S.M. 1973. *Hydraulics and Fluid Mechanics*, Standard Book House, Delhi
2. Chow, V. T. 1983. *Open Channel Hydraulics,* Mc Graw Hill Book Co., New Delhi

REFERENCE BOOK:

1. Jagdish Lal, 1985. *Fluid Mechanics and Hydraulics.* Metropolitan Book Co. Private Limited., New Delhi

II Year B.Tech. Food Tech. II-Semester

L	T	P	To	C
4	0	-	4	4

FT206 HEAT AND MASS TRANSFER

Course Description & Objectives:

This course will impart knowledge about fundamentals of heat and mass transfer and its application in food industry.

By the end of the course students will be able to understand Conduction, convection, radiation, heat transfer during boiling and condensation to learn about the design of heat exchangers and understand the principles of mass transfer.

Course Outcomes:

By the end of the course students will be able to gain knowledge on

1. *Heat transfer, Stefan Boltzmann constant, overall heat transfer coefficient, one dimensional steady stateconduction,Theory, Fourier's law etc.*
2. *Concept of electrical analogy and its applications*
3. *Heat transfer through composite walls and insulated pipelines, through slab, sphere, cylinder with uniform heat generationetc.*
4. *Concept of Nusselt's number, Prandtl number, Reynold's number,Grashoff number, some important empirical relations used for determination of heat transfer coefficient*
5. *Heat exchangers design and application in food industry*

UNIT I - Introduction to heat and mass transfer

Basic heat transfer process, thermal conductivity, convective film co-efficient, StefanBoltzman'sconstant,overall heat transfer coefficient. Physical properties related to heat transfer, one dimensional steady stateconduction,Theory of heat conduction, Fourier's law, Derivation of Fourier's equation. Linear heat flowthrough slab, cylinder and sphere, heat flow through slab, cylinder andsphere with non-uniform thermalconductivity

UNIT II - Heat transfer and equation of temperature

Concept of electrical analogy and its applications for thermal circuits, heat transfer throughcomposite walls and insulated pipelines.One dimensional steady state heat conduction with heatgeneration, heat flow throughslab, sphere, cylinder with uniform heat generation. Development ofequations of temperature distribution with different boundary condition.

UNIT III - Introduction to FINS

Steady state heat conduction with heat dissipation to environment-Introduction to extendedsurfaces (FINS) of uniform area of cross section. Equation of temperature distribution with differentboundary conditions, Effectiveness and efficiency of the FINS. Introduction to unsteady state heatconduction, Convection, types of convection, use of dimensional analysis for correlating variablesaffecting convective heat transfer. Concept of Nusselt's number, Prandtl number, Reynold's number,Grashoff number, some important empirical relations used for determination of heat transfer coefficient.

UNIT IV- Heat Exchanger

Radiation - heat radiation, emissivity, absorptivity, transmissivity, radiation through black and greysurfaces, and determination of shape factors. Introduction to condensing and boiling heat transfer, Film anddropwise condensation, effect of non-condensable gases, boiling heat transfer. Heat exchangers- generalintroduction, fouling factors, jacketed kettles, LMTD, parallel and counter flow heat exchangers.

UNIT V- Types of heat exchanger and mass transfer

Shell and Tube and plate heat exchangers, heat exchanger design, application of different types ofexchangers in dairy and food industry. Mass transfer-introduction, Fick's law of diffusion, steady statediffusion of gases and liquids through solids. Equimolar diffusion, isothermal evaporation of water into air,mass transfer coefficient, application in Dairy and Food industry.

TEXT BOOKS:

1. Geankoplis, C.J. 1978. *Transport Processes and Unit Operations.* Allyn and Bacon Inc., Newton,Massachusetts.
2. Holman, J. P. 1989. *Heat Transfer*. McGraw Hill Book Co., New Delhi.

REFERENCE BOOKS:

1. Incropera, F. P. and De Witt, D .P. 1980. *Fundamentals of Heat and Mass Transfer.*
2. John Wileyand Sons, New York.Gupta, C. P. and Prakash, R. 1994. *Engineering Heat Transfer*. Nem Chand and Bros., Roorkee.

II Year B.Tech. Food Tech. II-Semester

L	T	P	To	C
4	0	-	4	4

FT208 THERMODYNAMICS & HEAT ENGINES

Course Description & Objectives:

This course will impart knowledge regarding fundamentals of thermodynamics and heat engines and their application in food processing. By the end of the course students will be able to understand various laws of thermodynamics, heat engines and boilers.

Course Outcomes:

By the end of the course, the students will be able to

1. *Understand the basic concepts of Thermodynamics, Thermodynamic systems,*
2. *Thermodynamic cycles and Laws of Thermodynamics*
3. *Solve engineering problems by the application of Thermodynamics*
4. *Different types of boilers and their application*

Unit I- Introduction to thermodynamics

Introduction; Microscopic and macroscopic viewpoints in thermodynamics; Fundamental concepts of system, control volume, state properties, equilibrium, processes Survey of units and dimensions; forms of energy and energy interaction

UNIT II- Basic concept of thermodynamics

Basic concept of thermodynamics: Introduction, States, Work, Heat, Temperature, Zeroth, 1st, 2nd and 3rd law of thermodynamics, Concept of internal energy, enthalpy and entropy. Properties of Steam: Formation of steam at constant pressure, Thermodynamic properties of Steam. Numerical on steam quality measurement.

Unit III- Heat and Work

Heat and work; State postulate; thermodynamic properties of pure substance in solid, liquid and vapour phases; P-V-T behaviour of simple compressible substances; phase rule; thermodynamic property tables and charts; ideal and real gases; equations of state; compressibility factor; generalised compressibility chart; First law of thermodynamics for closed loop system, internal energy and enthalpy; First law for control volumes, Steady flow and unsteady flow applications. Process calculations for ideal and real gases using equations, tables and charts.

UNIT IV-Heat Engine

Definitions of Heat Engine, Heat Pump, Thermal efficiency, COP; Carnot cycle. Second Law of thermodynamics; Statements and corollaries; entropy; concept of reversibility and irreversibility

UNIT V- Steam Generators

Steam Generators: Classification of boilers, Comparison of fire tube and water tube boilers, Function of mountings and accessories, Constructional and operational details of Cochran and Babcock and Wilcox boiler

TEXT BOOKS:

1. R E Sonntag, C Borgnakke and G J Van Wylen, Fundamentals of Thermodynamics, 6th Ed., John Wiley, 2003.
2. G F C Rogers and Y R Mayhew, Engineering Thermodynamics Work and Heat Transfer, 4th Ed., Pearson 2003.

REFERENCE BOOKS:

1. J P Howell and P O Buckius, Fundamentals of Engineering Thermodynamics, McGraw Hill, 1992.
2. Y. A. Cengel and M. A. Boles, Thermodynamics, An Engineering Approach, 4th Ed., Tata McGraw Hill, 2003.

II Year B.Tech. Food Tech. II-Semester	L	T	P	To	C
	-	-	3	3	2

HS304 PROFESSIONAL COMMUNICATION LAB

Course Description & Objectives:

The Professional Communication exposes students to conventions of corporate communication and documentation procedures involved in the day-to-day functioning of the business world. The course is aimed at improving written communication skills of undergraduate students and preparing them to meet professional challenges in the work spheres. Writing and Personality are not two exclusive spheres of influence and this course will work on the *relationship between professional writing and a personality that is able to meet the goals of an organization in creative and innovative ways.*

Course Outcomes:

1. *To enable students to write logical sentences and paragraphs, use appropriate diction, grammar and punctuation.*
2. *To expose them to the world of business and business register*
3. *To make them compose clear and concise business messages*
4. *To produce business documents for mailing to external recipients or intra-organizational circulation*
5. *To enable them to speak business English for handling various business situations.*

UNIT I - Writing

- Elements of Technical Writing : Sentence structure - reducing verbosity - arranging ideas logically – building coherence - paragraph level and document level - topic sentence - cohesive devices – transitionals – paraphrasing – précis-writing.
- Mechanics of Writing: Stylistic elements – the rapporteur- the purpose- the reader (audience) - elementary rules of grammar- choice of diction - elementary principles of composition - matters of form – punctuation - conventions of business communication - language and tone - weak links in business correspondence - ethical concerns in business writing.

UNIT II - Reports

- Parts of the Report: Writing an abstract - features of a good abstract – approach - compare and contrast - cause and effect.
- Types of Technical Reports : Drafting a technical proposal - formal and informal proposals - factual reports, feasibility reports, survey reports – parts of a report - title page –declaration – acknowledgements – table of contents - abstract – introduction – conclusion – citations – references - appendices - oral reports and presentations.

UNIT III - Letter Writing

- Letter-Writing - Formal and informal letters - structure of formal letters - expressions of salutations, introductory and concluding paragraphs -

different types of letters - sales letter - complaint letter - adjustment letter - letter to the editor - covering letter - claim letter – letter of condolence.

UNIT IV - Correspondence

- **Business Correspondence :** E-mail – nature and scope - e-mail etiquette - Common Errors in composing e-mails – Quotations - Inviting quotations - sending quotations – placing orders - Office Communication - agenda - notice - circular
- **Effective Resume-Writing:** Structure and presentation - defining career objective - projecting one's strengths and skill-sets
- Summarizing - formats and styles - covering letter.

UNIT V - Drafting

- Business Proposals: Drafting business proposals - calculating profit and loss-averages - ratios and proportions – partnership - simple interest - compound interest - calculating volumes and areas
- course of action - cause and effect- theme detection - making judgments - logical deductions - analyzing arguments – syllogisms - Venn diagrams - matching definitions -verbal reasoning - numerical reasoning - working out justifications.

REFERENCE BOOKS :

1. Strunk , William, Jr.*The Elements of Style*, Fourth Edition,1999.
2. Rozakis, Laurie, Ph.D, (2003). *English Grammar for the Utterly Confused*, McGraw-Hill.

II Year B.Tech. Food Tech. II-Semester

L	T	P	To	C
-	-	3	3	2

FT210 FLUID MECHANICS LAB

Course Description & Objectives:

To understand various flows, application of basic equations, transportation and metering of fluids.This course covers identification of flows, measurement of fluids, pressure drop calculations, performance of fluid flow machinery.

Course Outcomes:

1. *Identify, name, and characterize flow patterns and regimes.*
2. *Utilize basic measurement techniques of fluid mechanics.*
3. *Measure fluid pressure and relate it to flow velocity.*
4. *Demonstrate practical understanding of friction losses in flows.*

List of Experiments:

1. Identification of Laminar and Turbulent Flows (Reynolds Apparatus).
2. Verification of Bernoulli's Equation
3. Measurement of flowing fluid using Venturi Meter
4. Measurement of flowing fluid using Orifice Meter
5. Measurement of flowing fluid using Pitot Tube
6. Measurement of flowing fluid using Rotameter
7. Determination of Friction loss in fluid flow through pipes
8. Determination of Pressure drop in packed bed
9. Determination of Pressure drop in fluidized bed
10. Characteristics of single stage centrifugal pump
11. Characteristics of multistage centrifugal pump
12. Characteristics of Reciprocating pump
13. Coefficient of discharge in V – notch

II Year B.Tech. Food Tech. II-Semester

L	T	P	To	C
-	-	3	3	2

FT212 FOOD PROCESSING LAB

Course Outcomes:

This lab will impart knowledge about

1. *Various equipment used for food processing,*
2. *Various methods of food preservation.*

List of Experiments:

1. Introduction to different equipments, accessories in food science & technology laboratory.
2. Survey on availability of different varieties of processed foods, raw materials, cost and technology used.
3. A visit to the nearby warehouse.
4. Different processing methods used in food preparation &changes in food.
5. Preservation of foods using high concentration of sugar.
6. Preservation of food using Salt.
7. Preservation of food using Acid.
8. Preservation of foods by different drying /dehydration methods and reconstitution of foods by dehydration methods.
9. Methods of processing of foods using different temperatures-Dry heat methods.
10. Methods of processing of foods using different temperatures-moist methods.
11. Preservation of foods by freezing.
12. Preservation of foods by fermentation.
13. Preservation of foods by irradiation & ionizing radiation.

I Year B.Tech. BME I - Semester

L	T	P	To	C
4	-	-	4	4

HS112 - MATHEMATICS FOR BIOTECHNOLOGIST - I

Course description and Objectives :

Without mathematics not a single day of an engineer will pass! Aim of this course is to introduce some elementary mathematics to non mathematical students. We study progressions, binomial theorem, partial fractions, trigonometry, plane geometry etc. We also introduce basic vector algebra. Later we introduce the differentiation and integration and later differential equations, which have many applications.

Course Outcomes:

- *This course will bridge the gap of biological students to cope up with mathematics during their Engineering programme.*
- *This course will help them to learn progressions, binominal theorem, partial fractions, trigonometry, and plane geometry along with vector algebra.*
- *The differentiation and integration will help them to use many applications effectively and efficiently in their engineering course.*
- *All the above topics will be useful in their research work as well as projects.*
- *First order first degree differential equations applications will be used in law of cooling, growth and decay problems.*
- *The concept of maxima-minima has many real time applications.*

UNIT I - Mathematical Preliminaries

Arithmetic & geometric progression, finding n^{th} term, sum of n terms, Binomial theorem, Partial fractions, Trigonometric ratios, Sum of angles, compound angles.

UNIT II - Straight line and Vector Algebra

Cartesian co-ordinates (in XY-plane), Straight lines different forms, Angle between straight lines, Point of intersection. Vector Algebra: Vector addition, Multiplication, Representation, Geometrical resultant Vectors, Orthogonal, Parallel vectors, Angle between vectors.

UNIT III - Differential Calculus

Concept of limit, continuity, differentiation, product rule, quotient rule, differentiation of trigonometric, logarithmic, exponential functions, Introduction to partial differentiation, Euler's theorem, maxima & minima.

UNIT IV - Integral Calculus

Introduction, Integration of different functions, methods of integration, integration by parts, Concept of definite integrals, application of definite integrals, problems on areas.

UNIT V - Ordinary Differential Equations

Formation of differential equation by eliminating arbitrary constants, first order and first degree – variable separables, exact, homogeneous, linear & Bernoulli's equation.

Applications of first order ordinary differential equations to growth and decay problems.

TEXT BOOKS :

1. *P. Seshagiri Rao*, "A Text book of Remedial Mathematics", 1st edition, Parma Med Press, Hyderabad, 2008.
2. *T.K.V. Iyengar and others*, "Engineering Mathematics" Volume-I, 9th edition, S. Chand & Company, 2010.

REFERENCE BOOKS :

1. *B.S.Grawal*, "Higher Engineering Mathematics", 40th edition, KhannaPublishers, 2009.
2. *H.K. Dass*, "Advanced Engineering Mathematics", S.Chand & Co,2002.

I Year B.Tech. BME I - Semester

L	T	P	To	C
4	-	-	4	4

HS123 - ENGINEERING PHYSICS

Course description and Objectives :

There is a symbiotic relation between physics and engineering. Broadly speaking, engineering is mainly applied physics. Recent technical developments have been the result of joint efforts of physicists and engineers. A proper study of physics is therefore indispensable for an engineering student to excel in his field. The purpose of this course is to present the principles and concepts of physics as relevant to an engineer.

Course Outcomes:

The students will be made to get acquainted to the following learning outcomes:

- *Concepts of Physical optics, devices and applications.*
- *Ultrasonic waves, production, applications in NDT.*
- *Introduction to Quantum mechanics in relevance to that of modern physics.*
- *Exposure to latest inventions like lasers, fibers and applications*
- *Insight into nano technology and applications, solar energy to combat energy crisis.*

UNIT I - Physical Optics

Interference – Types - Interference in thin films (Reflection) – Newton's Rings – Michelson's Interferometer, Fabry-perot interferomenter – Applications.

Diffraction – Fraunhoffer Diffraction at single slit – Diffraction grating

Polarization – Production of plane polarized light – Nicol prism – Optical activity – photo elasticity.

UNIT II - Ultrasonics & NDT

Ultrasonics : Introduction – Basic principle of ultrasonic waves – piezoelectric method – Properties of ultrasonic waves – Types of ultrasonic waves – Determination of Velocity of ultrasonic waves in solids and liquids – Ultrasound in Medical Applications.

NDT : Introduction - Types – Theory and practice of Ultrasonic Testing – Ultrasonic Testing Systems – Ultrasonic Testing Methods – X-Ray Radiography.

UNIT - III Quantum Mechanics & Free electron theory of metals

Quantum Mechanics : Matter waves - Schroedinger's time independent wave equation - Physical significance of the wave function - Particle in one dimensional potential well – tunneling phenomenon.

Free electron theory of metals : Introduction – Classical free electron theory – Electrical conductivity of metal – Fermi - Dirac distribution function and its variation with temperature – Quantum free electron theory.

UNIT IV - Lasers & Fiber Optics:

Lasers: Characteristics of Laser light – Spontaneous and Stimulated emission of radiation – Low power and High power lasers, He-Ne Laser – CO_2 Laser – Nd-Yag laser - Applications of Lasers, Holography and Applications

Fiber Optics: Principle of optical fiber - materials – Numerical Aperture – Types of fibers – Dispersion and Attenuation in optical fibers – Fiber Optic sensors Applications – Clinical Applications of Fiber Optic Laser System - Endoscopy.

UNIT V - Solar Energy & NanoScience and Technology

Solar Energy : Solar radiation – Photovoltaic effect – solar cells – Efficiency of solar cell – Solar thermal energy conversion systems.

NanoScience & Technology : Introduction to nano meterials – Basic principles of nanoscience & Technology – Fabrication of nanomaterials – Physical & Chemical properties of nanomaterials – Applications of nanotechnology.

TEXT BOOKS :

1. M.R.Srinivasan, “Physics for Engineers” New Age International, 2002-2003.
2. M.N. Avadhanulu & P.G. Kshirasagar, “Engineering Physics”, 1st edition, S. Chand & Company Ltd, 1992.

REFERENCE BOOKS :

1. Halliday, Resnic and Walker, “Fundamentals of Physics”, 6th edition, John Willey publishers, 2003.
2. Grawfor F.S., Berkley Physics courses, “Waves and Oscillations”, Volume III McGraw Hill, 1992.
3. V. Raghavan, “Materials Science and Engineering”, 5th edition, Prentice-Hall India, 2004.
4. S.O.Pillai, “Solid State Physics”, 6th edition, New Age International Publications, Revised, 2005.
5. V.Rajendran, “Engineering Physics”, 1st edition, TMH Publications, 2010.

I Year B.Tech. BME I - Semester	L	T	P	To	C
	4	-	-	4	4

ME101 - ENGINEERING MECHANICS

Course description and Objectives :

The course aims to impart the knowledge to understand the forces and their reactions on various static and dynamic conditions.

Course Outcomes:

- *Use scalar and vector analytical techniques for analyzing forces in statically determinate structures.*
- *Solve the engineering problems in case of equilibrium conditions and to calculate the reaction forces of various supports of different structures.*
- *Determine the centroid, centre of gravity and moment of inertia of various surfaces and solids.*
- *Solve the problems involving dry friction.*
- *Apply fundamental concepts of kinematics and kinetics of particles to the analysis of simple, practicalproblems.*

UNIT I - Basic Concepts and Principles of Statics :

Introduction to Engineering Mechanics, Scalar and Vector quantities, Forces, Characteristics of a force, Definitions and examples of various types of force systems, Law of transmissibility, Definition of resultant, Composition and resolution of forces, Moment of a force, Principles of moments of force, Couples, characteristics of a couple, Transformations of a couple, Resultants of Force Systems, Possible resultants of different types of force systems, Resultant of a concurrent coplanar force system, Resultant of a non concurrent coplanar force system

UNIT II - Equilibrium of Rigid Bodies

Free body diagrams, Types of supports and their reactions, requirements of stable equilibrium, Equations of equilibrium of a concurrent coplanar force system, Equilibrium of Bodies acted on by two or three forces, Equilibrium of bodies acted on by non-concurrent coplanar force system

UNIT III - Properties of Surfaces and Solids :

Centroid and Center of Gravity: Centre of gravity of parallel forces in a plane, centroids and center of gravity of composite bodies, Distributed Loads on Beams.

Moments of Inertia: Definition, Parallel axis theorem and perpendicular axis theorem for areas, Polar Moment of inertia, Second moment of area by

integration, Radius of gyration of areas, Moments of inertia of composite areas.

UNIT IV - Friction :

Nature of friction, Laws of friction, Coefficient of friction, Angle of friction, Cone of friction, Types of Friction - Sliding Friction, Rolling Friction, Belt Friction, Ladder Friction, Wedge friction.

UNIT V - Kinematics and Kinetics :

Absolute Motion: Introduction, Recapitulation of basic terminology of mechanics, Displacement, Velocity and acceleration their relationship, Rectilinear motion of a particle

Relative Motion: Introduction to kinematics of relative motion, Relative displacement, Relative velocity

Kinetics: Introduction to Kinetics, Force, Mass and Acceleration, Newton's Laws of motion, Equation of motion for a particle, D Alembert's principle, Rectilinear translation of a rigid body, Work done by a force, Work done by a force system, Energy, Potential energy, Kinetic energy, Principle of Work and kinetic energy, Conservation of energy, Linear impulse, Linear momentum, Principle of linear impulse and linear momentum, Conservation of linear momentum.

TEXT BOOKS :

1. J. L. Meriam, L. G. Kraige, "Engineering Mechanics: Dynamics", 7th ed., John wiley & sons, 2012
2. A. K. Tayal, "Engineering Mechanics", Umesh Publications, 2005.

REFERENCE BOOKS :

1. L. Singer - Harper, "Engineering Mechanics", 3rd ed., Fedinand . , Collins, 1975.
2. Timoshenko & Young, "Engineering Mechanics", 4th ed., Tata McGraw Hill, New Delhi, 2007.
3. S. S. Bhavakati & J. G. Rajasekharappa, "Engineering Mechanics", 3nd ed., New Age International Publications, New Delhi, 2008.

I Year B.Tech. BME I - Semester	L	T	P	To	C
	3	1	-	4	4

HS114 - TECHNICAL ENGLISH COMMUNICATION

Course description and Objectives :

To introduce students to the specific use of language for the purposes of Technical Communication which would be an essential prerequisite for success in the areas of writing and speech. The teaching efforts in this course will be directed towards making students develop their technical and non-technical writing abilities using the fundamental principles that apply to the correct use of the English language free of grammatical and other related errors.

Course Outcomes:

Students shall achieve the ability to write and demonstrate college-level proficiency in the following:

- *Clear and effective communication of meaning in speaking and writing.*
- *The ability to perform effectively the essential steps of the writing process (Note making, organizing, composing, revising, and editing).*
- *The ability to explain, develop, and criticize ideas effectively.*
- *Effective organization within the paragraph and the essay.*
- *Accuracy, variety, and clarity of sentences.*
- *Appropriate diction.*
- *Control of conventional mechanics (e.g., punctuation, spelling)*

UNIT - I

- Text : Environmental Consciousness (Climate Change – Green Cover – Pollution)
- Grammar : Articles – Prepositions – Sentence Types and Construction
- Vocabulary : Root – Prefixes - Suffixes
- Composition : Paragraph Writing (Descriptive & Narrative)
- Lab Practice : Introduction to Phonetics (Organs of Speech; Consonants, Vowels & Diphthongs; Syllable, Stress & Intonation)

UNIT - II

- Text : Emerging Technologies
  (Solar Power – Cloud Computing – Nanotechnology)
- Grammar : Time and Tense (Present-Past-Future; Helping Verbs; Modals)
- Vocabulary : Synonyms – Antonyms
- Composition : Note-making
- Lab Practice : Grammar Practice (Speaking of past, present & future)

UNIT - III

- Text : Energy
  (Renewable and Non-renewable Sources – Alternative Sources – Conservation – Nuclear Energy)
- Grammar : Subject-Verb Agreement - Sentence Construction (Characteristics of Technical Writing)
- Vocabulary : Idioms & Phrases
- Composition : Summarizing
- Lab Practice : Situational Conversations – Role-Plays
  (Introducing; Greeting; Enquiring; Informing; Requesting; Inviting)

UNIT - IV

- Text : Engineering Ethics
  (Challenger Disaster – Biotechnology – Genetic Engineering – Protection from Natural Calamities)
- Grammar : Sentence Transformation (Degrees, Voice, Speech & Synthesis)
- Vocabulary : Phrasal Verbs
- Composition : Letter Writing (Informal)
- Lab Practice : Situational Conversations – Role-Plays
  (Emotions; Directions; Descriptions; Agreements; Refusals; Suggestions)

UNIT - V

- Text : Travel and Tourism
  (Advantages and Disadvantages of Travel-Tourism – Atithi Devo bhava – Tourism in India)
- Grammar : Common Errors
- Vocabulary : One-word Substitutes
- Composition : Letter Writing (Formal)
- Lab Practice : Group Discussions

TEXT BOOKS :

Mindscapes - English for Technologists and Engineers, Orient Black Swan, 2012.

REFERENCE BOOKS :

1. V. R. Narayana Swamy, ***"Strengthen Your Writing",*** 1st edition, Orient Longman, 2003.
2. Thomas Elliott Berry***, "The Most Common Mistakes in English Usage",*** 1st edition, Tata McGraw Hill, 2004.
3. T. Balasubramanyam, ***A Textbook of English Phonetics for Indian Students***, Macmillan Ltd., 2000.
4. Sasikumar.V and P.V. Dhamija,. ***Spoken English: A Self-Learning Guide to Conversation Practice,*** 34th Reprint, Tata McGraw Hill, New Delhi, 1993.
5. Margaret M Maison, **"Examine your English",** 1st edition**,** Orient Longman, 1999.
6. Ashraf Rizwi, "***Technical English Communication***", Tata McGraw Hill, Latest Edition.

I Year B.Tech. BME I - Semester

L	T	P	To	C
3	1	-	4	4

CS101 - PROBLEM SOLVING AND COMPUTER PROGRAMMING

Course description and Objectives :

Aim of this course is to introduce the techniques of problem solving and concepts of programming language to the students. Because of its popularity and suitability to develop different types of applications, 'C' language has become the de-facto programming language to engineers. A comprehensive introduction of C language is offered through this course to enable the students to write diversified programs.

Course Outcomes:

On Completion of this course student should be able to

- *Able to understand the basic terminology used in computer programming and to write, compile and debug programs in C language.*
- *Use different data types in a computer program and design programs involving decision structures, loops and functions.*
- *Able to understand the allocation of dynamic memory using pointers*
- *Use different data types to create/update basic data files.*

UNIT I - Fundamentals of computers

Basic functional units and discrete components of a computer, computer networks, networking components, Binary representation of integers and real numbers, ASCII, EBCDIC, Unicode, Generations of computer languages.

UNIT II - Problem Solving Steps and Basic of C Language

Problem understanding, Formulating a mathematical model, Development of an algorithm, Representation of an algorithm, Flow chart and Pseudo code, Coding, Testing and Debugging, Comments, Processor statement, Function header statement, Variable declaration statement and Executable statement, C Character Set, constants, identifiers, operators, punctuations, keywords, Basic data types, modifiers, identifiers, variables, C scopes, type qualifiers, storage class specifiers, variable initializations, constants,

reading and writing characters, formatted I/O.

UNIT III – Preliminaries of C

Assignment, arithmetic , relational, logical, bitwise, ternary, address, indirection, sizeof, dot, arrow, and parentheses operators, Expressions Precedence of operators and associatively, Category of Statements, Selection, Iteration, jump, label, expression and block, Function declaration, prototype, definition, calling by value and address, standard library functions and recursive functions.

UNIT IV - Arrays and Pointers

Declaration, initialization, reading, writing, accessing and passing as a parameter to functions, Multidimensional arrays and String functions, pointer expressions, pointer and arrays, multiple indirection, initializing pointers, pointer to functions, Dynamic memory allocation functions.

UNIT V - Structures and File Processing

declaration, initialization and accessing, array of structures and passing structures to functions, structure pointers, arrays and structures within structures, unions, bit-fields, typedef and enumerations, I/O and processing operations on text and binary files. pre-processor directives.

TEXT BOOKS :

1. Reema Thareja, "Introduction to C Programming", Oxford University Press, India, 2013
2. Herbert Schildt, C: "The Complete Reference", 4th Edition, Tata McGraw-Hill, 2000.

REFERENCE BOOKS :

1. E. Balagurusamy, " Programming in ANSI C", 4TH Edition, Tata McGraw- Hill, 2008.
2. R Ravichandran and T Jeyapoovan, " Computer Programming with C", Soni Graphics, India, 2014.

I Year B.Tech. BME I - Semester

L	T	P	To	C
3	-	-	3	3

CS105 - NETWORK SECURITY

Course description and Objectives :

This Course focuses towards the introduction of System, Information and Network security using various methodologies. It also focuses on the practical aspects that have been used to provide e_mail and web security.

Course Outcomes:

On Completion of this course student should be able to

- *understand the Importance of Information Security*
- *Know the ways to protect the information*
- *understand the Firewall importance*
- *understand the need of Virtual Private Networks.*

UNIT I - History of security :

History of security – Physical security, communications security, emissions security, computer security, network security and information security. Security process - Anti-virus software, access controls, firewalls, smart cards, biometrics, intrusion detection, policy management, vulnerability scanning, encryption, physical security mechanisms.

UNIT II - Access attacks

Snooping, eavesdropping, interception; Modification attacks - Changes, insertion and deletion; Denial of service attacks- Denial of access to information, applications, systems and communication; Repudiation attacks - Masquerading and denying an event. Hacking - Hacker motivation, historical hacking techniques, IP spoofing and malicious code.

UNIT - III

Confidentiality of files, information in transmission and traffic flow, integrity, availability and accountability; Integrity of files and information during transmission; Availability - backups, failover and disaster recovery; Accountability – identification and authentication, and audit.

UNIT - IV

Concepts of firewalls, Application layer and packet filtering firewalls; Virtual Private Networks.

UNIT - V

Basic encryption concepts, Private Key encryption standards-DES, triple DES and AES. Public key encryption – RSA. Concepts of digital signatures.

TEXT BOOKS :

1. Eric Maiwald, Fundamentals of Network security, Dreamtech Press, 2007.

REFERENCE BOOKS :

1. William Stallings, "Cryptography and Network security", 4^{th} edition, Pearson Education, 2010.

I Year B.Tech. BME I - Semester

L	T	P	To	C
-	-	3	3	2

HS120 - ENGINEERING PHYSICS LAB

Course description and Objectives :

This lab is intended to make the students realize the theoretical concepts of physics having hands on experience in conducting the following experiments. Students may have to take up any 10 experiments from each section.

Course Outcomes:

- *Students realize concept of resonance of sound conducting the experiment of Sonometer Melde's experiment and volume generator.*
- *The students understand the concepts of light conducting the experiments of dispersion of light, diffraction of light, optical fibers and lasers.*
- *The students acquire the knowledge of magnetic field theory, thermal energy and elastic properties by conducting the experiments of field along the axis of circular coil, Lee's experiment, Seebeck effect and Torsional pendulum.*

PHYSICS LAB

1. Verification of laws of transverse vibrations in stretched string - Sonometer
2. Melde's Experiment - Transverse and Longitudinal modes.
3. Determination of Rigidity modulus of a material in the form of a wire - Torsional pendulum
4. Dispersive power of the material of a Prism - Spectrometer
5. Determination of wavelength of a monochromatic light source - Diffraction Grating.
6. Field along the axis of a circular coil – stewart Gee's apparatus.
7. Volume Resonator.
8. Band gap of semiconductor
9. Hall coefficient
10. Thermal conductivity of bad conductor Lee's method
11. Optical Fiber – Determination of numerical aperture
12. Solar Cell
13. Seebeck effect

REFERENCE BOOKS:

1. Vogel's Text book of qualitative Chemical Analysis J.Mendham, R.C Denney, J.D. Bares, M.Thomas & B. Siva Sankar, Pearson Publications – Volume I (2009).

I Year B.Tech. BME I - Semester

L	T	P	To	C
-	-	3	3	2

CS107 - COMPUTER PROGRAMMING LAB

Course description and Objectives :

To familiarize the students in preparation of documents and presentations with office automation tools. A comprehensive problem solving skills through C language is offered to enable the students to write diversified solutions using this language.

Course Outcomes:

- *Able to write, compile and debug programs in C language.*
- *Able to formulate problems and implement algorithms in C.*
- *Able to effectively choose programming components that efficiently solve computing problems in real-world*

1. Write A Program to find simple Interest, compound interest
2. Write A Program to covert given temperature from C to F & F to C
3. Write A Program to check Entered number is positive or zero or Negative
4. Write A Program to print given year is Leap year or not
5. Write A Program to do arithmetic operations using switch
6. Write A Program to find biggest among 3 Numbers
7. Write A Program to print grade of a student for 5 sub avg>70(A), 60-70(B), 50-60(C),<50(F)
8. Write A Program to find Roots fo Quadratic Equation
9. Write A Program to find sum of individual digits of a given number
10. Write A Program to check whether the given number is PALINDRAM or not
11. Write A Program to check whether the given number is PERFECT or not
12. Write A Program to check whether the given number is PRIME or not
13. Write A Program to check whether the given number is ARMSTRONG or not
14. Write A Program to check whether the given number is STRONG or not
15. Write A Program to find sum of Natural Numbers

HS 111 ENGINEERING MATHEMATICS - I

L	T	P	To	C
3	1	-	4	4

Course Description & Objectives :

Without mathematics not a single day of an engineer will pass! All the topics of this course are relevant to all branches of engineering. Differential equations are used in various places. Laplace transformations are used, for example, for conversion of domains, from time domain to frequency domain. These are also used to solve ordinary differential equations. When data is given at only a finite points, we use numerical methods for find the approximate values of functions, also to solve differential equations approximately etc. Maxima, minima of a function has got many applications.

Course Outcomes:

1. *Students will understand that Mathematics which they learn can be used at different levels in their Engineering course irrespective of their branches.*
2. *This course will help to sketch the graph of a differential equation and its direction mixing fields*
3. *Laplace transform used to compute solutions of equations involving impulse functions*
4. *They will be able to use Laplace transformations for conversion of domains from time domain to frequency domain.*
5. *Differential Equations help them to find approximate values of function.*
6. *They will be able to analyze and use them in different applications.*
7. *Eigen values and Eigen vectors play a prominent role in the study of ordinary differential equations and in many applications of physical sciences.*

UNIT I - Ordinary Differential Equations & Differential Equations of Second Order :

Differential Equations of First Order : Definiton, Order and degree of a differential equation, Formation of differential equations, Solution of a differential equation, Differential equations of first order and first degree : variables separable, Homogenous equations, Linear equations, Exact differential equations.

Differential Equations of Second Order : Linear differential equations of second order with constant coefficients, Methods for finding the complementary functions and particular integral, General method of finding the particular integral of any function.

UNIT II - Applications of Differential Equations and Laplace Transformations

Applications of Differential Equations : Newton's law of cooling, Natural law of growth, Orthogonal trajectiories**.**

Laplace transformations : Definition, Properties, Convolution theorem, Inverse Laplace transformation, Solving differential equations using Laplace Transformation.

UNIT III - Numerical Methods

Taylor's Method, Picard Method, Euler Method, Modified Euler Method, Runga-Kutta Methods.

Interpolation by Lagrange and Newton methods.

UNIT IV - Matrices

Rank of a matrix, finding rank of a matrix using Echelon form, Normal form, triangular form, PAQ form, inverse of a matrixEigen values, Eigen vectors, properties, Cayley-Hamilton theorem (without proofs), Diagonalisation of a matrix.

Solving System of equations (Gauss-Siedal method only)

UNIT V - Maxima and Minima & Jacobians

Maxima and Minima : Review of partial differentiation: Partial derivatives, Partial derivatives of higher order, Homogeneous function, Euler's theorem, Total differential coefficient,

Maxima and Minima of a function of two variables, Conditions for extreme values, Lagrange method of undetermined multipliers.

Jacobians : Definition, Properties, Jacobian of implicit functions, Partial derivaties of Implicit functions using Jacobian.

TEXT BOOKS :

1. H. K. Dass and Er. Rajnish Verma, Higher Engineering Mathematics, S. Chand & Co., New Delhi, 2011.
2. B.S. Grewal, "Higher Engineering Mathematics", 40th edition, Khanna Publishers, 2009.

REFERENCES:

1. B.V. Ramana, "Higher Engineering Mathematics", 3rd Edition, Tata McGraw-Hill Publishing Co, 2008.
2. R K Jain, S R K Iyengar, "Advanced Engineering Mathematics", 2nd Edition, Narosa Publishing House.
3. Erwin Kreyszig, "Advanced Engineering Mathematics", 8th Edition, John Wiley & Sons (Asia) Pvt. Ltd. 2001.

HS 113 ENGINEERING PHYSICS

L	T	P	To	C
3	1	-	4	4

Course Description & Objectives :

There is a symbiotic relation between physics and engineering. Broadly speaking, engineering is mainly applied physics. Recent technical developments have been the result of joint efforts of physicists and engineers. A proper study of physics is therefore indispensable for an engineering student to excel in his field. The purpose of this course is to present the principles and concepts of physics as relevant to an engineer.

Course Outcomes:

The students will be made to get acquainted to the following learning outcomes:

1. *Concepts of Physical optics, devices and applications.*
2. *Ultrasonic waves, production, applications in NDT.*
3. *Introduction to Quantum mechanics in relevance to that of modern physics.*
4. *Exposure to latest inventions like lasers, fibers and applications*
5. *Insight into nano technology and applications, solar energy to combat energy crisis.*

UNIT I - Physical Optics

Interference – Types - Interference in thin films (Reflection) – Newton's Rings – Michelson's Interferometer, Fabry-perot interferomenter – Applications.

Diffraction – Fraunhoffer Diffraction at single slit – Diffraction grating

Polarization – Production of plane polarized light – Nicol prism – Optical activity – photo elasticity.

UNIT II - Ultrasonics & NDT

Ultrasonics : Introduction – production of ultrasonic waves – piezoelectric method – Properties of ultrasonic waves – Types of ultrasonic waves – Determination of Velocity of ultrasonic waves in solids and liquids – Applications.

NDT : Introduction - Types – Theory and practice of Ultrasonic Testing – Ultrasonic Testing Systems – Ultrasonic Testing Methods – X-Ray Radiography.

UNIT - III Quantum Mechanics & Free electron theory of metals

Quantum Mechanics : Matter waves - Schroedinger's time independent wave equation - Physical significance of the wave function - Particle in one dimensional potential well – tunneling phenomenon.

Free electron theory of metals : Introduction – Classical free electron theory – Electrical conductivity of metal – Fermi - Dirac distribution function and its variation with temperature – Quantum free electron theory.

UNIT IV - Lasers & Fiber Optics:

Lasers: Characteristics of Laser light – Spontaneous and Stimulated emission of radiation – Low power and High power lasers, He-Ne Laser – CO_2 Laser – Nd-Yag laser - Applications of Lasers, Holography and Applications

Fiber Optics: Principle of optical fiber - materials – Numerical Aperture – Types of fibers – Dispersion and Attenuation in optical fibers – Optical sensors – Optical fiber communication system.

UNIT V - Solar Energy & NanoScience and Technology

Solar Energy : Solar radiation – Photovoltaic effect – solar cells – Efficiency of solar cell – Solar thermal energy conversion systems.

NanoScience & Technology : Introduction to nano meterials – Basic principles of nanoscience & Technology – Fabrication of nanomaterials – Physical & Chemical properties of nanomaterials – Applications of nanotechnology.

TEXT BOOKS :

1. M.R.Srinivasan, "Physics for Engineers" New Age International, 2002-2003.
2. M.N. Avadhanulu & P.G. Kshirasagar, "Engineering Physics", 1st edition, S. Chand & Company Ltd, 1992.

REFERENCES:

1. Halliday, Resnic and Walker, "Fundamentals of Physics", 6th edition, John Willey publishers, 2003.
2. Grawfor F.S., Berkley Physics courses, "Waves and Oscillations", Volume III McGraw Hill, 1992.
3. V. Raghavan, "Materials Science and Engineering", 5th edition, Prentice-Hall India, 2004.
4. S.O.Pillai, "Solid State Physics", 6th edition, New Age International Publications, Revised, 2005.
5. V.Rajendran, "Engineering Physics", 1st edition, TMH Publications, 2010.

EE 111 FUNDAMENTALS OF ELECTRICAL ENGINEERING

L	T	P	To	C
4	0	-	4	4

Course Description & Objectives :

To understand the basic concepts, laws, techniques in analyzing various DC and AC circuits and concepts in coupled circuits. Study of construction details, working of various electrical machines and Semiconductor Devices and operation

Course Outcomes:

1. *Able to explain the notation and components of electric circuits*
2. *Able to analyze DC and single phase and three phase AC circuits using different methods and theorems*
3. *Able to operate various electrical machines.*
4. *Able to explain the concepts of Semiconductor Devices and operation*

UNIT I - Fundamentals Of DC Circuits

Circuit Concepts: Concepts of network, Active and passive elements, voltage and current sources, concept of linearity and linear network, unilateral and bilateral elements, R, L and C as linear elements. Ohm's Law – Kirchhoff's Laws –application to simple series, parallel circuits, mesh and nodal analysis of simple resistive circuits.(simple numerical problems).

UNIT II - Fundamentals of A.C. Circuits:

Generation of A.C. voltage - frequency, average value, R.M.S. value, form factor, peak factor for sinusoidal only - phasor representation of alternating quantities. Analysis of simple series and parallel A.C. circuits-(simple numerical problems)

Balanced Three phase systems – relation between phase and line quantities of voltages and currents in star and delta connected systems (Elementary treatment only)

UNIT III - Fundamentals of Electromagnetism and Transformers:

Concepts of Magneto motive force, reluctance, flux and flux density , concept of Self Inductance and Mutual Inductance, Coefficient of coupling-only elementary treatment. (simple numerical problems).

Transformers: Principle of operation of single phase transformer – constructional features – EMF equation (simple numerical problems)

UNIT IV - Electrical Machines:

DC Machines: Constructional details of a D.C. Machine.

D.C. Generator – Principle of operation – EMF equation – types of D.C. generators (simple numerical problems)

D.C. Motor – Principle of operation – Torque equation – types of D.C. motors (simple numerical problems)

A.C Machines: Principle of operation of three phase induction motors – slip ring and squirrel cage motors – Torque equation derivation, Constructional details of synchronous machines.

UNIT V - Semiconductor Devices:

Classification of solids based on energy band theory - Intrinsic semiconductors - Extrinsic semiconductors - P type and N type semiconductors - P-N junction diode and its characteristics –Half and Full wave rectifiers- Zener diode and its characteristics - Voltage regulator. Bipolar junction transistor – Operation-Types- Applications.

TEXT BOOKS:

1. Mittle, V.N., “Basic Electrical Engineering”, 2nd ed., TMH, New - Delhi, 1990.
2. V.K.Mehta,”Principles of Electrical Engineering and Electronics”, 3rd ed., S. Chand Publications, New Delhi, 2010.

REFERENCES:

1. Millman & Halkias, “Integrated Electronics”, McGraw Hill, 1979.
2. A.K. Thereja & B.L. Thereja, “Electrical Technology”, Vol. – II, S.Chand Publications, 2007.
3.. U.Bakshi & A.Bakshi, “Basic Electrical Engineering”, 1st ed., Technical Publications, Pune, 2005.
4. U.Bakshi & A.Bakshi, “Basic Electrical Engineering”, 1st ed., Technical Publications, Pune, 2005.

HS 114 TECHNICAL ENGLISH COMMUNICATION

L	T	P	To	C
3	2	-	5	5

Course Description & Objectives :

To introduce students to the specific use of language for the purposes of Technical Communication which would be an essential prerequisite for success in the areas of writing and speech. The teaching efforts in this course will be directed towards making students develop their technical and non-technical writing abilities using the fundamental principles that apply to the correct use of the English language free of grammatical and other related errors.

Course Outcomes:

Students shall achieve the ability to write and demonstrate college-level proficiency in the following:

1. *Clear and effective communication of meaning in speaking and writing.*
2. *The ability to perform effectively the essential steps of the writing process (Note making, organizing, composing, revising, and editing).*
3. *The ability to explain, develop, and criticize ideas effectively.*
4. *Effective organization within the paragraph and the essay.*
5. *Accuracy, variety, and clarity of sentences.*
6. *Appropriate diction.*
7. *Control of conventional mechanics (e.g., punctuation, spelling)*

UNIT - I

- Text : Environmental Consciousness (Climate Change – Green Cover – Pollution)
- Grammar : Articles – Prepositions – Sentence Types and Construction
- Vocabulary : Root – Prefixes - Suffixes
- Composition : Paragraph Writing (Descriptive & Narrative)
- Lab Practice : Introduction to Phonetics (Organs of Speech; Consonants, Vowels & Diphthongs; Syllable, Stress & Intonation)

UNIT - II

- Text : Emerging Technologies
  (Solar Power – Cloud Computing – Nanotechnology)
- Grammar : Time and Tense (Present-Past-Future; Helping Verbs; Modals)
- Vocabulary : Synonyms – Antonyms
- Composition : Note-making
- Lab Practice : Grammar Practice (Speaking of past, present & future)

UNIT - III

- Text : Energy
  (Renewable and Non-renewable Sources – Alternative Sources – Conservation – Nuclear Energy)
- Grammar : Subject-Verb Agreement - Sentence Construction
  (Characteristics of Technical Writing)
- Vocabulary : Idioms & Phrases
- Composition : Summarizing
- Lab Practice : Situational Conversations – Role-Plays
  (Introducing; Greeting; Enquiring; Informing; Requesting; Inviting)

UNIT - IV

- Text : Engineering Ethics
  (Challenger Disaster – Biotechnology – Genetic Engineering – Protection from Natural Calamities)
- Grammar : Sentence Transformation (Degrees, Voice, Speech & Synthesis)
- Vocabulary : Phrasal Verbs
- Composition : Letter Writing (Informal)
- Lab Practice : Situational Conversations – Role-Plays
  (Emotions; Directions; Descriptions; Agreements; Refusals; Suggestions)

UNIT - V

- Text : Travel and Tourism
  (Advantages and Disadvantages of Travel-Tourism – Atithi Devo bhava – Tourism in India)
- Grammar : Common Errors
- Vocabulary : One-word Substitutes
- Composition : Letter Writing (Formal)
- Lab Practice : Group Discussions

TEXT BOOKS :

Mindscapes - English for Technologists and Engineers, Orient Black Swan, 2012.

REFERENCES:

1. V. R. Narayana Swamy***, "Strengthen Your Writing",*** 1st edition, Orient Longman, 2003.
2. Thomas Elliott Berry***, "The Most Common Mistakes in English Usage",*** 1st edition, Tata McGraw Hill, 2004.
3. T. Balasubramanyam, ***A Textbook of English Phonetics for Indian Students***, Macmillan Ltd., 2000.
4. Sasikumar.V and P.V. Dhamija,. ***Spoken English: A Self-Learning Guide to Conversation Practice,*** 34th Reprint, Tata McGraw Hill, New Delhi, 1993.
5. Margaret M Maison, **"Examine your English",** 1st edition**,** Orient Longman, 1999.
6. Ashraf Rizwi, "***Technical English Communication***", Tata McGraw Hill, Latest Edition.

CS 101 PROBLEM SOLVING AND COMPUTER PROGRAMMING

L	T	P	To	C
4	1	-	5	5

Course Description & Objectives :

Aim of this course is to introduce the techniques of problem solving and concepts of programming language to the students. Because of its popularity and suitability to develop different types of applications, 'C' language has become the de-facto programming language to engineers. A comprehensive introduction of C language is offered through this course to enable the students to write diversified programs.

Course Outcomes:

On Completion of this course student should be able to

1. *Able to understand the basic terminology used in computer programming and to write, compile and debug programs in C language.*
2. *Use different data types in a computer program and design programs involving decision structures, loops and functions.*
3. *Able to understand the allocation of dynamic memory using pointers*
4. *Use different data types to create/update basic data files.*

UNIT I - Fundamentals of computers

Basic functional units and discrete components of a computer, computer networks, networking components, Binary representation of integers and real numbers, ASCII, EBCDIC, Unicode, Generations of computer languages.

UNIT II - Problem Solving Steps and Basic of C Language

Problem understanding, Formulating a mathematical model, Development of an algorithm, Representation of an algorithm, Flow chart and Pseudo code, Coding, Testing and Debugging, Comments, Processor statement, Function header statement, Variable declaration statement and Executable statement, C Character Set, constants, identifiers, operators, punctuations, keywords, Basic data types, modifiers, identifiers, variables, C scopes, type qualifiers, storage class specifiers, variable initializations, constants, reading and writing characters, formatted I/O.

UNIT III – Preliminaries of C

Assignment, arithmetic , relational, logical, bitwise, ternary, address, indirection, sizeof, dot, arrow, and parentheses operators, Expressions Precedence of operators

and associatively, Category of Statements, Selection, Iteration, jump, label, expression and block, Function declaration, prototype, definition, calling by value and address, standard library functions and recursive functions.

UNIT IV - Arrays and Pointers

Declaration, initialization, reading, writing, accessing and passing as a parameter to functions, Multidimensional arrays and String functions, pointer expressions, pointer and arrays, multiple indirection, initializing pointers, pointer to functions, Dynamic memory allocation functions.

UNIT V - Structures and File Processing

declaration, initialization and accessing, array of structures and passing structures to functions, structure pointers, arrays and structures within structures, unions, bit-fields, typedef and enumerations, I/O and processing operations on text and binary files. pre-processor directives.

TEXT BOOKS :

1. Reema Thareja, “Introduction to C Programming”, Oxford University Press, India, 2013
2. Herbert Schildt, C: “The Complete Reference”, 4^{th} Edition, Tata McGraw-Hill, 2000.

REFERENCES:

1. E. Balagurusamy, “ Programming in ANSI C”, 4^{TH} Edition, Tata McGraw- Hill, 2008.
2. R Ravichandran and T Jeyapoovan, “ Computer Programming with C”, Soni Graphics, India, 2014.

HS 115 ENGINEERING MATHEMATICS - II

L	T	P	To	C
3	1	-	4	4

Course Description & Objectives :

Without mathematics not a single day of an engineer will pass! All the topics of this course are relevant to all branches of engineering. In real life, many quantities are dependent on more than one quantity. Hence study of functions of several variables is crucial. In this course, we study partial differentiation, partial differential equations, multiple integrals all involving functions of two variables. We also study Fourier series and Z-transformations and difference equations.

Course Outcomes:

1. *The students will understand that many quantities are dependent on more than one quantity so they learn functions of several variables.*
2. *They will be able to solve Partial Differential Equations, multiple integrals which are involving functions of two variables.*
3. *They can apply Z – transforms to solve difference equations.*
4. *They will be able to calculate areas and volumes.*
5. *The student will enable to locate the maxima and minima of a function is an important task which arises often in applications of mathematics to problems in engineering and science.*
6. *Vector differentiation and integration used to find the arc lengths and curvatures of space curves*

UNIT I - Partial Differential Equations :

Formation of Partial Differential Equations, Linear (Lagrange) Equations, Method of multipliers, Non-linear partial differential equations (Types), Charpit's method.

Second order linear equations, classifications, Solution by method of separation of variables.

UNIT II - Fourier Series :

Periodic functions, Fourier series, Dirichlet's conditions, Determination of Fourier coefficients, Discontinuous functions, even and odd functions, Half-range series, Functions having arbitrary period.

UNIT III - Z-transformations & Applications :

Z-transformations : Sequences, Z-transformation, Properties, Inverse Z-transformation, Multiplication and division by k, Initial and final value theorems,

Convolution, Determination of inverse Z-transformation.

Applications : Solutions of difference equations using Z-transformations.

UNIT IV - Multiple Integrals :

Double integrals, Evaluation, Evaluation in Polar coordinates, Change of order of integration, Change of variables, Applications to Area in Cartesian coordinates and polar coordinates.

Triple integrals, Fundamentals, Evaluation of triple integrals.

UNIT V - Vector Differentiation and Integration

Vector Function, Differentiation, Scalor and Vector point function, Gradient, Normal, Divergence, Directional Derivate, Curl, Vector identities.

Line Integral, Surface Integral, Volume integral, Green's theorem, Stoke's theorem, Gauss theorem of divergence (without proofs).

TEXT BOOKS :

1. H. K. Dass and Er. Rajnish Verma, Higher Engineering Mathematics, S. Chand & Co., New Delhi, 2011.
2. B.S. Grewal, "Higher Engineering Mathematics", 40th edition, Khanna Publishers, 2009.

REFERENCES:

1. B.V. Ramana, "Higher Engineering Mathematics", 3rd Edition, Tata McGraw-Hill Publishing Co, 2008.
2. R K Jain, S R K Iyengar, "Advanced Engineering Mathematics", 2nd Edition, Narosa Publishing House.
3. Erwin Kreyszig, "Advanced Engineering Mathematics", 8th Edition, John Wiley & Sons (Asia) Pvt. Ltd. 2001.

HS 117 ENGINEERING CHEMISTRY

L	T	P	To	C
4	0	-	4	4

Course Description & Objectives :

Chemistry is the backbone in designing and understanding the nature and properties of various engineering materials. Currently, the electronics and computer engineers are waiting for suitable polymers for using miniature super computers. So this subject develops fundamental knowledge about new engineering materials and their significance in technical fields and industrial sectors. Water is an essential element for the existence of human, plant and animal lives, besides that it has greater industrial applications. The knowledge about water is the basic requirement for a professional student. Characterization of materials with instrumental techniques is essential for engineers.

Course Outcomes:

1. *Differentiate between soft and hard water. Understand the disadvantages of using hard water domestically and industrially. Select and apply suitable softening methods (Soda-lime, zeolite, ion-exchange methods, etc.) to soften the hard water for industrial and domestic applications.*
2. *Acquaintance of primary and secondary cells, Hydrogen-Oxygen and Methanol fuel cells, dry and wet corrosions, corrosion controlling methods*
3. *Acquaintance of the properties and engineering applications of Ceramics, Refractories, Glasses, Cement, Abrasives, Lubricants*
4. *Acquaintance of Preparation, properties and applications of different polymers (Polyethylene, PVC, Tefflon, Bakelite,Urea-Formaldehyde, Silicones, Rubber – Vulcanization, Synthetic Rubbers-(Buna-S, Buna-N, Neoprene); treatment of membranes.*
5. *Acquaintance of various spectroscopic methods (UV-visible / IR), Beer-Lambert's Law, qualitative and quantitative analysis, block diagrams of UV and IR spectrophotometers*.

UNIT I - Water Technology :

Introduction-Hardness of water-Determination of hardness by EDTA-Disadvantages of hard water-Scales & Sludges-Caustic embrittlement-Boiler corrosion-Priming & Foaming, WHO, BIS Standards of water-Softening Methods- Lime Soda process, Zeolite process, Ion Exchange process - Desalination of brackish water-Reverse osmosis, Electro dialysis.

UNIT II - Electrochemical cells and AND Corrosion:

Electrochemical cells: primary cell-(Dry or lecalanche cell), Secondary cell-(Lead-acid storage cell, Lithium ion battery), Hydrogen-Oxygen Fuel cell, Methanol fuel cell.

Corrosion: Introduction-Dry corrosion (chemical)-Wet corrosion (electrochemical)-Mechanism of wet corrosion-Bimetallic corrosion-Concentration cell corrosion-Factors influencing corrosion-Corrosion control methods- Cathodic protection and Electroplating.

UNIT III - Engineering Materials :

Properties and engineering applications of Ceramics, Refractories, Glasses, Cement,Abrasives, Lubricants.

UNIT IV - Polymers :

Introduction –Types of polymerization-Preparation, properties and applications of Polyethylene, PVC, Tefflon, Bakelite, UreaFormaldehyde, Silicones, Rubber – Vulcanization, Synthetic Rubbers - (Buna-S, Buna-N, Neoprene). Elementary treatment of Membranes

UNIT V - Instrumental Techniques :

Interaction of radiation with matter,UV-Visible Spectroscopy-Beer –Lambert's law ,Qualitative and Quantitative Analysis,Block diagram of UV-Visible Spectrophotometer.IRSpectroscopy-Types of Vibrations,Identification of functional groups,Block diagram of IR Spectrophotometer**.**

TEXT BOOKS :

1. P.C Jain and Monica Jain, "Engineering Chemistry", 15th edition, Dhanpat Rai Publications 2009.
2. Gurudeep Raj and Chatwal Anand, "Instrumental Methods of Analysis", 5th edition, Himalaya Publications, 2007.

REFERENCES:

1. S.S.Dara, "Text book of Engineering Chemistry" 1st edition, S. Chand Publications, 2009.
2. C.V. Agarwal, C.P. Murthy, A.Naidu, "Chemistry of Engineering materials", 9th edition, BSP Publications, 2008.
3. M.R. Senapati, "Advanced Engineering Chemistry" 2nd edition, Lakshmi Publications, 2006
4. H.W. Wilard and Demerit, "Instrumental methods of Analysis", 7th edition, CBS Publications, 1986.

HS 122 ENGINEERING MATERIALS

L	T	P	To	C
4	-	-	4	4

Course Description & Objectives :

The course will help students to learn about the elementary relationships between structure and properties of materials how materials can be classified. It also reveals the engineering applications of metals, alloys, semi conductors and magnetic materials and relation between properties and engineering applications.

Course Outcomes:

The students will be made to get acquainted to the following learning outcomes:

1. *The bonding in solids. Crystal systems and their structural features*
2. *Fundamentals related to phase equilibria and relevance in Materials Science*
3. *Mechanical properties of solids, factors affecting such properties in order to gain materials information.*
4. *Classification of solids based on band theory, sources of resistivity in metals, semi conductors transport mechanism and applications.*
5. *Classification of magnetic materials, hysteresis, ferrites and applications*
6. *Super conductors, classification and their applications. Dielectric materials, types of polarization and new engineering materials and their usefulness.*

UNIT I - Bonding in Solids & Crystallography:

Bonding in Solids: Inter atomic forces – Types of bonds – Primary & Secondary bonded materials and their properties – Cohesive energy.

Crystallography: Introduction – classification of Crystal systems – SC, BCC & FCC structures –Miller indices of planes & directions – Separation between successive planes – X-ray diffraction – Bragg's Law – Powder method – Crystal imperfection – Point and line imperfections – Grain boundaries

UNIT II - Phase Equilibria & Mechanical Properties :

Phase Equilibria: Gibb's phase rule & terms involved – Reduced phase rule - Two component systems–invariant reactions – Eutectic system & Iron – Carbon system - Lever rule.

Mechanical Properties : Introduction – mechanical properties of materials – Stress-Strain relations of various solids – Elastic moduli- deformations in solids- Fracture – Creep- Fatigue – Factors affecting mechanical properties of materials.

UNIT III - Conducting Materials & Semiconductors :

Conducting Materials: Introduction – Classification of solids based on the band models - Relaxation time and electrical conductivity of a metal – Collision time & mean free path – Sources of resistivity of metals.

Semiconductors: Introduction – Generation & recombination – Intrinsic semiconductors – Extrinsic semiconductors – Drift and diffusion (Qualitative treatment) – Einstein relation – Hall effect – Direct and Indirect band gap.

UNIT IV - Magnetic Properties & Superconductivity

Magnetic Properties: Introduction – Origin of magnetic moment – Classification of magnetic materials – Domain theory of ferromagnetism – Hysteresis curve - Soft and hard magnetic materials – Ferrites and their applications.

Superconductivity – Introduction - Meissner Effect – Types of superconductors – High Temperature superconductors – Applications.

UNIT V - Dielectrics & Functional materials

Dielectrics : Introduction – Dielectric polarization – Internal electric field – Clausius – Mossotti relation – Ferro and Piezo electricity - Electrets – Applications.

Functional materials: Introduction – Metallic glasses – Biomaterials – Composites – Metal matrix composites - Fiber reinforced plastics – Conducting polymers - shape memory alloys – smart materials.

TEXT BOOKS :

1. V. Raghavan, “Materials Science and Engineering”, 3 rd ed., PHI, 1996.
2. Lawrence H. Van Vlack, “Element s of Materials Science and Engineering”, 6th ed., Wesley Publication, 1989.

REFERENCES:

1. Arumugam. M “Material Science” Anuradha Technical Book Publishers, Kumbakonam.K, 1997.
2. Manas Chandra, “Science of Engineering Materials”, Vol 1-3, Mc - Millian Company of India, Delhi.
3. Pillai, S.O, “Solid State Physics”, New Age International, 1998.
4. William F. Smith, “Principles of Materials Science and Engineering”, MGH, Publishers, 1988.
5. Structure and Properties of Materials – John Wulff – Wiley Eastern Ltd.

ME 101 ENGINEERING MECHANICS

L	T	P	To	C
3	1	-	4	4

Course Description & Objectives :

The course aims to impart the knowledge to understand the forces and their reactions on various static and dynamic conditions.

Course Outcomes:

1. *Use scalar and vector analytical techniques for analyzing forces in statically determinate structures.*
2. *Solve the engineering problems in case of equilibrium conditions and to calculate the reaction forces of various supports of different structures.*
3. *Determine the centroid, centre of gravity and moment of inertia of various surfaces and solids.*
4. *Solve the problems involving dry friction.*
5. *Apply fundamental concepts of kinematics and kinetics of particles to the analysis of simple, practicalproblems.*

UNIT I - Basic Concepts and Principles of Statics :

Introduction to Engineering Mechanics, Scalar and Vector quantities, Forces, Characteristics of a force, Definitions and examples of various types of force systems, Law of transmissibility, Definition of resultant, Composition and resolution of forces, Moment of a force, Principles of moments of force, Couples, characteristics of a couple, Transformations of a couple, Resultants of Force Systems, Possible resultants of different types of force systems, Resultant of a concurrent coplanar force system, Resultant of a non concurrent coplanar force system

UNIT II - Equilibrium of Rigid Bodies

Free body diagrams, Types of supports and their reactions, requirements of stable equilibrium, Equations of equilibrium of a concurrent coplanar force system, Equilibrium of Bodies acted on by two or three forces, Equilibrium of bodies acted on by non-concurrent coplanar force system

UNIT III - Properties of Surfaces and Solids :

Centroid and Center of Gravity: Centre of gravity of parallel forces in a plane, centroids and center of gravity of composite bodies, Distributed Loads on Beams.

Moments of Inertia: Definition, Parallel axis theorem and perpendicular axis theorem for areas, Polar Moment of inertia, Second moment of area by

integration, Radius of gyration of areas, Moments of inertia of composite areas.

UNIT IV - Friction :

Nature of friction, Laws of friction, Coefficient of friction, Angle of friction, Cone of friction, Types of Friction - Sliding Friction, Rolling Friction, Belt Friction, Ladder Friction, Wedge friction.

UNIT V - Kinematics and Kinetics :

Absolute Motion: Introduction, Recapitulation of basic terminology of mechanics, Displacement, Velocity and acceleration their relationship, Rectilinear motion of a particle

Relative Motion: Introduction to kinematics of relative motion, Relative displacement, Relative velocity

Kinetics: Introduction to Kinetics, Force, Mass and Acceleration, Newton's Laws of motion, Equation of motion for a particle, D Alembert's principle, Rectilinear translation of a rigid body, Work done by a force, Work done by a force system, Energy, Potential energy, Kinetic energy, Principle of Work and kinetic energy, Conservation of energy, Linear impulse, Linear momentum, Principle of linear impulse and linear momentum, Conservation of linear momentum.

TEXT BOOKS :

1. J. L. Meriam, L. G. Kraige, "Engineering Mechanics: Dynamics", 7th ed., John wiley & sons, 2012
2. A. K. Tayal, "Engineering Mechanics", Umesh Publications, 2005.

REFERENCES:

1. L. Singer - Harper, "Engineering Mechanics", 3rd ed., Fedinand . , Collins, 1975.
2. Timoshenko & Young, "Engineering Mechanics", 4th ed., Tata McGraw Hill, New Delhi, 2007.
3. S. S. Bhavakati & J. G. Rajasekharappa, "Engineering Mechanics", 3nd ed., New Age International Publications, New Delhi, 2008.

HS 118 ENVIRONMENTAL STUDIES

L	T	P	To	C
3	0	-	3	3

Course description and Objectives :

The objective of this course is to heighten on awareness of nature and its importance to students

and make them understand the need to make judicious use of all natural resources for long team sustenance of life on this planet.

Course Outcomes:

1. *To provide Knowledge on importance of natural resources and integrate technical “field” knowledge with analytical skills to prevent natural resources depletion*
2. *To maintain healthy and Diverse Ecosystems ,*
3. *Work together to conserve the biodiversity*
4. *Take immediate measures to control the Pollution*
5. *Adopt Ecofriendly technology.*
6. *Maintenance of hygienic conditions*

UNIT I - Environment and Natural Resources :

Environment: Definition, Scope and Importance – Need for Public Awareness

Natural Resources: Renewable and non-renewable resources – Natural resources and associated problems – Forest Resources: Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources: Use and over utilization of surface and ground water – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources - Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity–Energy resources: renewable and non-renewable energy sources, alternate energy sources. Land resources: Land as a resource, land degradation, Soil erosion – case studies - Role of an individual in conservation of natural resources.

UNIT II - Ecosystems and Biodiversity :

Ecosystem: Concept of an ecosystem. – Complete and incomplete ecosystem - Structure and functions of an ecosystem - Ecological succession. - Food chains, food webs -Structure and functional features of the following ecosystem: a. Forest ecosystem b. Grassland ecosystem c. Desert ecosystem, d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) **Biodiversity**: introduction of biodiversity, Bio-geographical classification of India - Value of biodiversity- Biodiversity at global, National and local levels - Hot-spots of biodiversity - Threats to biodiversity - Endangered and endemic species of India – Conservation of biodiversity

UNIT III - Environmental Pollution and Applications of Remote Sensing / GIS on Environment

Definition, Cause, effects and control measures of: Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution - Solid waste Management: Causes, effects and control measures of municipal and industrial wastes - Climate change, global warming, acid rain, ozone layer depletion -Case Studies - Role of an individual in prevention of pollution - Pollution case studies. – Green technology and its concept, role of green technology in controlling environmental problems.

UNIT IV - Social issues and EIA :

Sustainable development -water conservation: Cloud Seeding (Artificial rain making system), rainwater harvesting, watershed management - Disaster management: floods, earthquake, cyclone and landslides - Environment Protection Act. - Air (Prevention and Control of Pollution) Act. - Water (Prevention and control of Pollution) Act - Wildlife Protection Act - Forest Conservation Act

EIA: introduction to E.I.A.-definition of E.I.A and E.I.S – scope and objectives of E.I.A.- methods of E.I.A –CEIA, REIA, MOEF, CPCB, SPCB – Importance of E.I.A in proposed Projects / Industry /

Developmental activity - Remote sensing / GIS: Introduction of remote sensing / GIS, definition of remote sensing, applications of the remote sensing on environment (site selection, land use/land cover pattern, water/air/soil quality models, a criteria of environmental information systems)

UNIT V - Environmental Sanitation :

Food sanitation: food and drugs Act, food preservations, food borne diseases- Milk sanitation: tests for milk, pasteurization of the milk - water borne diseases-

air borne diseases-viral diseases (HIV/AIDS, SARS, bird-flu, anthrax)-maintenance of sanitary and hygienic conditions

Field Work/Environmental Visit: Visit to a local area to document environmental assets – river/ forest/ grassland / hill /mountain - Study of local environment - common plants, insects, birds - Study of simple ecosystems – pond, river, hill, slopes etc - Visits to industries, water treatment plants, effluent treatment plants

TEXT BOOKS :

1. Y. Anjaneyulu, “Introduction to Environmental Science”, B S Publications, 2008.
2. Dr. M. Chandrasekhar, “A Text book of Environmental Studies”, HI-TECH publications, 2006

REFERENCES:

1. Dr. M. Anji Reddy, “A Text book of environmental science and Technology”, B S Publications, 2008
2. Dr. K. Mukkanti, “A Text book of Environmental Studies”, S.CHAND Company Ltd, 2009.
3. EHILRS and ST, “Text book of Municipal and Rural Sanitation”, M.S Hill, 1998.
4. C. S. Rao, Wiley Eastern Ltd, “Environmental Pollution Control Engineering”, New Age International Ltd, 2001
5. Dr. M. Anji Reddy, “Introduction to Remote Sensing”, B S Publications, 2004.
6. Kurian Joseph and R.Nagendram, “Essentials of environmental studies”, Pearson Education Pt Ltd, Delhi, 2007.
7. Sharma & Kour “Text book of Environmental pollution”.
8. H.C Perkins “Text book of Air Pollution”.

CS 105 NETWORK SECURITY

L	T	P	To	C
2	-	-	2	-

Course description and Objectives :

This Course focuses towards the introduction of System, Information and Network security using various methodologies. It also focuses on the practical aspects that have been used to provide e_mail and web security.

Course Outcomes:

On Completion of this course student should be able to

1. *understand the Importance of Information Security*
2. *Know the ways to protect the information*
3. *understand the Firewall importance*
4. *understand the need of Virtual Private Networks.*

UNIT I - History of security :

History of security – Physical security, communications security, emissions security, computer security, network security and information security. Security process - Anti-virus software, access controls, firewalls, smart cards, biometrics, intrusion detection, policy management, vulnerability scanning, encryption, physical security mechanisms.

UNIT II - Access attacks

Snooping, eavesdropping, interception; Modification attacks - Changes, insertion and deletion; Denial of service attacks- Denial of access to information, applications, systems and communication; Repudiation attacks - Masquerading and denying an event. Hacking - Hacker motivation, historical hacking techniques, IP spoofing and malicious code.

UNIT - III

Confidentiality of files, information in transmission and traffic flow, integrity, availability and accountability; Integrity of files and information during transmission; Availability - backups, failover and disaster recovery; Accountability – identification and authentication, and audit.

UNIT - IV

Concepts of firewalls, Application layer and packet filtering firewalls; Virtual Private Networks.

UNIT - V

Basic encryption concepts, Private Key encryption standards-DES, triple DES and AES. Public key encryption – RSA. Concepts of digital signatures.

TEXT BOOKS :

1. Eric Maiwald, Fundamentals of Network security, Dreamtech Press, 2007.

REFERENCES:

1. William Stallings, "Cryptography and Network security", 4th edition, Pearson Education, 2010.

HS 119 PROFESSIONAL ETHICS, VALUES AND HUMAN RIGHTS

L	T	P	To	C
2	-	-	2	-

Course description and Objectives :

• To create an awareness on Engineering Ethics and Human Values.

• To instill Moral and Social Values and Loyalty

• To appreciate the workplace rights of Others, responsibilities and Safety of others.

Course Outcomes:

The course will enable the students to attain the following:

1. *an understanding of professional and ethical responsibility in workplace*
2. *the broad education necessary to understand the impact of engineering solutions in a global and societal context*
3. *a knowledge of contemporary issues related to human and professional interactions at workplace*
4. *an engineer's life-long commitment to serve the disadvantaged*

UNIT I - Human Values :

Morals, Values and Ethics – Integrity – Work Ethic – Service Learning – Civic Virtue – Respect for Others – Living Peacefully – Caring – Sharing – Honesty – Courage – Valuing Time – Co-operation – Commitment – Empathy – Self-Confidence – Character – Spirituality.

UNIT II - Engineering Ethics & **Engineering as social experimentation :**

Engineering Ethics : Variety of moral issues – types of inquiry moral dilemmas – moral autonomy – The problems of Many Hands – Kohlburg's theory – Gilligan's theory Impediments to Responsible Action.

Engineering as social experimentation - Codes of ethics - a balanced outlook on law - the challenger case study.

UNIT III - Engineer's Responsibility for Safety :

Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis – Reducing Risk – The Government Regulator's Approach to Risk - Chernobyl

Case Studies and Bhopal.

UNIT IV - Workplace Rights and Responsibilities & Work Environment :

Workplace Rights and Responsibilities : Engineers and Managers. Oganizational complaint procedures. Government agencies. Resolving Employee concerns. Limits on acceptable behaviour in large corporation.

Work Environment : Ethical and legal considerations, Organizational responses to offensive behaviour and harassment. Ethics in a Global Context.

UNIT V - Global Issues :

Multinational Corporations – Business Ethics - Environmental Ethics – Computer Ethics - Role in Technological Development – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Honesty – Moral Leadership – Sample Code of Conduct.

TEXT BOOKS :

1. Mike Martin and Roland Schinzinger, “Ethics in Engineering”, McGraw Hill, New York, 2005.

REFERENCES:

1. Prof. (Col) P S Bajaj and Dr. Raj Agrawal, “Business Ethics – An Indian Perspective”, Biztantra, New Delhi, 2004
2. Charles E Harris, Michael S. Protchard and Michael J Rabins, “Engineering Ethics – Concepts and Cases”, Wadsworth Thompson Learning, United States, 2000 (Indian Reprint now available)
3. Engineering Ethics-An industrial Perspective, Gail Dawn Baura
4. Charles E Harris, Michael S Pritchard and Michael J Rabins, “Engineering Ethics – Concepts and Cases”, Thompson Learning, 2000.
5. Charles E Harris, Michael S Pritchard and Michael J Rabins, “Engineering Ethics – Concepts and Cases”, Thompson Learning, 2000.
6. PSR Murthy, “Indian Culture Values and Professional Ethics”, BS Publications
7. Edmund G Seebauer and Robert L Barry, “Fundamentals of Ethics for Scientists and Engineers”, Oxford University Press, Oxford, 2001.

HS 120 ENGINEERING PHYSICS LAB

L	T	P	To	C
-	-	3	3	2

Course description and Objectives :

This lab is intended to make the students realize the theoretical concepts of physics having hands on experience in conducting the following experiments. Students may have to take up any 10 experiments from each section.

Course Outcomes:

1. *Students realize concept of resonance of sound conducting the experiment of Sonometer Melde's experiment and volume generator.*
2. *The students understand the concepts of light conducting the experiments of dispersion of light, diffraction of light, optical fibers and lasers.*
3. *The students acquire the knowledge of magnetic field theory, thermal energy and elastic properties by conducting the experiments of field along the axis of circular coil, Lee's experiment, Seebeck effect and Torsional pendulum.*

PHYSICS LAB

1. Verification of laws of transverse vibrations in stretched string - Sonometer
2. Melde's Experiment - Transverse and Longitudinal modes.
3. Determination of Rigidity modulus of a material in the form of a wire - Torsional pendulum
4. Dispersive power of the material of a Prism - Spectrometer
5. Determination of wavelength of a monochromatic light source - Diffraction Grating.
6. Field along the axis of a circular coil – stewart Gee's apparatus.
7. Volume Resonator.
8. Band gap of semiconductor
9. Hall coefficient
10. Thermal conductivity of bad conductor Lee's method
11. Optical Fiber – Determination of numerical aperture
12. Solar Cell
13. Seebeck effect

REFERENCES:

1. Vogel's Text book of qualitative Chemical Analysis J.Mendham, R.C Denney, J.D. Bares, M.Thomas & B. Siva Sankar, Pearson Publications – Volume I (2009).

EE 113 FUNDAMENTAL OF ELECTRICAL ENGG. LAB

L	T	P	To	C
-	-	3	3	2

Course description and Objectives :

To understand basic electrical elements, electrical energy its consumption and measurement. To develop practical knowledge on electrical machines, electronic devices and circuits

Out Comes :

1. *Able to realize characteristics of electrical elements.*
2. *Able to analyze given simple ac and dc networks.*
3. *Able to work on different electrical machines.*
4. *Able to reflect the knowledge of electronic devices to verify experimentally.*

List of Experiments

1. Familiarization with basic components such as Resistors, Capacitors, Diodes, Transistors
2. Familiarization with basic electrical measuring instruments
3. Verification of ohm's law
4. Verification of KVL and KCL
5. Calculation of power factor in simple RL and RC circuits
6. Magnetization characteristic of a D.C. self excited generator
7. Measurement of power and energy.
8. Measurement of transformation ratio of single phase transformer.
9. Measurement of Power, Power factor of 3-phase induction motor.
10. Characteristics of PN junction diode.
11. Characteristics of Zener diode.
12. Operation of Full wave Rectifier
13. Operation of half wave Rectifier
14. Study and Working of fluorescent lamp
15. Measurement of armature and field resistances of d c machine using voltmeter-ammeter method.

Note : Any 10 of above experiments are to be conducted.

CS 107 COMPUTER PROGRAMMING LAB

L	T	P	To	C
-	-	3	3	2

Course description and Objectives :

To familiarize the students in preparation of documents and presentations with office automation tools. A comprehensive problem solving skills through C language is offered to enable the students to write diversified solutions using this language.

Course Outcomes:

1. *Able to write, compile and debug programs in C language.*
2. *Able to formulate problems and implement algorithms in C.*
3. *Able to effectively choose programming components that efficiently solve computing problems in real-world*

List of Experiments:

1. Write A Program to find simple Interest, compound interest
2. Write A Program to covert given temperature from C to F & F to C
3. Write A Program to check Entered number is positive or zero or Negative
4. Write A Program to print given year is Leap year or not
5. Write A Program to do arithmetic operations using switch
6. Write A Program to find biggest among 3 Numbers
7. Write A Program to print grade of a student for 5 sub avg>70(A), 60-70(B), 50-60(C),<50(F)
8. Write A Program to find Roots fo Quadratic Equation
9. Write A Program to find sum of individual digits of a given number
10. Write A Program to check whether the given number is PALINDRAM or not
11. Write A Program to check whether the given number is PERFECT or not
12. Write A Program to check whether the given number is PRIME or not
13. Write A Program to check whether the given number is ARMSTRONG or not
14. Write A Program to check whether the given number is STRONG or not
15. Write A Program to find sum of Natural Numbers

16. Write A Program to print the following triangle

```
      1
    2   3
  4   5   6
7   8   9   10 etc……….
```

17. C Progrm to find Factorial of Given number using Recursive and Non Recursive Functions.
18. Write A Program to print Fibonacci Series upto given limit using recursive, Non recursive
19. Write program in C for determining the minimum and maximum and sum of elements of an array of ‘n’ elements and searching for a given element.
20. C Program for computing range, mean and standard deviation of a given numeric dataset.
21. Write A Program in C for performing addition, subtraction, multiplication and transpose operations on matrices.
22. Write program to perform the following string operations on the given string. a) string length b) string copy c) string concatenation d) string comparison e) reverse string f) sub string
23. Write A Program to read student record (no, name, marks1, marks2, marks3, marks4, marks5, calculate average and Grade) and display the student record.
24. Write A Program to do arithmetic operations using pointers.
25. Write A Program to create two data files and copy the content of these two data files as a single file in another new file?

HS 121 ENGINEERING CHEMISTRY LAB

L	T	P	To	C
-	-	3	3	2

Course description and Objectives :

This lab is intended to make the students enlighten with the theoretical concepts of chemistry. Instrumental techniques are useful for characterization of materials for future engineers.

Students may have to take up any 10 experiments from the following experiments.

Course Outcomes:

1. *To enable the students to analyse the hardness & chlorides in the potable water.*
2. *To help students to determine the Alkalinity in water used especially in industries.*
3. *To impart knowledge on polymers used as insulators.*
4. *To provide an idea about Advanced techniques in chemical analysis using conductometer and spectrophotometer.*

Volumetric Analysis:

1. Determination of total Alkalinity of water
2. Determination of Percentage purity of Washing soda
3. Determination of Fe(II) by Dichrometry
4. Determination of Percentage of available chlorine in Bleaching powder
5. Determination of chlorides by Argentometry
6. Determination of Total hardness of water

Preparations:

7. Preparation of Bakelite
8. Preparation Of Urea- Formaldehyde Resin

Instrumental methods of Analysis:

9. Determination of Viscosity of a Lubricating oil
10. Determination of Strength of acid by conductometry
11. Determination of Mn^{+7} by Colorimetry
12. Demonstration of UV-Visible Spectrophotometer with Ferrothiocyanate

REFERENCE BOOKS:

1. Vogel's Text book of qualitative Chemical Analysis J.Mendham, R.C Denney, J.D. Bares, M.Thomas & B. Siva Sankar, Pearson Publications – Volume I (2009).
2. Experiments in Applied Chemistry by Dr.Sunita Rattan. S.K. Kataria & Sons publications,2008.

ME 103 ENGINEERING GRAPHICS

L	T	P	To	C
1	-	2	3	3

Course description and Objectives :

To familiarize students with the conventional concept of engineering drawing and application through AutoCAD.

Course Outcomes:

After completion of this course, student will be able to prepare plan and elevation of any pictorial view either conventional or through AutoCAD.

UNIT - I

Introduction to Engineering drawing: Introduction to Engineering Drawing – Types of lines, lettering, dimensioning Construction of polygon & Conics. (Ellipse, Parabola & Hyperbola by general method)

UNIT - II

Orthographic Projections: Principle of projection-Planes of projections.

Projections of points:

Projection of straight lines: Inclined to one plane and both the planes.

Projections of planes: Simple planes, Planes inclined to reference planes.

UNIT - III

Projections & Sections of solids – projections of prisms – cylinders – cones - pyramids – solid axis inclined to one plane, simple sections- prism, cylinder, pyramid and cone. AutoCAD Fundamentals.

UNIT - IV

Isometric projections: Isometric drawing of simple objects through AutoCAD

UNIT - V

Orthographic projections: Conversion of Pictorial view into orthographic view using AUtoCAD and Conventional.

TEXT BOOKS :

1. N.D.Bhatt, "Engineering Drawing", 49th ed., Charotar Publication, 2007.
2. K. Venugopal, "Engineering Drawing through Auto CAD", 1st ed., New Age Publication, 2008.

REFERENCES::

1. Jhole, "Engineering Drawing", 2nd ed., Tata McGraw Hill, 2008.
2. K.L. Narayana, "Engineering drawing" 2nd ed., Scitech Publications, 2008.

ME 105 WORKSHOP PRACTICE

L	T	P	To	C
-	-	3	3	2

Course description and Objectives :

To provide the hands on experience to the students on basic workshop skills.

Course Outcomes:

After completion of this course, students will be able to identify various tools connected to all the trades. They are also able to make various objects to the given dimension by using various types of tools.

Trades for exercises:

1. Carpentry:
2. Fitting
3. Tin Smithy & Black smithy4. House wiring
5. Foundry & Welding (Demonstration)
6. Machine shop & CNC (Demonstration)
7. IT Workshop
8. Study of discrete components of computer and networking (1 session)
9. Demonstration of assembling a computer, disk partitioning and installation of system and application software. installation of modem etc. (2 sessions)

Note: In each trade, the students has to perform at least two jobs

TEXT BOOKS :

1. S.K. Hazra Choudhury, Elements of workshop Technology, 11th Edition, Media Promoters, 1997
2. Gopal, T.V., Kumar, T., and Murali, G., A first course on workshop practice – Theory, Practice and Work Book, Suma Publications, Chennai, 2005.
3. Venkatachalapathy, V. S., First year Engineering Workshop Practice, Ramalinga Publications, Madurai, 1999.

II Year B.Tech. Petroleum Engg. - I-Semester

L	T	P	To	C
4	0	-	4	4

HS 213 PROBABILITY & STATISTICS

Course Description & Objectives:

This course is to impart knowledge to the students concerned with the laws governing random events. The collection, analysis, interpretation, and display of numerical data and its applications in Food Science and Technology.

Course Outcomes:

Students who successfully complete this course should be able to demonstrate understanding of:

1. *Basic probability axioms and rules and the moments of discrete and continuous random variables as well as be familiar with common named discrete and continuous random variables.*
2. *How to derive the probability density function of transformations of random variables and use these techniques to generate data from various distributions.*
3. *How to calculate probabilities, and derive the marginal and conditional distributions of bivariate random variables.*
4. *Discrete time Markov chains and methods of finding the equilibrium probability distributions.*
5. *How to calculate probabilities of absorption and expected hitting times for discrete time Markov chains with absorbing states.*

UNIT I - Descriptive Statistics

Basic Definitions, Frequencies, Graphical Representation, Histogram, Ogive curves, Measures of Central tendency, Arithmetic mean, Median, Mode, mean deviation, standard deviation, Symmetry and Skewness, Karl Pearson's Coefficient of skewness.

UNIT II - Curve Fitting and Correlation, Regression

Least squares method, curve fitting (straight line and parabola only)

Covariance, Correlation, Types, Pearson's Coefficient of correlation, Rank correlation, Spearman's rank correlation. Regression, Regression lines, multiple regression.

UNIT III - Probability

Introduction, Definition (Classical and Axiomatic approach), Addition theorem, Conditional probability, Multiplication theorem, Total probability, Bayes theorem.

UNIT IV - Distributions

Random variables, Discrete and Continuous variables, Introduction to Distributions.

Binomial distribution : Definition, Mean and Standard deviation, Recurrence relation, Applications, Fitting of binomial distribution.

Poisson Distribution : Definition, Mean and Standard deviation, Recurrence relation, Poisson Distribution is an approximation of Binomial distribution, Applications, Fitting of Poisson distribution.

Geometric Distribution : Definition, Properties.

Normal Distribution : Definition, Normal curve, Mean and Standard deviation, Median, Mode, Normal Distribution applications, Normal Distribution is an approximation to Binomial distribution.

Exponential Distribution : Definition, Properties.

UNIT V - Sampling Methods

Population and Sampling, Parameters and Statistics, Types of sampling, Sampling Distributions, Central limit theorem, Standard Error of mean from infinite population, Standard deviation of variance.Test of hypothesis and test of significance, confidence limits, confidence interval, Test of significance of Large samples, T-distribution, Chi square test.

TEXT BOOKS :

1. *H. K. Dass* and *Er. Rajnish Verma*, Higher Engineering Mathematics, S. Chand & Co., New Delhi, 2011.
2. *Miller and Fruinds*, Fundamentals of Probability and Statistics, PHI publication.

I Year & I Sem.; M.Tech. Biotechnology & Bioprocess Engg.	L	T	P	TO	C
	3	1	-	4	4

(BT527) ADVANCED BIOPROCESS ENGINEERING

Objectives of the Course:

This course helps to familiarize various aspects of bioreactors, to understand the media requirements and working conditions for profitable run of bioprocess industries with the help of data analysis

UNIT I: Kinetics of Microbial Growth, Sterilisation and Product Formation:

Different modes of operation - batch, fed batch and continuous cultivation. Simple unstructured kinetic models for microbial growth, Monod model, growth of filamentous organisms, product formation kinetics, substrate and product inhibition on cell growth and product formation.

Different types of industrial sterilization, Thermal death kinetics of microorganisms, batch and continuous heat sterilization of liquid media, filter sterilization of liquid media, air sterilization and design of depth filters, design of sterilization equipment - batch and continuous.

UNIT II: Metabolic Stoichiometry and Energetics:

Stoichiometry of cell growth and product formation, elemental balances, degrees of reduction of substrate and biomass, available electron balances, yield coefficients of biomass and product formation, maintenance coefficients energetic analysis of microbial growth and product formation, oxygen consumption and heat evolution in aerobic cultures, thermodynamic efficiency of growth.

Unit III: Bioreactor Operation:

Choosing the cultivation method, design and operation of a typical aseptic, aerobic fermentation process, alternate bioreactor configurations. Environmental requirements for animal cell cultivations, reactors for large scale production using animal cell, plant cell cultivation. Active and Passive Immobilization of cells, Diffusional limitations in Immobilized cells, Bioreactor considerations in Immobilized cell.

Unit IV: Transport Phenomena in Bioprocess Systems:

Gas – Liquid Mass Transfer in cellular systems, determination of oxygen rates, mass transfer for freely rising or falling bodies, correlations for mass transfer coefficient and interfacial area, mass transfer across free surface, other factors affecting $K_l a^1$, heat transfer correlations, sterilization of gases and liquids by filtration.

Unit V: Mixed culture and Solid State Fermentation:

Introduction, major classes of interactions in mixed cultures, simple models describing mixed cultures interactions, mixed cultures in nature, and industrial utilization of mixed cultures. Solid-state fermentation.

TEXT BOOKS :

1. Shuler, M.L. and Kargi,F. " *Bioprocess Engineering - Basic concepts* – 2nd ed., Prentice Hall of India Pvt. Ltd., 2005
2. Peter F. Stanbury, Stephen J. Hall & A. Whitaker, *Principles of Fermentation Technology,* 2nd ed., Butterworth – Heinemann An Imprint of Elsevier India Pvt. Ltd., 2005.

REFERENCE BOOKS :

1. Bailey and Ollis, " Biochemical Engineering Fundamentals", 2nd ed.,McGraw Hill, 1986.
2. Pauline M. Doran, "Bioprocess Engineering Calculation", Blackwell Scientific Publications.
3. Harvey W. Blanch, Douglas S. Clark, "Biochemical Engineering," Marcel Dekker, Inc.

I Year & I Sem.; M.Tech. Biotechnology & Bioprocess Engg.	L	T	P	TO	C
	3	1	-	4	4

(BT529) ENZYME TECHNOLOGY

Objectives of the Course:

The aim of the course is to give advanced knowledge about the technical use of enzymes and the possibilities to change and improve enzyme performance for adaptation to technical applications.

UNIT I: Introduction to Enzymes :

Classification of enzymes; Mechanisms of enzyme action; concept of active site and energetics of enzyme substrate complex formation; specificity of enzyme action; principles of catalysis – collision theory, transition state theory; role of entropy in catalysis.

UNIT II: Kinetics of Enzyme Action:

Kinetics of single substrate reactions; Estimation of Michaelis – Menten parameters, Multisubstrate reactions & mechanisms. Turnover number; Types of inhibition & models for substrate and product. Allosteric regulation of enzymes, Monod - Changeux - Wyman model, pH and temperature effect on enzymes, Deactivation kinetics.

UNIT III: Enzyme Immobilization:

Physical and chemical techniques for enzyme immobilization – adsorption, matrix entrapment, encapsulation, cross-linking, covalent binding - examples, advantages and disadvantages. Immobilised enzyme bioreactors and their applications.

UNIT IV: Purification and Characterization of Enzymes from Natural Sources:

Production and purification of crude enzyme extracts from plant, animal and microbial sources; methods of characterization of enzymes; development of enzymatic assays.

UNIT V: Applications of enzymes:

Application of enzymes in industrial, medical, analytical, chemical, pharmaceutical and food sectors. Application of enzymes in analysis; Design of enzyme electrodes and their application as Biosensors in industry, healthcare, food and environment.

TEXT BOOKS :

1. Palmer T. "Enzymes: Biochemistry, Biotechnology and Clinical Chemistry", First East -West Press Edition, 2004
2. James E Bailey, David F., Ollis, "Biochemical engineering Fundamentals" 2nd ed., Mc Graw Hill Intl. Edition.

REFERENCE BOOKS :

1. Colin Ratledge and Bjorm Kristiansen, "Basic Biotechnology", 2nd ed.,Cambridge University Press.
2. Wiseman, Alan. "Handbook of Enzyme Biotechnology", 3rd ed., Ellis Harwood, 1995.

I Year & I Sem.; M.Tech. Biotechnology & Bioprocess Engg.

L	T	P	TO	C
3	1	-	4	4

(BT531) ADVANCED BIOCHEMICAL REACTION ENGINEERING

Objectives of the Course:

1. *Develop familiarity with chemical reaction kinatics.*
2. *Giving basic concepts of reactor design.*
3. *Making familiarity with reactor operation, studing various param eters like flow pattern and thermodynamics of reactions.*

UNIT I: Overview of chemical reaction engineering:

Classification of reactions, variables affecting the rate of reaction, Concept of order, molecularity of a reaction, definition of reaction rate, concentration dependent term of rate equation, Temperature dependent term of rate equation, Evaluation of rate constants, temperature using Arrhenius equation. Searching for a mechanism

UNIT II: Ideal Reactors :

Irreversible unimolecular type first order reactions, irreversible bimolecular type second order reactions.

Interpretation of batch reactor data. Introduction to reactor design-general discussion, symbols and relation ship between C_A and X_A. Ideal batch reactor, Steady-state mixed flow reactor, Steady-state plug reactors.

UNIT III: Multiple Reactions And Nonisothermal Reactions:

Introduction to multiple reactions, qualitative discussion about product distribution, quantitative treatment of product distribution and of reactor size. Heats of reaction, equilibrium constants from thermodynamics, equilibrium conversion, general graphical design procedure, optimum temperature progression, heat effects, adiabatic operations, non adiabatic operations.

UNIT IV: Characterization of Reactors:

Definition of bioreactor, Concepts of reactors based on flow characteristics, design of ideal reactors using material and energy balance. Batch bioreactor design. Definition of chemostat, turbidostat, single flow single stage chemostat, single flow multistage chemostat, recycle flow in chemostat, Plug flow behavior, design of plug flow reactor.

UNIT V: Non-Ideal Reactors & Heterogenous Reactions :

Concepts of residence time distribution, micro mixing and macro mixing, Reasons for non-ideality, concept of macro using –RTD analysis (E-C-F functions), diagnosing the ills of non-ideal bioreactors. **Heterogenous reactions:** Solid catalyzed reactions, the rate equation for surface kinetics, Pore diffusion, resistance combined with surface kinetics, perfomance equation for reactors containing porous catalyst particles, product distribution in multiple reactions.

TEXT BOOKS :

1. Octave Levenspiel, "Chemical Reaction Engineering" , 3rd ed. John Wiely & Sons, 1999.
2. D.G.Rao, "Introduction to Biochemical Engineering", McGraw-Hill, 2005.
3. P.M.Doran , "Bioprocess Engineering Principles", Academic Press, 1995.
4. M.L.Shuler and F. kargi , "Bioprocess Engineering", Prentice Hall of India ,1992.

REFERENCE BOOKS :

1. H.S. Fogler, "Elements of Chemical Reaction Engineering", 2nd ed. PHI, 1992.
2. J.M.Smith, "Chemical Engineering Kinetics", 3rd ed. Mc Graw Hill, 1981.

I Year & I Sem.; M.Tech. Biotechnology & Bioprocess Engg.	L	T	P	TO	C
	3	1	-	4	4

(BT533) r - DNA TECHNOLOGY

Objectives of the Course:

This course will focus on the concepts about the structure, synthesis and processing of nucleic acids and protein synthesis in prokaryotes and eukaryotes. Also to make the students aware about the classification and types of mutations and how they effect the gene and its expression and how DNA will repair the damage.

Also to provide the awareness about the process of gene expression and its regulation, different vectors used for gene transfer, cloning methods and their expression & detection, r-DNA technology and its applications.

UNIT I : Replication, Transcription & Translation mechanisms in prokaryotes & eukaryotes:

Mechanism of DNA replication in *E.coli*, Eukaryotic telomeres and its replication, Homologous and Heterologous recombination. Mechanism of transcription in prokaryotes and eukaryotes, Post transcriptional processing of RNA 's t-RNA, r-RNA, m- RNA splicing. The genetic code and Wobble Hypothesis, Protein synthesis in Prokaryotes and Eukaryotes & their differences. Post translation modifications.

UNIT II: Mutagenesis & Gene regulation in prokaryotes & Eukaryotes:

Classifications and types of mutations, their actions and applications. Mutagenesis – different mechanisms of mutagenesis, site directed mutagenesis, DNA damage and repair mechanisms. Mutagenicity testing using microbial systems- Ames test; gene regulation in prokaryotes - *lac, trp*, arabinose & *gal* operons, catabolic repression, attenuation; gene regulation in eukaryotes - gene amplication, gene rearrangements, enhancers, silencers, regulatory transcription factors, structural motifs, DNA response elements.

UNIT III: Vectors, expression & detection of clones

Different types of cloning vectors -plasmid – pUC 8, ? pGEM3Z Phagemids, 2 mm plasmid, YAC, BAC, P element, Transposons, types of mechanisms and applications of transposons, retrotransposons; Cloning strategies, construction of prototype vector (pBR 322), Genomic and cDNA library construction and application; Detection & Expression of cloned genes in yeast & *E. coli*.

UNIT IV : Molecular Techniques & Molecular Markers:

DNA sequencing, foot printing with DNase I, HRT & HART, Protein- Protein interactions - phage display & yeast 2 hybrid systems, chromosome walking, pulsed-field & field inversion gel electro phoresis, immunochemical detection & immunochemical screening, colony hybridization, plaque-lift procedure, differential screening & replicaplating. Nested PCR, RACE, Microsatellites, EST's, SNP's, antisense technology, DNA profiling.

UNIT V: Applications of r-DNA Technology:

Gene cloning in medicine (Insulin, Blood clotting factor VIII), High-level expression of proteins in different host systems (*E. coli*, yeast, insect, mammalian cells), Inclusion bodies, refolding techniques, Case study for important therapeutic proteins, monoclonal antibodies and quality control of recombinant proteins. Introduction to Gene therapy (*Ex vivo & In vivo*) & Advantages and limitations of Gene therapy and novel technologies.

TEXT BOOKS :

1. B.D. Singh, "Fundamentals of Genetics", 4th ed., Kalyani Publishers, 2007.
2. Channarayappa, "Molecular Biotechnology Principles and Practices", University Press, 2006.

REFERENCE BOOKS :

1. G.m. Malacinski, "Molecular Biology", 4th ed.,Friefelder's Essentials Narosa Publisishng House, 2006.
2. Becker, Kleinsmith, Hardin, "The World of the Cell:Friefelder's EssentialsFriefelder's Essential" 6th ed., Pearson Publishers. 2006.

I Year & I Sem.; M.Tech. Biotechnology & Bioprocess Engg.	L	T	P	TO	C
	3	1	-	4	4

(BT535) ADVANCED PROCESS ENGINEERING PRINCIPLES - I

Objectives of the Courses:

1. *Develop familiarity with basic principles of process engineering.*
2. *Introducing the basic unit operations in process engineering*
3. *Develop familiarity with fluid flow Intorduction of various measuring devices, transporting equipment used in industry.*

UNIT I: Introduction to process engineering principles:

Introduction to unit operations and unit processes**,** Units and dimensions, basic quantities and derived units. Conversion of units. Concept of mass and force, definition of g_c and its utility. Various equations of state including ideal gas law to evaluate P-V-T data, their, application in process calculations by solving basics numerical problems.

UNIT II: Rheology of fluids:

Newton's law of viscosity. Concept of Newtonian and non - Newtonian fluids- Different types of non-Newtonian fluids with examples in bioprocesses.

Fluid mechanics- Properties of fluids, fluid statics, and energy balance in fluid flow through pipes and conduits, Bernoulli's equation and its application, calculation of power required for pumping fluids. Examples from bioprocess systems.

UNIT III: Momentum transfer:

Flow through pipes, Laminar and turbulent flow characterization by Reynolds number, average velocity, pressure drop due to skin friction and foam friction, friction factor chart, Hagen-Poiseuille equation.

UNIT VI: Drag and settling:

Flow past immersed bodies: Definition of drag and drag coefficient. Introduction of the concept of packed beds. Friction in flow through beds of solids, derivation of friction factor equations and pressure drop expressions. Motion of particles through fluids, terminal velocity.

UNIT V: Measuring and Transportation:

Fluid transportation machinery: Different types of pumps, positive displacement pumps, reciprocating Pumps, diaphragm pumps, centrifugal pumps, Calculation of pump horse power. Flow measuring devices-manometers, orifice meter, venture meter and rotameter.

TEXT BOOKS :

1. Pauline M.Doran., "Bioprocess Engineering Principles", Academic Press, 1995.
2. Mc Cabe, W.L, Smith J.C.,and Harriot P, "Unit Operations of Chemical Engineering", Mc-Graw Hill, 3rd ed., 2006.

REFERENCE BOOKS :

1. D.G.Rao, "Introduction to Biochemical Engineering", Tata Mc Graw Hill , 2005.
2. S. K. Ghosal, S. K. Sanyal and S. Dutta, "Introduction to Chemical Engineering", TMH Publications, 1993.

I Year & I Sem.; M.Tech. Biotechnology & Bioprocess Engg.	L	T	P	TO	C
	3	1	-	4	4

(BT537) BIOINFORMATICS AND MOLECULAR MODELLING

Objectives of the Course :

To equip students with computational skills and to help them use computational methods to study, organise, analyse and interpret biological information at molecular, genetic and genomics levels.

UNIT I : Introduction:

Scope of Bioinformatics, Elementary commands and protocols, ftp, telnet, http. Primer on information theory. DNA Mapping and sequencing –Map alignment – Large scale sequencing methods - Shotgun – DNA sequencing – Sequence assembly.

UNIT II: Sequence Alignement and Dynamic Programming & Phlogeny

Heuristic Alignment algorithms. Global sequence alignments- Neddleman-Wunsch Algorithm, Smith-Waterman Algorithm-Local sequence alignments (Amino acid substitution Matrices (PAM, BLOSUM). Ultrasonic trees – parsimony – Ultrametric problem – Perfect phylogeny – Phylogenetic alignment – connection between multiple alignment and tree.

UNIT III: Biological Database and their use:

Introduction to Biological databases, Organization and management of databases. Searching and retrieval of information from the World Wide Web. Structure databases - PDB (Protein Data Bank), Molecular Modeling Databases (MMDB). Primary Databases NCBI,EMBL, DDB. Swissprot, PIR,KEGG. BioChemical databases- KEGG, EXGESCY,BRENDA, WIT.

UNIT IV: Introduction to Molecular Modelling :

Introduction - Useful Concepts in Molecular Modelling: Coordinate Systems. Potential Energy, Surfaces. Molecular Graphics. Surfaces. Computer Hardware and Software. The Molecular Modelling Literature. Force Fields, Bond Stretching, Angle Bending, Introduction to Non-bonded Interactions. Electrostatic Interactions. Van der Waals Interactions. Hydrogen Bonding in Molecular Mechanics. Force Field Models for the Simulation of Liquid Water.

UNIT V: Energy Minimisation and Computer Simulation:

Energy Minimisation and Related Methods for Exploring the Energy Surface. Non-Derivative method, 1st and 2nd order minimisation methods. Computer Simulation Methods. Simple Thermodynamic Properties and Phase Space. Boundaries. Analyzing the Results of a Simulation.

TEXT BOOKS :

1. D. Baxivanis and Foulette,"Bioinformatics: A Practical guide to the Analysis of Genes and Proteins", Wiely Indian Edition, 2001.
2. Mount. D. Cold, "Bioinformatics: Sequence and Genome Analysis", Spring Harbor Lab.: 2001
3. T K Attwood, D J parry-Smith, "Introduction to Bioinformatics", 1st Edition,11th Reprint, Pearson Education, 2005.
4. C S V Murthy, "Bioinformatics",1st ed., Himalaya Publishing House, 2003.

REFERENCE BOOKS :

1. Harshawardhan P.Bal, "Bioinformatics – Principles and Applications " Tata Mac Graw Hill.
2. Arthur.M.Lesk , "Introduction to Bioinformatics", Oxford University Press.
3. A.R.Leach, "Molecular Modelling Principles and Application", Longman,1996.
4. J.M.Haile, "Molecular Dynamics Simulation Elementary Methods", John Wiley and Sons, 1997.
5. Satya Prakash Gupta, "QSAR and Molecular Modeling", Springer - Anamaya Publishers, 2008.

I Year & I Sem.; M.Tech. Biotechnology & Bioprocess Engg.	L	T	P	TO	C
	3	1	-	4	4

(BT539) BIO ANALYTICAL TECHNIQUES

Objectives of the Course:

The objective of this course is to understand the scope of application, advantages and limitations of the various modern analytical and separation techniques.

UNIT I: Spectroscopy:

Principle, instrumentation and application of Colorimeter, UV – Visible Spectrophotometer, IR spectophotometer, Flourimeter, Flame photometer, x-ray spctroscopy, NMR.

UNIT II: Microscopy and Electrophoresis:

Basics of phase contrast, confocal and fluorescent microscopy; electron microscopy – SEM and TEM; Flow cytometry, Electrophoresis – principles, supporting materials-paper, starch, agarose, polyacrylamide types – gel and capillary electrophoresis, disc, Isoelectric focussing, immuno-electrophoresis, isotachophoresis.

UNIT III: Chromatography:

Chromatography - principles, types - paper, thin layer, adsorption, ion-exchange, affinity, gel filtration, gas liquid and HPLC, GC-MS, Simulation moving bed.

UNIT IV: Radio active techniques:

Radioactive isotopes, radioactive decay and their types, principles of scintillation counting, isotope dilution technique, radioactive techniques-RIA, GM counter, Scintillation counter, Autoradiography, Applications in Medicine & Diagnosis, Radiation hazards and methods for containment and prevention.

UNIT V: Thermo Analytical Techniques:

Theory of thermal analysis- thermo gravimetric- Basic theory, construction and working of Differential Thermal Analysis (DTA) and Differential Scanning Calorimeter (DSC)

Text Books:

1. Willard and Merrit, "Instrumental Methods and Analysis" . 6th ed, CBS Publishers & Distributors.
2. Keith Wilson, Kenneth H.Goulding, "A Biologist Guide to Principles and Techniques of Practical Biochemistry", 3rd ed., ELBS series.
3. Skoog and West, "Fundamentals of Analytical Chemistry", 1982.

REFERENCE BOOKS :

1. Ewing GW, "Instrumental Methods of Chemical Analysis", McGraw Hill Book Company, 1989.
2. Braun. H, "Introduction to Chemical Analysis", McGraw Hill, 1987.

I Year & I Sem.; M.Tech. Biotechnology & Bioprocess Engg.	L	T	P	TO	C
	3	1	-	4	4

(BT541) ADVANCED PLANT AND ANIMAL BIOTECHNOLOGY

Objectives of the Course:

This Course was designed to provide the advanced concepts and industrial applications in the field of agricultural biotechnology. Production of high yielding, disease resistant crop varieties by using plant transformation technology. Introduction and concepts about Structure and organization of animal cell lines and stems cell culture and embryonic development to enhance the live stock production for the future needs. Concepts of Molecular farming and production antibiotics, plantibodies from GM organisms. To provide students opportunities to participate in R&D projects, and develop clinical and laboratory research skills.

UNIT I : Introduction to Tissue Culture & Applications:

An over view and important concepts of tissue culture and tissue engineering technology, its applications in various fields. Embyo culture and embryo rescue. Anther, pollen, ovary, ovule, nucellus culture, Endosperm culture for production of haploid plants and homozygous lines. Germplasm conservation (Cryopreservation); Hardening & Field transformation of cultured Plants;

UNIT II: Plant Genetic Engineering for Productivity and Performance (Biotic & Abiotic Stress):

Gene transformation technology-Agrobacterium mediated gene transfer; Agrobacterium based vectors, viral vectors and their application. Direct gene transfer methods; chemical methods, electroporation, microinjection, particle bombardment Herbicide resistance, Insect resistance, Disease resistance, virus resistance,. Abiotic stress tolerance ;Drought, temperature, salt tolerance.

UNIT III: Animal Biotechnology:

Primary culture – Mechanical and enzymatic mode of desegregation, establishment of primary culture. Subculture - passage number, split ratio, seeding efficiency, criteria for subculture. Cell cycle; primary cell culture; nutritional requirements for animal cell culture; techniques for mass culture of animal cell lines.

UNIT IV: Techniques of Animal Biotechnology:

In vitro fertilization - Concept of superovulation, collection, maintenance, and maturation of oocytes, fertilization of oocytes, Maintenance and assessment of embryos, embryo transfer - Artificial insemination, preparation of foster mother, surgical and non-surgical methods of embryo transfer, donor and recipient aftercare.

UNIT V: Molecular Farming & Industrial Products:

Production of secondary metabolites from plants and animals, principles and mechanisms of Processes for enhancing the production of secondary metabolites. Technology of plant cell culture for production of chemicals; Bioreactors systems and models for mass cultivation of plant and animal cells.

Applications of Plant and Animal biotechnology principles for the production of quality oil, Industrial enzymes, Antigens (edible vaccine) and plantibodies. Application of animal cell culture for production of vaccines, growth hormones; interferons, cytokines and therapeutic proteins.

Hybridization of cell lines, stem cells and its application in organ synthesis; transgenic animals and molecular farming. {Ref: 3,6,7,8}

Text Books:

1. Bhojwani, S.S. and Rajdan, "Plant Tissue Culture: Theory and Practice", 2004.
2. H.K.Das, "Text Book of Biotechnology ". 5th ed., Wiley India, (P) Ltd. New Delhi, 2007.
3. H.S. Chawla, "A Text Book of Planat Biotechnology", 2nd ed., Oxford & IBH, New Delhi, 2002.

Reference Books:

1. Freifelder D," Molecular Biology", Jones and Bartlett Publishers inc. 1987.
2. Kalyan Kumar De., "Introduction to Plant Tissue Culture", 2nd ed., New Central Book Agency, Kolkata, 1992.
3. Jennie, P.Mather & David Barnes (Ed.) "Animal Cell Culture Methods", Academic Press (An imprint of Elsevier) USA. 1998.

I Year & I Sem.; M.Tech. Biotechnology & Bioprocess Engg.	L	T	P	TO	C
	3	1	-	4	4

(BT543) MICROBIOLOGY AND BIOCHEMISTRY

Obectives of the Courses:

1. *To familiarize the student to understand about classification, diversity and physiology of microorganisms. Also to acquaint about the methods of microbe cultivation and sterilization techniques as well as microbial diseases, host pathogen interaction and their control.*
2. *The major objective of the course is the complete understanding of the entire chemical processes associated with living cells at the molecular level.*

UNIT I: Introduction to Microbiology:

Discovery of microorganisms, Theory of spontaneous generation, Germ theory of diseases, Major contribution and events in the field of Microbiology, Scope and relevance of microbiology, Development of pure culture methods, Enrichment culture methods, Development of microbiology in twentieth century.

UNIT II: Major groups of Microorganisms:

Micro diversity, Diversity classification of Woese et al. Three domains of life. Five - kingdom system of Whittaker. Classification systems - Phylogenetic, Phenetic, Taxonomic ranks, Major characteristics used in Taxonomy, Molecular approaches to microbial taxonomy, Structural organization and multiplication of bacteria, viruses, algae and fungi.

UNIT III: Microbial Growth and Genetic System:

Theory and practice of sterilization, Principles of microbial nutrition, Construction of culture media, Enrichment culture techniques for isolation of chemoautotrophs, chemoheterotrophs and photosynthetic microorganisms. Growth factors and their functions in metabolism. Aerobic and anaerobic metabolism, Definition of growth, Growth curve, Availability of oxygen, Culture collection and Maintenance of cultures. Bacterial genetic system- Transformation, Conjugation and Transduction.

UNIT IV: Introduction to Biomolecules:

Biomolecules- Occurrence, classification, structure, properties and functions of carbohydrates, proteins, lipids and vitamins, Stabilization of proteins and nucleic acids, Structural and functional relationships in complex carbohydrates, proteins and nucleic acids.

UNITV: Metabolic Pathways and Protein Targeting:

Metabolic pathways of Carbohydrates, Lipids, Proteins, Amino acids and Nucleic acids. Bioenergetics- Redox biochemistry, energy rich compounds, respiratory chain, oxidative phosphorylation and triose phosphate cycle. Plasma membrane structure and transport, Protein targeting.

TEXT BOOKS :

1. Lehninger, A. L., Nelson, D. L. and Cox, M. M. "Principles of Biochemistry", 3rd ed., Freeman Publishers, New York.2000.
2. Prescott LM, Harley JP, Klein DA, Wm. C. Brown, "Microbiology" 3rd ed,Tata McGraw Hill.
3. Roger Y Stanier, "General Microbiology", 5th ed., Macmillan,

REFERENCE BOOKS :

1. Donald Voet and Judith G. Voet ."Biochemistry", Volume 1 Biomolecules, Mechanisms of Enzyme Action, & Metabolism; 2004.
2. J.L.JAIN., "Textbook of Biochemistry", 5thed., S.Chand Publishers, 2002.

I Year & I Sem.; M.Tech. Biotechnology & Bioprocess Engg.	L	T	P	TO	C
	3	1	-	4	4

(BT545) MASS TRANSFER AND SEPARATIONS

Objectives of the Course:

1. *Develop familiarity with major chemical process separations units.*
2. *Apply appropriate criteria for selecting among alternative separation technologies.*
3. *Complete design calculations for equilibrium staged separation processes (e.g., distillation, absorption).*
4. *Complete design calculations for differential contactors. Apply mass transfer fundamentals to calculate rates of mass transfer for practical situations and to identify rate-limiting processes.*

UNIT I: Diffusion and Mass Transfer Coefficients :

The Mass Transfer Operations: Classification of the Mass -Transfer Operations, Choice of Separation Method, Methods of Conducting the Mass-Transfer Operations, Design Principles, Molecular Diffusion, Steady State Molecular Diffusion in Fluids at Rest and in Laminar Flow, estimation of diffusivity of gases and liquids, type of solid diffusion. Types of mass transfer coefficients, Dimensionless numbers, explanation of mass transfer coefficients by various theories, diffusion between phases.

UNIT II: **Humidification & Drying :**

Humidification: Vapor-Pressure Curve, Definitions, Psychometric Charts, Enthalpy of gas-vapor Mixtures, Humidification and Dehumidification.

Drying: Drying equilibrium, batch drying under constant drying conditions, mechanisms of batch drying, rotary dryer, drum dryer, spray dryer.

UNIT III: Distillation:

Distillation: Fields of applications, VLE for miscible liquids, immiscible liquids, Positive and negative deviations from ideality, enthalpy-concentration diagrams, flash vaporization and differential distillation for binary and multi component mixtures. Continuous rectification-binary systems, multistage tray towers –method of Mc Cabe and Thiele, enriching section, exhausting section, feed introduction, total reflux, minimum and optimum reflux ratios, packed distillation column, Steam distillation.

UNIT IV : Extraction operations:

Liquid-Liquid Extraction: Fields of usefulness, liquid-liquid equilibrium, equilateral triangular co-ordinates, choice of solvent, multistage wise extraction.

Leaching: Fields of applications, preparation of solid for leaching, types of leaching, leaching equilibrium, Single stage and multi stage leaching calculations.

UNIT IV:Adsorption and Crystalization:

Adsorption: Adsorption, types of adsorption, nature of adsorbents, adsorption equilibrium, Adsorption Hysteresis, effect of temperature, Heat of adsorption, stage wise operations.

Crystalization: Crystal geometry, equilibria and yields, supersaturation, classification of crystallisers, material balance of crystalisers.

TEXT BOOKS :

1. Robert E. Treybal, "Mass Transfer Operations", 3rd ed., Mc. Graw Hill, International Year.
2. Binay. K.Dutta, "Principles of Mass Transfer and Separation Processes",Prentice Hall of India, New Delhi, 2007.

REFERENCE BOOK :

1. Alapati Suryanarayana "Mass Transfer Operations", 1st Edition, New - Age, International, 2006.
2. Seader. J. D, E. J. Henley & D.Keith Roper, "Separation Processes Principles", John Wiley & sons, New York, 2010.

Year & I Sem.; M.Tech. Biotechnology & Bioprocess Engg.	L	T	P	TO	C
	-	-	3	3	2

(BT547) r - DNA TECHNOLOGY LABORATORY

Objectives of the course:

1. *The objective of the course is to familiarize students with recombinant DNA technology.*
2. *To gain practical knowledge in retrieving biological information and analyzing them and to use bioinformatics tools to solve biological problems.*

Genetic Engineering Lab:

1. Isolation of Plant, Bacterial Genomic DNA and Plasmid DNA.
2. Restriction Enzyme digestion.
3. *Restriction mapping and ligation.*
4. Demonstration Chemical mutagenesis.
5. SDS - PAGE
6. Blotting Techniques – Southern/Northern/Western blots
7. Cloning of DNA into plasmid vector.
8. Expression of Beta – galactosidase and assay.

Bioinformatics Lab:

1. Knowledge of different biological databases.
2. Gene and protein sequence data bases (NCBI, DDBJ, EMBL, SWISS PROT, PIR).
3. Structure databases (MMDB, PDB, CATH, SCOP).
4. Pathway Databases (KEGG, BRENDA)
5. Bibliographic databases (PUBMED, MEDLINE).
6. Gene prediction tools
7. Analysis of protein sequence using Expasy.

TEXT BOOKS:

1. Ausubel etal, “Current Proteocols in Molecular Biology”, 1987.
2. Birnboim, H.C., and Doly, J. “A Rapid Alkaline Extraction Procedure for Screening Recombinant Plasmid DNA Nucleic Acid Research”. 1979.
3. Channarayappa , “ Molecular Biotechnology Principles and Practices”, Universties Press. Pvt., Hyderabad. 2006.

REFERENCE BOOKS :

1. Dev Baines Sodium Dodecl Sulfate - polyacrlamide gel electrophoresis. In protein Purification Techniques. A Practical Approach, 2 nd ed., . Simon Roe (Editor), Oxford University Press, New Delhi. 2001.
2. Hai-Rong Cheng and Ning Jiang. “Extremely Rapid extraction of DNA from bacteria and yeasts”, Biotechnology Letters. 2006.
3. Talwar GP and Gupta SK, “A handbook of Practical and Clinical Immunology”, vol 1 and 2 CBS Publications, 1992.

I Year & I Sem.; M.Tech. Biotechnology & Bioprocess Engg.	L	T	P	TO	C
	-	-	3	3	2

(BT549) BIOPROCESS ENGINEERING LABORATORY

Objectives of the course:

1. *To learn - microbial process fundamentals and Enzyme catalysis.*
2. *To gain practical knowledge in retrieving biological information and analyzing them and to use bioinformatics tools to solve biological problems.*

Bioprocess Engineering Lab:

1. Identification of Laminar and Turbulent Flows (Reynolds Apparatus).
2. Determination of Venturi and Orifice coefficient.
3. Determination of thermal conductivity of a metal rod.
4. Determination of the order of a reaction using a batch reactor and analyzing the data by (a) differential method (b) integral method.
5. To determine the order of the reaction and the rate constant using a CSTR.
6. RTD studies in CSTR.

Microbial Culture Studies :

1. Culturing of different types of microorganisms used in the production of commercially important products.
2. Growth of microorganisms.
3. Temperature effect on growth-estimation of energy of activation and Arrhenius Constant for microorganisms.
4. Study of Growth substrate utilization and product formation kinetics in shake – flask cultures.
5. Batch, fed batch and continuous cultures
   a) Estimation of Monod parameters
   b) Pure and mixed cultures
   c) Production of secondary metabolites in synthetic and complex industrial media

Enzyme Kinetics :

6. Extraction of commercially important enzymes, Development of enzyme assays and quantification of enzyme activity and specific activity.
7. Estimation of Michaelis - Menten parameters
8. Effect of pH and temperature on enzyme activity
9. Kinetics of inhibition, Techniques of enzyme immobilization - matrix entrapment, ionic and cross linking.

Tissue Culture Lab:

1. Raising of aseptic Seedlings.
3. Callus induction, Organ culture.
4. Protoplast isolation and culture.
5. Agrobacterium mediated gene transfer, selection of transformants, reporter gene (GUS) assays.

TEXT BOOKS :

1. K.R. Aneja, "Experiments in Microbiology, Plant pathology & Biotechnology", New age International Publishers.
2. P. Gunasekharan, "Laboratory Manual in Microbiology", Newage International Publishers.
3. J.Jayaraman, "Laboratory Manaual in Biochemistry", New age International.

REFERENCE BOOKS :

1. Eisenthal, R. & Danson N.J. "A Practical Approach", (Eds) Enzyme Assays:, IRI Press, Oxford, UK, 1992.
2. Arti Nigiam and Archana Ayyagari, "Lab manual of Biochemistry Immunology and Biotechnology".
3. C.C.Giri & Archana Giri, "Plant biotechnology : Practical Manual", IK International, 2007.

I Year & II Sem.; M.Tech. Biotechnology & Bioprocess Engg.

L	T	P	TO	C
3	1	-	4	4

(BT528) UPSTREAM & DOWNSTREAM PROCESSING

Objectives of the course:

The objective of this course is to familiarize students with the downstream section of a bioprocess for the production of biotechnological products. To familiarize the student regarding removal of insolubles, product isolation, high-resolution techniques and product polishing.

UNIT I : Upstream processing :

Development of inocula for industrial fermentation.

Fermentation Media: Media composition, media sterilization and contamination, inoculum media, media economics, screening for fermentation media.

Size reduction: Criteria for comminution, energy requirement and efficiency, equipment for size reduction, screening of particles and screening efficiency.

UNIT II: Primary Separation and Recovery Processes:

Cell disruption methods for intracellular products, removal of insolubles, biomass (and particulate debris) separation techniques, flocculation and sedimentation, centrifugation and Filtration methods.

UNIT III: Enrichment Operations:

Membrane based separations micro and ultra filtration theory, design and configuration of Membrane separation equipment, applications, Precipitation methods (with salts, organic solvents, and polymers) Extractive separations, aqueous two-phase extraction, insitu product removal, integrated bioprocesing.

UNIT IV: Product Resolution / Fractionation and polishing:

Adsorptive chromatographic separation processes, electrophoretic separations (all electrophoresis techniques including capillary electrophoresis) Hybrid separation technologies (membrane chromatography, electro chromatography etc) Gel Permeation Chromatography, dialysis, Crystallization.

UNIT V: New and Emerging Techniques :

Pervaporation, Super critical extraction, foam based separation, Product recovery trains-few examples.

TEXT BOOKS :

1. James E Bailey, David F., "Ollis, Biochemical Engineering Fundamentals", 2nd ed., Mc Graw Hill , 1993.
2. Asenjo J.M., "Separation Processes in Biotechnology " , Marcel Dekker Inc. 1993.
3. "Product Recovery in Bioprocess Technology", BIOTOL Series, VCH, 1990.

REFERENCE BOOKS :

1. Wankat P.C, " Rate Controlled Separations ", Elsevier, 1990.
2. Belter PA and Cussler E, " Bioseparations ", Wiley , 1985
3. McCabe, Smith, Harriott, "Unit Operations of Chemical Engineering", 5th ed.,Tata Mc Graw Hill.

I Year & II Sem.; M.Tech. Biotechnology & Bioprocess Engg.	L	T	P	TO	C
	3	1	-	4	4

(BT530) ADVANCED FERMENTATION TECHNOLOGY

Objectives of the Course:

This course helps the student to understand the various requirements in the fermentation industry like measurement of variable, process control, modeling and simulation of fermenters.

UNIT I: Fermentation Processes and Parameters:

General requirements of fermentation processes and an overview, configuration of fermentor and ancillaries, main parameters to be monitored and controlled in fermentation processes.

UNIT II: Media Design for Fermentation Process:

Criteria for good medium, medium requirements for fermentation processes, points to be considered in the selection of different nutrients including oxygen, formulation of optimal growth and product formation, examples of simple and complex media, design of various commercial media for industrial fermentations – medium optimization methods.

UNIT III: Sterilisation of Media:

Over view on fermentation technology, history of development of fermentation industry, Introduction, design of batch sterilization processes – calculation of Del factor, holding time, Richard's rapid method for sterilization cycles, design of continuous sterilization processes, Sterilisation of fermenter, feeds, liquid wastes, filter sterilization of media, air, exhaust air, theory and design of depth filters.

UNIT IV: Instrumentation for Measurement and Control of Variables:

Introduction to process variables, instruments used for measurement and control of temperature, flow measurement and control, measurement and control of pressure, rate of stirring, control of foam, oxygen and pH.

UNIT V: Production of Value added compounds from renewal sources:

Production of primary and secondary metabolites: Biopolymers, Biodeseal, Bioethanol, aminoacids, antibiotics.

TEXT BOOKS :

1. Peter F. Stanbury, Stephen J. Hall & A. Whitaker, "Principles of Fermentation Technology", 2nd ed., Pergamon,1995.
2. Scragg A.H., "Bioreactors in Biotechnology", Edited, Ellis Horwood Limited, England, 1991.
3. Pauline M. Doran, "Bioprocess Engineering Calculation", Blackwell Scientific Publications.

REFERENCE BOOKS :

1. Shuler, M.L. and Kargi,F. " Bioprocess Engineering - Basic concepts", 2nd ed., Prentice Hall of India Pvt. Ltd., 2005.
2. Mukhopadhyay S.N., "Process Biotechnology Fundamentals", 2nd ed., Viva Books Private Limited, Chennai 2004.
3. Wang D.I.C., Cooney C.L., Demain A.L., Dunnil.P., Humphery A.E., Lilly M.D., " Fermentation And Enzyme Technology ", John Wiley And Sons., 1980.
4. Bailey and Ollis, " Biochemical Engineering Fundamentals", 2nd ed., McGraw Hill, 1986.

I Year & II Sem.; M.Tech. Biotechnology & Bioprocess Engg.	L	T	P	TO	C
	3	1	-	4	4

(BT532) PLANT DESIGN & ECONOMICS FOR BIOTECHNOLOGISTS

Objectives of the Course:

1. *Giving basic concepts of reactor design.*
2. *Making familiarity with reactor operation and controlling.*
3. *Brief introduction of plant economics.*

UNIT I: Introduction:

Introduction, types of bioreactors: stirred-tank bioreactors, airlift bioreactors. Heat transfer. Scale up: stirred-tank bioreactors, airlift bioreactors. Introduction of airlift bioreactors, design and construction of the airlift-loop reactor. air-lift reactor microgravity, loop reactors and fluid bed reactors. New Bio reactors for aerobic processes.

UNIT II: Design Aspects:

Agitated vessels, flow patterns, flow number, velocity patterns and velocity gradients, power consumptions, power correlations, power consumption in non newtonian liquids, agitator selection and scaleup. **Hydrodynamics:** Two-phase flow, mixing, oxygen transfer: isobaric method, non-isobaric model, oxygen transfer in a three-phase flow.

UNIT III: Bioreactor Design for Plant & Animal Cells Culture:

Introduction, plant cells: plant cell bioreactors, characteristics of plant cell suspensions, plant cell bioreactor requirements, plant cell bioreactor design, plant cell bioreactor operation, alternative cultures for plant cells. Animal cells: Animal cell bioreactors, animal cell bioreactor operation, and animal cell bioreactor design.

UNIT IV : Design and Cost Considerations:

General design considerations, Cash flow for industrial operations, capital investments, estimation of capital investments, cost indices,estimation of total product of cost direction, production costs, fixed charges, plant overhead costs, financing. Interest and investment cost, type interest, nominal and effective interest rates, continuous interest, present worth and discount annuities

UNIT V: Depreciation and Profitability :

Depreciation: types of depreciation, services life, salvage value, present value, methods for determining depreciation, single unit and group depreciation. Profitability: alternative investments and replacements, profitability standards, discounted cash flow, capitalized cost, pay out period alternative investments, analysis with small investments, increments and replacements.

TEXT BOOKS :

1. Scragg A.H., "Bioreactors in Biotechnology", Edited by Ellis Horwood Limited, England 1991.

2. M.S. Peters and K.D.Timmerhaus, "Plant Design and Economics for Chemical Engineering", 4th ed., Mc Graw Hill,.,1991.

3. Mccabe Smith, Harriott, "Unit Operations of Chemical Engineering", 5th ed., Mc Graw Hill.1992.

REFERENCE BOOK :

1. Mukhopadhyay S.N., "Process Biotechnology Fundamentals", 2nd ed., Viva Books Private Limited, Chennai 2004.

I Year & II Sem.; M.Tech. Biotechnology & Bioprocess Engg.	L	T	P	TO	C
	3	1	-	4	4

(BT534) BIOPROCESS MODELING CONTROL & SIMULATION

Objectives of the Course:

1. To acquaint students with basic models in bioprocess engineering.

2. To give knowlege of various parameters to be considered in bioprocess modeling.

3. To acquaint students with controling of bioprocess and simulation of bioprocess.

UNIT-I: Introduction to Modeling:

Process Design – Process Synthesis, Process Analysis, Optimization, Strategy for Process Engineering, Process Plant Simulation; Modeling Aspects – Physical Modeling, Mathematical Modeling, Model Formulation Principles, Fundamental Laws used in Modeling, Cybernetics, Controlled System and Principles of Similarity.

Unit-II: The Kinetics of Enzyme–catalyzed Reactions:

Michaelis–Menton Kinetics, Evaluation of Parameters in the Michaelis–Menton Equation: Kinetics of Substrate Utilization, Product Formation and Biomass Production in cell cultures – Ideal Batch Reactor, Ideal Continuous-Flow Stirred–Tank Reactor (CSTR), Monod Growth Kinetics, Monod Chemostat Model, and Product yield coefficient and Growth-Cycle Phases for Batch Cultivation.

Unit-III: Design and Analysis of Biological Rectors:

Ideal Bioreactors – Fed Batch Reactors, Enzyme- Catalyzed Reactions in CSTRs, CSTR Cell Reactors with Recycle and Wall growth, The Ideal Plug-flow Tubular Reactor, Dynamic Models.

Unit-IV: Modeling of Fermentation Processes:

System Analysis Approach to the Mathematical Modeling of fermentation processes – Kinetics of Simple Processes, Stoichiometry of Microbial Processes, Physiological Aspects of Mathematical Models for Fermentation Processes, Modeling of Oxygen Transfer, and The use of Simple Mixing Models for Simulation of Fermentation Processes; Mathematical Model Identification– Preliminary Analysis of Experimental data, Rate Relationship and Kinetic Parameters.

Unit–V: Fundamentals of Mass Balancing:

Mass Balances - Systems without Chemical Reactions, Study State Processes without Chemical Reactions, Intermittent Operation without Reactions; Systems with Chemical Reactions – Processes with (bio) Chemical Reactions, Steady state system with chemical reactions, Intermittent operation with Chemical Reactions. Transient Mass Balances – A Perfectly Stirred Tank Model, Transient Mass Balances with Reactions. The Plug Flow Model.

TEXT BOOKS :

1. B.V. Babu, "Process Plant Simulation", OXFORD University Press, 2004.

2 JAMES E. BAILEY, David F.OLLIS, "Biochemical Engineering Fundamentals", 2nd ed., McGraw Hill, International Book Company, 1986

REFERENCE BOOK :

1. B. VOLESKY and J. VOTRUBA, "Modeling and Optimization of Fermentation Processes", ELSEVIER, 1992.

I Year & II Sem.; M.Tech. Biotechnology & Bioprocess Engg.

L	T	P	TO	C
3	1	-	4	4

(BT536) IMMUNOTECHNOLOGY

Objectives of the Course:

1. *Acquire knowledge and understanding of theoretical concepts of Immunology.*
2. *Acquire skills and competence in specialized immunological techniques in the diagnosis and management of health related disorders.*
3. *Acquire knowledge and understanding of research methods employing immunological techniques for application in biomedical and clinical research*

UNIT I : Introduction :

Cells of immune system; innate and acquired immunity; primary and secondary lymphoid organs; antigens: chemical and molecular nature; haptens; adjuvants; types of immune responses; theory of clonal selection.

UNIT II: Cellular Responses :

Development, maturation, activation and differentiation of T-cells and B-cells; TCR; antibodies: structure and functions; antibodies: genes and generation of diversity; antigenantibody reactions; monoclonal antibodies: principles and applications; antigen presenting cells; major histocompatibility complex; antigen processing and presentation; regulation of T-cell and B-cell responses.

UNIT III: Infection and Immunity :

Injury and inflammation; immune responses to infections: immunity to viruses, bacteria, fungi and parasites; cytokines; complement; immunosuppression, tolerance; allergy and hypersensitivity; AIDS and Immunodeficiencies; resistance and immunisation; Vaccines.

UNIT IV: Transplantation and Tumor Immunology:

Transplantation: genetics of transplantation; laws of transplantation; tumor immunology, Autoimmunity; Autoimmune disorders and diagnosis.

UNIT V: ImmunoTechniques :

ELISA, Immunoelectrophoresis, RIA, SDS-PAGE, non-isotopic methods for detection of antigens, chemiluminescence assay, immunohistochemistry, monoclonal and polyclonal antibody production.

TEXT BOOKS :

1. Roitt I, Male, Brostoff, "Immunology", Mosby Publ., 2002.
2. Kuby J, "Immunology", WH Freeman & Co., 2000.

REFERENCE BOOK :

1. Ashim K. Chakravarthy, "Immunology", TataMcGraw-Hill, 1998.

I Year & II Sem.; M.Tech. Biotechnology & Bioprocess Engg.	L	T	P	TO	C
	3	1	-	4	4

(BT538) COMPUTATIONAL BIOLOGY

Objectives of the Course:

It helps the student to be familiar with the various Bioinformatics tools. Helps in Predicting the 3 Dimensional structure of proteins (without wet lab) giving information about function of protein and hence It gives knowledge about finding the function of gene and identifying disease causing genes by comparative genomics.

UNIT I: Introduction to Computational Biology:

Introduction, Biomolecular sequence analysis – Nucleic acid sequences, Motifs – localization and extraction, Protein sequence analysis and prediction of secondary structural features.Basics of Microarray.

UNIT II: Discrete Models of Biopolymers:

Discretized structure models – Lattice proteins, contact graphs. Combinatorial considerations – secondary structure graphs. Random graph models of sequence structure maps, RNA secondary structures.

UNIT III: Protein Folding & Prediction and DNA-Protein Interaction:

Overview of protein structure, Protein folding invitro and invivo, Theoretical models of Folding, Insilico folding, Protein structure prediction - Alignment based methods. DNAProtein Interaction – Target prediction, sequence based methods, Structure based method, Ab inito method.

UNIT IV: Computational Genomics & Drug Design:

Sequences and contigs, Sequence data description, Advanced Sequence data description, Genome annotation- Eukaryotic and Prokaryotic genome annotation tools. Computer simulated functions.Role of Bioinformatics in Drug Discovery.

UNIT V: Computation in Comparative Genomics & Phylogeny:

Introduction, Evolutionary basis, Tools for comparative genomics – data selection, Alignment, Visualization.,Definition and Description of Phylogenetic trees and types of trees.

TEXT BOOKS :

1. Andrezej K Konopka and James C. Crabbe, "Compact Handbook of Computational Biology", Marcel Dekker, USA, 2004.
2. Peter Clote,Rolf Backofen, "An Introduction Computational Molecular Biology", John Wiley & Sons ltd.,
3. David W. "Sequences and Genome Analysis", Mount Published, CSHL Press Science, 2004.

REFERENCE BOOKS :

1. Michael S Waterman, "Introduction to Computational Biology", CRC Press.
2. C.Stan, "Computational Biochemistry", TSAI WILEY Publications.
3. S. Salzberg, D. Searls, and S. Kasif, "Computational Methods in Molecular Biology", Edited by Elsevier Science, 1998.
4. Joao Setubal and Joao Meidanis, "Introduction to Computational Molecular Biology", Publisher: PWS Publishing Company, Boston, 1997.

I Year & II Sem.; M.Tech. Biotechnology & Bioprocess Engg.	L	T	P	TO	C
	3	1	-	4	4

(BT540) ENVIRONMENTAL BIOTECHNOLOGY

Objectives of the Course:

This course provides a fundamental knowledge of biological methods used in safeguarding the environment by waste treatment, energy production from waste and biological methods for minimum pollution formation.

UNIT I: Effluent Treatment – Aerobic Treatment :

Treatment of domestic and industrial waste waters – physical, chemical and biological, aerobic treatment methods – trickling filters, towers, RBC (rotating biological contactors), air sparged reactors, FBR (fluidized bed reactor), IFBBR (inverse fluidized bed biofilm reactory), expanded bed reactor, packed bed reactors, activated sludge process

UNIT II: Effluent Treatment – Anaerobic Treatment :

Anaerobic digestion, anaerobic digesters, anaerobic filters, UASB (up flow anaerobic sludge blankets)

UNIT III: Bioremediation :

Introduction, biostimulation, bioaugmentation, insitu, exsitu, intrinsic and engineered bioremediation, solid phase bioremediation – land farming, prepared beds, soil piles, Phytoremediation, compositing bioventing, biosparging

UNIT IV: Xenobiotics:

Introduction to xenobiotics and their biodegradtion, biological detoxification, hazardous waste management of cyanide, oxalate, urea and phenols.

UNIT V: Application of Biotechnology in Mining & Fuels Industry:

Metal biotechnology of copper and iron, microbial transformation, accumulation and concentration of metals, metal leaching Production of non conventional fuels like hydrogen, alcohols and biogas, use of microorganisms in improvement of oil recovery {Ref:

TEXT BOOKS :

1. L.E. Casida, JR. "Industrial Microbiology", 2nd ed., New Age International (P) Ltd., New Delhi, 2006.
2. S.N.Jogdand, "Environmental Biotechnology", 3rd ed., Himalaya Publishing, 2007.
3. Pradipta Kumar Mohapatra, "Text book of Environmental Biotechnology", IK International Publishing House (P) Ltd., New Delhi, 2006.

REFERENCE BOOKS :

1. Martin Alexander, "Biodegradation and Bioremediation" , Academic Press, 1999.
2. Foster C.F. John ware D.A. "Environmental Biotechnology", Ellis, Honwood Ltd. 1987.
3. Karnely D. Chakrabarty K. Ovnen G.S. "Biotechnology and Biodegradation", Advances in Applied Biotechnology series, Vol. Gulf Publications Co. London, 1989.

I Year & II Sem.; M.Tech. Biotechnology & Bioprocess Engg.	L T	P	TO	C
	3 1	-	4	4

(BT542) INDUSTRIAL BIOTECHNOLOGY AND METABOLIC ENGINEERING

Objectives of the Course:

The objective of the course is to understand the production of commercially and therapeutically important metabolites and bioproducts like enzymes, recombinant proteins.

UNIT I : Introduction & Applications of Metabolic Engineering:

Identification of metabolic regulation is a key point in metabolic engineering. Basic concepts of Metabolic Engineering – Overview of cellular metabolism – Different models for cellular reactions, induction – Jacob Monod model and its regulation, Differential regulation by isoenzymes, Feed back regulation. Applications in pharmaceuticals, chemical bioprocess, food technology, agriculture, environmental bioremediation and biomass conversion.

UNIT II: Production of Primary & Secondary Metabolites :

A brief outline of processes for the production of some commercially important Organic acids (e.g. citric acid, lactic acid, acetic acid, gluconic acid,); Amino acids (Glutamic acid, lysine, aspartic acid Phenylalanine); and Alcohols (ethanol, 2,3- butanediol) Study of production processes for various classes of low molecular weight secondary metabolites: Antibiotics-beta-lactams (Penicillins), semi synthetic Pencillins and Cephalosporins amino-glycosides (streptomycin), macrolids (erythromycin), quinines, and aromatics. Vitamin (B12) and Steroids, dual or multiple fermentation.

UNIT III: Production of Commercially Important Enzymes & Recombinant Proteins:

Proteases, Amylases Lipases, Cellulases, Pectinases, Isomerases and other commercially important. Enzymes for the food & pharmaceutical industries; Production of recombinant proteins (Insulin, Interleukin & Interferon's) having therapeutic and diagnostic applications; production of vaccines.

UNIT IV: Bioconversions & Regulation of Enzyme Production:

Applications of Bioconversions, Factors affecting bioconversions, Specificity, Yields, Co metabolism, Product inhibition, mixed or sequential bioconversions, Conversion of insoluble substances. Strain selection, Genetic improvement of strains, Gene dosage, metabolic pathway manipulations to improve fermentation, Feed back repression, Catabolite Repression, optimization and control of metabolic activities. The modification of existing - or the introduction of entirely new - metabolic pathways. Natural Biopreservatives (Nisin), and Biopolymers (Xanthan Gum and PHB); Single Cell Protein, Racemically-pure Drug Intermediates, Steroid Bioconversions; High -Fructose Corn syrup; Bioconversion of Vegetable Oils.

UNIT V: Metabolic Engineering with Bioinformatics:

Metabolic pathway modeling, Analysis of metabolic control and the structure metabolic networks, Metabolic pathway synthesis algorithms. Metabolomics, metabolomics measurements using NMR, Spectrophotometry, LCMS, and metabolic product in fermentation.

TEXT BOOKS :

1. Wang.D.I.C Cooney C.L., Demain A.L., Dunnil.P. Humphrey, “Fermentation and Enzyme Technology”, A.E. Lilly M.D., John Wiley and sons, 1980.
2. Stanbury P.F.and Whitaker A., “Principles of Fermentation Technology”, Pergamon Press, 1984.
3. Zubay G., “Biochemistry, Macmillan Publishers”, 1989.

REFERENCE BOOK :

1. Gregory N.Stephanopoulos, “Metabolic Engineering Principles and Methodologies”- Aristos et al-Elsevier.

I Year & II Sem.; M.Tech. Biotechnology & Bioprocess Engg.	L	T	P	TO	C
	3	1	-	4	4

(BT544) ADVANCED PROCESS ENGINEERING PRINCIPLES - II

Objectives of the Course:

1. Develop familiarity with thermal energy concept.
2. To estimate properties of chemical compounds and biomass.
3. Develop familiarity with heat of reactions.
4. Develop familiarity with major heat transfer operations.
5. Develop familiarity with design of heat transfer equipment.

UNIT I: Basics of Thermodynamics :

The scope of thermodynamics, thermodynamic state and state functions, enthalpy, steady-state, steady-flow process, equilibrium, phase rule, reversible process, constant -V and constant - P process, heat capacity. Laws of thermodynamics, Calculation of Work, energy and property changes in reversible processes. The PVT behavior of pure substances, virial equations, ideal gas, applications of the virial equations.

UNIT II: Thermodynamics of flow Processes and Heat Engines:

Principles of conservation of mass and energy for flow systems, analysis of expansion processes. Statements of the second law, heat engines, thermodynamic temperatures scales, Entropy, Entropy changes of an ideal gas, third law of thermodynamics, entropy from microscopic view point.

UNIT III: Thermodynamic Properties of Fluids and Solution Thermodynamics:

Estimation of thermodynamic properties using equations of state; Maxwell relationships and their applications; Calculation of flow processes based on actual property changes Partial molar properties; concepts of chemical potential and fugacity, Ideal & non ideal solutions; Gibbs Duhem equation; Excess properties of mixtures; Activity Coefficient.

UNIT IV: Heat Transfer by Conduction:

Fourier's law, thermal conductivity, steady state conduction in plane wall & composite walls, compound resistances in series, heat flow through a cylinder, conduction in spheres, Typical heat exchange equipment, countercurrent and parallel current flows, energy balances, rate of heat transfer, overall heat transfer coefficient, logarithmic mean temperature difference, and individual heat transfer coefficients, fouling factors.

UNIT V: Heat Exchange Equipment :

General design of heat exchange equipment, heat exchangers, condensers, boilers and calendrias, extended surface equipment, heat transfer in agitated vessels, scraped surface heat exchangers, heat transfer in packed beds.

TEXT BOOKS :

1. J M.Smith, H.C. Van Ness and M.M.Abbott. "Introduction to Chemical Engineering Thermodynamics", McGraw Hill.

2. K. V. Narayanan, "Chemical Engineering Thermodynamics", PHI, 2001.

REFERENCE BOOKS :

1. Y.V.C.Rao, "Engineering Thermodynamics", University Publications.

2. W.L. Mc Cabe and JC Smith, "Unit Operations of Chemical Engineering", 5th ed., Mc Graw Hill, 1993.

I Year & II Sem.; M.Tech. Biotechnology & Bioprocess Engg.	L T	P	TO	C
	3 1	-	4	4

(BT546) CANCER BIOLOGY AND THERAPY

Obectives of the Course :

1. To acquaint students with the biological principles of cancer as well as the human dimensions of the disease and its therapies.

2. To introduce the students to important and current concepts in Cancer Biology and Cancer Genetics and the lectures are organized into 4 broad thematic groups:

a) Cell-Autonomous Mechanisms (e.g., tumor suppressor and oncogene function, DNA repair pathways, senescence, apoptosis),

b) Non Cell-Autonomous Mechanisms (e.g., tumor microenvironment, hypoxia, angiogenesis).

c) Organ Systems (e.g., pancreatic cancer, hematopoetic malignancies)

d) Therapeutic Approaches.

UNIT I : Fundamentals of Cancer Biology:

Regulation of cell cycle, mutations that cause changes in signal molecules, effects on receptor, signal switches, tumour suppressor genes, modulation of cell cycle in cancer, different forms of cancers, diet and cancer. Cancer screening and early detection, Detection using biochemical assays, tumor markers, molecular tools for early diagnosis of cancer.

UNIT II : Principles of Carcinogenesis:

Theory of carcinogenesis, Chemical carcinogenesis, metabolism of carcinogenesis, principles of physical carcinogenesis, x-ray radiation-mechanisms of radiation carcinogenesis.

UNIT III : Principles of Molecular Cell Biology of Cancer:

Signal targets and cancer, activation of kinases; Oncogenes, identification of oncogenes, retroviruses and oncogenes, detection of oncogenes. Oncogenes/proto oncogene activity. Growth factors related to transformation. Telomerases.

UNIT IV : Principles of Cancer Metastasis:

Clinical significances of invasion, heterogeneity of metastatic phenotype, metastatic cascade, basement membrane disruption, three step theory of invasion, proteinases and tumour cell invasion.

UNIT V : New Molecules for Cancer Therapy :

Different forms of therapy, chemotherapy, radiation therapy, detection of cancers, prediction of aggressiveness of cancer, advances in cancer detection. Use of signal targets towards therapy of cancer; Gene therapy.

TEXT BOOKS :

1. Maly B.W.J, "Virology A Practical Approach", IRLl Press,Oxford, 1987.

2. Dunmock N.J And Primrose S.B., "Introduction to Modern Virology", Blackwell Scientific Publications, Oxford, 1988.

I Year & II Sem.; M.Tech. Biotechnology & Bioprocess Engg.	L	T	P	TO	C
	-	-	3	3	2

(BT548) MINI DESIGN PROJECT

I Year & II Sem.; M.Tech. Biotechnology & Bioprocess Engg.

L	T	P	TO	C
-	-	3	3	2

(BT550) DOWNSTREAM PROCESSING LABORATORY

Objectives of the Course:

1. To introduce the advanced laboratory skills that reinforce basic principles and techniques learned in introductory biology, chemistry, and physics courses;
2. To provide research outcomes that develop critical thinking and analysis skills;
3. To improve communication skills through group participation, written reports, and oral presentations; and
4. To expose students to how technology is changing the types of biochemical and molecular questions asked in plant biology.
5. To aquaint the student to learn about various cell disruption techniques and product recovery methods.

Downstream Processing Lab:

1. Chromatography techniques - Paper, TLC, HPLC, Gel filtration & Ion exchange chromatography.
2. Electrophoresis & Blotting techniques-PAGE, SDS-PAGE, Agarose & Western Blot technique.
3. Solid separation methods - Filteration, Sedimentation, Centrifugation, Product enrichment operations, twophase aqueous extraction and high resolution purification.
4. Protein precipitation and its recovery.
5. Product crystallization and drying.

TEXT BOOKS :

1. Scopes AK, “ Protein Purification “, IRL Press, 1993.
2. J.Jayaraman, “Laboratory Manaual in Biochemistry”, New age International, 2002.

REFERENCE BOOK :

1. Eisenthal, R. & Danson N.J. “Enzyme Assays: A Practical Approach” IRI Press, Oxford, UK, .1992.

ACADEMIC REGULATIONS (CBCS)
COURSE STRUCTURE
AND DETAILED SYLLABUS
FOR

I YEAR M.TECH.
POST GRADUATE PROGRAMME
COMPUTER SCIENCE & ENGINEERING

(Applicable from the academic year 2014 - 2015 onwards)

DEPARTMENT OF
COMPUTER SCIENCE & ENGINEERING

VIGNAN’S UNIVERSITY

Foundation for Science, Technology & Research
(Estd u/s 3 of UGC Act of 1956)

Vadlamudi, GUNTUR - 522 213 (A.P.)

AcademicRegulations 2014-15 for M.Tech.
(Regular)
(Effective for the students admittd into first year from the academic year 2011-2012)

1.0 Eligibility for admission

Admission to the above programme shall be made subject to the eligibility, qualifications and specialization prescribed by the University from time to time. Admissions shall be made on the basis of merit rank obtained by the qualifying candidate at an Entrance Test conducted by the university or on the basis of any other order of merit approved by the university.

2.0 Award of M.Tech Degree

2.1 A student shall be declared eligible for the award of the M.Tech degree, if he pursues a course of study for not less than two academic years and completes it successfully.

2.2 A Student, who fails to fulfill all the academic requirements for the award of the degree within four academic years from the year of his admission, shall forfeit his seat in M.Tech course.

3.0 Courses of Study

The following specializations are offered at present for the M.Tech course of study. All the courses are of 4-semester (two years) duration. The required theory subjects and practicals are covered in the I year in two semesters. The student has to complete his project work under the guidance of a faculty member in the second year in the III & IV semesters.

- M.Tech in Biotechnology and Bioprocess Engineering
- M.Tech in Industrial Pollution Control Engineering
- M.Tech (CSE)
- M.Tech (IT)
- M.Tech in Embedded Systems
- M.Tech in VLSI
- M.Tech in Communication and Signal Processing
- M.Tech in DE&CS
- M.Tech in Power Electronics and drives
- M.Tech in Machine Design
- M.Tech in Energy Engineering

4.0 Attendance

The programmes are offered on a unit basis with each subject being considered a unit.

4.1 A candidate shall be deemed to have eligibility to write end semester examinations in a subject if he has put in at least 75% of attendance in that subject.

4.2 Shortage of attendance upto 10% in any subject (i.e. 65% and above and below 75%) may be condoned by the university on genuine and valid reasons on representation by the candidate with supporting evidence.

4.3 Acandidate shall getminimumrequired attendance atleast in three (3) theory subjects to get promoted to the next semester. In order to qualify for the award of the Post – Graduate Degree, the candidate shall complete all the academic requirements of the subjects, as per the course structure.

4.4 Shortage of attendance below 65% shall in no case be condoned.

5.0 Evaluation

The performance of the candidate in each semester shall be evaluated subject – wise with a maximum of 100 marks for theory and 100 marks for practicals, on the basis of internal evaluation and end semester examination.

5.1 For the theory subject 60 marks shall be awarded based on the performance in the end semester examination, 40 marks shall be awarded based on the internal evaluation. The internal evaluation shall bemade based on the better of the marks secured in the two mid-term examinations conducted one in the middle of the semester and the other immediately after the completion of instruction. Each mid term examination shall be conducted for duration of 120 minutes with 4 questions to be answere out of 6 questions.

5.2 For practical subjects, 60 marks shall be awarded based on the performance in the end semester examinations, 40 marks shall be awarded based on the day-to-day performance as Internal Marks.

5.3 There shall be a seminar presentation during 3rd semester. For seminar, a student under the supervision of a faculty member, shall collect the literature on a topic and critically review the literature and submit it to the department in a report form and shall make an oral presentation before the departmental committee. The departmental committee consists of Head of the Department, supervisor and two other senior facult members of the department. For seminar there will be only internal evaluation of 50 marks. A candidate has to secure a minimum of 50% to be declared successful.

5.4 A candidate shall be deemed to have secured the minimum academic requirement in a subject if he secures a minimum of 40% of marks in the end examination and a minimum aggregate of 50% of the total marks in the end semester examination and internal evaluation taken together.

5.5 In case the candidate does not secure the minimum academic requirement in any subject (as specified in 5.4) he has to reappear for the end examination in that subject. A candidate shall be given one chance to re-register for each subject provided the internal marks secured by a candidate are less than 50% and he has failed in the end examination. In such case candidate must re-register for the subject(s) and secure required minimum attendance. Attendance in the re-registered subject(s) has to be calculated separately to become eligible to write the end examination in the re-registered subject(s). The attendance of re-registered subject(s) shall be calculated separately to decide upon the eligibility for writing the end examination in those subject(s). In the event of taking another chance, the internal marks and end examination marks obtained in the previous attempt are nullified.

5.6 In case the candidate secure less than the required attendance in any subject(s), he shall not be permitted to appear for the end examination in that subject(s). He shall re-register the subject when next offered.

5.7 Laboratory examination for M.Tech courses must be conducted with two examiners, one of them being laboratory class teacher and second examiner shall be other laboratory teacher.

6.0 Evaluation of project / Dissertation work

Every candidate shall be required to submit thesis or dissertation after taking up a topic approved by the Project Review Committee.

6.1 A Project Review Committee(PRC) shall be constituted with Principal as chair person Heads of all the Departments which are offering theM.Tech programmes and two other senior faculty members.

6.2 Registration of ProjectWork:Acandidate is permitted to register for the project work after satisfying the attendance requirement of all the subject (theory and practical subjects)

6.3 After satisfying 6.2, a candidate has to submit, in consultation with his project supervisor, the title, objective and plan of action, of his project work to the Departmental Committee for its

approval. Only after obtaining the approval of Departmental Committee the student can initiate the project work

6.4 If candidate wishes to change his supervisor or topic of the project he can do so with approval of Departmental Committee. However, the departmental committee shall examine whether the change of topic / supervisor leads to a major change of his initial plans of project proposal. If so, his date of registration for the project work starts from the date of change of supervisor or topic as the case may be.

6.5 A candidate shall submit status report in two stages at least with a gap of 3 months between them to the concerned Departmental committee. The departmental committeewill review the progress and quality of the work and advise suitably.

6.6 The work on the projects shall be initiated in the beginning of the second year and the duration of the project is for two semesters. A candidate is permitted to submit project thesis only after successful completion of theory and practical course with the approval of PRC not earlier than 40 weeks from the date of registration of the project work for the approval of PRC the candidate shall submit the draft copy of thesis to the Principal (through Head of the Department) and shall make an oral presentation before the PRC.

6.7 Three copies of the project Thesis certified by the supervisor shall be submitted to the college / school / institute.

6.8 The principal of the college will submit a panel of 5 examiners, who are eminent in that field with the help of the concerned guide and head of the department. The university will select one out of the five names and appoints as the examiner for the thesis.

6.9 Aviva-voce examination shall be conducted by a board consisting of the supervisor, Head of the Department and the examiner.

The Board shall jointly report candidates work as:

A. Excellent **B. Good**

C. Satisfactory **D. Unsatisfactory**

Head of theDepartment shall coordinate andmake arrangements for the conduct of viva-voce examination.

If the report of the viva-voce is unsatisfactory, the candidate will retake the viva-voce examination after three months. If he fails to get a satisfactory report at the second viva-voce examination, he will not be eligible for the award of the degree.

7.0 Award of Degree and Class

A candidate shall be eligible for the respective degree if he satisfies the minimum academic requirements in every subject and secures 'satisfactory' report on his thesis / dissertation and viva-voce.

First class with distinction : 70% or more

First class :	**below 70% but not less than 60%**
Second class :	**below 60% but not less than 50%**

8.0 With-holding of results:

If the candidate has not paid any dues to the university or if any case of in-discipline is pending against him, the result of the candidate will be withheld and he will not be allowed into the next higher semester.Th issue of the degree is liable to be withheld in such cases.

9.0 Transitory Regulations:

Candidate who have discontinued or have been detained for want of attendance or who have failed after having undergone the course are eligible for admission to the same or equivalent subjects as and when subjects are offered, subject to 5.5 and 2.0.

10.0 General:

10.1 The academic regulations should be read as a whole for purpose of any interpretation.

10.2 In case of any doubt or ambiguity I the interpretation of the above rules, the decision of the Vice-Chancellor is final

10.3 The university may change or amend the academic regulation and syllabus at any time and the changes and amendments made shall be applicable to all the students with effect from the date notified by the university

10.4 Wherever the word he, him or his occur, it will also include she and her.

The unprecedented growth of computer systems and adopting them into every possible walk of lifemade the computer studies as one of the fastpaced engineering streams. Be it a simplemobile-phone or a sophisticated space shuttle, computer is there everywhere to play its vital role. School of Computing at Vignan University is a Research-oriented, Student- Centered school offering undergraduate and postgraduate programs in Computer Science, Computer Engineering, Information Technology and Computer Applications. The school promotes world class research in computer related disciplines with absolute commitment to excellence in teaching.

The School of computing offers the following programs at present.

1. B.Tech., in Computer Science & Engineering (CSE)
2. B.Tech., in Information Technology (IT)
3.Master of ComputerApplications (MCA)
4. M.Tech., in Computer Science & Engineering (CSE)
5.M.Tech., in Information Technology (IT)

TheM.Tech CSE degree program offered by Vignan University is versatile in many respects. The Master of Technology in Computer Science and Engineering is designed for graduates in engineering seeking professional development and enhancement of theirComputer Science andEngineering knowledge with a broad inerest in the scientific, engineering and business applications of the computer technology.
The course is administered by the Faculty of Engineering and is taught by the School of Computing.

Objective of the Course :

The Course is designed for students are

1. Gain substantial expertise in design, modeling, analysis and applications of computer related systems.
2. Gain in - depth understanding of both theory and application of computer system architecture, advanced computer networks, distributed computer systems, programming languages,digital signal processing and soft computing.
3. Develop an increased awareness of the changing technical and commercial context in the IT industry .

I Year						Semester - I
S.Code	**Subject**	**L**	**T**	**P**	**To**	**C**
CS601	Advanced Database management Systems	3	1	-	4	4
CS603	Advanced Operating Systems	3	1	-	4	4
CS621	Data Structure & Algorithms	3	1	-	4	4
CS507	Advanced Computer Architecture	3	1	-	4	4
	Elective-I					
CS609	Computer Networking	3	1	-	4	4
CS611	Real Time Systems & Software	3	1	-	4	4
CS613	Natural Networks	3	1	-	4	4
	Elective-II					
CS615	Mobile Computing	3	1	-	4	4
CS617	E - Commerce	3	1	-	4	4
CS619	Computer Graphics	3	1	-	4	4
CS625	Performance Evaluation of Computer Systems	3	1	-	4	4
	Labs:					
CS623	Data Structures and Algorithms Lab	-	-	3	3	2
CS523	Advanced Database Management Systems lab	-	-	3	3	2
TOTAL		33	11	6	50	48

I Year						Semester - II
S.Code	**Subject**	**L**	**T**	**P**	**To**	**C**
CS502	Data werehousing & Mining	3	1	-	4	4
CS504	Network Security & Cryptography	3	1	-	4	4
CS506	Object Oriented Analysis and Design	3	1	-	4	4
CS508	Embedded Systems	3	1	-	4	4
	Elective- III					
CS510	Digital Image Processing	3	1	-	4	4
CS602	Modern Compiler Design	3	1	-	4	4
CS604	Cluster and Grid Computing	3	1	-	4	4
CS606	Big Data Analytics	3	1	-	4	4
	Elective- IV					
CS608	Adwanced Software Engineering	3	1	-	4	4
CS610	Adhoc Sensor Networks	3	1	-	4	4
CS612	Internet Technologies	3	1	-	4	4
CS626	Could Computing	3	1	-	4	4
	Labs:					
CS522	UML Lab	-	-	3	3	2
CS524	ES Lab	-	-	3	3	2
TOTAL		33	11	6	50	48

I YEAR - M.TECH SYLLABUS

I Year M.Tech. CSE I - Semester

L	T	P	To	C
3	1	-	4	4

CS601 ADVANCED DATABASE MANAGEMENT SYSTEMS

Objective of the course :

The objective of the course is to present an introduction to database management systems (DBMS), with an emphasis on how to organize, maintain and retrieve efficiently, and effectively information froma DBMS. The course focuses on the areas of : Information gathering, Data analysis, Database design,Concurrency and robustness, Efficiency and scalability.

UNIT - I

Database System concepts:

Database System concepts and architecture, Data modeling using Entity Relationship (ER) model and Enhanced ER model, Specialization, Generalization, Data Storage and indexing, Single level andmulti level indexing, Dynamic Multi level indexing using B Trees and B+ Trees.

UNIT - II

Relational dataModel :

TheRelational dataModel, Relational database design using ER to relational mapping, Relational algebra and relational calculus, Tuple Relational Calculus, Domain Relational Calculus, SQL.

UNIT - III

Database design theory and methodology :

Database design theory and methodology, Functional dependencies and normalization of relational databases, Normal Forms, Properties of relational decomposition, Algorithms for relational database schema design

UNIT - IV

Transaction processing concepts :

Transaction processing concepts, Schedules and serializability, Concurrency control, Two Phase Locking Techniques, Optimistic Concurrency Control, Database recovery concepts and techniques.

UNIT - V

Object Oriented Database Systems :

Object Oriented Database Systems: User Defined ADTs, Objects, Object Identity and

Reference types, Object relational and extended relational database systems, Distributed database concepts, overview of client-server architecture and its relationship to distributed database, Introduction to database security.

TEXT BOOKS :

1. Fundamentals of Database Systems - *Elmasri, Navathe, Somayajulu, Gupta,* IE, Pearson Education, 2006

REFERENCE BOOKS :

1. DatabaseManagement Systems - *Ramakrishnan R.* & *Gehrke J.,* 3rd ed., 2003, *McGraw Hill.*
2. Database Systems-Concepts, Design andApplications - *S K Singh*, Pearson Education, 2006.
3. Database System Concepts - Silberschatz, *Korth H. F. &Sudarshan S, Tata McGraw Hill*.

I Year M.Tech.CSE I - Semester

L	T	P	To	C
3	1	-	4	4

CS603 ADVANCED OPERATING SYSTEMS

Objective of the Course :

This course contains the basic and advanced concepts of operating systems. After completing this course students should understand how the operating system defines an abstraction of hardware behavior with which programmers can control the hardware. It also enables the students to understand how operating system manages resource sharing among the computer's users.

UNIT - I

Introduction to operating system & Process Scheduling :

What Operating System do, Operating System structure. Process Concept: Overview , Process scheduling, Operations on process, Inter process communication, Process scheduling criteria, uniprocess scheduling and multi process scheduling algorithms , and case study: process scheduling in Linux.

UNIT - II

Process synchronization & Dead locking :

Process Synchronization–Background, Hardware Support to Process Synchronization, Semaphores, Monitors, Deadlock prevention, Deadlock Avoidance and Deadlock Detection and Recovery, Case Study: Unix,Windows2000 Concurrency Mechanisms.

UNIT - III

Memory Management & Introduction to Distributed Systems :

Segmentation, Demand Paging, Page Replacement Algorithms, Contiguous, Linked and Indexed Allocation, Case Study: Unix, Linux Memory management. Introduction to Distributed Systems, Goals, Hardware Concepts, Software Concepts, Design Issues of Distributed Systems.

UNIT - IV

Communication in Distributed Systems :

Communication in Distributed Systems, The Client Server Model, Remote Procedure Call, Group Communication, Case Study: Remote Procedure call in DCE. Processes And Processors in distributed Systems, Processor Allocation, and Scheduling in Distributed Systems.

UNIT - V

Process Synchronization & Deadlock in Distributed Systems :

Synchronization in Distributed Systems, Clock Synchronization, Mutual Exclusion, Election Algorithms, Atomic Transactions, Deadlocks in Distributed Systems. Case Study: Process Management in MACH and CHORUS.

I

TEXT BOOKS :

1. Operating System Principles – *Abraham Silberschatz, Peter Baer Galvin, Greg Gagne*, Seventh Edition,2006, *John Wiley* & Sons Inc.
2. Distributed Operating Systems –*Andrew S. Tanenbaum*, First Edition, 1995, PearsonEducation,

REFERENCE BOOKS :

1. Operating Systems – Operating System: Internals and Design Principles, *William Stallings*, Fourth edition, 2005, Prentice Hall.

I Year M.Tech. CSE I - Semester

L	T	P	To	C
3	1	-	4	4

CS621 DATA STRUCTURES & ALGORITHMS

Objective of the Course:

The course enables the students to understand the importance of algorithms in the problem-solving process, create algorithms for solving simple problems.

UNIT - I

Elementary Data Structures: Trees, Dictionaries, Priority Queues Balanced Search Trees - Properties and ADTs of AVL , Red-Black and Splay Trees.

UNIT - II

Introduction to Algorithm analysis:
Algorithm, Performance Analysis-Space complexity, Time complexity, Asymptotic Notation- Big oh notation, Omega notation, Theta notation

Divide and conquer: General method, applications-Binary search, Merge sort, Quick sort.

UNIT - III

Greedy method:
General method, applications-Job sequencing with deadlines, 0/1 knapsack problem, Minimum cost spanning trees, Single source shortest path problem.

UNIT - IV

Dynamic Programming:
General method, applications-Matrix chain multiplication, Optimal binary search trees, 0/1 knapsack problem, All pairs shortest path problem, Travelling sales person problem. design.

UNIT- V

Backtracking:
General method, applications-n-queen problem, sum of subsets problem,.

NP-Hard and NP-Complete problems: Basic concepts, non deterministic algorithms, NP - Hard and NP Complete classes.

TEXT BOOKS:

1. Fundamentals of Computer Algorithms, *Ellis Horowitz, Sartaj Sahni* and *Rajasekaaran*, second edition, University press.
2. Sartaj Sahni, Data Structures, Algorithms and Applications in C++, Second Edition, University Press, Reprinted 2010

REFERENCE BOOKS

1. Introduction to Algorithms,*T.H.Cormen,C.E.Leiserson, R.L.Rivest,*and *C.Stein,* secondedition, PHI Pvt. Ltd.
2. Design and Analysis of algorithms, Aho, Ullman and Hopcroft, Pearson education.
3. **Algorithm Design:** Foundations, Analysis and Internet examples, *M.T.Goodrich* and *R.Tomassia, John wiley* and sons.
4. Algorithms – *Richard Johnson baugh* and *Marcus Schaefer*, Pearson Education
5. Introduction to the Design and Analysis of Algorithms, Anany Levitin, 3rd Edition by, Addison-Wesley.
6. Algorithm Design by *Jon Kleinberg* and *Eva Tardos* ,Pearson.

I Year B.Tech. CSE   I - Semester

L	T	P	To	C
3	1	-	4	4

CS507 ADVANCED COMPUTER ARCHITECTURE

Objective of the Course :

The course focuses on processor design, pipelining, superscalar, out-of order execution, caches (memory hierarchies), virtual memory, storage systems, and simulation techniques. Advanced topics include a survey of parallel architectures and future directions in computer architecture

UNIT - I

Introduction to Computer Architecture :

Types of computers,

register transfer language and microoperations : Register Transfer language. Register Transfer Bus and memory transfers, Arithmetic Micro Operations, logic micro operations, shift micro operations, Arithmetic logic shift unit. Instruction codes. STACK organization. Instruction formats. Addressing modes.

UNIT - II

Control Unit and Memory Management :

Control memory, Address sequencing, micro program example, design of control unit : Hard wired control &Micro programmed control unit.

The Memory System : Basic concepts semiconductor RAM memories. Read-only memories Cache memories performance considerations, Virtual memories.

UNIT - III

Instruction Level Parallel Processors :

Introduction to Parallel

Processing : Basic Concepts, Types and Levels of Parallism, Classification of Parallel Architecture, Basis Parallel Techniques.

Introduction to IPL-processors: evolution and overview of ILP processors, dependencies between instructions. Instruction scheduling, preserving sequentional consistency.

Pipelined processors: Basic concepts , Design space of pipelines , Overview of pipelined instruction processing , pipelined execution of integer and Boolean instructions.

UNIT - IV

Processing of Control Transfer Instructions :

VIGNAN UNIVERSITY

Introduction , types of branches , how architectures check the results of operations , the branch problems ,performance measures of branch processing , basic approaches to branch handling , delayed branching , branch processing.

Introduction to data-parallel architectures : introduction , connectivity, alternative architectural classes.

SIMD architectures : introduction , design space

UNIT - V

Thread and process-level parallel architectures :

Introduction to MIMD architectures , multi-threaded architectures, introduction, computational models.

Distributed memory MIMD Architectures : Introduction, direct interconnection networks.

Shared Memory MIMD Architectures : Introduction, dynamic interconnection networks , cache coherence

TEXT BOOKS :

1. Computer Systems Architecture – *M.Moris Mano,* IIIrd Edition,Pearson/PHI
2. Advanced computer architectures- *Dezso sima,Terence Fountain , Peter Kacsuk*

REFERENCESBOOKS :

1. ComputerArchitectureA quantitative approach *John L. Hennessy* & *DavidA.PattersonMorgan Kufmann*, 3rd ed.,
2. Structured Computer Organization – *Andrew S. Tanenbaum*, PHI/ Pearson, 4th ed.,
3. Fundamentals or ComputerOrganization and Design, - *Sivaraama Dandamudi* Springer Int. Edition.
4. Computer Organization, *Anjaneyulu*, Himalaya Pub house.

I Year M.Tech. CSE I - Semester

L	T	P	To	C
3	1	-	4	4

CS609 COMPUTER NETWORKING

(ELECTIVE - I)

Objective of the Course :

To impart knowledge about data communication and computer networks along with the basic principles behind them. To provide enough knowledge about the OSI model, TCP/IP model and popular network protocols. To create a good foundation covering the physical, data link, network, transport and application layers.

UNIT - I

Computer Networks and Internet :

What is internet, the network edge, the network core, Acess control and physical Media, ISP's and internet Backbones, Delay and Loss in packet-switched networks. Application Layer- Principles of Network Applications, The Web and HTTP, File transfer- FTP, Electronic mail in the internet, DNS, P2P File sharing.

UNIT - II

Transport Layer :

Introduction to Transport layer services, Multiplexing and Dmultiplexing, Connectionless Transport, principles of reliable data transfer, connection oriented Transport, principles of congestion control, TCP congestion control

UNIT - III

The Network Layer :

Introduction, virtual circuit and data gram networks, what is inside a router, The internet protocol, Routing algorithms, routing in the internet, broadcast and multicast routing, The Link layer and Local Area Networks- Link layer, error detection and correction techniques, Multiple acess protocols, link layer addressing, Ethernet, Interconnections, PPP, Link virtualizations

UNIT - IV

Wireless and Mobile Networks :

Introduction, Wireless links and Network characteristics , Wi-Fi:802.11 Wireless LANs, Cellular
internet acess, Mobility Management, Mobile IP, Managing Mobility in cellular Networks.

UNIT - V

Security in Computer Networks :

What is network security, principles of cryptography, Authentication, Integrity, key distribution and certification, Acess control, attacks and counter measure

TEXT BOOKS :

1. Computer Networking: A Top-Down Approach Featuring Internet - *J. F. Kurose* and *K . W. Ross*, 3/e, Perason Education, 2005.
2. Computer Networks -*Andrew S. Tanenbaum*, 3/E, PHI, 1996.

REFERENCEBOOKS :

1. Computer Networks, A systems approach - Peterson *L.L.* & *Davie B.S.*, 3/E, Harcourt Asia, 2003.
2. An Engineering Approach to Computer Networking - *Keshav S.,* Pearson Education, 2000.
3. IEEE/ACM Trans on Networking.

I Year M.Tech. CSE I - Semester

L	T	P	To	C
3	1	-	4	4

CS611 REAL TIME SYSTEMS & SOFTWARE

(ELECTIVE - I)

Objective of the Course :

In this course the student learns about the basics of Real time systems, Classification of Real Time Systems and Different Real time applications.

UNIT - I

Introduction :

Real-time Versus Conventional Software, Computer Hardware for Monitoring and Control, Software Engineering Issues. Process and State-based Systems model, Periodic and Sporadic Process, Cyclic Executives, CE definitions and Properties, Foreground-Background

UNIT - II

Organizations, Standard OS and Concurrency :

Architectures, Systems Objects and Object-Oriented Structures, Abstract Data Types, General Object Classes Requirements and Design Specifications: Classification of Notations, Data Flow Diagrams, Tabular Languages, State Machine, Communicating Real Time State Machine- Basic features, Timing and clocks, Semantics Tools and Extensions, State charts-Concepts and Graphical Syntax, Semantics and Tools.

UNIT - III

Declarative Specifications:

Regular Expressions and Extensions, Traditional Logics-Propositional Logic, Predicates, Temporallogic, Real time Logic Deterministic Scheduling : Assumptions and Candidate Algorithms, Basic RM and EDF Results, Process Interactions- Priority Inversion and Inheritance.

UNIT - IV

Execution Time Prediction:

Measurement of Software by software, Program Analysis with Timing Schema, Schema Concepts, Basic Blocks, Statements and Control, Schema Practice, Prediction by optimization, System Interference and Architectural Complexities, Timer Application, Properties of Real and ideal clocks, Clock Servers – Lamport's

Logical clocks, Monotonic Clock service, A software Clock server, Clock Synchronization- Centralized.

UNIT - V

Synchronization, Distributed Synchronization,
Programming Languages :

Real Time Language Features, Ada-Core Language, Annex Mechanism for Real Time Programming, Ada and Software Fault Tolerance, Java and Real-time Externsions, CSP and Occam.

TEXT BOOK :

1. Real – Time Systems and software by *Alan C. Shaw* ; *John Wiley* & Sons Inc.

REFERENCEBOOK :

1. Real - Time Systems - *Jane W.S.* LIU - Pearson Edition.

I Year M.Tech. CSE I - Semester

L	T	P	To	C
3	1	-	4	4

CS613 NEURAL NETWORKS

(ELECTIVE - I)

Objective of the Course :

On completion of this course the students will be able to expose themselves towards intelligence systems and knowledge based systems. It also provides knowledge of learning networks.

UNIT - I

Introduction toArtifical Neural Networks :

Introduction,Artificial Neural Networks, Historical Development of Neural Networks, Biological Neural Networks, Comparison Between them and the Computer, Comparison Between Artificial and Biological Neural Network Basic Building Blocks of Artificial Neural Networks, Artificial Neural Network (ANN) terminologies.

UNIT - II

Fundamental Models of Artificial Neural Networks :

Introduction, McCulloch-Pitts Neuron Model, Learning Rules, Hebbian Learning Rule Perceptron Learning Rule, Delta Learning Rule (Widrow-Hoff Rule or Least Mean Square(LMS)Rule, Competitive Learning Rule, Out Star Learning, Boltzmann Based Learning , Hebb Net.

Perceptron Networks : Introduction, Single Layer Perceptron, Brief Introduction to Multilayer Perceptron Networks.

UNIT - III

Adaline and Madaline Networks :

Introduction, Adaline, Madaline.

Associative Memory Networks : Introduction, Algorithms for Pattern Association, Hetero Associative Memory Neural Networks, Auto Associative Memory Network, Bi-directional Associative Memory

UNIT - IV

Feedback Networks : Introduction, Discrete Hopfiled Net, Continuous Hopfiled Net, Relation between BAM and Hopfiled Nets.

Feed Forward Networks : Introduction, Back Propagation Network (BPN), Radial Basis Function Network (RBFN).

UNIT - V

Self Organizing Feature Map :

Introduction, Methods Used for Determining the Winner, Kohonen Self Organizing Feature Maps, Learning Vector Quantization (LVQ),Max Net, Maxican Hat, Hamming Net

Adaptive Resonance Theory : Introduction, ART Fundamentals, ART 1,ART2

TEXT BOOKS:

1. Introduction to neural networks using MATLAB 6.0 by *Sivanandam, SSumathi, SNDeepa*, *TATA Mc Graw HILL*

REFERENCEBOOKS

1. Neural networks A comprehensive foundations, SimonHhay kin,Pearson Education 2nd ed., 2004
2. Artificial neural networks - *B.Yegnanarayana*, Prentice Hall of India P Ltd 2005.
3. Neural networks in Computer intelligence, *Li Min Fu*, TMH2003.
4. Neural networks *James A Freeman David M S kapura*, Pearson education 2004.

I Year M.Tech. CSE I - Semester

L	T	P	To	C
3	1	-	4	4

CS615 MOBILE COMPUTING

(ELECTIVE - II)

Objective of the Course :

- *Introduce the mobile and wireless data communication to the student.*
- *Describe the main characteristics of WLAN, Blue tooth, ZIGBEE, mobile IP.*
- *Illustrate how data is routed using mobile IP, using Home Agent & Foreign Agent*
- *Describe current areas of emerging interest in wireless and mobile computing.*

UNIT - I

Wireless Communication Fundamentals :

Introduction, Wireless transmission, Frequencies for radiotransmission, Signals, Antennas, Signal Propagation, Multiplexing, Modulations,Spread spectrum, Cellular Systems.

UNIT - II

Mobile Telecommunications Systems :

Introduction to 1G,2G,3G systems, GSM – System Architecture, Protocols, Connection Establishment, Frequency Allocation, Routing, Handover, Security, GPRS,UMTS.

UNIT - III

Wireless Local Area Networks :

Infrared Vs. Radio LANs, IEEE 802.11 Standards, Architecture, Physical Layer, MA CLayer, versions of 802.11, Blue Tooth - Introduction, Networking, Piconet, Scatternet, Protocol Architecture and Layers

UNIT - IV

Network Layer :

Mobile IP, Dynamic Host Configuration Protocol, Routing, Destination Sequence Distance Vector Routing, Dynamic Source Routing, Ad hoc On Demand Distance Vector Routing, Mobile Adhoc Networks, Wireless Sensor Networks -MAC protocols, Routing protocols, Applications of sensor networks.

UNIT - V

Transport and Application Layers :

TCP over Wireless Networks, Indirect TCP, Snooping TCP, Mobile TCP, Fast Retransmit / Fast Recovery, Transmission/Timeout Freezing, Selective Retransmission, Transaction Oriented TCP, Wireless Application Protocol – WAP Architecture, Wireless Datagram Protocol, Wirless Transport Layer Protocol, Wireless Transaction Protocol, Wireless Security Protocol, Wireless Markup Language, WML Script, Wireless Application Environment

TEXT BOOKS :

1. Mobile Communications – Jochen Schiller, Second Edition, Pearson Education,
2. Wireless Communications and Networks -William Stallings, Second Edition, Prentice Hall of India / Pearson Education,

I Year M.Tech. CSE I - Semester

L	T	P	To	C
3	1	-	4	4

(CS617) E-COMMERCE

(ELECTIVE - II)

Objective of the Course :

- *This course explores the basics of working with internet including WWW, Email, Browsing, Chatting etc., and also explores the potential of secured electronic transactions, E-mail security and electronic publishing.*

UNIT - I

Electronic Commerce Environment and Opportunities :

Background, The Electronic Commerce Environment, Electronic Marketplace Technologies. Modes of Electronic Commerce: Electronic Data Interchange, Migration to Open EDI, Electronic Commerce with www/ Internet, Commerce Net Advocacy, web Commerce Going Forward.

UNIT - II

Approaches to Safe Electronic Commerce :

Secure Transport Protocols, Secure Transactions, Secure Electronic Payment Protocol (SEPP), Secure Electronic Transaction (SET), Certificates for authentication Security on web Servers and Enterprise Networks. Electronic Cash and Electronic Payment Schemes: Internet Monetary Payment & Security Requirements. Payment and Purchase Order Process, On-line Electronic cash.

UNIT - III

Internet/Intranet Security Issues and Solutions :

The need for Computer Security, Specific Intruder Approaches, Security Strategies, Security Tools, Encryption, Enterprise Networking and Access to the Internet, Antivirus Programs, Security Teams.

UNIT IV

Master Card/Visa Secure Electronic Transaction :

Introduction, Business Requirements, Concepts, payment Processing. E-Mail and Secure E-mail Technologies for Electronic Commerce: Introduction, The Means of Distribution, A model for Message Handling, E-mail working, Multipurpose Internet Mail Extensions, Message Object Security Services,

Comparisons of Security Methods, MIME and Related Facilities for EDI over the Internet.

UNIT - V

Internet Resources for Commerce :

Introduction, Technologies For web Servers, Internet Tools Relevant to Commerce, Internet Applications for Commerce, Internet Charges, Internet Access and Architecture, Searching the Internet. Advertising on Internet: Issues and Technologies. Introduction, Advertising on the Web, Marketing creating web site, Electronic Publishing Issues, Approaches and Technologies: EP and web based EP.

TEXT BOOKS :

1. Web Commerce Technology Handbook by *DanielMinoli*, *Emma Minoli, McGraw-Hill*
2. Frontiers of electronic commerce – *Kalakata, Whinston,* Pearson.

REFERENCEBOOKS :

1. Frontiers of electronic commerece by *Galgotia.*
2. E-Commerce fundamentals and applications *Hendry Chan*, *Raymond Lee, Tharam Dillon*, *Ellizabeth Chang, JohnWiley*.
3. E-Commerce, *S.Jaiswal –Galgotia*.
4. E-Commerce, *EfrainTurbon, Jae Lee, DavidKing, H.Michael Chang.*
5. Electronic Commerce – *Gary P.Schneider – Thomson.*
6. E-Commerce – Business, Technology, Society, Kenneth *C.Taudon, Carol*.

I Year M. Tech. CSE I - Semester

L	T	P	To	C
3	1	-	4	4

(CS619) COMPUTER GRAPHICS

(ELECTIVE - II)

Objective of the Course :

- *Computer graphics is the art and science of communicating information using images that are generated and presented through computation. This requires (a) the design and construction of models that represent information in ways that support the creation and viewing of images,(b) the design of devices and techniques through which the person may interact with the model or the view, and (c) the creation of techniques for rendering the model. The goal of computer graphics course is to learn the techniques that engage the person's visual centers alongside other cognitive centers in understanding.*

UNIT - I

Introduction :

Application areas of Computer Graphics, Overview of graphics systems, Video display devices, Raster-scan systems, Random scan systems, Graphics monitors and Work stations, Input devices.

UNIT - II

Output primitives :

Points and lines, Line drawing algorithms, Mid-point circle and ellipse algorithms. Filled area primitives - Scan line polygon fill algorithm, boundary-fill and flood-fill algorithms, Attributes of output primitives - Line attributes, Character attributes and Anti aliasing.

UNIT - III

2-D Geometrical transforms :

Translation, Scaling, Rotation, Reflection and shear transformations, Matrix representations and Homogeneous coordinates, Composite transforms, Transformations between coordinate systems.

2-D viewing : The viewing pipeline, Viewing coordinate reference frame, Window to view-port coordinate transformation, Viewing functions, Cohen-Sutherland and Cyrus-beck line clipping algorithms, Sutherland-Hodgeman polygon clipping algorithm.

UNIT - IV

3-DGeometric transformations : Translation, Rotation, Scaling, Reflection and shear transformations, Composite transformations. **3-D viewing** - Viewing pipeline, Viewing coordinates, View volume and general projection transforms and Clipping

UNIT - V

3-D object representation : Polygon surfaces, Quadric surfaces, Spline representation, Her mite curve, Bezier curve and B-Spline curves, Bezier and B-Spline surfaces. Classification, back-face detection, Depthbuffer, Scan-line, Depth sorting, BSP-tree methods, Area sub-division and Octree methods.

TEXT BOOKS :

1. Computer Graphics *C version* - *Donald Hearn* and *M. Pauline Baker*, Pearson Education.
2. Computer Graphics Principles& practice -*C,* Foley, *Van Dam*, *Feiner* and *Hughes,* second edition in C, Pearson Education.

REFERENCEBOOKS :

1. Computer Graphics - *Donald Hearn* and *M.Pauline Baker*, second Edition, PHI/Pearson Education.
2. Computer Graphics Second edition, *Zhigand xiang*, *Roy Plastock, Schaum's* outlines, *Tata Mc- Graw hill* edition.

I Year M.Tech. CSE I - Semester

L	T	P	To	C
3	1	-	4	4

CS625 PERFORMANCE EVALUATION OF COMPUTER SYSTEMS

(Elective –I)

Objective of the Course:

To impart the fundamental concepts of computer systemperformance evaluation.

UNIT - I

A Systematic Approach to Performance Evaluation; Techniques for Performance Evaluation - Analytical Modelling, Simulation and Measurement; Performance Metrics - Selection and Utility Classification; Performance Requirements Specification; Types of Workloads; Art of DataPresentation; Ratio Games.

UNIT - II

Key Characteristics of Commonly used Probability Distributions; Stochastic Processes, Markov Processes, Markov Chains and Markov Models.

UNIT - III

Queuing Models - introduction to Queuing Theory, Analysis of a single Queue, Queuing Networks, Operational laws, Mean Value Analysis, Convolution Algorithm and Hierarchical Decomposition of Large Queuing Networks.

UNIT - IV

Simulation - Introduction, Examples and Concepts in Discrete-Event Simulation; Random-Numbers - Properties and Techniques for Generating; Random-Variate generation techniques; Input Modelling. Simulation Models - Verification and validation;

UNIT -V

Design of Experiments - Introduction, 2^k Factorial Designs, 2^k r Factorial Designs, 2^{k-p} Fractional Factorial Designs and Full Factorial Designs with k Factors.

TEXT BOOKS:

1. *Raj Jain*, The Art of Computer Systems Performance Analysis,Wiley India Pvt Ltd, Reprint 2010 (for Units I, III and V)
2. *Kishor Shridharbhai Trivedi*, Probability and Statistics with Reliability, Queuing, and Computer Science Applications, 2nd Edition, Wiley 2001 (for Unit II)
3. *Jerry Banks, John S. Carson II, Barry L. Nelson, David M. Nicol* and *P Shahabudeen,* Discrete-Event System Simulation, Fourth Edition, Pearson Prentice Hall, Second Impression 2008 (For Unit IV)
4. NPTEL Video Lectures on course topics

IYear M.Tech. CSE I - Semester

L	T	P	To	C
-	-	3	3	2

CS623 DATA STRUCTURES AND ALGORITHMS LAB

Objective of the Course:

In this laboratory after completing experiments student has to learn how to analyze a problem & design the solution for the problem. In addition to that, solution must be optimum, i.e., time complexity & memory usage of the solution must be very low.

1. Code the List ADT operations using array, single linked list, double linked list.
2. Write a program that reads two lists of elements, prints them, reverses them, prints the reverse list, sort the lists, print the sorted lists, merges the list, prints merge list.
3. Implement a polynomial ADT and write a program to read two polynomials and print them, adds the polynomials, prints the sum, multiply the polynomials and print the product.
4. Implement stack ADT and write a program that reads an infix arithmetic expression of variables, constants, operators (+, -, *, /) and converts it into the corresponding postfix form. Extend the program to handle parenthesized expression also.
5. Implement Queue ADT and write a program that performs Radix sort on a given set of elements.
6. Implement the following sorting operations:-
   (a) Merge Sort (b) Quick Sort
7. Implement AVL Tree ADT and Write a program that interactively allows
   a. Insertion b. Deletion c. Find_min d. Find_max
8. Write a C++ program to find optimal ordering of matrix multiplication. (Note: Use Dynamic programming method).
9. Consider the problem of eight queens on an (8x8) chessboard. Two queens are said to attack each other if they are on the same row, column, or diagonal. Write a C++ program that implements backtracking algorithm to solve the problem i.e. place eight non-attacking queens on the board.
10. Write a C++ program to find the strongly connected components in a digraph.
11. Write a C++ program to implement dynamic programming algorithm to solve all pairs shortest path problem.

12. Write a C++ program to solve 0/1 knapsack problem using the following:
    a) Greedy algorithm.
    b) Dynamic programming algorithm.
    d) Branch and bound algorithm.
13. Write a C++ program that uses dynamic programming algorithm to solve the optima binary search tree problem.
14. Write a C++ program for solving traveling sales persons problem using the following:
    a) Dynamic programming algorithm.
    b) The back tracking algorithm.
    c) Branch and Bound.

TEXT BOOKS :

1. *Richard F.Gilberg, Behrouz A.Forouzan, Thomson,* “Data Structures,A Pseudocode Approac with C++”, 1^{st} ed., Business Information Press, 2007.
2. *D.S.Malik, Thomson*, “Data Structures Using C++”, 1^{st} ed., Cengage Learning, 2007.
3. *Ellis Horowitz, Satraj Sahni* and *Rajasekharam,* “Fundamentals of Computer Algorithms”, 2^{nd} ed., Galgotia publications pvt. Ltd, 2006.

I Year M.Tech. CSE I - Semester

L	T	P	To	C
-	-	3	3	2

CS523 ADVANCED DATABASE MANAGEMENT SYSTEMS LAB

Objective of the Course :

This lab work will enhance database handling, data manipulation and data processing skills through SQL & PL/SQL, which will help them in developing data centric computer applications.

Week 1&2

Familiarization of the MySQL database – creation and manipulation of tables. (6 Hours)

Week 3&4

Analyze a given situation, develop an ER model and convert the ER model to Relational model. (6 Hours)

Week 5&6

Implement the database using MySQL and manipulate the tables using SQL commands. (6 Hours)

Lab Course Project :

Week 7&8

Course project topic selection , developing an ER model and converting ER model to a Scheme diagram (6 Hours)

Week 9

Developing a data flow diagram for the problem specification. (3 Hours)

Week 10&11

Implementation of front end pages. (6 Hours)

Week 12&13&14

Implementation of server side pages and verifying the normalization (9 Hours)

Week 15

Testing the constraints and project (3 Hours)

Week 16

Submission and evaluation of project

TEXT BOOKS:

1. *Elmasr, Navathe,* ‘Fundamentals of Database Systems’, 4 th ed., Pearson Education,
2. *Reghu Ramakrishnan*, Databse Management Systems, *McGrawHill*

I Year M.Tech. CSE II - Semester

L	T	P	To	C
3	1	-	4	4

CS502 DATAMINING AND DATAWAREHOUSING

Objective of the course :

- *To understand and implement classical algorithms in data mining and datawarehousing*
- *To assess the strengths and weaknesses of the algorithms*
- *To identify the application area of algorithms, and apply them*

UNIT - I

Data Warehouse – Introduction **:**

A Multi-dimensional data model, DataWarehouse Architecture, DataWarehouse Implementation, From Data Warehouse to Data Mining. **Data Mining** – Introduction, Data Mining, Kinds of Data, Data Mining Functionalities, Classification of Data Mining Systems, Major issues in Data Mining.

UNIT - II

Data Preprocessing:

Data cleaning, Data Integration & Transformation, Data Reduction, Discrimination & Concept Hierarchy Generation, Data Mining Primitives. **Mining Association rules in large databases** –Association rule mining, mining single-dimensional Boolean Association rules from Transactional Databases, Mining Multi-dimensional Association rules from relational databases & Data Warehouses.

UNIT - III

Concept Description:

Introduction, Data Generalization and Summarization-Based Characterization, Analytical Characterization, Mining Class Comparisons, Mining Descriptive Statistical Measures in Large Databases.

UNIT - IV

Classification & Prediction:

Introduction, Classification by Decision tree induction, Bayesian Classification, , Classification by Back propagation, Other Classification Methods, Prediction, Classifier accuracy.

Mining Complex Type of Data – Multidimensional Analysis and Descriptive Mining of Complex Data Objects, Mining Spatial Databases, Mining Multimedia Databases, Mining Text Databases, Mining the World Wide Web.

UNIT - V

ClusterAnalysis :

Introduction, Types of data in Cluster analysis, A categorization of major clustering methods, partitioning methods, Hierarchical methods, Density-Based Methods: DBSCAN, Grid-based Method: STING; Model-based Clustering Method: Statistical approach, Outlier analysis.

TEXT BOOKS:

1. Data Mining Concepts & Techniques – *Jiawei Han Micheline Kamber –Morgan Kaufmann* Publishers, Second Edition.

REFERENCEBOOKS :

1. Advances in Knowledge Discover and Data Mining- *Usama M.Fayyad, Gregory Piatetsky Shapiro*, *Padhrai Smyth, RamasamyUthurusamy*,, TheM.I.T. Press, 1996.
2. The Data Ware house *Toolkit, RalphKimball, Margy Ross, JohnWiley* and Sons Inc., 2002.
3. Building Data Mining Applications for CRM -*Alex Berson, Stephen Smith, Kurt Thearling*, *Tata*

I Year M.Tech. CSE II - Semester

L	T	P	To	C
3	1	-	4	4

CS504 NETWORK SECURITY & CRYPTOGRAPHY

Objective of the course :

This Course focuses towards the introduction of network security using various cryptographic algorithms. Underlying network security applications. It also focuses on the practical applications that have been implemented and are in use to provide email and web security.

UNIT - I

Introduction:

Security Trends, Security attacks, Security services, Security Mechanisms, A Model for Network Security Model, Classical Encryption Techniques, Symmetric Cipher Model, Substitution Techniques, Transposition Techniques, Rotor Machines, Steganography.

UNIT - II

Block Ciphers and Data Encryption Standard:

Block Cipher Principles, Data Encryption Standard, Strength of DES, Differential and Linear Cryptanalysis, Block Cipher Design Principles, Advanced Encryption Standard, Evaluation Criteria of AES,AES Cipher, Multiple encryption and Triple DES, Block Cipher Modes of Operation, RC4. Cast-128, Blowfish Algorithms

UNIT - III

Public - Key Encryption and Hash Functions :

Principles of Public Key Cryptosystems, RSA Algorithm, KeyManagement , Message Authentication and Hash Functions, Authentication Requir ements, Authentication Functions, Message Authentication, Hash Functions, Security of Hash Functions and MACs, Digital. Signatures, Authentication Protocols, Digital Signature Standard.

UNIT - IV

Network Security Applications :

Kerberos, X.509Authentication Service, Public Key Infrastructure, Pretty Good Privacy, S/MIME , IP Security Overview, IP Security architecture, Authentication Header, Encapsulating Security Payload, Combining Security associations, Key Management.

VIGNAN UNIVERSITY

UNIT - V

System Security:

Secure Socket Layer and Transport Layer Security, Secure Electronic Transaction, Intruders, Intrusion Detection, Password Management, Malicious Software, Firewalls, Trusted Systems.

TEXT BOOKS :

1. Cryptography and Network security by *William Stallings*, Pearson Education, 4th ed.,

REFERENCEBOOKS :

1. *William Stallings* , "Network Security Essentials Applications and Standards", 2nd ed., Pearson Education, 2003.
2. *Charlie Kaufman, Radis Perlman* and *Mike Speciner*, "Network Security – Private Communication in a Public World" 2nd ed., Pearson Education, 2003.
3. *Cyrus Piekari, Anton Chuvakin*, "Security Warrior", 2nd ed., Oreilly Publishers, 2005.
4. *Peborab Russell, G.T. Gangeni* Sr, "Computer Security Basics", 2nd ed., Oreilly Publishers, 2006.

I Year M. Tech. CSE II - Semester

L	T	P	To	C
3	1	-	4	4

CS506 OBJECT ORIENTED ANALYSIS AND DESIGN

Objective of the Course:

- *gain enough competence in object-oriented analysis and design (OOAD) to tackle a complete OO project*
- *acquire UML, a common language for talking about requirements, designs, and component interfaces*
- *understand the main principles of good OO design*
- *understand what major tasks are appropriate to developing OO models and software*
- *understand the issues and options in reuse and component based development*

UNIT - I

Introduction to UML:

Importance of modeling, principles of modeling, object oriented modeling, conceptual model of the UML,
Architecture, Software Development Life Cycle.

UNIT - II

Basic Structural Modeling:

Classes, Relationships, common Mechanisms, and diagrams. Advanced Structural Modeling : Advanced
classes, advanced relationships, Interfaces, Types and Roles, Packages.

UNIT - III

Class &Object Diagrams:

Terms, concepts, modeling techniques for Class & Object Diagrams.

UNIT - IV

Basic Behavioral Modeling:

Interactions, Interaction\ diagrams. Basic Behavioral Modeling-II : Use cases, Use case Diagrams, Activity diagrams Advanced Behavioral Modeling : Events and signals, state machines, processes and Threads, time and space, state chart diagrams.

UNIT - V

Architectural Modeling :

Component, Deployment, Component diagrams and Deployment diagrams.

TEXT BOOKS :

1. The Unified Modeling Language User Guide -*Grady Booch, James Rumbaugh, Ivar Jacobson* : Pearson Education.

REFERENCE BOOKS :

1. UML 2 Toolkit - *Hans-Erik Eriksson*, *Magnus Penker, Brian Lyons, David Fado:WILEY-Dreamtech* India Pvt. Ltd.
2. Fundamentals of Object Oriented Design in UML - *Meilir Page-Jones*: Pearson Education.
3. Modeling Software Systems Using UML2 - Pascal Roques:*WILEYDreamtech* India Pvt. Ltd.
4. Object OrientedAnalysis & Design -*Atul Kahate*: The *McGraw-Hill* Companies.

I Year M.Tech CSE II - Semester

L	T	P	To	C
3	1	-	4	4

CS508 EMBEDDED SYSTEMS

Objective of the course :

Emphasis on Comprehensive treatment of Embedded Hardware and Real. Time Operating systems along with case studies in tune with the requirements of Industry. The example-driven approach puts you on a fast track to understanding embedded-system programming and applying what you learn to your projects.

UNIT - I

Introduction to Embedded Systems :

Applications of ES, Embedded Hardware Units and Devices , Embedded Software, Examples of Embedded Systems, Design Metrics in ES, Challenges in ES Design.

UNIT - II

Introduction :

8051 Micro controller Hardware, Input/ Output Ports and Circuits, External Memory, Counter and Timers, Serial data Input/ Output, Interrupts.

UNIT - III

Data Transfer and Logical Instructions :

Arithmetic Operations, Decimal Arithmetic. Jump and Call Instructions, Further Details on Interrupts.

UNIT - IV

Introduction to Real Time Operating Systems :

Tasks and Task States, Tasks and Data, Semaphores, and Shared Data; Message Queues, Mailboxes and Pipes, Timer Functions, Events, Memory Management, Interrupt Routines in an RTOS Environment.

UNIT - V

Principles Basic Design :

Using a Real-Time Operating System, Embedded Software Development Tools: Host and Target machines, Linker/Locators for Embedded Software, Getting Embedded Software into the Target System.

VIGNAN UNIVERSITY

TEXT BOOKS :

1. Embedded Systems, *Raj Kamal*, TMH.
2. The 8051Microcontroller, 3rd ed., *Kenneth J.Ayala*, *Thomson.*
3. An Embedded Software Primer, *David E. Simon*, PearsonEducation.

REFERENCEBOOKS :

1. Computers as Components-principles of Embedded computer system design, *Wayne Wolf*, *Elseveir*
2. Embedding system building blocks, Labrosse, via CMP publishers.
3. Micro Controllers, *Ajay V Deshmukhi*, TMH.
4. Embedded System Design, *Frank Vahid, Tony Givargis, JohnWiley*. Microcontrollers, *Raj kamal*, Pearson Education.

I Year M.Tech. CSE II - Semester

L	T	P	To	C
3	1	-	4	4

CS510 DIGITAL IMAGE PROCESSING

(ELECTIVE - III)

Objective of the course :

- *This course introduces the analytical tools and methods, which are currently used in digital image processing and pattern recognition as applied to image information for human viewing. After completing the students should be able to understand the concepts of digital image processing and pattern recognition*

UNIT - I

Elements of visual perception:
Image sampling and quantization Basic relationship between pixels – Basic geometric transformations- Introduction to Fourier Transform and DFT – Properties of 2D Fourier Transform – FFT – Separable Image Transforms -Walsh – Hadamard – Discrete Cosine Transform.

UNIT - II

Spatial Domain methods:
Basic gray level transformation – Histogram equalization – Image subtraction – Image averaging –Spatial filtering: Smoothing, sharpening filters – Laplacian filters – Frequency domain filters: Smoothing – Sharpening filters – Homomorphic filtering Model of Image Degradation/ restoration process – Noisemodels – Inverse filtering -Least mean square filtering –Blind image restoration.

UNIT - III

Lossless compression :
Variable length coding – LZW coding – Bit plane coding. Lossy Compression: Transform coding –Wavelet coding – Basics of Image compression standards: JPEG, MPEG. Edge detection – Thresholding - Region Based segmentation – Boundary representation: chain codes- Polygonal approximation – Boundary segments. Ref. Books

UNIT - IV

Introduction:
Machine perception , pattern recognition example, pattern recognition systems, the design cycle.

Bayesian Decision Theory: Introduction, contenous features – two categories classification ,minimumerror-rate classification, zero-one loss function, classifiers, discriminant functions.

UNIT - V

Normal density :
Univariate andmultivariate density , discriminant functions for the normal dencity, Bayes decision theory – discrete features, compound Bayesian decision theory and context.
Maximum likelihood and Bayesian parameter estimation: Introduction, maximum likelihood estimation, Bayesian Estimation, Bayesian parameter estimation – Gaussian Case.

TEXT BOOK :

1. Digital Image Processing, *Rafael C Gonzalez, Richard E Woods* 2nd Edition,. Pearson Education 2003
2. Pattern classification, *Richard O. Duda , Peter E.Hart , David G.Stroke.Wiley* student edition. 2nd ed.,

REFERENCEBOOKS :

1. Image Processing Analysis and Machine Vision – *Millman Sonka, Vaclav hlavac, Roger Boyle, Thompson* Learning (1999).
2. Fundamentals of Digital Image Processing, *A.K. Jain*, PHI
3. Digital Image Processing andApplications, *Chanda DuttaMajumdar* Prentice Hall of India, 2000
4. Pattern Recognition and Image Analysis – *Earl Gose, Richard John baugh. Steve Jost* PHI 2004.

I Year M.Tech. CSE II - Semester

L	T	P	To	C
3	1	-	4	4

CS602 MODERN COMPILER DESIGN

(ELECTIVE - III)

Objective of the course :

- *Competent in programming language design and implementation.*
- *Aware of concepts of abstract language classification, context free grammars, symbol tables, code optimization and parsing techniques.*
- *Understand language and parsing topics covered in pre-requisite courses, such as programming languages, Introduction to Algorithms and Discrete Mathematics.*
- *Competent in large-scale software planning and design.*
- *Competent in communicating and negotiating on a team-based project.*

UNIT - I

Introduction to Compiler :

Introduction to compiler, Different phases of a compiler: Lexical analyzer, Syntax analyzer, Semantic analyzer, Intermediate code generation, Code optimizer, and code generation.

UNIT - II

Parsing Techniques:

Syntactic specification: Context-free grammars, Derivation and parse trees, Basic parsing techniques.

UNIT - III

LRParsers : **LRParsers**:

SLR, Canonical LR and LALR , Syntax directed translation schemes, Various forms of intermediate code.

UNIT - IV

Code Generation :

Code generation: Issues in the design of a code generator, The target machine, Runtime storage management, Basic blocks and flow graphs, Simple code generator, Register allocation and assignment.

UNIT - V

Code Optimization :

Code optimization: Principle of sources of optimization, Optimization of basic blocks, loops in flow graphs, Introduction to global data-flow analysis, Data-flow analysis of structured flow graphs.

TEXT BOOKS :

1. Compilers, Principles, Techniques and Tools -*A.V.AHO, R.SETHI, J.D.ULLMAN*, Pearson Education, 13th Indian Reprint, 2003
2. The Theory and Practice of Compiler Writing - *J.P. TREMBLAY, P.G. SORRENSON*, *McGraw Hill*, 1985

REFERENCEBOOKS :

1. *Lex &yacc – John R. Levine, Tony Mason, Doug Brown*, O'reilly
2. Modern Compiler Design- *Dick Grune, Henry E. Bal, Cariel T. H. Jacobs,Wiley* dreamtech.
3. Engineering a Compiler-*Cooper* & *Linda, Elsevier*.
4. Compiler Construction, *Louden, Thomson*.

I Year M.Tech. CSE II - Semester

L	T	P	To	C
3	1	-	4	4

CS604 CLUSTER AND GRID COMPUTING

(ELECTIVE - III)

Objective of the course :

- To provide an over view of the basic concepts of Grid Computing
- To highlight the advantages of deploying Grid Computing
- To illustrate the practical adoption of a Grid deployment through real life case studies.

UNIT - I

Introduction to Grid Computing :

Chapter 1 (Page No 25 – 46) & Chapter 2 (Page No 49 – 67). Introduction – The Grid – Past, Present and Future –Applications of grid computing organizations and their roles.

UNIT - II

Grid Computing Architecture :

Chapter 3 (Page No 69 – 79) & Chapter 9 (Page No 155 – 200) & Chapter 5 (Page No 93-134). Grid Computing anatomy – Next generation of Grid computing initiatives– Merging the Grid services architecture with Web services architecture.

UNIT - III

Grid Computing Technologies :

Chapter 10 (Page No 201 – 235) . OGSA – Sample use cases that drive the OGSA platform components – OGSI and WSRF– OGSA Basic Services – Security standards for grid computing.

UNIT - IV

Grid Computing Tool Kit :

Chapter 11 (Page No 239 – 350) . Globus Toolkit –Versions – Architecture –GT Programming model –A sample grid service implementation.

UNIT V

High Level Grid Services :

Chapter 14 (Page No 351 – 374). High level grid services – OGSI .NET middleware Solution Mobile OGSI.NET for Grid computing on Mobile devices.

TEXT BOOKS :

1. Grid Computing - Joshy Joseph & Craig Fellenstein, Pearson/ PHI PTR- 2003.

REFERENCE BOOKS :

1. Grid Computing: Making the Global Infrastructure a reality – Fran Berman, Geoffrey Fox, Anthony J.G. Hey, John Wiley and sons,2003.
2. Grid Computing:A Practical Guide to Technology and Applications - Ahmar Abbas, Charles River media, 2003.

I Year M. Tech. CSE II - Semester

L	T	P	To	C
3	1	-	4	4

CS606 BIG DATA ANALYTICS

Objective of the Course:

- *Understand and apply the Big Data Flow to actual projects*
- *Being able to describe and apply the Data Analytics lifecycle to Big Data projects and lead other team members in the process*
- *Identify and successfully apply appropriate techniques (such as ML) and tools to solve actual Big Data problems (derive value from vast data sets)*
- *Have a n in-depth understanding of the Big Data ecosystem, specifically the Apache projects HDFS, Kafka, Map Reduce, Storm, Cassandra, and Mahout.*

UNIT - I

INTRODUCTION TO BIG DATA

Introduction to BigData Platform – Traits of Big data -Challenges of Conventional Systems - Web Data – Evolution Of Analytic Scalability - Analytic Processes and Tools - Analysis vs Reporting - Modern Data Analytic Tools - Statistical Concepts: Sampling Distributions - Re-Sampling - Statistical Inference - Prediction Error.

UNIT - II

DATA ANALYSIS

Regression Modeling - Multivariate Analysis - Bayesian Modeling - Inference and Bayesian Networks - Support Vector and Kernel Methods - Analysis of Time Series: Linear Systems Analysis - Nonlinear Dynamics - Rule Induction - Neural Networks: Learning And Generalization - Competitive Learning - Principal Component Analysis and Neural Networks - Fuzzy Logic: Extracting Fuzzy Models from Data - Fuzzy Decision Trees - Stochastic Search Methods.

UNIT - III

MINING DATA STREAMS

Introduction To Streams Concepts – Stream Data Model and Architecture - Stream Computing - Sampling Data in a Stream – Filtering Streams – Counting Distinct Elements in a Stream – Estimating Moments – Counting Oneness in a Window – Decaying Window - Real time

Analytics Platform(RTAP) Applications - Case Studies - Real Time Sentiment Analysis, Stock Market Predictions.

UNIT - IV

FREQUENT ITEMSETS AND CLUSTERING

Mining Frequent Item sets - Market Based Model – A priori Algorithm – Handling Large Data Sets in Main Memory – Limited Pass Algorithm – Counting Frequent Items ets in a Stream – Clustering Techniques – Hierarchical – K-Means – Clustering High Dimensional Data – CLIQUE And PROCLUS – Frequent Pattern based Clustering Methods – Clustering in Non-Euclidean Space – Clustering for Streams and Parallelism.

UNIT - V

FRAMEWORKS AND VISUALIZATION

MapReduce – Hadoop, Hive, MapR – Sharding – NoSQL Databases - S3 - Hadoop Distributed File Systems – Visualizations - Visual Data Analysis Techniques - Interaction Techniques; Systems and Analytics Applications - Analytics using Statistical packages-Approaches to modeling in Analytics – correlation, regression, decision trees, classification, association-Intelligence from unstructured information-Text analytics-Understanding of emerging trends and technologies-Industry challenges and application of Analytics

TEXT BOOKS:

1. *Michael Berthold, David J. Hand*, “Intelligent Data Analysis”, Springer, 2007.
2. *AnandRajaraman* and *Jeffrey David Ullman*, “Mining of Massive Datasets”, Cambridge University Press, 2012.
3. *Bill Franks*, “Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics”, *John Wiley* & sons, 2012.
4. *Glenn J. Myatt,* “Making Sense of Data”, *John Wiley* & Sons, 2007
5. Pete Warden, “Big Data Glossary”, O’Reilly, 2011.
6. *Jiawei Han*, *MichelineKamber* “Data Mining Concepts and Techniques”, Second Edition, Elsevier, Reprinted 2008.

I Year M. Tech. CSE II - Semester | L T P To C
3 1 - 4 4

CS608 ADVANCED SOFTWARE ENGINEERING

(ELECTIVE - IV)

Objective of the Course :

- *After completion of this course the student will have clear idea about Software Engineering and different phases in a project development.*
- *There is a detailed discuss about software architecture, software analysis and design and configuration management, and Metrics, quality assurance etc.*
- *A student can take-up a real world project as a part of final year project work and he can proceed in phased manner in completing the project. He will have clear idea about work flow in a software organization so that he/she faces interviews well*

UNIT - I

Introduction to Software Engineering:

Evolving Role of Software – Software – Changing Nature of Software – Legacy Software – Software Myths. **A Generic View of Process** –Software Engineering – A Layered Technology –A Process Framework – CMMI – Process Patterns – Process Assessment – Personal and Team Process Models – Process Technology – Product and Process.

UNIT - II

Process Models :

Perspective Models – The Waterfall Model – Incremental Process Models – Evolutionary Process Models Specialized Process Models – The unified Process **An Agile View of Process** – What is Agility –What is an Agile Process – Agile Process Models – Extreme Programming – Adaptive Software Development –Dynamic Systems Development Method – Scrum – Crystal – Feature Driven Development –Agile Modeling.

UNIT - III

Software Testing A strategic approach to software testing, test strategies for conventional software, Integration Testing, Validation Testing, System Testing, The Art of Debugging, Cost estimation models.

UNIT - IV

Life cycle of Processes :

Engineering and production stages, inception, Elaboration, construction, transition hases.

Artifacts of the process: The artifact sets, Management artifacts, Engineering artifacts, programmatic artifacts **Model based software architectures :** A Management erspective and technical perspective.

Work Flows of the process: Software process workflows, Iteration workflows.

UNIT - V

Checkpoints of the Process : Major mile stones, Minor Milestones, Periodic status assessments.

Iterative Process Planning: Work breakdown structures, planning guidelines, cost and schedule estimating, Iteration planning process, Pragmatic planning.

Project Organizations and Responsibilities: Line-of-Business Organizations, Project Organizations, evolution of Organizations.

Future Software Project Management: Modern Project Profiles, Next generation Software economics, modern process transitions.

TEXT BOOKS :

1. Software Engineering A Practitioner's Approach – *Roger S.Pressman*, Sixth Edition, *Mc GrawHill* 2. Software Project Management, Walker Royce: Pearson Education, 2005.

REFERENCE BOOKS :

1. Software Project Management, *Bob Hughes* and *Mike Cotterell*: *Tata McGraw*-Hill Edition.
2. Software Project Management, *oel Henry*, Pearson Education.
3. Software Project Management in practice, *Pankaj Jalote*, Pearson Education 2005.

I Year M. Tech. CSE II - Semester

L	T	P	To	C
3	1	-	4	4

CS610 ADHOC SENSOR NETWORKS

(ELECTIVE - IV)

Objective of the course :

- *This course explores the basics of working with internet including WWW, Email, Browsing, Chatting etc., and also explores the potential of secured electronic transactions, E-mail security and electronic publishing.*

UNIT - I

Fundamentals of Adhoc Networks :

Overview and Communication aspects of MANETs, Applications of MANETs, Challenges,

Topology-Based versus Position-Based Routing Approaches, Topology-Based Routing Protocols – Proactive, Reactive and Hybrid protocols, Position-Based Routing, Other Routing Protocols

UNIT - II

Broadcasting, Multicasting and Geocasting in Manets :

Introduction, The Broadcast Storm - Broadcasting in a MANET, Flooding-Generated Broadcast Storm, Redundancy Analysis, Rebroadcasting Schemes, Multicasting - Issues in Providing Multicast in a MANET, Multicast Routing Protocols, Comparison, Geocasting -Geocast Routing Protocols, Comparison.

UNIT - III

Wireless Sensor Network :

SIntroduction, The Mica Mote, Sensing and Communication Range, Design Issues, Energy Consumption, Clustering of Sensors, Applications of Sensor Networks.

UNIT - IV

Data Retrieval in Sensor Networks :

Introduction, Classifications of WSNs, MAC layer Design issues and Protocols, Routing Protocols of Sensor Networks - Network Structure Based Routing, Flat versus Hierarchical Routing, Multipath and Query Based Routing, Location- Based Routing, Transport Layer, High-Level Application Layer Support, Adapting to the Dynamic Nature of WSNs.

UNIT - V

Security and Connectivity to other Networks :

Introduction, Security in Ad Hoc Networks, Distributed Systems Security, Key Management, Secure Routing, Cooperation in MANETs, Security of Wireless Sensor Networks, Intrusion Detection Systems, Ingredients of a Heterogeneous Architecture, Protocol Stack, Comparison of the Integrated Architectures.

TEXT BOOKS :

1. *Ad hoc and Sensor Networks* - Theory and Applications, by *Carlos Cordeiro* and *Dharma P. Agrawal,* World Scientific Publications, March 2006, ISBN 981-256-681-3.
2. *Holger Karl and Andreas Willig Protocols and Architectures for Wireless Sensor Networks WILEY (ISBN: 0-470-09510-5)*
3. Ad Hoc Wireless Networks : Architectures and Protocols. *C. Siva Ram Murthy* (Author).Publisher: Prentice Hall PTR,May 28, 2004.4. Wireless Sensor Networks: An Information Processing Approach by *Feng Zhao* and *Leonidas J. Guibas* (Morgan Kaufmann, 2004)

REFERENCEBOOKS :

1. High Performance Communication Networks - *Jean warland* and *Pravin Varaiya*, 2ndEdition, Harcourt and *Morgan Kauffman*, London, 2000.
2. Communication networks - *Leon Gracia, Widjaja, Tata McGraw-Hill,* New Delhi, 2000.
3. ATM Networks - *Sumit Kasera, Pankaj Sethi*, *Tata McGraw-Hill*, New Delhi, 2000.
4. Data Communication and Networking - *Behrouz.a. Forouzan, Tata McGraw-Hill*, New Delhi, 2000.

I Year M. Tech. CSE II - Semester

L	T	P	To	C
3	1	-	4	4

CS612 INTERNET TECHNOLOGIES

(ELECTIVE - IV)

Objective of the Course:

This course demonstrate an in-depth understanding of the tools and Web technologies necessary for business application design and development. The course covers client side scripting like HTML, JavaScript and server side scripting like servlets, JSPs. and also XML and web servers and database interfacing.

UNIT - I

HTML Common tags :

List, Tables, images, forms, Frames, image maps : Cascading Style sheets; Introduction to Java Scripts, Objects in Java Script, Dynamic HTML with Java Script.

UNIT - II

XML :

Document type definition, XML Schemas, Document Object model, Presenting XML, Using XML Processors: DOM and SAX.

UNIT - III

Web Servers and Servlets :

Tomcat web server, Introduction to Servlets: Lifecycle of a Servlet, JSDK, The ServeletAPI, The javax. servlet Package, Reading Servlet parameters, Reading Initialization parameters. Introduction to Filters in servlets, Filter Life Cycle, Processing filters, Programming Filters, Configuring Filters, Container's rule for Ordering filters,The javax. servlet HTTP package, Handling Http Request & Responses,Using Cookies-Session Tracking, Security Issues,

UNIT - IV

Introduction to JSP:

The Problem with Servlet. The Anatomy of a JSPPage, JSP Processing. JSP. Application Designwith MVC Setting Up and JSP Environment Generating Dynamic Content, Using Scripting Elements Implicit JSP, Objects, Conditional Processing – Displaying Values Using an Expression to Set an Attribute, Declaring Variables and Methods Error Handling and

Debugging Sharing, Data Between JSP pages, Requests, and Users Passing Control and Date between Pages – Sharing Session and Application Data – Memory, Usage Considerations.

UNIT - V

Database Access :

Database Programming using JDBC, Studying Javax.sql.* package, Accessing a Database from a JSP Page, Application – Specific Database Actions, Deploying JAVA Beans in a JSP Page, custom tags, introduction to The Java Server Pages Standard Tag Library (JSTL 1.0), Introduction to struts framework.. Simple example in struts.

TEXT BOOKS :

1. *Chris Bates*, "Web Programming, building internet applications", 2nd ed.,WILEY Dreamtech.
2. The complete Reference Java 2 Fifth Edition by *Patrick Naughton* and *Herbert Schildt*. TMH.
3. Java Server Pages –Hans Bergsten, SPDO'Reilly.

REFERENCEBOOKS :

1. Programming world wide web-Sebesta, Pearson
2. Core Servletsandjavaserver Pages Volume 1: Core Technologies By Mart Hall and Larry Brown Pearson
3. Internet and World Wide Web – How to program by *Dietel* and *Nieto* PHI/Pearson Education Asia.
4. *FiruzaAibara*, "HTML for beginners", 2nd ed., SPD Oreilly Publishers, 2010.
5. *Murach*'s beginning JAVA JDK 5, Murach, SPD.
6. *Jennifer Niederst, Robbins*, "Learning web Design", 3rd ed., SPD, Oreilly Publishers, 2010.

I Year M. Tech. CSE II - Semester

L	T	P	To	C
3	1	-	4	4

CS626 CLOUD COMPUTING

(Elective – IV)

Objective of the Course:

Cloud computing has evolved as a very important computing model, which enables information, software, and shared resources to be provisioned over the network as services in an on-demand manner. This course provides an insight into what is cloud computing and the various services cloud is capable.

UNIT - I

Introduction: Definition, Historical developments, Computing platforms and technologies.

Principles of Parallel and Distributed Computing: Parallel versus distributed computing, Elements of parallel computing, Elements of distributed computing, Technologies for distributed computing.

UNIT - II

Virtualization: Characteristics, Virtualization techniques, Virtualization and cloud computing, Pros and cons of virtualization, Technology examples.

Cloud Computing Architecture: Cloud reference model, Types of clouds, Economics of clouds, Open challenges.

Aneka: Cloud Application Platform: Framework overview, Anatomy of the Aneka container, Building Aneka clouds, Cloud programming and management.

UNIT - III

Concurrent Computing- Thread Programming: Programming applications with threads, Multithreading with Aneka, Programming applications with Aneka threads.

High Throughput Computing- Task Programming: Task computing, Task-based application models, Aneka task-based programming.

UNIT - IV

Data Intensive Computing – Map-Reduce Programming: Introduction, Technologies for data-intensive computing, Aneka MapReduce programming. Cloud Platforms in Industry: Amazon web services, Google AppEngine, Microsoft Azure.

UNIT - V

Cloud Applications: Scientific applications in – Healthcare, Biology, Geo-science; Business applications in – CRM and ERP, Productivity, Social networking, Media applications, Multiplayer online gaming.

Advanced Topics in Cloud Computing: Energy efficiency in clouds, Market based management of clouds, Federated clouds / InterCloud, Third party cloud services.

TEXT BOOKS :

1. *Buyya R, Vecchiola C, Selvi S T, Mastering Cloud Computing*, *McGraw Hill* Education (India), 2013.

REFERENCE BOOKS :

1. *Buyya R, Broberg J, Goscinski A, Cloud Computing - Principles and Paradigms*, Wiley, 2011.
2. *Rittinghouse J W, Ransome J F, Cloud Computing - Implementation, Management, and Security*, CRC Press, 2010.
3. *Velte A T, Velte T J, Cloud Computing - A Practical Approach*, McGraw Hill, 2011.
4. *Shroff G, Enterprise Cloud Computing - Technology,Architecture, Applications*, Cambridge University Press, 2010.
5. *Antonopoulos N, Gillam L, Cloud Computing - Principles, Systems and Applications*, Springer, 2010.
6. *Furht B, Escalante A, Handbook of Cloud Computing*, Springer, 2010.
7. *Sosinsky B, Cloud Computing Bible*, Wiley, 2011.
8. *Joseph J, Fellenstein C F, Grid Computing*, Pearson, 2004.

I Year M. Tech. CSE II - Semester

L	T	P	To	C
-	-	3	3	2

CS522 UML LAB

Objective of the Course:

- *Main objective of this lab is to enable the student to practice the object-oriented analysis and design through UML on a particular application (project) so that he will apply same methodology in miniproject which has to be done in final year. And also it will give exposure to tools that support UML and Object oriented software development.*

1. The student should take up the case study of Unified Library Application which is mentioned in the theory, and Model it in different views i.e Use case view, logical view, component view, Deployment view, Database design, forward and Reverse Engineering, and Generation of documentation of the project.

2. Student has to take up another case study of his/her own interest and do the same whatever mentioned in first problem. Some of the ideas regarding case studies are given in reference books which Were mentioned in theory syllabus can be referred for some idea.

NOTE:

The analysis, design, coding, documentation, database design of mini project which will be carried out in 4th year should be done in object oriented approach using UML and by using appropriate software which supports UML, otherwise the mini project will not be evaluated. I Prepare the following documents for two or three of the experiments listed below and develop the software engineering methodology.

1. Program Analysis and Project Planning. Thorough study of the problem – Identify project scope –Objectives – Infrastructure.

2. Software requirement Analysis Describe the individual Phases / Modules of the project – Identify deliverables.

VIGNAN UNIVERSITY

3. Data Modeling Use work products – Data dictionary – Use diagrams and activity diagrams, build and test lass diagrams – Sequence diagrams and add interface to class diagrams.

4. Software Developments and Debugging

5. Software Testing Prepare test plan – perform validation testing – Coverage analysis –memory leaks – develop test case hierarchy – Site check and Site monitor.

Suggested List of Applications:

1. Student Marks Analyzing System
2. Quiz System
3. Online Ticket Reservation System
4. Payroll System
5. Course Registration System
6. Expert Systems
7. ATM Systems
8. Stock Maintenance
9. Real-Time Scheduler
10. Remote Procedure Call Implementation

Mini-Project – I :
A Point-of-Sale (POS) System
A POS system is a computerized application used to record sales and handle payments; it is typically used in a retail store, it includes hardware components such as a computer and bar code scanner, and software to run the system. It interfaces to various service applications, such as a third-party tax calculator and inventory control. These systems must be relatively fault tolerant; that is, even if remote services are temporarily unavailable they must still be of capturing sales and handling at least cash payments. A POS system must Support multiple and varied client-side terminals and interfaces such as browser, PDAs, touch-screens.

Mini-Project – II :
Online Bookshop Example
Following the model of amazon.com or bn.com, design and implement an online bookstore.

Mini-Project – III :
A Simulated Company
Simulate a small manufacturing company. The resulting application will enable the user to take out a loan, purchase a machine, and over a series

of monthly production runs, follow the performance of their company.

Mini-Project – IV :
A Multi-Threaded Airport Simulation

Simulate the operations in an airport. Your application should support multiple aircrafts using several runways and gates avoiding collisions/ conflicts. Landing: an aircraft uses the runway, lands, and then taxis over to the terminal. Take-Off: an aircraft taxies to the runway and then takes off.

Mini-Project –V :

An Automated Community Portal

Business in the 21st Century is above all BUSY. Distractions are everywhere. The current crop of “enterprise intranet portals” are often high noise and low value, despite the large capital expenditures it takes to stand them up. Email takes up 30 - 70% of an employee’s time. Chat and Instant Messaging are either in the enterprise or just around the corner. Meanwhile, management is tasked with unforeseen and unfunded leadership and change-agent roles as well as leadership development and succession management. What is needed is a simplified, repeatable process that enhances communications within an enterprise, while allowing management and peers to self-select future leaders and easily recognize high performance team members in a dynamic way. Additionally, the system should function as a general-purpose content management, business intelligence and peer-review application. Glass code’s goal is to build that system. The software is released under a proprietary license, and will have the following features: Remote, unattended moderation of discussions However, it will have powerful discovery and business intelligence features, and be infinitely extendable, owing to a powerful API and adherence to Java platform standards. Encourages peer review and indicates for management potential leaders, strong team players and reinforces enterprise and team goals seamlessly and with zero administration.

Mini-Project –VI :

A Content Management System

The goal is to enable non-technical end users to easily publish, access, and share information over the web, while giving administrators and managers complete control over the presentation, style, security, and permissions.

Features:

- Robust Permissions System
- Templates for easy custom site designs
- Total control over the content
- Search engine friendly URL’s
- Role based publishing system
- Versioning control ? Visitor profiling

Mini-Project– VII :
An Auction Application
Several commerce models exist and are the basis for a number of companies like eBay.com, pricellne.com etc. Design and implement an auction application that provides auctioning services. It should Clearlymodel the various auctioneers, the bidding process, auctioning etc.

Mini-Project –VIII :
A Notes and File Management System
In the course of one’s student years and professional career one produces a 1 lot of personal notes and documents. All these documents are usually kept 1 on papers or individual files on the computer. Either way the bulk of the I information is often erased corrupted and eventually lost. The goal of this 1 project is to build a distributed software application that addresses this “| problem. The system will provide an interface to create, organize and manage I personal notes through the Internet for multiple users. The system will also allow users to collaborate by assigning permissions for multiple users to view and edit notes.

Mini-Project – IX :
A Customizable Program Editor
A programmer’s editor which will be focused on an individual programmer’s particular needs and style. The editor will act according to

the specific language the current source file is in, and will perform numerous features, such as auto-completion or file summarization, on the file. These features will be able to be turned on or off by the programmer, and the programming style of the user will be used to create *as* efficient an editing environment as possible.

Mini-Project – X :
A Graphics Editor
Design and implement a Java class collection that supports the construction of graph editing applications, i.e., applications that include the ability to draw structured and unstructured diagrams.
E.g.,
The goal of the GEF project is to build a graph editing library that can be used to construct many, high-quality graph editing applications. Some of GEF's features are: A simple, concrete design that makes the framework easy to understand and extend.

Node-Port-Edge graph model that is powerful enough for the vast majority of connected graph applications. Model-View-Controller design based on the Swing Java UI library makes GEF able to act as a UI to existing data structures, and also minimizing learning time for developers familiar with Swing.

High-quality user interactions for moving, resizing, reshaping, etc. GEF also supports several novel interactions such as the broom alignment tool and selection-action-buttons. Generic properties sheet based on Java Beans introspection. XML-based file formats based on the PGML standard.

TEXT BOOK :

1. *Grady Booch, James Rumbaugh, Ivar Jacobson* : The Unified Modeling Language User Guide, Pearson Education.

I Year M. Tech CSE II - Semester

L	T	P	To	C
-	-	3	3	2

CS524 EMBEDDED SYSTEMS LAB

Objective of the course :

The Lab course will lay emphasis on learning Assembly Language Programming of 8051. Familirization of Embedded software programming using KEIL IDE.

1. Write a program to perform Arithmetic operation
2. Write a program to perform Logical operation
3. Write a program to perform Control operation
4. Read inputs from switches using I/O interface
5. Program tomake LEDs blink using I/O Interface
6. Program to write a program for serial communication
7. Write a program for encryption/ description
8. Develop necessary interfacing circuit to read data from a sensor and process using the 8051 board. The data has to be displayed on PC monitor
9. Sort RTOS (MCOS) on to 89CS1 board and verify
10. Simulate an elevatormovement using RTOS on 89CSI board
11. Familarization of ARM programmingmodel usingARMkit.

REFERENCE BOOK :

1. *KVKKF Prasad*, 'Embedded/real - TimeSystems', Dreamtech.Press.
2. *Michael Barr, Rick Lobtimen*, "Programming Embedded Systems in C & C++", 1st ed., Oreilly Publishers, 2010.

M.Tech-Embedded Systems

FIRST SEMESTER

Code	Subject	L	T	P	To	C
EC509	Digital System Design	3	1	-	4	4
EC511	Microcontrollers and Applications	3	1	-	4	4
EC515	Embedded System Design Concepts	4	-	-	4	4
EC531	Software For Embedded Systems	3	1	-	4	4
ELECTIVE-I						
EC539	VLSI Technology and Design	4	-	-	4	4
EC541	Neural Networks & Fuzzy Systems	4	-	-	4	4
EC543	Digital Image & Video Processing	4	-	-	4	4
ELECTIVE-II						
EC545	DSP Processors &Architechtures	3	1	-	4	4
EC547	Computer Architectures & Parallel Processing	4	-	-	4	4
EC549	Data Communication	4	-	-	4	4
LAB						
EC553	Microcontrollers Lab	-	-	3	3	2
EC555	HDL & FPGA Synthesis Lab	-	-	3	3	2

M.Tech-Embedded Systems

SECOND SEMESTER

Code	Subject	L	T	P	To	C
EC510	Real Time Operating Systems	4	-	-	4	4
EC518	RISC Processors Architecture and Programming	3	1	-	4	4
EC520	Wireless Communications And Networks	4	-	-	4	4
EC522	Smart Instrumentation	4	-	-	4	4

ELECTIVE-III

EC530	Embedded Linux	3	1	-	4	4
EC532	Robotics Design and Control	4	-	-	4	4
EC546	Adaptive Signal Processing	4	-	-	4	4

ELECTIVE-IV

EC548	Micro Electro Mechanical Systems	4	-	-	4	4
EC550	VLSI Signal Processing	4	-	-	4	4
EC552	ADHOC And Sensor Networks	4	-	-	4	4

LAB

EC554	Instrumentation Lab	-	-	3	3	2
EC556	Real Time Operating Systems Lab	-	-	3	3	2

M.Tech-Embedded Systems

SECOND YEAR FIRST SEMESTER

Subject	L	T	P	To	C
PROJECT PART-I	-	-	20	20	20
SEMINAR	-	-	2	2	2

SECOND SEMESTER

Subject	L	T	P	To	C
PROJECT PART-II	-	-	20	20	20

EC-509 - DIGITAL SYSTEM DESIGN

L	T	P	To	C
3	1	-	4	4

Course Objectives:

- To learn about HDL
- Acquire the knowledge of designing sequential machines using ASM
- Asynchronous sequential machine design, races and hazards
- Synchronous design using PLD'S and GAL'S

Course Learning Outcomes:

- Able to use HDL for digital design
- Easily design involving synchronous/ asynchronous machine without hazards and races.
- Two level implementation of digital logic using PLD'S, GAL'S and FPGA.

UNIT - I **(12 hours)**

VHDL

Design Flow, Program structure, Types and Constants, Structural Design Elements, Dataflow Design Elements, Behavioral Design Elements, Functions and Procedures, Libraries and Packages.

UNIT - II **(10 hours)**

Design of Digital systems

ASM charts, Hardware description language and control sequence methods, Reduction of state tables, state assignments. Sequential circuit design: design of iterative circuits, design of sequential circuits using ROMs and PLAs, sequential circuit design using CPLD, FPGAs.

UNIT - III **(9 hours)**

Asynchronous sequential machine

Fundamental mode model, flow table, state reduction, minimal closed covers, races, cycles and hazards.

UNIT - IV **(10 hours)**

Programmable logic

ROM, PLA, PAL, PLD, PGA – Features, programming and applications using complex programmable logic devices Altera series – Max 5000/7000 series and Altera FLEX logic – 10000 series CPLD, AMD's – CPLD (Mach 1 to 5); Cypres FLASH 370 Device Technology, Lattice pLSI's Architectures – 3000 Series – Speed Performance and in system programmability.

UNIT - V (**9 hours)**

FPGAs

Field Programmable Gate Arrays – Logic blocks, routing architecture, Design flow, Technology Mapping jfor FPGAs, Case studies – Xilinx XC4000 & ALTERA's FLEX 8000/10000 FPGAs: AT & T – ORCA's (Optimized Reconfigurable Cell Array): ACTEL's – ACT-1,2,3 and their speed performance

TEXT BOOKS:

1. John F W akerly, "Digital Design Principles and Practices", Pearson Education, 2002
2. Donald G. Givone, "Digital principles and Design", Tata McGraw Hill 2002.

REFERENCES:

1. John M Yarbrough, "Digital Logic applications and Design", Thomson Learning, 2001]
2. Nripendra N Biswas, "Logic Design Theory", Prentice Hall of India, 2001
3. Charles H. Roth Jr., "Fundamentals of Logic design", Thomson Learning, 2004.
4. P.K.Chan & S. Mourad, "Digital Design Using Field Programmable Gate Array", jPrentice Hall (Pte), 1994.
5. S.Trimberger, Edr., "Field Programmable Gate Array Technology", Kluwer Academic Publicatgions, 1994.
6. J. Old Field, R.Dorf, "Field Programmable Gate Arrays", John Wiley & Sons, Newyork, 1995.
7. S.Brown, R.Francis, J.Rose, Z.Vransic, "Field Programmable GateArray", Kluwer Pubin, 1992

EC511 - MICROCONTROLLERS AND APPLICATIONS

L	T	P	To	C
3	1	-	4	4

Course Objectives:

- To expose the students to the fundamentals of microcontroller based system design.
- To understand I/O and RTOS role on microcontroller.
- To Gain knowledge on PIC Microcontroller based system design.
- To Learn Microchip PIC 8 bit peripheral system Design
- To do case study experiences for microcontroller based applications

Course Learning Outcomes:

- Design a 8051 microcontroller based embedded system
- Design a PIC18F452 based system
- Interface various peripherals to 8051

UNIT - I **(10 hours)**

8051 Architecture

Architecture – memory organization – addressing modes – instruction set – Timers - Interrupts - I/O ports, Interfacing I/O Devices – Serial Communication.

UNIT - II **(12 hours)**

8051Programming

Assembly language programming – Arithmetic Instructions – Logical Instructions–Single bit Instructions – Timer Counter Programming – Serial Communication Programming -Interrupt Programming – RTOS for 8051 – RTOS Lite – Full RTOS – Task creation and run .

UNIT - III (10 hours)

Pic microcontroller(PIC18F452)

Architecture – memory organization – addressing modes – instruction set – PIC programming in Assembly & C –I/O port, Data Conversion, RAM & ROM Allocation, Timer programming, over view of MP-LAB IDE.

UNIT - IV **(10 hours)**

PERIPHERAL OF PIC MICROCONTROLLER

Timers – Interrupts, I/O ports- I2C bus-A/D converter-UART- CCP modules - ADC,DAC and Sensor Interfacing –Flash and EEPROM memories.

UNIT - V **(10 hours)**

Applications

Interfacing LCD Display – Keypad Interfacing -7 segment LED interfacing - Generation of Gate signals for converters and Inverters - Motor Control – Controlling AC appliances –Measurement of frequency - Stand alone Data Acquisition System.

TEXT BOOKS:

1. Muhammad Ali Mazidi, Rolin D. Mckinlay, Danny Causey ‘ PIC Microcontroller and Embedded Systems using Assembly and C for PIC18’, Pearson Education 2008.
2. Kenneth J.Ayala,’The 8051 Microcontroller-Architecture, programming and Applications’.

REFERENCES:

1.John.B.Peatman,’Design with PIC microcontrollers’, Pearson Education.
2.John Iovine, ‘PIC Microcontroller Project Book ’, McGraw Hill 2000
3.Myke Predko, “Programming and customizing the 8051 microcontroller”, Tata McGraw Hill 2001.

EC515 - EMBEDDED SYSTEM DESIGN CONCEPTS

L	T	P	To	C
4	-	-	4	4

Course Objectives:

- To study the overview of Embedded System Architecture
- To focus on distributed Embedded Architecture and its accessing protocols
- To understand about the design methodologies in hardware and software design

Course Learning Outcomes:

- Explain various embedded system applications and design requirements
- Construct embedded system hardware
- Develop software programs to control embedded system
- Generate product specification for embedded system
- Outline validation and testing methodologies for embedded system

UNIT – I **(9 hours)**

An Introduction to Embedded Systems: An Embedded system, processor in the system, other hardware units, software embedded into a system, Exemplary embedded systems, embedded system – on – chip (SOC) and in VLSI circuit. Processor and memory organization –Structural Units in a Processor, Processor selection for an embedded system, memory devices, memory selection for embedded systems, allocation of memory to program cache and memory management links, segments and blocks and memory map of a system, DMA, interfacing processors, memories and Input Output Devices.

UNIT – II **(9 hours)**

Embedded Design Life Cycle: Introduction, Product Specification, Hardware/ software partitioning, Iteration and Implementation, Detailed hardware and software design, Hardware/Software integration, Product Testing and Release, Maintaining and upgrading existing products. **Selection Process**: Packaging the Silicon, Adequate Performance, RTOS Availability, Tool chain Availability, Other issues in the Selection process. **Partitioning Decision:** Hardware/Software Duality, Hardware Trends, ASICs and Revision Costs.

UNIT – III **(9 hours)**

Development Environment: The Execution Environment, Memory Organization, System Startup. **Special Software Techniques:** Manipulating the Hardware, Interrupts and Interrupt service Routines (ISRs), Watchdog Times, Flash Memory, Design Methodology. **Basic Tool Set:** Host – Based Debugging, Remote Debuggers and Debug Kernels, ROM Emulator, Logic Analyzer. **Debugging Techniques:** Background Debug Mode (BDM), Joint Test Action Group (JTAG) and Nexus.

UNIT – IV **(9 hours)**

Testing: Why Test? When to Test? Which Test? When to Stop? Choosing Test cases, Testing Embedded Software, Performance Testing, Maintenance and Testing, The Future. **Writing Software for Embedded Systems:** The compilation Process, Native Versus Cross-Compilers, Runtime Libraries, Writing a Library, Using alternative Libraries, using a standard Library.

UNIT – V **(9 hours)**

Buffering and Other Data Structures: What is a buffer? Linear Buffers, Directional Buffers, Double Buffering, Buffer Exchange, Linked Lists, FIFOs, Circular Buffers, Buffer Under run and Overrun, Allocating Buffer Memory, Memory Leakage. Memory and Performance Trade-offs.

TEXT BOOKS:

1. Raj Kamal, “Embedded Systems Architecture Programming and Design”, 2nd Edition Tata McGra-Hill.
2. Arnold S. Burger, “Embedded System Design – Introduction to Processes, Tools, Techniques”, CMP Books.
3. Steve Heath, “Embedded Systems Design”, 2nd Edition, Newnes.

REFERENCES:

1. Butter worth Heinemann, Steve Heath; “Embedded systems design: Real world design”, Newton mass, USA 2002.
2. David E. Simon, An embedded software primer, Addison Wesly-1999.

EC531 - SOFTWARE FOR EMBEDDED SYSTEMS

L	T	P	To	C
3	1	-	4	4

Course Learning Outcomes:

- To be able to understand the usage and advantages of Low level and High level languages
- To be able to understand the fundamentals of embedded Programming.
- To be able to understand GNU C Programming Tool Chain in Linux.
- To be able to understand basic concepts of embedded C and Embedded OS
- To be able to understand concepts of embedded Java .

UNIT - I **(9 hours)**

Embedded Programming

C and Assembly - Programming Style - Declarations and Expressions - Arrays, Qualifiers and Reading Numbers - Decision and Control Statements - Programming Process - More Control Statements - Variable Scope and Functions - Advanced Types – Simple Pointers - In-line Assembly.

UNIT - II **(9 hours)**

C Programming Toolchain in Linux

C Preprocessor - Stages of Compilation - Debugging and Optimization-Introduction to GCC - Debugging with GDB - The Make utility - Building and Using Libraries -Profiling using *gprof-Memory Leak Detection with valgrind.*

UNIT - III **(9 hours)**

Embedded C and Embedded OS

Adding Structure to 'C' Code: Object oriented programming with C, Header files for Project and Port, Examples. Meeting Real-time constraints: Creating hardware delays - Need for timeout mechanism - Creating loop timeouts -

Creating hardware timeouts. Creating embedded operating system: Basis of a simple embedded OS, Introduction to sEOS, Using Timer 0 and Timer 1, Portability issue, Alternative system architecture, Important design considerations when using sEOS.

UNIT - IV **(9 hours)**

Time-Driven Multi-State Architecture and Hardware

Multi-State systems and function sequences: Implementing multi-state (Timed) system - Implementing a Multi-state (Input/Timed) system. Using the Serial Interface: RS232 - The Basic RS-232 Protocol - Asynchronous data transmission and baud rates - Flow control – Software architecture - Using on-chip UART for RS-232 communication - Memory requirements – The serial menu architecture - Examples. Case study: Intruder alarm system.

UNIT - V **(9 hours)**

Embedded Java

Introduction to object oriented concepts : Core Java/Java core-Java buzzwords, overview of java programming, Data types, variables and arrays, operators, Control statements. Understanding J2ME connected Device configuration, Connected Limited device configuration, Profiles, Anatomy of MIDP applications, Advantages of MIDP.

TEXT BOOKS:

1. Michael J Pont, “Embedded C”, Pearson Education, 2007.
2. Steve Oualline, ‘Practical C Programming 3rd Edition’, O’Reilly Media, Inc, 2006.
3. Stephen Kochan, “Programming in C”, 3rd Edition, Sams Publishing, 2009.

REFERENCES:

1. Beginning J2ME-From Novice to Professional-3rd Edition , Sing Li and Jonathan Knudsen,Dreamtech Press, NewDelhi.
2. GNU/Linux application programming, Jones, M Tim, Dreamtech press, New Delhi
3. C and the 8051 Programming Volume II, Building efficient applications, Thomas W Schultz, Pretice hal
4. UNIX NETWORK PROGRAMMING, STEVENS, W RICHARD , PH, New Jersey
5. Linux Device Drivers, 2nd Edition, By Alessandro Rubini & Jonathan Corbet, O’Reilly
6. Data Structures Using C- ISRD group, TMH

8. Data structures –Seymour Lipschutz, Schaums Outlines
9. C Programming for Embedded systems, Zurell, Kirk
10. C and the 8051 Programming for Multitasking – Schultz, Thomas W
11. C with assembly language, Steven Holzner, BPB publication
12. C and the 8051: Hardware, Modular Programming and Multitasking Vol i – Schultz, Thomas W
13. Art of C Programming, JONES, ROBIN,STEWART, IAN
14. Kelley A & Pohl, " A Book on C", Addison – Wesley
15. Advanced Linux Programming Mark Mitchell, Jeffrey Oldham, and Alex Samuel, TECHMEDIA

EC539 - VLSI TECHNOLOGY AND DESIGN (Elective I)

L	T	P	To	C
4	-	-	4	4

Course Objectives:

- To learn the basic MOS Circuits
- To learn the MOS Process Technology
- To understand the operation of MOS devices.
- To impart in-depth knowledge about analog and digital CMOS circuits

Course Learning Outcomes:

- Understand the fabrication process of IC technology
- Analysis of the operation of MOS transistor
- Analysis of the physical design process of VLSI design flow
- Analysis of the design rules and layout diagram
- Design of Adders, Multipliers and memories etc
- Making sense of the ASICs
- Getting the idea of design approach

UNIT - I **(8 hours)**

VLSI Fabrication Technology

An overview of wafer fabrication, oxidation, Photo Lithography, Diffusion, Ion implantation, Metallization, Packaging , nMOS process, n well CMOS process, p well CMOS process, Twin-Tub process, Silicon on insulator process, Bi-CMOS process.

UNIT - II **(9 hours)**

Introduction to MOS Technology and Electrical Properties

Overview of VLSI Design Methodology VLSI design process- Basic MOS transistors**-** Enhancement mode transistor operation - Drain current Vs voltage derivation -NMOS inverter- Determination of pull up to pull down ratio for an NMOS inverter-CMOS inverter - DC Characteristics- Bi-CMOS inverter-Latch up in CMOS circuits.

Unit - III **(9 hours)**

Design process

VLSI Design Flow, MOS Layers, Stick diagram, Design rules, Layout generation

Circuit concepts and characterization

Sheet Resistance, Standard unit of capacitance, Delay, Driving large Capacitive Loads, Propagation delay, Wiring Capacitances, Fan-in and fan-out characteristics, Choice of layers, Introduction to scaling.

Unit - IV **(10 hours)**

CMOS Subsystem Design

Introduction, Alternative CMOS Logic structures, Design of Adders, Parity generators, One/Zero Detector, Comparators, Binary Counters, ALU, Multipliers, Shifters, memory elements.

Unit - V **(9 hours)**

Introduction to ASICs –Types, Standard Cell Array, Gate Arrays, Programmable Array Logic- PLAs, CPLDs, FPGAs,

Design Approach- Design capture tools, Design Verification Tools, Synthesis, testing.

TEXTBOOKS :

1. Kamran Eshraghian, Eshraghian Dougles and A. Pucknell," Essentials of VLSI
circuits and systems", PHI, 2005 Edition.

2. Weste and Eshraghian, "Principles of CMOS VLSI Design", Pearson Education, 1999.

REFERENCES :

1. John P. Uyemura, "Chip Design for Submicron VLSI: CMOS Layout & Simulation",Thomson Learning.

2. . John .P. Uyemura, John W iley, "Introduction to VLSI Circuits and Systems",2003.

3. John M. Rabaey, "Digital Integrated Circuits" PHI, EEE, 1997.

4. Wayne Wolf, "Modern VLSI Design" Pearson Education.

EC541 - NEURAL NETWORKS & FUZZY SYSTEMS (Elective I)

L	T	P	To	C
4	-	-	4	4

Course objectives

- To know the models of brain as a neuron
- To obtain the knowledge of learning strategies and learning rules
- To obtain the knowledge of feed forward and feedback network.
- To obtain the knowledge of logical components etc.,

Course Outcome

- Obtains the knowledge of Neuron model of a brain.
- Understands how different learning strategies and learning rules can be applied to various applications.
- Knows how Fuzzy logic can be useful to solve different problems.

UNIT – I **(9 hours)**

Introduction to Neural Networks: Introduction, Organization of the Brain, Biological and Artificial Neuron Models, Integrate-and-Fire Neuron Model, McCulloch-Pitts Model, Characteristics of ANN, Potential Applications of ANN. Artificial Neuron Model, Operations of Artificial Neuron, Types of Neuron Activation Function, ANN Architectures, Classification Taxonomy of ANN -– Connectivity, Neural Dynamics (Activation and Synaptic), Learning Strategy (Supervised, Unsupervised, Reinforcement), Learning Rules, Types of Application.

UNIT – II **(9 hours)**

Single Layer & Multi-layer Feed forward Neural Networks: Introduction, Perceptron Models: Discrete, Continuous and Multi-Category, Training Algorithms: Discrete and Continuous Perceptron Networks, Perceptron Convergence theorem, Limitations of the Perceptron Model, Applications. Credit Assignment Problem, Generalized Delta Rule, Derivation of Back propagation (BP) Training, Summary of Back propagation Algorithm, Kolmogorov Theorem, Learning Difficulties and Improvements.

UNIT – III **(9 hours)**

Associative Memories: Paradigms of Associative Memory, Pattern Mathematics, Hebbian Learning, General Concepts of Associative Memory (Associative Matrix, Association Rules, Hamming Distance, The Linear Associator, Matrix Memories, Content Addressable Memory), Bidirectional Associative Memory (BAM) Architecture, BAM Training Algorithms: Storage and Recall Algorithm, BAM Energy Function, Proof of BAM Stability Theorem Architecture of Hopfield Network: Discrete and Continuous versions, Storage and Recall Algorithm, Stability Analysis, Capacity of the Hopfield Network Summary and Discussion of Instance/Memory Based Learning Algorithms, Applications.

Neural network applications: Process identification, control, fault diagnosis and load forecasting.

UNIT – IV **(9 hours)**

Classical & Fuzzy Sets : Introduction to classical sets - properties, Operations and relations; Fuzzy sets, Membership, Uncertainty, Operations, properties, fuzzy relations, cardinalities, membership functions.

UNIT – V **(9 hours)**

Fuzzy Logic System Components: Fuzzification, Membership value assignment, development of rule base and decision making system, Defuzzification to crisp sets, Defuzzification methods.

Fuzzy logic applications: Fuzzy logic control and Fuzzy classification.

TEXT BOOKS:

1. Rajasekharan and Rai, “Neural Networks, Fuzzy logic, Genetic algorithms: synthesis and applications”, PHI Publication.
2. S.N.Sivanandam, S.Sumathi, S.N.Deepa, “Introduction to Neural Networks using MATLAB 6.0 “TMH, 2006
3. J.M.Zurada, “Artificial Neural Networks”.
4. Timothy.J.Ross, “Fuzzy logic Applications”.

REFERENCES:

1. James A Freeman and Davis Skapura, “Neural Networks”, Pearson Education, 2002.
2. Simon Hakins, “Neural Networks”, Pearson Education
3. C.Eliasmith and CH.Anderson, “Neural Engineering”, PHI
4. Bart Kosko, “Neural Networks & Fuzzy systems”.

EC543 - DIGITAL IMAGE & VIDEO PROCESSING (Elective I)

L	T	P	To	C
4	-	-	4	4

Course Objectives:

- By taking this course, learners will learn proper image representation, enhancement, filtering, restoration, analysis, reconstruction from projection.
- This course will build proficiency in terms of Understanding the mathematical and signal principles forming the basis for methods of image processing.
- By taking this course, students will learn advanced digital image processing techniques, including various image transformations, image reconstruction from incomplete information, image segmentation and recognition.
- Understand the fundamentals of digital video processing.
- Understand the basic principles and techniques for motion analysis.
- Understand the basic principles and techniques for video filtering, noise reduction, interpolation, deinterlacing, and super resolution.
- Understand the basic video processing techniques for compression and communication
- Apply the acquired knowledge to specific video processing related problems and projects at work.

Course Learning Outcomes:

- A learner will be able to apply knowledge of modeling, designing, and developing and prototyping methods of image processing for various engineering applications.
- A course learner will get know- how to Implement basic image processing algorithms using different tools such as MATLAB
- A learner will gain a competency like spatial filtering techniques, including linear and nonlinear methods can be thought.
- A student earns ability to interpret and analyze 2D signals in the frequency domain through the Fourier transforms.

- In the global scenario, sharing the knowledge is the need to reach to solution. In this rapid technology growing era, expertise of individuals and opportunities available in providing solutions are clubbed together across the globe, hence global, economic and social dimensions have been fulfilled.
- A learner will always feel a need to learn, conduct independent study and analysis of image processing problems and techniques tool developments in the domain.
- At the end of the course the student should have a clear impression of the breadth and practical scope of digital image processing and have arrived at a level of understanding that is the foundation for most of the work currently underway in this field.
- Possess advanced knowledge within the area of media technology, with emphasis on representing, analyzing, compressing and processing video.
- Be able to use relevant and suitable methods when carrying out further research and development activities in the area of video analyzes
- Be able to critically review relevant literature when solving the assigned problem or topic
- Be able to give a presentation and demo about their findings

UNIT - I **(9 hours)**

Fundamentals steps of Image processing: Components of an Image processing system, Image sampling and quantization, relationship between the pixels. Gray level transformation, Histogram processing, Smoothing and sharpening spatial filters, Smoothing and sharpening frequency domain filters.

UNIT - II **(7 hours)**

Image compression and segmentation: Compression models, Error free coding, lossy coding, compression standards. Image segmentation: Edge linking and boundary detection, Thresholding, Region based segmentation.

UNIT - III **(9 hours)**

Video Representation : Video formation, perception and representation: Color perception and specification, Video capture and display, Analog video raster, Analog color TV systems, Digital VideoVideo Sampling: Basics of lattice theory, sampling over lattice, Sampling of video signals, filtering operations, Conversion of signals sampled on different lattices, Sampling rate conversion of video signals.

UNIT - IV **(9 hours)**

Video Modeling: Camera model, illumination model, object model. Scene model, Two dimensional motion models 2-D motion estimation: Optical flow, General methodologies, Pixel based motion estimation, Block matching algorithm, Mesh-based motion estimation, Global motion estimation. Application of motion estimation in video coding

UNIT - V **(7 hours)**

Video Coding: Information theory, Binary encoding, Scalar quantization, Vector quantization, Waveform based video coding: Block based transform coding, Predictive coding, Object based scalability, Wavelet Transform based coding

TEXT BOOKS:

1. Digital Image processing – Gonzaleze and woods2.
2. Video processing and communication – Yao Wang, Joern Ostermann and Ya-Qin Zhang, Prentice Hall3.

REFERENCES:

1. Digital video processing – M. Tekalp.
2. Handbook of Image and Video Processing - Alan C. Bovik

EC545 - DSP Processors & Architechtures (Elective II)

L	T	P	To	C
3	1	-	4	4

Course Objectives:

- Architecture of a Real time Signal Processing Platform
- Digital Signal Processor Architecture
- Difference in the complexity of programs between a General Purpose Processor and Digital Signal Processor
- Apply previous signal processing knowledge in real-time digital signal processing systems.
- Learn to program a DSP processor.
- Prepare students with multi disciplinary competency

Course Learning Outcomes:

At the end of the course, students should be able to:

- Define digital signal processor (DSP)
- Comprehend performance enhancements provided by DSP in the areas: memory architecture, pipelining, parallel execution, cache use, direct memory access, addressing methods, hardware loop control etc.
- Different Errors introduced during A-D and D-A converter stage
- Develop tools and methods for DSP.

UNIT – I **(8 hours)**

Architectures for Programmable Digital Signal Processing Devices

Introduction, Basic Architectural Features, DSP Computational Building Blocks, Bus Architecture and Memory, Data Addressing Capabilities, Address Generation Unit, Programmability and Program Execution, Speed Issues, Features for External Interfacing.

UNIT – II **(8 hours)**

Programmable Digital Signal Processors

Introduction, Commercial Digital Signal-processing Devices, Data Addressing Modes of TMS320C54xx Digital Signal Processors, Data Addressing Modes of TMS320C54xx Processors, Memory Space of TMS320C54xx Processors, Program Control.

UNIT – III **(8 hours)**

DSP Programming and Operations

TMS320C54xx Instructions and Programming, Programming for IIR, FIR, FFT etc., On-Chip peripherals, Interrupts of TMS320C54xx Processors, Pipeline Operation of TMS320C54xx Processors.

UNIT – IV **(8 hours)**

Interfacing Memory and Parallel I/O Peripherals to Programmable DSP Devices

Introduction, Memory Space Organization, External Bus Interfacing Signals, Memory Interface, Parallel I/O Interface, Programmed I/O, Interrupts and I/O, Direct Memory Access (DMA),

UNIT – V **(8 hours)**

Interfacing Serial Converters to a Programmable DSP Device

Introduction, Synchronous Serial Interface, A multi-channel Buffered Serial Port (McBSP), McBSP Programming, A CODEC Interface Circuit, CODEC Programming, A CODEC-DSP Interface Example.

TEXT BOOKS:

1. “Digital Signal Processing”, A. Singh & S. Srinivasan, Thomson Learning.

REFERENCES:

“Digital Signal Processors”, B. Venkataramani & M. Bhaskar, Tata McGraw Hill.

EC547 - COMPUTER ARCHITECTURE AND PARALLEL PROCESSING (Elective II)

L	T	P	To	C
4	-	-	4	4

Course Objectives: To understand the concepts of computer architecture.• To understand the concepts of pipelined and parallel processing.

Course Learning Outcomes: Describe the principles of computer design• Describe the operation of performance enhancements such as pipelines, dynamic scheduling, branch prediction, caches, and vector processors.• Describe modern architectures such as Super Scalar, vector processors .• Develop applications for high performance computing systems.

UNIT - I (9 hours)

Theory of Parallelism

Parallel Computer models – the state of computing, Multiprocessors and Multi computers and Multi vectors and SIMD computers, PRAM and VLSI models, Architectural development tracks, Program and network properties – Conditions of parallelism.

UNIT - II (9 hours)

Partitioning and Scheduling

Program partitioning and scheduling, Program flow mechanisms, System interconnect architectures, Principles of scalable performance – performance matrices and measures, Parallel processing applications, speedup performance laws, scalability analysis and approaches.

UNIT - III (9 hours)

Hardware Technologies

Processor and memory hierarchy advanced processor technology, superscalar and vector processors, memory hierarchy technology, virtual memory technology, bus cache and shared memory – backplane bus systems, cache memory organizations, shared memory organizations, sequential and weak consistency models.

UNIT - IV (9 hours)

Pipelining and Superscalar Technologies

Parallel and scalable architectures, Multiprocessor and Multicomputers, Multivector and SIMD computers, Scalable, Multithreaded and data flow architectures.

UNIT - V (9 hours)

Software and Parallel Processing

Parallel models, Languages and compilers, Parallel program development and environments, UNIX, MACH and OSF/1 for parallel computers.

TEXT BOOKS:

1. Kai Hwang "Advanced Computer Architecture". McGraw Hill International 2001

2. Carl Homacher, Zvonko Vranesic, Sefwat Zaky, "Computer Organisation", 5th Edition, TMH, 2002.

REFERENCES:

1. Dezso Sima, Terence Fountain, Peter Kacsuk, "Advanced computer Architecture – A design Space Approach". Pearson Education,2003.
2. David E. Culler, Jaswinder Pal Singh with Anoop Gupta "Parallel Computer Architecture" ,Elsevier, 2004.
3. John P. Shen. "Modern processor design Fundamentals of super scalar processors", Tata McGraw Hill 2003.
4. Sajjan G. Shiva "Advanced Computer Architecture", Taylor & Francis, 2008.
5. V.Rajaraman, C.Siva Ram Murthy, "Parallel Computers- Architecture and Programming", Prentice Hall India, 2008.
6. John L. Hennessy, David A. Petterson, "Computer Architecture: A Quantitative Approach", 4th Edition, Elsevier, 2007.
7. Harry F. Jordan Gita Alaghaband, "Fundamentals of Parallel Processing". Pearson Education, 2003.
8. Richard Y. Kain, "Advanced computer architecture – A system Design Approach", PHI, 2003.

EC549 - Data Communication (Elective-II)

L	T	P	To	C
4	-	-	4	4

Course Objectives:

The objective of the course is to ensure that students have the necessary networking skills to design, implement, and analyze data communication networks

Course Learning Outcomes (CLOs):

- To be able to understand the concepts of data communication and networks
- To be able to understand different protocols that are require at various layers of the network model
- To be able to analyze the given network and know its performance for various situations.

Unit-1 Data Communication Systems

History of data communications, Network architecture, Protocols and standards, Layered network architecture, Open systems interconnection, Network topologies, LAN, WAN and MAN, Data communication hardware, DTE and DCE, Serial interfaces, Network interface card, Modem, Digital data digital signals, Digital data analog signals, Circuit switching vs. Packet switching

Unit-2 Local Area Networks

Transmission formats – Baseband vs Broadband, LAN topologies, Collision vs broadcast domains, Connectivity devices, Medium access control and Logical link control sublayers, Channel access problem, MAC addressing, Ethernet - evolution of Ethernet, Variants of Ethernet

Unit-3 Internetworking

TCP/IP Protocol suite, Comparison with ISO suite, IP address notation, IP address classes, Address masking, Introduction to subnetting, Subnet masking for Class A, B, and C, Supernetting, Classless IP addressing,

Classless interdomain routing , Address resolution protocol, Hardware addresses vs IP addresses, IP datagram, Different fields of IP header

Unit-4 IPv6 and Routing

Internet protocol version 6, Advantages of IPv6, IPv6 Addressing format, IPv6 header, Routing in Internets, Static vs Dynamic routing, Routing Tables, Distance Vector Routing, Link State Routing, Hierarchical routing, Broadcast Routing, Multicast Routing

Unit-5 Transport and Application Layers

Transport layer protocols, Introduction to transport layer, Port address, User datagram protocol- UDP, Transmission control protocol-TCP, Header of TCP, Various fields of TCP header, TCP connection establishment and termination, TCP error control and Flow control, Domain name system-DNS, Dynamic host configuration protocol-DHCP

Text Books:

1. Wayne Tomasi, “Introduction to Data Communication and Networking”, 1/e, Pearson Education
2. A S Tanenbaum, “Computer Networks”, 5th Edition, PHI

Reference Books:

1. James .F. Kurouse & W. Rouse, “Computer Networking: A Topdown Approach Featuring”,3/e, Pearson Education.
2. Forouzan, “Data Communications and Networking”, 4th Edition, McGraw Hill
3. W illiam Stallings, “Data and Computer Communication”, Eighth Edition, Pearson Education, 2000

EC553 - MICROCONTROLLERS LAB

L	T	P	To	C
-	-	3	3	2

Course Learning Outcomes:

- To be able to learn about accessing various documents such as device manuals, board manuals, schematics etc.
- To be able to understand importance of C and assembly programming languages.
- To be able to understand about importance of various CPU architectures.

Note:

I. At least 5 modules must interface with 8051 and 5 modules with ARM7.

II. At least 10 experiments are to be carried out, at least 5 experiments must be coded in 'embedded c' and 5 in 'Assembly Language'.

Modules:

1. Calculator type keyboard
2. 4-Digit,7-segment LED Display
3. Dual DAC
4. TXDR Interface Using PT100 with ADC
5. Stepper Motor
6. Elevator Interface
7. 4*4 Matrix Hex Keypad
8. Temp Sensor
9. 16 Channel 8-bit ADC
10. Logic Controller
11. Traffic Lights
12. Musical Tone Generator
13. Opto Isolated Input Interface
14. Opto Isolated Output Interface
15. DC Motor

EC555 - HDL & FPGA SYNTHESIS LAB

L	T	P	To	C
-	-	3	3	2

The main objective of this lab is to impart the knowledge in implementing digital designs in FPGAs.

It helps in prototyping embedded applications in fpga.

1. Combinational Subsystem Design
   - Adders, Multipliers, ALU
   - Encoders/Decoders
   - Multiplexers/De-multiplexer
   - Comparators
2. Sequential circuits Design
   - Serial adder
   - Counters
   - Memories
   - Real time small application

EC510- REAL TIME OPERATING SYSTEMS

L	T	P	To	C
4	-	-	4	4

Course Objectives:

- To acquire knowledge about different types of scheduling algorithms
- To understand the various functions of RTOS

Course Learning Outcomes:

- Distinguish a real-time system from other systems
- Identify the functions of operating system
- Evaluate the need for real-time operating system
- Understand basic multi-task scheduling algorithms for periodic, aperiodic, and sporadic tasks as well as understand the impact of the latter two on scheduling
- Understand capabilities of at least one commercial Real Time kernel

UNIT – I (8 hours)

Introduction To Real Time Systems

Typical Real Time Applications, Hard Vs Soft Real Time Systems, A reference model of Real Time Systems, Processors & Resources, Temporal Parameters of Real time Workload, Periodic Task model, Precedence Constraints & Data Dependency Functional Parameters.

UNIT - II (10 hours)

Real Time Operating Systems

Brief History of OS, Defining RTOS, The Scheduler, Objects, Services, Characteristics of RTOS, Defining a Task States, Scheduling, Task Operations, Structure, Synchronization, Communication and Concurrency, Defining Semaphores, Operations and Use, Defining Message Queue, States, Content, Storage, Operations and Use.

UNIT - III (8 hours)

Kernel objects, Services and I/O

Pipes, Event Registers, Signals, Other Building Blocks, Component Configuration, Basic I/O Concepts, I/O Subsystem.

UNIT - IV (8 hours)

Exceptions, Interrupts and Timers

Exceptions, Interrupts, Applications, Processing of Exceptions and Spurious Interrupts, Real Time Clocks, Programmable Timers, Timer Interrupt Service Routines (ISR), Soft Timers, Operations.

UNIT – V (9 hours)

Memory Management

Dynamic memory allocation, Fixed size memory management, Blocking vs Non Blocking Memory functions, Hardware memory management units, synchronizing and communication. **Case Studies of RTOS:** VxWorks, Free RTOS.

TEXT BOOKS:

1. Jane W.S.Liu, Real Time Systems, Pearson Education.
2. Real Time Concepts for Embedded Systems – Qing Li, Elsevier, 2011

REFERENCES :

1.Embedded /Real-Time Systems: concepts, Design and Programming—The Ultimate Reference, Prasad K.V.K.K, DREAMTECH PRESS, NEW DELHI
2.VxWorks Programmers Guide
3.VxWorks Reference Manual
4.Free RTOS Programmers Guide
5.Free RTOS Reference Manual

EC518- RISC PROCESSOR ARCHITECTURE AND PROGRAMMING

L	T	P	To	C
3	1	-	4	4

Course Learning Objectives:

· To understand the embedded system based on ARM processor and its hardware (ARM processor Core).

· To understand the techniques and rules for writing efficient C code and optimizing ARM assembly code.

· To discuss various Cache technologies and Architecture that surrounds the ARM cores and MMU.

· To Understand the architecture of ARM CORTEX-M3

Course Outcomes:

· Design an embedded system using ARM processor.

· Write source code that will compile more efficiently in terms of increased speed and reduced code size.

· Develop an embedded system with optimized key subroutines to reduce system power consumption and clock speed needed for real time operation

UNIT –I (8hours)

ARM Architecture

ARM Design Philosophy, Registers, Program Status Register, Instruction Pipeline, Interrupts and Vector Table, Architecture Revision, ARM Processor Families.

UNIT –II (10hours)

ARM Programming Model – I

Instruction Set: Data Processing Instructions, Addressing Modes, Branch, Load -Store Instructions, PSR Instructions, Conditional Instructions.

ARM Programming Model – II

Thumb Instruction Set: Register Usage, Other Branch Instructions, Data Processing Instructions, Single-Register and Multi Register Load-Store Instructions, Stack, Software Interrupt Instructions

UNIT –III (10hours)

ARM Programming

Simple C Programs using Function Calls, Pointers, Structures, Integer and Floating Point Arithmetic, Assembly Code using Instruction Scheduling, Register Allocation, Conditional Execution and Loops. Exception Handling , Interrupts , Interrupt handling schemes, Firmware and boot loader.

UNIT –V (12 hours)

Memory Management

Cache Architecture, Polices, Flushing and cleaning Cache memory, MMU, Page Tables, Translation, Access Permissions, Context Switch.

UNIT – V (10 hours)

ARM Cortex-M3

ARM Cortex-M3 Processor –Architecture- Instruction Set Development-The Thumb-2 Technology and Instruction Set Architecture-CORTEX-M3 Applications.

TEXT BOOKS:

1. ARM System developers guide-ELSEVIER publications
2. The indefinite guide to ARM CORTEX-M3.

REFERENCES:

1. Steve Furber, ‘ARM system on chip architecture’, Addision Wesley
2. ARM Architecture Reference Manual

EC520 - WIRELESS COMMUNICATIONS AND NETWORKS

L	T	P	To	C
4	-	-	4	4

Course objectives:

- As wireless communication systems are fast replacing the wired communication systems studying the technologies of wireless communication and networks became more important.
- Aim of this course is to offer the knowledge in wireless communication technologies and networking of wireless devices

Course Learning Outcomes:

- To be able to appreciate the need and importance of wireless networks
- Good understanding of various wireless communication and technologies for long range and short range communications
- Familiarity with protocols used for wireless environment in comparison with wired networks.
- Application of this knowledge to incorporate wireless network technologies into embedded devices.

Unit-1

Fundamentals of Wireless Communications

The concept of spread spectrum, Frequency hopping spread spectrum, Direct sequence spread spectrum, Code division multiple access, Generation of spreading sequences.

Unit-2

Cellular Networks

Principles of Cellular Networks, First Generation Analog, Second Generation TDMA, Second Generation CDMA, Third Generation Systems

Unit-3

Cordless, WiLL and Broadband Systems

Cordless systems, Wireless local loop, IEEE 802.16 fixed broadband wireless access standard, Mobile IP, Wireless application protocol.

Unit-4

Wireless LANs

Infrared LANs, Spread spectrum LANs, Narrowband microwave LANs, IEEE 802 Protocol architecture, IEEE 802.11 Architecture and services, IEEE 802.11 Medium access control, IEEE 802.11 Physical layer

Unit-5 Bluetooth

Bluetooth overview, Radio specification, Baseband specification, Link manager specification, Logical link control and adaptation protocol

TEXT BOOKS :

1. W illiam Stallings, “Wireless communications and Networking”, Prentice Hall,India
2. T S Rappaport, “Wireless Communications: Principles and Practice”, 2nd Edition, Prentice Hall, India

REFERENCE BOOKS :

1. Kamilo Feher, “Wireless Digital Communications”, Prentice Hall, India
2. Dharma Prakash Agarwal, Qing- An Zeng, “Introduction to Wireless and Mobile Systems”, Thomson , 2006
3. Garry J .Mullet, “Introduction to Wireless Telecommunication systems and Networks”, cenage learning
4. Simon Haykin, Michael Moher, “Modern wireless Communications”, Pearson, 2005.

EC522 - SMART INSTRUMENTATION

L	T	P	To	C
4	-	-	4	4

Course Objectives:

The course is extensively hands on, giving participants considerable practical experience of the devices typically found in industry.

Courses Learning Outcome:

The students will be able to

- Identify various sensors, Transducers and their brief Performance specifications.
- Understand principle of working of various types of signal conditioning, processing and transmitter
- Make comparative study of various protocol.
- Understand applications of Instrumentation in Embedded system(Real Time Interface)

UNIT I (8 hours)

General concepts and terminology of measurement systems, static and dynamic characteristics, errors, standards and calibration.

UNIT II (10 hours)

Introduction, principle, construction and design of various active and passive transducers. Introduction to semiconductor sensors and its applications, Design of signal conditioning circuits for various Resistive, Capacitive and Inductive transducers and piezoelectric transducer.

UNIT III (8 hours)

Introduction to transmitters, two wire and four wire transmitters, Smart and intelligent Transmitters. Design of transmitters.

UNIT IV (15 hours)

Introduction to EMC, interference coupling mechanism, basics of circuit layout and grounding, concept of interfaces, filtering and shielding. Safety: Introduction, electrical hazards, hazardous areas and classification, non-hazardous areas, enclosures – NEMA types, fuses and circuit breakers. Protection methods: Purging, explosion proofing and intrinsic safety.

UNIT V (8 hours)

Field bus, Mod bus, GPIB, IEEE-488, VME, VXI, Network buses – Ethernet – TCP/IP protocols; CAN bus- basics, Message transfer, Fault confinement.

TEXT BOOKS:

1. John P. Bentley, Principles of Measurement Systems, Third edition, Addison Wesley Longman Ltd., UK, 2000.
2. Doebelin E.O, Measurement Systems - Application and Design, Fourth edition, McGraw-Hill International Edition, New York, 1992.

REFERENCES:

1. M. Sze, “Semiconductor sensors”, John W iley & Sons Inc., Singapore, 1994.
2. Noltingk B.E., “Instrumentation Reference Book”, 2nd Edition, Butterworth Heinemann, 1995.
3. L.D.Goettsche, “Maintenance of Instruments and Systems – Practical guides for measurements and control”, ISA, 1995.

EC530 - EMBEDDED LINUX (Elective III)

L	T	P	To	C
3	1	-	4	4

Course Objectives:

- To study the fundamentals of operating systems.
- To understand Linux operating measurement systems.
- To obtain basic knowledge on board support packages and device drivers.

Course Learning Outcomes:

- Introduction to embedded Linux
- Understand the Embedded operating systems that is needed to run embedded systems
- Build embedded systems using Embedded Linux operating systems

UNIT - I **(9 hours)**

Fundamentals of Operating Systems

Overview of operating systems, Process and threads, Processes and Programs, Programmer view of processes, OS View of processes, Threads, Scheduling, Non preemptive and preemptive scheduling, Real Time Scheduling, Process Synchronization, Semaphores, Message Passing, Mailboxes, Deadlocks, Synchronization and scheduling in multiprocessor Operating Systems

UNIT - II **(9 hours)**

Linux Fundamentals

Introduction to Linux, Basic Linux commands and concepts, Logging in, Shells, Basic text editing, advanced shells and shell scripting, Linux File System, Linux programming, Processes and threads in Linux, Inter process communication, Devices, Linux System calls.

UNIT - III **(9 hours)**

Introduction to Embedded Linux

Embedded Linux-Introduction, Advantage, Embedded Linux Distributions, Architecture, Linux kernel architecture, User space, Linux startup sequence, GNU cross platform Tool chain.

UNIT - IV **(9 hours)**

Board Support Package and Embedded Storage

Inclusion of BSP in kernel build procedure, Boot loader Interface, Memory Map, Interrupt Management, PCI Subsystem, Timers, UART, Power Management, Embedded Storage, Flash Map, Memory Technology Device (MTD) –MTD Architecture, MTD Driver for NOR Flash, The Flash Mapping drivers, MTD Block and character devices, mtdutils package, Embedded File Systems, Optimizing storage space – Turning kernel memory.

UNIT - V **(9 hours)**

Embedded Drivers and Application Porting

Linux serial driver, Ethernet driver, I2C subsystem, USB gadgets, Watchdog timer, Kernel Modules, Application porting roadmap, Programming with threads, Operating System Porting Layer, Kernel API Driver, Case studies - RTLinux – uClinux.

TEXT BOOKS:

1.P. Raghavan ,Amol Lad , Sriram Neelakandan, ‘Embedded Linux System Design and Development’, Auerbach Publications 2006

REFERENCES:

1. Dhananjay M. Dhamdhere, ‘Operating Systems A concept based Approach’, Tata Mcgraw-Hill Publishing Company Ltd
2. Matthias Kalle Dalheimer, Matt Welsh, ’Running Linux’, O’Reilly Publications 2005
3. .Mark Mitchell, Jeffrey Oldham and Alex Samuel ‘Advanced Linux Programming’ New Riders Publications
4. Karim Yaghmour, ‘Building Embedded Linux Systems’, O’Reilly Publications 2003
5. Abott,Linux for Embedded and real time applications,newness,3rd edition.

EC532 - ROBOTICS DESIGN & CONTROL (Elective III)

L	T	P	To	C
4	-	-	4	4

Course Objectives:

Mechatronic systems synergistically combine computer science, electrical engineering, and mechanical engineering. Robotics systems can be viewed as a subset of mechatronics that focuses on sophisticated control of moving devices.

The objective of this course is to expose students to the fundamentals of these systems. Over the course emphasis will be laid on topics like how to interface a computer with the real world, different types of sensors and their use, different types of actuators and their use, and forward and inverse kinematics of simple two link robotic manipulators.

Course Outcomes:

- To be able to understand basic concepts of robotics.
- Enhances practical applications of sensors and actuators in robotic systems.
- To be able to design and model robotic manipulator.
- To be able to design and develop dynamic control systems with related to robotics.

UNIT – I **(8 hours)**

Introduction

Brief History - Past, Present status and Future trends in robotics - Uses of robots – Robot Anatomy: Overview of Robot subsystems - Concept of Workspace - Mechanisms and Transmission - Types of Robots - Issues in Designing and Controlling Robots: Resolution, Repeatability, Accuracy and Compliance.

UNIT – II **(10 hours)**

Sensors and Actuators

End-Effectors: Different types of Grippers and Tools - Vacuum and other methods of gripping, Actuators: Pneumatic, Hydraulic and Electric Actuators – Sensors: Internal and External sensors - Position, Velocity and Acceleration Sensors - Proximity Sensors - Force Sensors - Laser range finder - Camera. Micro-controllers, DSP, Real time operating systems.

UNIT – III **(10 hours)**

Robot Kinematic

Positions, Orientations and Frames - Mappings: Changing descriptions from frame to frame, Operators: Translations, Rotations and Transformations - Transformation Arithmetic - D-H Representation - Forward and Inverse Kinematics of Six DOF Robot Arm - Robot Arm dynamics.

UNIT – IV **(10 hours)**

Control Design

Robot Control: Independent joint control - PD and PID feedback - Actuator models - Nonlinearity of Manipulator models - Issues in nonlinear control - Force feedback - Hybrid control - Motion planning and Obstacle avoidance: Road map methods, Graph search algorithms, Potential field methods - Robot languages -.Computer Control and Robot software.

UNIT - V **(7 hours)**

Introduction to Machine Vision

Robot Vision - Camera model and Perspective transformation - Image processing fundamentals for Robotic applications - Image acquisition and preprocessing - Segmentation and region characterization - object recognition by image matching and based on features - Problem of bin-picking - Futuristic topics in Robotics

TEXT BOOKS:

1. Groover M P, “Industrial Robotics”, Pearson Publications.
2. Mittal R K & Nagrath I J, “Robotics and Control”, Tata Mc Graw Hill Publications.
3. Ghosal A, “Robotics: Fundamental Concepts and Analysis”, Oxford University Press.

REFERENCE BOOKS:

1. Fu K S, “Robotics”, McGraw Hill Publications
2. P. Coiffet and M. Chaironze, “An Introduction to Robot Technology”, Kogam Page Ltd. London,1983.
3. Richard D. Klafter, “Robotic Engineering”, Prentice Hall India Limited.
4. John J Craig, “Introduction to Robotics”, Pearson Education publications.
5. Mark W. Spong and M. Vidyasagar, “Robot Dynamics & Control”, John Wiley & Sons (ASIA) Pvt. Ltd.

EC546 - ADAPTIVE SIGNAL PROCESSING (Elective III)

L	T	P	To	C
4	-	-	4	4

Course Objectives:

- Understand the problems associated with processing of signals in the changing environment
- Explain the algorithms and solutions to the useful for adaptive signal processing.
- Understand the statistical properties of signals to analyze the systems in adaptive processing.
- Analyzes the performance of the adaptive filters.
- Demonstrate the design of important class of adaptive filters, LMS, RLS and Kalman filters.

Course Learning Outcomes: After completion of this course the Student should be able to-

- Explain the importance of signal processing in non-stationary environment.
- Explain the role and importance of adaptive signal processing in communications signal processing
- List and apply the various mathematical models to adaptive signal processing.
- Use various techniques to model the systems.
- Understand the problem of finding the minimum error criteria.
- Demonstrate the various methods to design the adaptive filters
- Use computer based simulation tools to understand the theoretical concepts of adaptive signal processing in various communication applications.

UNIT - I **(9 hours)**

Introduction: The filtering problem, Adaptive filters, linear filter structures, approaches to the development of linear adaptive filter algorithms, real and complex forms of adaptive filters, non linear adaptive filters, Applications.

Stationary Processes and Models: Partial characterization of a discrete time stochastic process, mean ergodic theorem, correlation matrix, correlation matrix of sine wave plus noise, stochastic models, wold decomposition, asymptotic stationarity of an auto regressive process. Yule-W alker equations.Selecting the model order. Complex Gaussian process.

UNIT - II **(9 hours)**

Wiener Filters: Linear optimum filtering problem statement, principle of orthogonality, minimum mean squared error, wiener – hopf equations, error – performance surface. Channel equalization. Linearly constrained minimum variance filter , generalized side lobe cancellers.

UNIT - III **(9 hours)**

Linear Prediction: Forward Linear Prediction, backward Linear Prediction, Levinson-Durbin algorithm, properties of prediction error filters, Schur-Cohn test, auto regressive modeling of a stationary stochastic process, Cholesky factorization, lattice predictors, joint process estimation, block estimation.

Method of steepest descent : Steepest descent algorithm, stability of the Steepest descent algorithm.

UNIT - IV **(9 hours)**

Least Mean Square (LMS) Algorithm: Over view of the structure and operation of the Least Mean square Algorithm, Least Mean square adaptation Algorithm, stability and performance analysis of the LMS algorithm. Normalized Least Mean Square (NLMS) Algorithm, Concept of method of least squares,

Recursive Least Squares (RLS) Algorithm: the matrix inversion lemma, the exponentially weighted RLS algorithm, update recursion for the sum of weighted error squares. Convergence analysis of the RLS algorithm.

UNIT - V **(9 hours)**

Kalman Filters: Recursive minimum mean square estimation for scalar random variables, statement of the Kalman filtering problem, the innovations process, estimation of the state using the innovations process, filtering, initial conditions, variants of the Kalman filter, extended Kalman filtering.

TEXT BOOKS:

1. Adaptive Filter Theory, S. Haykin, Prentice-Hall, 4-th edition, 2001.
2. Fundamentals of Adaptive Filtering, Ali H. Sayed, John Wiley, 2003.

REFERENCES:

1. Monson H. Hayes , “Statistical Digital Signal Processing And Modeling”, Wiley India, 2008.
2. John G. Proakis, Dimitris G.Manolakis, “Digital Signal Processing, Principles, Algorithms and Applications”, Pearson Education / PHI, 2007.

EC548 - MICRO ELECTRO MECHANICAL SYSTEMS (Elective IV)

L	T	P	To	C
4	-	-	4	4

Course Learning Outcomes:

After thorough learning of MEMS the student will:

- Understand the different materials-Substrates used in MEMS manufacture.
- To acquire knowledge on different fabrication techniques.
- To acquire different mechanical transduction techniques.
- Understand the different techniques used in pressure sensors and different types of pressure sensors.
- To understand the functional and usages of various sensors like, electro static thermal, force, torque and inertial sensors.
- To understand the functional and usages of various actuators like, electro static thermal, actuators.
- Understand future applications of MEMS.
- Be able to apply all these skills to the design of a MEMS system.
- The above can be applied to understand the design and fabrication of MEMS.

UNIT - I **(10 hours)**

Introduction

Intrinsic Characteristics of MEMS – Energy Domains and Transducers- Sensors and Actuators –- Silicon based MEMS processes – New Materials – Review of Electrical and Mechanical concepts in MEMS – Semiconductor devices – Stress and strain analysis – Flexural beam bending- Torsional deflection, Broad response of MEMS to mechanical, thermal and electrical stimuli.

UNIT - II **(10 hours)**

Micromachinning

Introduction to Micro fabrication –Photo lithography-Deposition techniques-Chemical vapour deposition, physical vapour deposition-Silicon Anisotropic Etching – Anisotrophic Wet Etching – Dry Etching of Silicon – Plasma Etching – Deep Reaction Ion Etching (DRIE) – Isotropic Wet Etching – Gas Phase

Etchants –Basic surface micromachining processes – Structural and Sacrificial Materials – Acceleration of sacrificial Etch – Striction and Antistriction methods.

UNIT - III **(10 hours)**

Sensors And Actuators-I

Electrostatic sensors – Parallel plate capacitors – Applications – Inter digitated Finger capacitor – Comb drive devices – Thermal Sensing and Actuation – Thermal expansion– Thermal couples – Thermal resistors – Applications.

UNIT - IV **(10 hours)**

Sensors And Actuators-II

Piezoresistive sensors – Piezoresistive sensor materials - Stress analysis of mechanical elements – Applications to Inertia, Pressure, Tactile and Flow sensors – Piezoelectric sensors and actuators – piezoelectric effects – piezoelectric materials – Applications to Inertia , and Flow sensors.

UNIT - V **(10 hours)**

Polymer Mems

Polymers in MEMS– Polimide - SU-8 - Liquid Crystal Polymer (LCP) – PDMS – PMMA – Parylene – Fluorocarbon - Application to Acceleration, Pressure and Flow sensors.

TEXT BOOKS:

1.Chang Liu, ‘Foundations of MEMS’, Pearson Education Inc., 2006.
2.Tai Ran Hsu, “MEMS & Micro systems Design and Manufacture” Tata McGraw Hill, New Delhi, 2002.

REFERENCES:

1. Stephen D.Senturia "Microsystem Design" Springer International Edition,2010
2. Marc J Madou " Fundamentals of Micro Fabrication", CRC Press, 2011
3. Julian w. Gardner, Vijay k. varadan, Osama O.Awadelkarim, "Micro Sensors, MEMS and Smart devices", John Wiley & son LTD,2002
4. Steeve P Beeby, G Ensel, "MEMS Mechanical Sensors" Architect House.
5. Nadim Maluf, "An introduction to Micro electro mechanical system design", Artech House,2000.
6. Mohamed Gad-el-Hak, editor, "The MEMS Handbook", CRC press Baco Raton, 2000
7. James J.Allen, "Micro Electro Mechanical System Design", CRC Press published in 2005

EC550 - VLSI SIGNAL PROCESSING (Elective IV)

L	T	P	To	C
4	-	-	4	4

Course Objectives:

- To understand the basic concepts of DSP algorithms.
- To analyze the various pipelining and parallel processing techniques.
- To analyze the retiming and unfolding algorithms for various DSP applications.

Course Learning Outcomes:

- To learn DSP algorithms.
- To understand and analysis the concept of pipelining and other processing for DSP applications.

UNIT - I **(7 hours)**

Introduction To DSP Systems - Typical DSP algorithms- Representation of DSP Algorithm.

Iteration Bound – data flow graph representations, loop bound and iteration bound - Longest path Matrix algorithm.

Pipelining and parallel processing – Pipelining of FIR digital filters- parallel processing- pipelining and parallel processing for low power.

UNIT - II **(9 hours)**

Retiming- definitions and properties-solving systems of inequalities-Retiming techniques.

Unfolding – an algorithm for Unfolding- properties of unfolding - critical path-unfolding and retiming - applications of unfolding.

Folding –Introduction- transformations- registers minimization techniques - register minimization in folded architectures - folding of multirate systems.

UNIT - III **(10 hours)**

Systolic Architecture design-introduction-systolic array design methodology-FIR systolic arrays-selection of scheduling vector-Matrix-Matrix multiplication and 2D systolic array design-Systolic design for space representations containing delays.

Algorithmic strength reduction in filters and transforms – introduction-parallel FIR filter – DCT and inverse DCT- parallel architectures for rank- order filters.

UNIT - IV **(12 hours)**

Pipelined and parallel recursive and adaptive filters – introduction-Pipeline interleaving in digital filters-pipelining in 1st-order IIR digital filters-pipelining in higher-order IIR digital filters-parallel processing for IIR filters-combined pipelining and parallel processing for IIR filters- low power IIR filter design using pipelining and parallel processing-pipelined adaptive digital filters. **Bit-Level Arithmetic Architectures-**introduction-parallel multipliers-interleaved floor-plan and bit-plane-based digital filters-bit serial multipliers-bit serial filter design and implementation-canonic signed digit arithmetic-distributed arithmetic.

UNIT - V **(7 hours)**

Numerical Strength Reduction – sub expression elimination- multiple constant multiplication-Sub expression sharing in digital filters-Additive and Multiplicative number splitting.

Overview of- low power design and programmable digital signal processors.

TEXT BOOKS:

1. Keshab K.Parthi, " VLSI Digital Signal Processing systems, Design and implementation ",Wiley, Inter Science, 1999.

REFERENCES:

1. Mohammed Isamail and Terri Fiez, " Analog VLSI Signal and Information Processing", Mc Graw-Hill, 1994.
2. S.Y. Kung, H.J. White House, T. Kailath, " VLSI and Modern Signal Processing ",Prentice Hall, 1985.
3. Jose E. France, Yannis Tsividis, " Design of Analog - Digital VLSI Circuits for Telecommunication and Signal Processing ", Prentice Hall, 1994

EC552 - ADHOC AND SENSOR NETWORKS (Elective IV)

L	T	P	To	C
4	-	-	4	4

Course Learning Outcomes:

- Appreciate the importance of Adhoc and sensor networks for applications like environment monitoring, habitat monitoring, health care and data acquisition systems.
- Understanding of data transmission technologies of the Adhoc and sensor devices with focus on channel access routing and security.
- Appreciate the need and importance of converged networks, ubiquitous environment and 'Internet of things' in the context of Adhoc and sensor networks.
- Capable of model building ,new protocol design and strategies simulation of the systems that include the above.

UNIT - I **(12 hours)**

Fundamentals of Adhoc Networks

Overview and Communication aspects of MANETs, Applications of MANETs, Challenges, Topology-Based versus Position-Based Routing Approaches, Topology-Based Routing Protocols – Proactive, Reactive and Hybrid protocols, Position-Based Routing, Other Routing Protocols

UNIT - II **(12 hours)**

Broadcasting, Multicasting and Geocasting in Manets

Introduction, The Broadcast Storm - Broadcasting in a MANET, Flooding-Generated Broadcast Storm, Redundancy Analysis, Rebroadcasting Schemes, Multicasting - Issues in Providing Multicast in a MANET, Multicast Routing Protocols, Comparison, Geocasting - Geocast Routing Protocols, Comparison.

UNIT - III **(10 hours)**

Wireless Sensor Network

Introduction, The Mica Mote, Sensing and Communication Range, Design Issues, Energy Consumption, Clustering of Sensors, Applications of Sensor Networks.

UNIT - IV **(12 hours)**

Data Retrieval in Sensor Networks

Introduction, Classifications of WSNs, MAC layer Design issues and Protocols, Routing Protocols of Sensor Networks - Network Structure Based Routing, Flat versus Hierarchical Routing, Multipath and Query Based Routing, Location-Based Routing, Transport Layer, High-Level Application Layer Support, Adapting to the Dynamic Nature of WSNs.

UNIT - V **(10 hours)**

Security and Connectivity to other Networks

Introduction, Security in Ad Hoc Networks, Distributed Systems Security, Key Management, Secure Routing, Cooperation in MANETs, Security of Wireless Sensor Networks, Intrusion Detection Systems, Ingredients of a Heterogeneous Architecture, Protocol Stack, Comparison of the Integrated Architectures.

TEXT BOOKS :

1. Ad hoc and Sensor Networks - Theory and Applications, by Carlos Cordeiro and Dharma P. Agrawal, World Scientific Publications, March 2006, ISBN 981-256-681-3.
2. Holger Karl and Andreas Willig Protocols and Architectures for Wireless Sensor Networks WILEY (ISBN: 0-470-09510-5)
3. Ad Hoc Wireless Networks : Architectures and Protocols. C. Siva Ram Murthy (Author).Publisher: Prentice Hall PTR, May 28, 2004.
4. Wireless Sensor Networks: An Information Processing Approach by Feng Zhao and Leonidas J. Guibas (Morgan Kaufmann, 2004)

REFERENCE BOOKS :

1. High Performance Communication Networks - Jean warland and Pravin Varaiya, 2nd Edition, Harcourt and Morgan Kauffman, London, 2000.
2. Communication networks - Leon Gracia, Widjaja, Tata McGraw-Hill, New Delhi, 2000.
3. ATM Networks - Sumit Kasera, Pankaj Sethi, Tata McGraw-Hill, New Delhi, 2000.
4. Data Communication and Networking - Behrouz.a. Forouzan, Tata McGraw Hill, New Delhi, 2000.

EC554 - INSTRUMENTATION LAB

L	T	P	To	C
-	-	3	3	2

Course Learning Outcomes:

- Develop an embedded system project concept.
- Develop a design specification.
- Create a development plan covering such items as functional description, implementation methods, resource, requirements, schedule, and interface requirements, integration strategy, and test plan.
- Reassess requirements throughout design process.
- In this lab student learns over all system development from sensing to actuation.
- Student learns how to get data from different sensors
- Student learns how to activate and control a actuator
- Learns communicating sensed data and control data using specific protocols.

Note: The lab can be conducted as Mini project which should contain at least a sensor, a serial communication bus, wireless protocol and actuator. All the students must carry out their mini projects with different specifications.

1. **Working with different Sensors:** Temperature, Pressure, Humidity, Smoke, Displacement, LDR, Accelerometer etc
2. **Working with different serial Communication Standards and Buses:** RS 232, CAN, I2C, SPI, USB, HART, and MODBUS.
3. **Working with Data Acquisition & Signal Conditioning using Labview.**
4. **Working with different Wireless Protocols:** Zigbee, RF, Wi-Fi, Bluetooth, and GSM.
5. **Working with different Actuators:** Relay, DC Motor ,Stepper motor etc.

EC556 - REAL TIME OPERATING SYSTEMS LAB

L	T	P	To	C
-	-	3	3	2

Note:

i. All the experiments are to be carried out independently by each student

ii. At least 10 experiments are to be carried out on any commercial/open RTOS.

Course Objectives:

- To understand the fundamental concepts of Real time operating systems.
- To understand the principles of concurrency and synchronization and apply them to write correct concurrent programs.
- To understand the basic resource management techniques in a Real time operating system.

Course Learning Outcomes:

- Understand the design aspects of operating system .
- Understand the concepts of process, address space, and file.
- Compare and contrast various CPU scheduling algorithms.

I. Experiments on Inter Process Communication :

Pipes

Message Queues

Signals

Mail boxes

Semaphores and Mutex

Shared memory

II. Experiments on Multi-Processing

Fork functions

Process priorities

Priority Inversion

Multi Threading

Inter Thread Communication

VIGNAN UNIVERSITY:: VADLAMUDI

School of Mechanical Engineering

M.Tech.
MACHINE DESIGN

			L	T	T	O	C
SEMESTER – I							
1.	ME501	Advanced Mechanisms	3	1	-	4	4
2.	ME503	Advanced Mechanics of Solids	3	1	-	4	4
3.	ME505	Creep, Fatigue &Fracture Mechanics	3	1	-	4	4
4.	ME555	Advanced Finite Element Analysis	3	1	-	4	4
5.	**Elective – I**		**3**	**1**	**-**	**4**	**4**
	ME509	Mechanics of Composite Materials					
	ME511	Pressure Vessel Design					
	ME513	Theory of Plasticity					
6.	**Elective – II**		**3**	**1**	**-**	**4**	**4**
	ME527	Advanced Numerical Methods in Engineering					
	ME517	Realibility Engineering					
	ME519	Industrial Hydraulics & Pneumatics					
Labs							
1.	ME523	Simulation lab.	-	-	3	3	2
1.	ME525	Modelling lab	-	-	3	3	2
SEMESTER - II							
1.	ME502	Advanced Mechanical Engineering Design	3	1	-	4	4
2.	ME568	Mechanical Vibrations	3	1	-	4	4
3.	ME506	Design Synthesis	3	1	-	4	4
4.	ME508	Optimization Techniques	3	1	-	4	4
5.	**Elective – III**		**3**	**1**	**-**	**4**	**4**
	ME510	Computational Fluid Dynamics					
	ME512	Industrial Tribology					
	ME514	Gear Engineering					
Elective – IV		**3**	**3**	**1**	**-**	**4**	**4**
	ME516	Experimental Stress Analysis					
	ME518	Nanotechnology					
	ME520	Condition Monitoring & Fault Diagnosis of Machines					
Labs							
1.	ME522	Machine Dynamics Lab.	-	-	3	3	2
2.	ME524	Hydraulics &Pneumatics Lab.	-	-	3	3	2
SEMESTER - III							
1.	ME	Project Work Part - I	-	-	10	10	14
SEMESTER - IV							
1.	ME	Project Work Part - II	-	-	10	10	14

L = Lecture ; **T =** Tutorial ; **P =** Practicals; **To =** Total ; **C =** Credits

I Year M.Tech. Machine Design, I Semester L T P TO C 4 0 0 4- 4

(ME 501) ADVANCED MECHANISMS

Objective of the Course: The Design of a new machine for the performance of an operation, associated with industrial needs.

Course Outcome:

- Familiar with common mechanisms used in machines and everyday life
- Ability to calculate mobility and enumerate rigid links and types of joints with in mechanisms.
- Knowledge on advanced kineatics of plane motion (Euler – Savary Equation,Bobillier'sCostruction,Hartmann's Costruction).
- Ability to synthesis a new machine with analytical and graphical methods.
- Ability to find D-H notation, transformations, forward kinetic and inverse kinematic analysis of any manipulators.

UNIT - I Introduction: Elements of Mechanisms; Mobility Criterion for Planar mechanisms and manipulators; Mobility Criterion for spatial mechanisms and manipulators. Spherical mechanisms-spherical trigonometry.

UNIT - II Advanced Kinematics of plane motion-I: The Inflection circle ; Euler – Savary Equation; Analytical and graphical determination of di; Bobillier'sCostruction; Collineation axis ; Hartmann's Costruction; Polode curvature; Hall's Equation; Polode curvature in the four bar mechanism; coupler motion; relative motion of the output and input links; Freudenstein'scollineation –axis theorem; Carter – Hall circle;

UNIT - III Introduction to Synthesis-Graphical Methods: The Four bar linkage; Guiding a body through Three distinct positions; The Rotocenter triangle ; Guiding a body through Four distinct positions; Burmester's curve; Function generation : Relative Rotocenter method, Overlay method, Velocity pole method. Path generation. Hornes's and Nelson's motion Atlas, Roberts's theorem.

UNIT - IV Introduction to Synthesis - Analytical Methods: Function Generation: Freudenstien's equation, Precision point approximation, Precision – derivative approximation; Path Generation: Synthesis of Four-bar Mechanisms for specified instantaneous condition; Method of components; Synthesis of Four-bar Mechanisms for prescribed extreme values of the angular velocity of driven link; Method of components.

UNIT - V Manipulator kinematics: D-H notation, D-H convention of assignment of co-ordinate frames and link parameters table; D-H transformation matrix ; Direct and Inverse kinematic analysis of Serial manipulators: Formulation of Jacobian series for planar serial manipulator.

TEXT BOOKS:

1. Jeremy Hirschhorn, "Kinematics and Dynamics of Plane Mechanisms", 3rd Edition, Mc GrawHill,
2. L. Sciavicco and B. Siciliano, "Modelling and control of Robot manipulators", 2nd Edition, Springer – Verlag, London, 2000.
3. Amitabh Ghosh and Ashok Kumar Mallik, "Theory of Mechanisms and Machines", E.W.P. Publishers.

REFERENCE BOOKS:

1. Allen S.Hall Jr., "Kinematics and Linkage Design", 4th Edition, PHI, 1964.
2. J.E. Shigley and J.J. Uicker Jr., "Theory of Machines and Mechanisms", Mc Graw-Hill, 1995.
3. Mohsen Shahinpoor, "A Robot Engineering Text Book", 5th Edition, Harper & Row Publishers, New York, 1992.

4. Joseph Duffy, "Analysis of mechanisms and Robot Manipulators", 4th Edition, Edward Arnold, 1990

I Year M.Tech. Machine Design, I Semester L T P TO C 3 1 - 4 4

(ME 503) ADVANCED MECHANICS OF SOLIDS

Objective of the Course : To analyse and predict the mechanical behaviour of deformable solid bodies like beams, columns, plates and non circular shafts using techniques of engineering mechanics and applied mathematics.

Course Outcomes: On completion of the course, the students will be able to:

- determine the important mechanical properties of materials
- demonstrate the different theories of failure for brittle and ductile materials
- apply the different methods of unsymmetrical bending analysis demonstrate the significance and concept of shear centre
- apply the principles of structural dynamics

UNIT - I Unsymmetrical bending and Shear Centre : Introduction, product of inertia – parallel axes theorem for product of inertia – principal axes and principal moments of inertia, bending stresses in beams due to unsymmetrical bending, deflection of straight beams due to unsymmetrical bending. Concept of shear center, determination of shear center for symmetrical and unsymmetrical sections.

UNIT - II Torsion of non-circular shafts : Introduction, Membrane Analalogy, torsion of non-circular solid sections, thin wall tubular sections, thin-walled multi-cell sections. Rotating Discs : Centrifugal stresses- Rotating ring, flat discs-Disc of uniform thickness and Disc of uniform strength.

UNIT - III Beams on Elastic foundation : General theory, infinite beam subjected to concentrated load at its end boundary conditions, infinite beam subjected to a distributed load, semi-infinite beam with point load near its end; short beams.

UNIT - IV Columns and struts : Introduction, Definitions, classification of columns, strength of columns, end conditions, equivalent length, Euler’s theory (for long columns), Rankine’s hypothesis for struts columns, columns subjected to Eccentric loading, beam columns.

UNIT - V Curved Beam Theory: Winkler bach formula for circumferntial stresses – Limitations, corrections factors – Radial stress in curved beams – closed rings subjected to concentrated and uniform loads.

TEXT BOOKS:

1. Boresi, "Advanced Mechanics of Materials", 6th Edition, John Wiley & Sons, 2003.

2. Timoshenko and S. Woinowsky - Krieger, "Theory of Plates and Shells", 2nd Edition, Tata Mc Graw Hill, 2010.

REFERENCE BOOKS:

1. J.P. Den Hartog, "Advanced Strength of Materials", 1st Edition, Dover Publications, 1987.

2. L.S. Srinath, "Advanced Solid Mechanics", 3rd Edition, Tata Mc Graw Hill, 2009.

3. R.K. Rajput, "Strength of Materials", 2nd Edition, S. Chand Publications, 2002.

4. B.C. Punmia, "Strength of Materials and Theory of Structures", 3 rd Edition, Lakshmi Publications 2003

I Year M.Tech. Machine Design, I Semester L T P TO C 3 1 - 4 4

(ME 505) CREEP, FATIGUE AND FRACTURE MECHANICS

Objective of the Course : This course helps the students to know the necessary methods of designing components against the failure under creep and fatigue phenomena. It also provides the fracture mechanics principles involved in the latest design procedures.

Course Outcomes: Upon successful completion of this course, the student will be able to:

- Identify and explain the types of fractures of engineered materials and their characteristic features;
- Understand the differences in the classification of fracture mechanics (LEFM and EPFM) and how their corresponding parameters can be utilized to determine conditions under which engineering materials will be liable to fail catastrophically in service;
- Appreciate the theoretical basis of the experimental techniques utilized for fatigue and creep analysis
- Develop expertise on the experimental techniques utilized for fatigue and creep analysis

UNIT – I Theoretical cohesive strength of metals – Ductile brittle transition of metals - Ductile fracture - Brittle fracture. Modes of fracture failure - Early concepts of stress concentrators and flaws. Inglis solution to stress round an elliptical hole - Surface energy – Griffiths analysis - Energy release rate - Crack resistance - Stable and Unstable crack growth - R-Curve. Stress intensity factor for a crack. Stresses and displacement in Cartesian and polar coordinates. Critical stress intensity factor - K1C testing.

UNIT – II Linear Elastic fracture mechanics - Elastic plastic fracture mechanics - Plastic zone shape for plane stress and plane strain – Effective crack length – Irwin plastic zone correction – Dugdole approach Effect of plate thickness. Elastic plastic analysis through J – Integral - Path Independence – J1C testing. Crack tip opening displacement

UNIT – III FATIGUE : Importance of Fatigue in engineering applications – Low cycle fatigue – Coffin Manson relation – Strain life equation – Structural features of fatigue – Fatigue crack propagation – High cycle fatigue – Basquin's law. Cumulative fatigue damage. Effect of Metallurgical variables on fatigue – Design for fatigue –Corrosion fatigue – Effect of temperature on fatigue.

UNIT – IV Crack growth and application of fracture mechanics to fatigue. Paris erdogan law – Effect of an overload – Crack closure – Variable ampliture fatigue load. Cycle counting methods – Reservoir Method – Rainflow Method. Fatigue of welded structures – Factors affecting the fatigue lives of welded joints.

UNIT – V CREEP: Time dependent mechanical behaviour – Creep curve – Effect of stress on creep curves – Stress rupture test – Structural changes during creep – Creep under combined stresses – Creep fatigue interaction.

TEXT BOOKS: 1. Prashant kumar, "Elements of Fracture Mechanics", 2nd Edition, Tata Mc Graw Hill, 2009. 2. George E.Dieter, "Mechanical Metallurgy", 3rd Edition, Mc Graw Hill Publication, 2007.

REFERENCE BOOKS:

1. Anderson T.L, "Fracture Mechanics: Fundamentals and Applications", 2nd Edition, Taylor & Francis Publications, 2005.

2. Broek.D- Martinus, "Elementary Engineering Fracture Mechanics", 1 st Edition, Nijhoff publishers, 1982.

3. V.M. Radha Krishnan, "Welding Technology & Design", 2nd Edition, New Age International Publications, 2006.

I Year M.Tech. Machine Design, I Semester L T P TO C 3 1 - 4 4

(ME 555) ADVANCE FINITE ELEMENT ANALYSIS

Objective and Outcome of the Course: This course deals with the theory and application of the finite element methods for analysing structural systems and heat transfer problems. Approximation theory for structural problems is presented as the basis for finite element methods.

UNIT-I Introduction- comparison of various FEA methods (Weight Residual, Displacement approach, Potential Energy approach, Galerkin approach, Virtual work approach, Rayliegh Ritz approach), Mathematical preliminaries of variational formulations and integral formulations.

UNIT-II Second – order differential equation in 1-D: Finite element models Basic steps of FEA for a boundary value problem, Applications in solid mechanics, heat transfer and fluid mechanics.

UNIT-III FEA applications: Euler – Bernoulli Beam Elements, Timoshenko beam elements, Application problems.

UNIT-IV Eigen value and time dependent problems: Introduction to Eigen value problems, Heat transfer and bar like problems, Natural vibration of beams, Buckling of beams, Introduction and Qualitative discussion on time dependent problems.

UNIT- V Single variable problems in 2-D: Introduction to Boundary Value Problems (BVP). Applications in Conductive and convective heat transfer, Fluid mechanics and solid mechanics. Introduction to Eigen value and time dependent problem.

TEXT BOOKS:

[1] J N Reddy, An Introduction To The Finite Element Method, Mcgraw-Hill, New York, 1993.

REFERENCES:

[1] R D Cook, D S MalkusAnd M E Plesha, Concepts And Applications Of Finite Element Analysis, 3d Ed., John Wiley, New York, 1989.

[2] K J Bathe, Finite Element Procedures In Engineering Analysis, Prentice-Hall, Englewood Cliffs, Nj, 1982.

[3] T J T Hughes, The Finite Element Method, Prentice-Hall, Englewood Cliffs, Nj, 1986

[4] O C Zienkiewicz And R L Taylor, The Finite Element Method, 3d Ed. Mcgraw-Hill,1989

I Year M.Tech. Machine Design, I Semester L T P TO C 3 1 - 4 4

(ME 509) MECHANICS OF COMPOSITE MATERIALS (ELECTIVE - I)

Objective of the Course: Composite materials are being increasingly used in the engineering structures. This subject provides knowledge about types of composites, failure behaviour and stress analysis techniques.

Course Outcome: Upon completion of this course the student will be able to

- Know various composite components example reinforcement and matrices
- Develop a knowledge of the manufacturing of composite materials
- Employs principles of material selection and design for composite materials
- Demonstrate basic knowledge on the various composite processing technique

UNIT - I Introduction, classifications of composites, particulate composites, fiber composites, sandwich structures, applications, geometric and physical definitions, classification of fibers, classification of matrices, types and classification of FRPs, applications, production methods.

UNIT - II Micro mechanics and macro mechanics, stress strain diagrams, fiber, matrix, composite. Micro mechanical estimation of elastic properties of lamina, different modes of failures, factors influencing the strength and stiffness, experimental characterization of composites.

UNIT - III Hooks law for orthotropic materials, relations between engineering constants and elements of stiffness and compliance matrices, restrictions on elastic constants, stress strain relations for lamina with arbitrary orientation, transformation of engineering constants.

UNIT - IV Strength of an orthotropic lamina subjected to biaxial stress field, theories of failures, failure envelop, importance of sign of shear stress on strength of composites, multi directional laminates, stress-strain relations, load deformation relations, different types of laminates, compliances, laminate engineering properties.

UNIT - V Stress analysis and safety factors for first-ply failure of laminates, computational procedure for stress and failure analysis of general multi directional laminates, hygrothermal stresses micromechanics of progressive failure, stiffness reduction, ultimate laminate failure, interlaminar stresses, edge effects.

TEXT BOOKS: 1. Isaac and M Daniel, "Engineering Mechanics of Composite Materials", 2nd Edition, Oxford University Press, 2006.

REFERENCE BOOKS:

1. B.D. Agarwal and L.J. Broutman," Analysis and performance of fibre Composites", 3rd Edition, Wiley- Inter-science New York, 2006.

2. R.M. Jones, "Mechanics of Composite Materials", 2nd Edition, Taylor and Francis Publications, 1999.

I Year M.Tech. Machine Design, I Semester L T P TO C 3 1 - 4 4

(ME 511) PRESSURE VESSEL DESIGN (ELECTIVE - I)

Objective of the course: Pressure vessel design involves fundamentals of various component designs. This subject provides basic knowledge required for an engineer to design and to analyse the behaviour of pressure vessels.

Course Outcome:

• Knowledge of basics of process equipment design and important parameters of equipment design
• Ability to design internal pressure vessels and external pressure vessels and fabrication knowledge
• Ability to design special vessels (e.g. tall vessels) and various parts of vessels (e.g. heads)

UNIT – I Introduction: Material-shapes of Vessels-stresses in cylindrical, spherical and arbitary, shaped shells. Cylindrical Vessels subjected to internal pressure, wind load, bending and torque-relation of pressure vessels-conical and tetrahedral vessels.

UNIT - II Cylinders and plates: Shrink fit stresses in built up cylinders-auto frettage of thick cylinders. Thermal stresses in Pressure Vessels. Plates subjected to pure bending with different edge conditions. Circular plates with simply supported and clamped ends subjected to concentrated and uniformly distributed loads, stresses, Design of dome bends, shell connections, flat heads and cone openings.

UNIT - III Discontinuity stresses in pressure vessels: Introduction, beam on an elastic foundation, infinitely long beam, semi infinite beam, cylindrical vessel under axially symmetrical loading, extent and significance of load deformations on pressure vessels, discontinuity stress in vessels, stress in a bimetallic joints, deformation and stress in flanges. Pressure vessel materials, ductile material tensile tests, structure and strength of steel, Leuder's lines, determination of stress patterns from plastic flow observations, behaviour of steel beyond the yield point, effect of cold work or strain hardening on the physical properties of pressure vessel steels.

UNIT - IV Fatigue of metals: fatigue crack growth, fatigue life prediction, cumulative fatigue damage, stress theory of failure of vessels subject to steady state and fatigue conditions. Influence of surface effects on fatigue, effect of the environment and other factors on fatigue life, thermal stress fatigue, creep and rupture of metals at elevated temperatures, hydrogen embrittlement of pressure vessel steels, brittle fracture, effect of environment on fracture toughness, fracture toughness relationships, criteria for design with defects, significance of fracture mechanics evaluations, effect of warm prestressing on the ambient temperature toughness of pressure vessel steels.

UNIT - V Design features: Localized stresses and their significance, stress concentration at a variable thickness transition section in a cylindrical vessel, stress concentration about a circular hole in a plate subjected to tension, elliptical openings, stress concentration factors for position, dynamic and thermal transient conditions, theory of reinforced openings, reinforcement, placement and shape, fatigue and stress concentration.

TEXT BOOKS:

1. John F. Harvey, "Theory and Design of Modern Pressure Vessels", 3rd Edition, Van Nostrand Reinhold Company, New York, 1997.
2. Timoshenko &Winowsky, "Theory of Plates and Shells", 2nd Edition, Tata Mc Graw Hill, 1964.

REFERENCE BOOKS:

1. Bickell M.B., C. Ruiz, "Pressure Vessel Design and Analysis", 1st Edition, Mac Millan / St. Martins, 1967.

2. Henry H. Bednar, "Pressure Vessel Design Hand Book", 2nd Edition, Krieger Publishing Co., 1991.

I Year M.Tech. Machine Design, I Semester L T P TO C 3 1 - 4 4

(ME 513) THEORY OF PLASTICITY (ELECTIVE - I)

Objective of the course: Knowledge in the plastic stage stress distributions are very much essential to understand the failure of various materials. This subjects provide the knowledge about behaviour of metals under plastic state and various stress strain relationships existing.

Course Outcome: Upon completion of course students able to get

- Knowledge on the theory of elasticity and plasticity.
- The studentss will understand the various theoretical elements of plasticity and the established plasticity models for metallic materials.
- Understand the main principles of the theory of plasticity for large deformations and be able to use the theory in nonlinear analysis of structures.

UNIT - I

Introduction :Modeling Uniaxial behavior in plasticity. Index notation, Cartesian tensors. Yield and failure criteria stress deviator tensors, invariants, principal, mean stresses. Elastic strain energy. Mohr's representation of stress in 2 & 3 dimensions. Haigh-westergaard stress space. Equilibrium equations of a body. Yield criteria: Tresca's von Mises rules, Drucker-prager criterion, anisotropic yield criteria.

UNIT - II

Strain at point : Cauchy's formula for strains, principal strains, principal shear strains, derivative strain tensor. Strain-displacement relationships. Linear elastic stress strain relations, Generalized Hook's law, nonlinear elastic stress strain relations. Principle of Virtual work and its rate forms, Drucker's stability postulate, normality, convexity and uniqueness for an elastic solid, Incremental stress strain relations.

UNIT - III

Criteria for loading and unloading : Elastic and plastic strain increment tensors, plastic potential and flow rule associated with different Yield criteria, Convexity, normality and uniqueness considerations for elastic-plastic materials. Expansion of thick walled cylinder.

UNIT - IV

Incremental stress strain relationship: Pradtl-Reuss material model. J_2 deformation theory, Druckerprager material, General Isotropic materials.

UNIT - V

Deformation theory of plasticity: Loading surface, Hardening rules. Flow rule and Druckers stability postulate. Concept of effective stress and effective strain mixed hardening material. Problems.

TEXT BOOKS:

1. M. Kachanov, "Fundamentals of theory of plasticity", 4rt Edition, Courier Dover Publications, 2004.
2. Dr. Sadhu Singh, "Theory of plasticity", 2rd Edition, Khanna Publications, 1990.

REFERENCE BOOK:

1. J. Chakrabarty, "Theory of Plasticity", 3rd Edition, Elsevier Publications, 2006.

I Year M.Tech. Machine Design, I Semester LT P TU Total 45 - 15 60

(ME 527) ADVANCDED NUMERICAL METHODS FOR ENGINEERING(ELECTIVE - II)

Objective of the Course : To familiarize the students with various numerical methods for solving mechanical engineering problems

Course Outcomes:

- Design programs which numerically compute derivatives and integrals of function which model physical systems
- Derive the differential equations for a chemical reaction system and design the algorithms and programs to numerically solve and equations and graphically illustrate the results.

UNIT - I Transcendental and polynomial equations: Bisection method, Iteration method, Regula falsi Method, Newton Raphson Method,, Solution of linear algebraic equations and eigen value problems: Direct methods, Error Analysis, Iteration methods, Eigen Values and Eigen Vectors

UNIT- II Interpolation and Approximation,- Lagrange and Newton Interpolations, Finite Difference operators, Interpolating polynomials using finite differences, Hermite interpolation, Approximation, Least Square Approximation, Uniform Approximation, Rational Approximation

UNIT –III Numerical Differentiation: Methods based on Interpolation, Methods based on finite difference operators, Numerical integration Newton-Cotes integration formulas, Composite integration methods –Trapezoidal rules, Simpson's rules, Gaussian quadrature. Romberg Integration.

UNIT - IV Numerical Solution of Ordinary Differential Equations: Picards Method, Taylor Series Method, Euler's Method, Modified Euler's method, Runge's method, Runge-kutta method, PredictorCorrector Methods-Milne's Method, Adam-Bashforth method, Simultaneous First order differential Equations, Second order differential equations, Boundary value Problems-Finite Difference Method

UNIT - V Numerical Solution of Partial Difference Equations-Solution of Laplace equation, Solution of Poisson Equations, Schmidt's method, crank-Nicolson method, Du-Fort and Frankel method , Solution of two dimensional Heat equation,-Hyperbolic equation, Solution of wave equation,

TEXT BOOKS:

1..M.K. Jain, S.R.K. Iyengar and R.K. Jain, "Numerical Methods for Scientific and Engineering Computation", 3rd, Edition, New age International Publication, 2007.

2. Dr B.S.Grewal, Numerical Methods in Engineerfing and Science, Khanna Publishers

REFERENCE BOOKS:

1.Steven.C. Chapra, Raymard, P. Canale, "Numerical Methods for Engineering", 6th Edition, Tata Mc Graw Hill, 2010.

2.J. Douglas Faires, Richard, L. Burden, "Numerical Methods", 3rd Edition, Thomson / Brooks / Cole, 2003.

I Year M.Tech. Machine Design, I Semester L T P TO C 3 1 - 4 4

(ME 517) RELIABILITY ENGINEERING (ELECTIVE - II)

Objective of the course: Reliability is one of the biggest concerns with almost all physical Systems used in the industry. This course equips the students with all the concepts and tools that are required to assess & Manage risk and plan for uninterrupted and hassle free operation of industrial systems.

Course outcomes: Upon completion of course student is able to

- Analyse the interference between strength and stress, or life data for estimating reliability
- Apply the appropriate methodologies and tools for enhancing the inherent and actual reliability of components and systems, taking into consideration cost aspects
- Specify life test plans for reliability validation.

UNIT - I Reliability Engineering : Reliability function – failure rate – Mean time between failures (MTBF) – Mean time to failure (MTTF) – Probability concept - Additional of probabilities - complimentary events - useful life availability – maintainability – system effectiveness.

UNIT - II Reliability Data Analysis : Time to failure distributions – Exponential, normal, Gamma, Weibull, ranking of data – probability plotting techniques – Hazard plotting.

UNIT - III Reliability Prediction Models : Series and parallel Systems – RBD approach – Standby systems – m/n configuration – Application of Baye's theorem – cut and tie set method – Markov analysis – FTA – Limitations.

UNIT - IV Reliability Management : Reliability Testing – Reliability growth monitoring – Non parametric methods – Reliability and life cycle costs – Reliability allocation – Replacement model.

UNIT - V Risk Assessment :Definiton and measurement risk – risk analysis techniques – risk reduction resources – industrial safety and risk assessment.

TEXT BOOKS:

1. John Davidson, "The Reliability of Mechanical System", 2nd Edition, Published by the Institution of Mechanical Engineers, London, 1998.

2. E. BalaguruSwamy "Reliability Engineering" 1st Edition, Tata Mc.Graw Hill, New Delhi, 2003.

REFERENCE BOOKS:

1. Modarres, "Reliability and Risk analysis", 1st Edition, CRC Press, 1992.

2. Smith C.O. "Introduction to Reliability in Design", 1st Edition, McGraw Hill, London, 1976.

3. Charles E. Ebeling, "Reliability and Maintainability Engineering", 2nd Edition, Tata Mc Graw Hill, 2009.

I Year M.Tech. Machine Design, I Semester L T P TO C 3 1 - 4 4

(ME 519) INDUSTRIAL HYDRAULICS & PNEUMATICS (ELECTIVE - II)

Objective of the course: This course equips the students with know how of hydraulic systems and pneumatic systems required for selection, design, operation and maintenance.

Course outcomes: The student is able to understand energy conservations in hydraulic, pneumatic, electro pneumatic systems and also make the devices used in generating the hydraulic and pneumatic power and how to transmit and control energy.

UNIT - I Basic Principles: Principles of Hydraulics, Hydraulic pumps and their characteristics, pump selection, pumping circuits, Hydraulic actuators both linear & rotary, selection & characteristics of pumps, Hydraulic valves, pressure & Flow direction controls, applications, Hydraulic fluids, symbols.

UNIT - II Hydraulic Circuits: Hydraulic Circuits: Reciprocating, Quick Return, Sequencing, Synchronizing and Accumulator, Safety circuits.

UNIT - III Design & Selection: Design of Hydraulic circuits and selection of components.

UNIT - VI Pneumatic fundamentals, control elements, logic circuits, sensing of position and pressure, switching. Electro-pneumatic and Electro Hydraulic circuits Robotic circuits.

UNIT - V Design of pneumatic circuits: Classic, cascade, step counter and combination methods PLC, Microprocessors, uses, selection criteria for pneumatic components, Installation and maintenance of Hydraulic and pneumatic power packs – fault finding, principles of low cost automation and case students.

TEXT BOOKS:

1. J. Michael and G. Ashby, “Power Hydraulics”, 2nd Edition, Prentice Hall, 1989.

2. Andrew Parr, “Hydraulics & Pneumatics”, 2nd Edition, Elsevier Publications, 2006.

REFERENCE BOOKS:

1. Dudley and Pippenger, "Basic Fludi Power", 2nd Edition, Prentice Hall, 1987.

2. Anthony Esposito, "Fluid Power with applications", 6th Edition, Prentice Hall, 2010.

I Year M.Tech. Mechanical Engg. I-Semester L T P To C - - 3 3 2

(ME-523) SIMULATION LAB

Course Objectives: To make the students understand physical systems in Mechanical Engineering and to develop their mathematical models and solutions for these models. The students will also learn to use the commercial process simulators.

Course Outcomes

- Understand the important physical phenomena from the problem statement
- Develop model equations for the given system
- Demonstrate the model solving ability for various processes/unit operations
- Demonstrate the ability to use a process simulation

LIST OF EXPEIMENTS

1. Analysis of beams for different cross section and different boundary condition for different loading conditions

   a) Uniformly distributed load,
   b) Uniformly Varying load,
   c) Angular loads
   d) Stepped Beam
   e) Bars of Tapered Cross section Area

2. Analysis of frames and structures

   a) 2D Truss
   b) 3D Truss

3. Stress analysis of a rectangular plate with a circular holeand elliptical hole and comparing the results with half modal and quarter modal

4. Plain stress analysis and plain strain problem

5. Dynamic analysis Modal Analysis of a Beam for different boundary conditions and natural Frequency determination Harmonic Analysis of a Cantilever Beam Transient Analysis of aCantilever beam Beam subjected to forcing function

6. Thermal analysis a) Thermal Analysis - 2D problem with conduction, convection and boundary conditions

7. Laminar Flow Analyses in a 2-D Duct

I Year M.Tech. Mechanical Engg. I-Semester L T P To C - - 3 3 2

MODELING LAB

Objective ofthe Course:

This lab is meant for the development of modeling and analysis skills of the machine components using software. This enables the students basic idea regarding modeling activities that are carried in present industries using modeling software.

Course Outcomes :

- Understand the important physical phenomena from the problem statement
- Develop model equations for the given system
- Demonstrate the model solving ability for various processes/unit operations
- Demonstrate the ability to use a process simulation

MODELING:

1. Sketcher: Development of part drawings for various components in the form of orthographic andisometric. Constraining the drawings.

2. 3-D Modeling: Generation of various 3D models through protrusion, revolve, shell sweep, creation of various features. Study of parent child relation. Boolean based modelling.

3. Assembly: Assembly modeling, study of various standard assembly operations. Assembling ofsimple components like Bolt & Nut, Sleeve and cotter joint, Knuckle Joint, shaft with journal bearing, screw jack and gear train.

4. Sheet metal work: Basic sheet metal operations, making different sheet metal patterns.

M.Tech. Power Electronics & Drives
Course Structure

(Teaching Scheme: Hrs per week)

I Year **Semester - I**

Code	Subject	L	T	P	To	C
EE501	Machine Modelling & Analysis	4	0	-	4	4
EE503	Analysis of Power Electronic Converters	4	0	-	4	4
EE505	Microprocessors & Microcontrollers	4	0	-	4	4
EE507	Power Electronic Control of DC Drives	4	0	-	4	4
	Elective - I	**4**	**0**	**-**	**4**	**4**
EE509	Digital Control Systems					
EE511	Optimization Techniques					
	Elective - II	**4**	**0**	**-**	**4**	**4**
EE513	Neural & Fuzzy Systems					
EE515	Energy Conversion Systems					
	Labs:					
EE517	Power Converters Lab	0	0	3	3	2
EE533	Power Electronics Simulation Lab - I	0	0	3	3	2
TOTAL		**18**	**6**	**6**	**30**	**28**

L = Lecture ; **T =** Tutorial ; **P =** Practicals ; **To =** Total ; **C =** Credits

M.Tech. Power Electronics & Drives
Course Structure

(Teaching Scheme: Hrs per week)

I Year — **Semester - II**

Code	Subject	L	T	P	To	C
EE502	Power Electronics Control of AC Drives	4	0	-	4	4
EE504	High Voltage DC Transmission	4	0	-	4	4
EE506	Dynamics of Electrical Machines	4	0	-	4	4
EE508	Flexible of AC Transmission Systems	4	0	-	4	4
	Elective - III	**4**	**0**	**-**	**4**	**4**
EE510	Reliability Engineering					
EE512	Power Quality					
	Elective - IV	**4**	**0**	**-**	**4**	**4**
EE514	Programmable Logic Controller and their Applications					
EE516	Advanced Digital Signal Processing					
	Labs:					
EE518	Electrical Systems Simulation Lab	0	0	3	3	2
EE534	Power Electronics Application Lab	0	0	3	3	2
TOTAL		**18**	**6**	**6**	**30**	**28**

L = Lecture ; **T =** Tutorial ; **P =** Practicals ; **To =** Total ; **C =** Credits

M.Tech. Power Electronics & Drives
Course Structure

(Teaching Scheme: Hrs per week)

II Year **Semester - III & IV**

Code	Subject	L	T	P	To	C
	Seminar	0	0	2	2	2
	Project work thesis & Viva Voce	0	0	0	0	40
TOTAL		**0**	**0**	**2**	**2**	**42**

TOTAL Number of Credits for the Programme	**98**

L = Lecture ; **T =** Tutorial ; **P =** Practicals ; **To =** Total ; **C =** Credits

M.Tech. - PED - I Year - I Semester

L	T	P	To	C
4	0	0	4	4

(EE501) MACHINE MODELLING & ANALYSIS

Objective of the Course :

The student learns the mathematical modelling of electrical machines.

UNIT - I

Introduction:

Elements of generalized theory: Essentials of rotating electrical machines-conventions-Basic two pole machine-representation of DC and three phase AC machines-Transformer and speed voltages in the armature – Kron's primitive machine – voltage equations – expression for power – Torque.

UNIT - II

Linear transformations in machines-invariance of power Transformation from a displaced brush axis – Transformation from three phases to two phases (a,b,c to a,b,0)-power invariance –transformation from rotating axes (a,b,0) to stationary axes (d,q,0) – park's transformation – physical concepts.

UNIT - III

Mathematical model of separately excited, series, shunt and compound DC motors transfer functions of separately excited DC motor – equations in state variable form computation of dynamic characteristics.

UNIT - IV

Three phase induction motor: circuit model-winding inductances-flux linkages-voltage equations-transformation to equivalent two phase representation – equations in the stator frame – equations in rotor reference frame - equations in synchronously rotating frame – expression for Torque equations in state variable form – equations for sinusoidal voltages– equivalent circuit of the induction motor.

UNIT - V

Synchronous motor – circuit model of a three –phase synchronous motor winding inductances – flux linkages voltage equations–parkstransformation to d,q,0 variables – direct and quadrature–axes Synchronous inductances and zero sequence inductance – voltage quations in steady state and phasor representation – expression for Torque power angle characteristic of salient pole motor.

REFERENCE BOOKS:

1. Vedam Subramanyam, "Thyristor control of Electric Drives"
2. Paul C.Krause, Oleg wasynezuk, Scott D. Sudhoff, "Analysis of electric machinery and Drive systems"

M.Tech. - PED - I Year - I Semester

L	T	P	To	C
4	0	0	4	4

(EE503) ANALYSIS OF POWER ELECTRONIC CONVERTERS

Objective of the Course :

With the advent of semiconductor devices, revolution is taking place in the power transmissions, distribution and utilization. This course introduces the basic concepts of converters, choppers, inverters and their analysis.

UNIT - I

Unsymmetrical bending and Shear Centre : Introduction– Half controlled and Fully controlled converters –harmonic analysis —power factor Improvement -single phase series converters – Numerical problems. Three phase converters – Half controlled and fully controlled converters – harmonic analysis — power factor Improvement – twelve pulse converter – dual converters – Numerical problems.

UNIT - II

Three phase AC voltage controllers and cyclo Converters: Three phase AC voltage controllers – Analysis of controllers with star and

delta Connected loads–applications–numerical problems. Three phase to three phase cycloconverters – analysis of Midpoint and bridge configurations – Limitations – Advantages – Applications -numerical problems.

UNIT - III

D.C. to D.C. Converters: Switched mode regulators–analysis of Buck ,Boost , buck-boost and Cuk regulators– comparison- Numerical problems- d.c to d.c converters with isolation- fly back, forward, push pull and half bridge configurations- comparison – applications –Numerical problems.

UNIT - IV

Pulse Width Modulated Inverters(three phase:

Three phase inverters – analysis of 180 degree 120 degree Conduction modes – voltage control of three phase inverters – sinusoidal PWM – Third Harmonic PWM – 60 degree PWM – space vector modulation – Comparison of PWM techniques –Current Source Inverter – variable d.c.

UNIT - V

Resonant Converters:

Resonant Converters- Zero current switching (ZCS) d.c to d.c converter - zero voltage switching(ZVS) d.c to d.c converter- clamped voltage (ZVS-CV)- applications –Numerical problems

REFERENCE BOOKS:

1. Mohammed H. Rashid, "Power Electronics", 3rd ed., Pearson Education, First Indian reprint 2004.

2. Ned Mohan, Tore M. Undeland and William P.Robbins, "Power Electronics" 2nd ed., John Wiley & Sons

M.Tech. - PED - I Year - I Semester

L	T	P	To	C
4	0	0	4	4

(EE505) MICROPROCESSORS & MICROCONTROLLERS

Objective of the Course:

To give students the working knowledge of advanced microprocessors, micro controllers, their programming and interfacing techniques with external devices.

UNIT – I

Intel 8086 Microprocessor: Architecture, register organization, Addressing modes, Instruction set. Signal description, Memory segmentation. Minimum and maximum modes of operations of 8086.

UNIT – II

Assembly language programming: Assembler directives, simple programs using data transfer, arithmetic, logical, and Branching instructions. Procedures and macros. Memory interfacing to 8086: Static RAM & EPROM. Dynamic RAM.

UNIT – III

Parallel data transfer schemes: 8255-PPI, Interfacing of switch/display, stepper motor, D/A and A/D converters, 8279, 8259-PIC interrupt controller, 8257-DMA. Serial data transfer schemes: 8251-USART interfacing. RS - 232C standard.

UNIT – IV

Advanced Microprocessors: 80386 Special function registers, Memory management, moving to protected mode, virtual mode, and memory paging mechanism. Introduction to the 80486 Microprocessor, Pentium and Pentium-Pro Microprocessor, and their special features.

UNIT – V

Intel 8051 Micro controller: 8051 Architecture, pin functions, register organization, memory interfacing, addressing modes, instruction set, I/O ports, Timers/Counters, Serial Communication, Interrupts structure. Assembly language programming with 8051.

REFERENCE BOOKS:

1. Y.Liu and G.A. Gibson, "Micro Computer Systems, The 8086/8088 Family Architecture, Programming and Design", 2nd ed., PHI.
2. Mike Predco, "8051 Micro controllers", TMH
3. Kenneth J. Ayala, "8086 Microprocessors", Penram International

M.Tech. - PED - I Year - I Semester

L	T	P	To	C
4	0	0	4	4

(EE507) POWER ELECTRONIC CONTROL OF DC DRIVES

Objective of the Course:

The course provides basic understanding of main principles of DC drives, various modes of operation, control from converters and choppers.

UNIT – I

Modeling of DC Machines: Theory of operation-Equivalent Circuit and Electromagnetic Torque-Electromechanical Modeling-State space modeling-Block diagram and Transfer functions

UNIT – II

Single Phase Controlled Converter DC Motor Drives: Principle of DC Motor Speed Control-Armature control-Field Control-armature and field controls. Single –phase semi converter and single-phase full converter fed Separately excited DC motor- for continuous and discontinuous modes of operation-Problems

UNIT – III

Three Phase Controlled Converter DC Motor Drives: Three-phase semi converter and three-phase full converter Separately excited DC motor-for continuous and discontinuous modes of operation-Problems-Four Quadrant Operation using Dual Converters-Control modeling of three-phase converter-Two quadrant Three Phase Converter Controlled DC Motor Drive-Transfer Functions of the subsystems

UNIT – IV

Design of Controllers: Current controller-First order Approximation of Inner Current Loop- speed controller-Simulation of one quadrant DC Motor Drive-The Motor equations-filet in the speed feed back loop-Speed Controller- Current Reference Generator-Current Controller-Flow Chart for Simulation.

UNIT – V

Chopper controlled DC Motor drives

Principle of operation of the chopper – four quadrant chopper circuit – chopper for inversion – chopper with other power devices – model of the chopper – input to the chopper – steady state analysis of chopper controlled DC motor drives – rating of the devices - Closed loop operation of DC Motor drives- Speed controlled drive system current control loop – pulse width modulated current controller – hysterisis current controller – modeling of current controller – design of current controller

REFERENCE BOOKS:

1. R.Krishnan, "Electric motor drives modeling, Analysis and control" 1st ed., Prentice Hall India
2. Shepherd, Hulley, Liang, "Power Electronics and motor control", 2nd ed., Cambridge University Press
3. M.H. Rashid, "Power Electronic circuits, Devices and applications", 1st ed., PHI, 1995
4. G.K. Dubey, "Fundamentals of Electric Drives", Narsa Publications, 1995

M.Tech. - PED - I Year - I Semester	L	T	P	To	C
	4	0	0	4	4

(EE509) DIGITAL CONTROL SYSTEMS

(ELECTIVE - I)

Objective of the Course:

The goal of the course is to provide access to the basic design and analysis tools used in practical discrete-time and sampled data control systems as well as to give an exposure to the student to the general area of linear systems theory which appears so very often in all branches of engineering

UNIT - I

Introduction to Digital Control systems: Data conversion and quantisation- Sampling process- Mathematical modeling- Data reconstruction and filtering of sampled signals- Hold devices- z transform and inverse z transform. Relationship between s- plane and z- plane- Difference equation. Solution by recursion and z-transform.

UNIT - II

Analysis of Digital Control Systems: Digital control systems- Pulse transfer function. z transform analysis of closed loop open loop systems- Modified z- transfer function-

UNIT - III

Stability of linear digital control systems- Stability tests- Jury stablility test – Stability Analysis by use of the Bilinear Transformation and Routh Stability criterion.

Steady- state error analysis- Root loci - Frequency domain analysis- Bode plots- Gain margin and phase margin Case study examples using MATLAB.

UNIT - IV

Classical Design of Digital Control Systems:

Cascade and feedback compensation by continuous data controllers-Digital controllers-Design using bilinear transformation- Root locus based design- Digital PID controllers- Dead beat control design- Case study examples using MATLAB.

UNIT - V

Advanced Design of Digital Control Systems:

State variable models- Interrelations between z-transform models and state variable models- Controllability and Observability - Response between sampling instants using state variable approach-Pole placement using state feedback . Dynamic output feedback- Effects of finite word length on controllability and closed loop pole placement- Case study examples using MATLAB

REFERENCE BOOKS:

1. B.C Kuo, "Digital Control Systems", 2nd ed., Oxford University Press, Inc., New York, 1992.

2. G.F. Franklin, J.D. Powell, and M.L. Workman, "Digital control of Dynamic Systems", Addison-Wesley Longman, Inc., Menlo Park, CA , 1998.

3. M. Gopal, "Digital Control and State Variable Methods", Tata MC Graw Hill Publishing Company, 1997.

4. John F. Walkerly, "Microcomputer architecture and Programs", John Wiley and Sons Inc., New York, 1981.

5. K. Ogata, "Discrete Time Control Systems", Addison-Wesley Longman Pte. Ltd., Indian Branch Delhi,1995.

6. C. H. Houpis and G.B. Lamont, "Digital Control Systems", MC Graw Hill Book Company, 1985.

M.Tech. - PED - I Year - I Semester

L	T	P	To	C
4	0	0	4	4

(EE511) OPTIMIZATION TECHNIQUES

(ELECTIVE - I)

Objective of the course:

The ever-increasing demand on engineers to lower production costs, energy losses and to maximize operational reliability has prompted engineers to look for rigorous methods of decision making such as optimization techniques. The knowledge of optimization is needed in design and operation of electrical systems because these systems handle large power. This course contains static optimization methods of linear and non-linear systems and also the dynamic programming.

UNIT- I

Linear Programming: Introduction-objective function and constrains. Examples from real world. Simplex method, standard form of linear programming problem. Geometrical solution, System of linear equations, simplex algorithm, two phases of simplex method.

UNIT- II

Revised simplex method-primal dual relations, dual simplex method, post-optimality analysis. Transportation problem, Assignment problem, quadratic programming, examples.

UNIT- III

Nonlinear programming: Unconstrained optimization-direct methods: Powell's Method, conjugate direction, Rosen Brock's method. Indirect search methods: steepest descent, conjugate gradient, Newton's methods. Davidon-Fletcher-Powell method.

UNIT- IV

Constrained optimization: Sequential linear programming, Methods of feasible directions, gradient projection method, generalized reduced gradient method, penalty function method, Augmented Legrangian multipliers method. Kuhn-Tucker conditions.

UNIT- V

Dynamic programming: Multistage decision processes, Principal of optimality, computational procedure, linear programming as a case of dynamic program. All integer and mixed integer programming, Branch and Bound method. Introduction to Genetic Algorithms, optimization of fuzzy systems. Neural network- based optimization.

REFERENCE BOOKS:

1. S.S.Rao, "Engineering Optimization", revised 3rd ed., New Age international publishers.
2. Kalyanmoy Dev, "Optimization for Engineering Design" Printice-Hall of India, 2005
3. Ashok D. Bellegundu and T.R. ChandruPatla, "Optimization Concepts and Application in Engineering" Pearson Edition Asia, 2002

M.Tech. - PED - I Year - I Semester	L	T	P	To	C
	4	0	0	4	4

(EE513) NEURAL & FUZZY SYSTEMS

(ELECTIVE - II)

Objective of the Course :

This course is useful in learning how we can adapt the systems that developed with nature in to understanding of the physical systems around us.

UNIT - I

Introduction to Neural NetworksIntroduction, Organization of the Brain, Biological and Artificial Neuron Models, Integrate-and-Fire Neuron Model, McCulloch-Pitts Model, Characteristics of ANN, Potential Applications of ANN. Artificial Neuron Model, Operations of Artificial Neuron, Types of Neuron Activation Function, ANN Architectures, Classification Taxonomy of ANN – Connectivity, Neural Dynamics (Activation and Synaptic), Learning Strategy (Supervised, Unsupervised, Reinforcement), Learning Rules, Types of Application

UNIT - II

Single Layer & Multi-layer Feed forward Neural Networks:

Introduction, Perceptron Models: Discrete, Continuous and Multi-Category, Training Algorithms: Discrete and Continuous Perceptron Networks, Perceptron Convergence theorem, Limitations of the Perceptron Model, Applications. Credit Assignment Problem, Generalized Delta Rule, Derivation of Back propagation (BP) Training, Summary of Back propagation Algorithm, Kolmogorov Theorem, Learning Difficulties and Improvements.

UNIT – III

Associative Memories:

Paradigms of Associative Memory, Pattern Mathematics, Hebbian Learning, General Concepts of Associative Memory (Associative Matrix, Association Rules, Hamming Distance, The Linear Associator, Matrix Memories, Content Addressable Memory), Bidirectional Associative

Memory (BAM) Architecture, BAM Training Algorithms: Storage and Recall Algorithm, BAM Energy Function, Proof of BAM Stability Theorem Architecture of Hopfield Network: Discrete and Continuous versions, Storage and Recall Algorithm, Stability Analysis, Capacity of the Hopfield Network Summary and Discussion of Instance/Memory Based Learning Algorithms, Applications. Neural network applications: Process identification, control, fault diagnosis and load forecasting.

UNIT - IV

Classical & Fuzzy Sets:

Introduction to classical sets - properties, Operations and relations; Fuzzy sets, Membership, Uncertainty, Operations, properties, fuzzy relations, cardinalities, membership functions.

UNIT – V

Fuzzy Logic System Components:

Fuzzification, Membership value assignment, development of rule base and decision making system, Defuzzification to crisp sets, Defuzzification methods. Fuzzy logic applications: Fuzzy logic control and Fuzzy classification.

REFERENCE BOOKS:

1. Rajasekharan and Rai, "Neural Networks, Fuzzy logic, Genetic algorithms synthesis and applications", PHI Publication.
2. S.N.Sivanandam, S.Sumathi, S.N.Deepa, "Introduction to Neural Networks using MATLAB 6.0", TMH, 2006
3. J.M.Zurada, "Artificial Neural Networks"
4. Timothy. J.Ross, "Fuzzy logic Applications"
5. James A Freeman and Davis Skapura, "Neural Networks", Pearson Education, 2002.
6. Simon Hakins, "Neural Networks", Pearson Education
7. C.Eliasmith and CH.Anderson, "Neural Engineering", PHI
8. Bart Kosko, "Neural Networks and Fuzzy Logic System", PHI Publications.

M.Tech. - PED - I Year - I Semester

L	T	P	To	C
4	0	0	4	4

(EE515) ENERGY CONVERSION SYSTEMS

(ELECTIVE - II)

Objective of the course:

The student learns the prevailing nonconventional energy systems and the ways of harnessing them. The development of these energy systems will find an answer to meet future needs.

UNIT - I

Photo voltaic power generation ,spectral distribution of energy in solar radiation, solar cell configurations, voltage developed by solar cell, photo current and load current, practical solar cell performance, commercial photo voltaic systems.

UNIT - II

Test specifications for pv systems, applications of super conducting materials in electrical equipment systems Principles of MHD power generation, ideal MHD generator performance, practical MHD generator, MHD technology Wind Energy conversion: Power from wind, properties of air and wind, types of wind Turbines.

UNIT - III

Operating characteristics Tides and tidal power stations, modes of operation, tidal project examples, turbines and generators for tidal power generation. Wave energy conversion: properties of waves and power content, vertex motion of Waves, device applications. Types of ocean thermal energy conversion systems Application of OTEC systems examples.

UNIT - IV

Miscellaneous energy conversion systems: coal gasification and liquefaction, biomass conversion, geothermal energy, thermo electric energy conversion, principles of EMF generation, description of fuel cells

Co-generation and energy storage, combined cycle co-generation, energy storage. Global energy position and environmental effects: energy units, global energy position.

UNIT - V

Types of fuel cells, H2-O2 Fuel cells, Application of fuel cells – Batteries, Description of batteries, Battery application for large power Environmental effects of energy conversion systems, pollution from coal and preventive measures steam stations and pollution, pollution free energy systems

REFERENCE BOOKS:

1. Rakosh das Begamudre, "Energy conversion systems" New age international publishers, New Delhi - 2000.
2. John Twidell and Tony Weir, "Renewable Energy Resources" 2nd ed., Fspon & Co

M.Tech. - PED - I Year - I Semester

L	T	P	To	C
0	0	3	3	2

(EE517) POWER CONVERTERS LAB

Objective of the course:

The student learns the application of power electronic systems in DC and AC drives.

Experiments :

1) Speed Measurement and closed loop control using PMDC motor
2) Thyristorised drive for PMDC Motor with speed measurement and closed loop control
3) IGBT used single 4 quadrant chopper drive for PMDC motor with speed measurement and closed loop control
4) Thysistorised drive for 1 Hp DC motor with closed loop control
5) 3 phase input, thyristorised drive, 3 Hp DC motor with closed loop
6) 3 phase input IGBT, 4 quadrant chopper drive for DC motor with closed loop control equipment
7) Cycloconverter based AC induction motor control equipment
8) Speed control of 3 phase wound rotor induction motor
9) Single phase fully controlled converter with inductive load
10) Single phase half wave controlled converter with inductive load.

M.Tech. - PED - I Year - I Semester

L	T	P	To	C
0	0	3	3	2

(EE533) POWER ELECTRONICS SIMULATION LAB-I

Objective of the course:

The student learns the analysis of of Power Electronics circuits through Mat lab simulation.

Experiments :

1) Development of DC shunt generator with self excitation.
2) Development of DC motor with constant field.
3) Model of a running DC motor with PWM excitation.
4) Starting of a DC motor with automatic starter.
5) dq transformation model development.
6) Single phase rectifier circuit model
7) Running of a DC motor with controlled (Thyristor) line rectification model development.
8) 3 Phase sinusoidal PWM technique model development.
9) Development of PID control of design.
10) Induction motor model development.

M.Tech. - PED - I Year - II Semester

L	T	P	To	C
4	0	0	4	4

(EE502) POWER ELECTRONIC CONTROL OF AC DRIVES

Objective of the Course :

To impart knowledge on operation and performance of I.M., Synchronous motors and brushless DC motor and thier speed control techniques.

UNIT – I

AC Machines for Drives: Induction Machines- torque production – equivalent circuit analysis – speed torque characteristics with variable voltage operation, variable frequency operation, constant v/f operation – variable stator current operation – induction motor characteristics in constant torque and field weakening regions.

UNIT – II

Control and Estimation of Induction Motor Drives : Scalar control-voltage fed inverter control- open-loop volts/Hz control-speed control slip regulation – speed control with torque and flux control current controlled voltage fed inverter drive – current fed inverter control – independent current and frequency control- speed and flux control in current –fed inverter drive- Volts /Hz control of current-fed inverter drive -Slip power recovery drives – static Kramer Drive – Phasor diagram- torque expression – speed control of a Kramer Drive – Static Scheribus Drive – modes of operation.

UNIT – III

Vector or Filed Oriented Control of Induction motor drives: DC Drive Analogy-Principles of Vector control-vector control methods – direct vector control –indirect vector control.

UNIT – IV

Control and Estimation of synchronous motor drives: Synchronous motor and its characteristics – control strategies – constant torque angle control-unity power factor control constant mutual flux linkage control- Flux weakening operation – maximum speed – direct flux weakening algorithm – constant torque mode controller – flux weakening controller –

indirect flux weakening – maximum permissible torque – speed control scheme – implementation strategy – speed controller design.

UNIT – V

Brushless DC motor drives: Three-phase full wave brush less dc motor – sinusoidal type of brush less dc motor – current controlled blushless dc motor servo drive.

REFERENCE BOOKS:

1. B.K. Bose, "Modern Power Electronics and AC drives", 1st ed., Pearson publications
2. R. Krishnan, "Electric motor drives Modeling, Analysis and Control", 1st ed., Pearson Publications , 2002
3. B.K. Bose, "Power Electronics and AC drives", Prentice Hall.
4. M.H. Rashid, "Power electronic circuits, Devices and applications", PHI, 1995
5. G.K. Dubey, "Fundamentals of Electrical drives", Narora publications,1995
6. B.K. Bose, "Power Electronics and Variable frequency drives", 1st ed, IEEE Press Standard publications 2002.

M.Tech. - PED - I Year - II Semester

L	T	P	To	C
4	0	0	4	4

(EE504) HIGH VOLTAGE DC TRANSMISSION

Objective of the Course :
The student learns production and control of HVDC and Reduction of Harmonics.

UNIT - I
General considerations, Power Handling Capabilities of HVDC Lines, Basic Conversion principles, static converter configuration. Static Power Converters : 3-pulse, 6-pulse and 12-pulse converters, converter station and Terminal equipment, commutation process, Rectifier and inverter operation, equivalent circuit for converter – special features of converter-transformers

UNIT - II
Control of HVDC Converters and systems: constant current, constant extinction angle and constant Ignition angle control. Individual phase control and equidistant firing angle control, DC power flow control, Harmonics in HVDC Systems, Harmonic elimination, AC and DC filters.

UNIT - III
Interaction between HV AC and DC systems – Voltage interaction, Harmonic instability problems and DC power modulation.

UNIT - IV
Multi-terminal DC links and systems; series, parallel and series parallel systems, their operation and control.

UNIT - V
Transient over voltages in HVDC systems : Over voltages due to disturbances on DC side, over voltages due to DC and AC side line faults Converter faults and protection in HVDC Systems: Converter faults, over current protection - valve group, and DC line protection. Over voltage protection of converters, surge arresters.

REFERENCE BOOKS:

1. E.W. Kimbark, "Direct current Transmission", Wiely Inter Science, NewYork.
2. J.Arillaga, "H.V.D.C.Transmission", Peter Peregrinus ltd., London UK 1983
3. K.R.Padiyar, "High Voltage Direct current Transmission", Wiely Eastern Ltd., New Delhi, 1992.
4. E.Uhlman, "Power Transmission by Direct Current", Springer Verlag, Berlin Helberg, 1985.

M.Tech. - PED - I Year - II Semester

L	T	P	To	C
4	0	0	4	4

(EE506) DYNAMICS OF ELECTRICAL MACHINES

Objective of the Course :

The subject helps the engineers to learn modern techniques and analytical methods for dealing with and solving operational problems in electrical machines. It also helps the students to develop and practice their research skills and find solutions to real problems.

UNIT - I

Operation And Steady State Behavior of Electrical Machines: Electromechanical conversion – steady state equations of dc machines - rotating field theory – operation of inductiion motor – operation of synchronous motor – power angle characteristics.

UNIT - II

Electro dynamical equations and their solutions: Lagrange's equation – Application of Lagrange's equation – solution of electro dynamical equations.

UNIT - III

Dynamics of DC Machines: Separately excited d.c. generators – steady state analysis – transient analysis – separately excited dc motors – steady state analysis – transient analysis interconnection of machines – Ward Leonard system of speed control

UNIT - IV

Induction Machine Dynamics: Induction machine dynamics during starting and braking – accelerating time – induction machine dynamics during normal operation – equation for dynamical response of the induction motor.

UNIT - V

Synchronous Machine Dynamics: Electromechanical equation – Motor operation – generator operation – small oscillations – general equations for small oscillations – representation of the oscillation equations in state variable form.

REFERENCE BOOKS:

1. Sen Gupta D.P. and J.W. Lynn “Electrical Machine Dynamics”, Macmillan Press Ltd., 1980
2. Bimbhra P.S. “Generalized Theory of Electrical Machines”, Khanna Publishers 2002.
3. P.C.Krause, O.Wasynczuk, "Electromechanical Motion Devices", Mc Graw Hill, 1989
4. C.Ong, "Dynamic Simulation of Electric Machinery Using MATLAB", Prentice Hall, 1998

M.Tech. - PED - I Year - II Semester

L	T	P	To	C
4	0	0	4	4

(EE508) FLEXIBLE AC TRANSMISSION SYSTEMS

Objective of the Course :

The student is exposed to the modelling and analysis of the power control methods and of improvement of power quality through the use of FACTS devices.

UNIT - I

Power Flow in AC Systems, Loading capability Limits, Dynamic stability considerations, controllable parameters, basic types of FACTS, FACTS controllers

UNIT - II

Voltage Source Converters: Single phase and 3-phase full wave bridge converters, transformer connections for 12, 24, 48 pulse operation, 3 level voltage source converters, PWM converters.

UNIT - III

Static Shunt Compensation: Objectives of shunt compensation, Voltage in stability and its prevention, power oscillations and damping, controllable VAR generation, variable impedance type VAR generators.

UNIT - IV

SVC and STATCOM: Dynamic performance, transient stability enhancement, modeling and simulation of SVC and STATCOM

UNIT - V

Series capacitive compensation, transient stability improvement. Thyristor controlled series capacitor (TCSC), thyristor control power angle regulator (TCPAR) Unified power flow controller and its modeling and simulation.

REFERENCE BOOKS:

1. N.G. Hingorani and L. Guygi, "Understanding FACTS Devices", IEEE Press Publications, 2000.
2. E. Acha et. Al. John Wiley, "FACTS: Modelling and Simulationin power Networks", London, UK, 2004
3. P. Kundur, "Power System Stability and Control", Mc Graw Hill, 1994.

M.Tech. - PED - I Year - II Semester

L	T	P	To	C
4	0	0	4	4

(EE510) RELIABILITY ENGINEERING

(ELECTIVE - III)

Objective of the Course :

Besides the quality, the reliability of electrical systems and their operation is equally important. This course exposes the student to methods of reliability evaluation and its improvement.

UNIT - I

Basic Probability Theory: Probability concepts, permutations and combinations, rules for combining probabilities, probability distributions, Binomial distribution and properties; effects of redundancy, partial output and unavailability.

UNIT - II

Network modeling of simple systems: series, parallel and series-parallel systems, partially redundant and stand-by redundant systems; perfect and imperfect switching, complex systems: cut-set method, tie-set method and connection matrix techniques, multi-failure modes.

UNIT - III

Reliability Evaluation: General reliability functions and their evaluation, Poisson distribution, normal distribution, exponential distribution, Weibul distribution; stand-by systems and their reliability evaluation.

Markov chains: Stochastic Transitional Probability Matrix, probability evaluation of different states, continuous Markov process4es: state space diagrams, limiting state probabilities, repairable systems, MTTF evaluation, complex systems.

UNIT - IV

Frequency and duration techniques: Application to multi-state problems, frequency balance approach, two-stage repair and installation process, approximate system reliability evaluation.

UNIT - V

Monte-Carlo simulation: Concepts of simulation, random variables, simulation output, applications of Monte-Carlo technique, reliability and availability of repairable systems and stand-by systems.

REFERENCE BOOKS:

1. Roy Billington and Ronald N Allen, "Reliability Evaluation of Engineering Systems", 2^{nd} ed., Springer International Edition.
2. Roy Billington and Ronald N Allen, "Reliability Evaluation of Power Systems", 2^{nd} ed., Springer International Edition.

M.Tech. - PED - I Year - II Semester

L	T	P	To	C
4	0	0	4	4

(EE512) POWER QULITY

(ELECTIVE - III)

Objective of the Course :

Extensive use of power electronic devices in operation and control of electrical systems and apparatus is limiting the electrical power to poor quality resulting in voltage flicker, voltage unbalance, increased electrical losses and equipment failure. Design of power converters and associated machine drives must have as an objective the minimum distortion of wave form. This course introduces the basics of power quality assessment and control techniques.

UNIT - I

Over view of power Quality and quantity standards - IEC and IEEE definitions - voltage fluctuations-transients-unbalance-waveform distortion-power frequency variations.

UNIT - II

Voltage variations, Voltage sags and short interruptions – flicker-longer duration variations - sources – range and impact on sensitive circuits-standards – solutions and mitigations – equipment and techniques.

UNIT - III

Transients – origin and classifications – capacitor switching transient – lightning-load switching – impact on users – protection – mitigation.

UNIT - IV

Harmonics – sources – definitions & standards – impacts - calculation and simulation – harmonic power flow - mitigation and control techniques – filtering – passive and active.

UNIT - V

Power Quality conditioners – shunt and series compensators-DStatcom-Dynamic voltage restorer-unified power quality conditioners-case studies.

REFERENCE BOOKS:

1. Heydt, G.T., "Electric Power Quality", 2nd ed., Stars in a Circle Publications, Indiana,1994.
2. Bollen, M.H.J., "Understanding Power Quality Problems, Voltage sags and interruptions", IEEE Press, New York, 2000.
3. Arrillaga, J, Watson, N.R., Chen, S., "Power System Quality Assessment", Wiley, New York, 2000.

M.Tech. - PED - I Year - II Semester

L	T	P	To	C
4	0	0	4	4

(EE514) PROGRAMMABLE LOGIC CONTROLLERS AND THEIR APPLICATIONS

(ELECTIVE - IV)

Objective of the Course :

The student learns about the different modules of the PLC System and methods of programming the PLCs.

UNIT - I

PLC Basics:

PLC system, I/O modules and interfacing, CPU processor, programming equipment, programming formats, construction of PLC ladder diagrams, devices connected to I/O modules. PLC programming: Input instructions, outputs, operational procedures, programming examples using contacts and coils, drill press operation

UNIT - II

Digital logic gates, programming in the Boolean algebra system, conversion examples. Ladder diagrams for process control: Ladder diagrams and sequence listings, ladder diagram construction and flow chart for spray process system.

UNIT - III

PLC Registers: Characteristics of Registers, module addressing, holdng registers, input registers output registers. PLC Functions: Timer functions and industrial applications, counters, counter function industrial applications, arithmetic functions, number comparison functions, number conversion functions

UNIT - IV

Data Handling functions: SKIP, Master control relay, Jump, Move, FIFO, FAL, ONS, CLR and Sweep functions and their applications. Bit pattern and changing a bit shift register, sequence functions and applications, controlling of two axis and three axis Robots with PLC, Matrix functions.

UNIT - V

Analog PLC operation: Analog modules and systems, Analog signal processing, multi bit data processing, analog output application examples, PID principles, position indicator with PID control, PID modules, PID tuning, PID functions

REFERENCE BOOKS:

1. John W. Webb and Ronald A. Reiss, "Programmable Logic Controllers– Principle and applications" 5th ed., PHI.
2. JR. Hackworth and F.D. Hackworth, "Programmable Logic Controllers– Programming Method and applications", Jr. Pearson, 2004.

M.Tech. - PED - I Year - II Semester

L	T	P	To	C
4	0	0	4	4

(EE516) ADVANCED DIGITAL SIGNAL PROCESSING

(ELECTIVE - IV)

Objective of the course:

The objective is to establish fundamental concepts of signal processing on multirate processing parametric modelling linear prediction theory, modern spectral estimation and high resolution techniques.

UNIT - I

Multi rate Signal Processing: Introduction, sampling an signal reconstruction, sampling Rate Conversion, Decimation by an Integer Factor, Interpolation by an Integer Factor, Sampling Rate Conversion by a Rational Factor, Sampling Rate Converter as a Time Variant system, Practical Systems for Decimators and Interpolators, Direct Form and Poly-Phase FIR Structures with Time varying Coefficients.

UNIT - II

Multi rate FIR filter design: Design of FIR Filters for Sampling Rate Conversion, Multistage Implementation of Sampling Rate Conversion, Applications of Interpolation and Decimation in Signal Processing Operations, Low-Pass and Band-Pass Filters

UNIT - III

Filter Bank implementation, Sub-Band Processing, Decimated Filter Banks, Two Channel Filter Banks, Tree structured Filter Banks, Octave-Band Filter Banks, Uniform DFT Filter Banks.

UNIT - IV

Estimation of Spectra from Finite Duration Observations of a Signal, the Period gram, Use DFT in power Spectral Estimation, Bartlett, Welch and Blackman, Turkey methods, Comparison of performance of Non-Parametric Power Spectrum Estimation Methods.

UNIT - V

Parametric Methods for power spectrum estimation, Relationship between Auto -Correlation and Model Parameters, AR(Auto-Regressive) Process and Linear prediction, Yule-Walker, Burg and Unconstructrained Least Squares Methods, Sequential Estimation, Moving Average(MA) and ARMA Models Minimum Variance Method, Piscaranko's Harmonic Decomposition Method, MUSIC Method.

REFERENCE BOOKS:

1. Proakis JG and Manolakis DG Digital Signal Processing Principles, Algorithms and applications, PHI
2. Openheim AV & Schafer RW, Discrete Time Signal Processing PHI.
3. Orfanadis S, Introduction to Digital Signal Processing PHI
4. Orfanadis S Optimum Signal Processing PHI

M.Tech. - PED - I Year - II Semester

L	T	P	To	C
0	0	3	3	2

(EE518) ELECTRICAL SYSTEMS SIMULATION LAB

Objective of the Course :
The student learns analysis of electrical system through computer simulation, using software packages.

EXPERIMENTS :

1. Transform a given dynamical system from I/O model to state variable model and vice versa.
2. Obtain model matrix of a given system, obtain its diagonalize form if exists or obtain Jordon Canonical form of system.
3. Write a program and implement linear quadratic regulator
4. Design a compensator for a given systems for required specifications.
5. Conduct a power flow study on a given power system.
6. Design a PID controller.
7. Develop a program to solve Swing Equation.
8. Develop a Simulink model for a single area load frequency problem and simulate the same.
9. Develop a Simulink model for a two-area load frequency problem and simulate the same.
10. Design a PID controller for two-area power system and simulate the same.
11. PSPICE Simulation of Single phase full converter using RL&E loads.
12. PSPICE Simulation of Three phase full converter using RL&E loads.
13. PSPICE Simulation of Single phase AC Voltage controller using RL load.
14. PSPICE Simulation of Three phase inverter with PWM controller.

M.Tech. - PED - I Year - II Semester

L	T	P	To	C
0	0	3	3	2

(EE534) POWER ELECTRONICS APPLICATION LAB

Objective of the course:

To Show awareness of the impact of power electronic control circuits on utility supply

To observe the difference of the conventional and power electronic control of drives

To explain the student with various power electronic converter topologies and their speed control application (open loop and closed loop operation)

Experiments :

1. V/F Control of Induction Motor with DSP Controller.
2. Speed control of PMSM Motor with DSP controller.
3. Speed control of BLDC Motor with Eddy current load setup.
4. Study of Single phase dual converter with and without circulating current mode .
5. Study of three-phase full and half controlled converter with R-L and R-L-E loads.
6. Study of DC to DC Non-Isolated switched mode converters.
7. Study of DC to DC Isolated switched mode converters.
8. Speed control of a four-quadrant separately excited DC motor drive.
9. Study of resonant converter.
10. Study of three-phase SPWM based voltage source inverter.

M.Tech-VLSI Syllabus

I YEAR **SEMESTER-I**

Code	Subject	L	T	P	To	C
EC557	VLSI Technology	3	1	-	4	4
EC559	Digital IC Design	3	1	-	4	4
EC561	Anolog IC Design	3	1	-	4	4
EC563	Programming and Scripting Languages For VLSI Design Automation	4	-	-	4	4
ELECTIVE-I						
EC565	Advanced Digital System Design	3	1	-	4	4
EC567	Semiconductor Device Modeling	4	-	-	4	4
EC545	DSP Processors & Architectures	4	-	-	4	4
ELECTIVE-II						
EC550	VLSI Signal Processing	3	1	-	4	4
EC569	Verification Methodologies	3	1	-	4	4
EC571	System On Chip Design	3	1	-	4	4
LAB						
EC575	Digital IC Design Lab	-	-	3	3	2
EC577	Analog IC Design Lab	-	-	3	3	2
	Total					**28**

M.Tech-VLSI

I YEAR SEMESTER-II

Code	Subject	L	T	P	To	C
EC558	CAD VLSI	4	-	-	4	4
EC560	VLSI Testing and Validation	3	1	-	4	4
EC562	Mixed Signal Design	3	1	-	4	4
EC564	Chip Design	4	-	-	4	4
ELECTIVE-III						
EC566	FPGA & CPLD Architectures and Applications	4	-	-	4	4
EC568	Low Power VLSI	4	-	-	4	4
EC570	RFIC Design	3	1	-	4	4
ELECTIVE-IV						
EC548	Micro Electro Mechanical Systems	4	-	-	4	4
EC572	Nano Electronics	4	-	-	4	4
EC574	Semiconductor Memory Design	3	1	-	4	4
LAB						
EC576	Mixed Signal Design Laboratory	-	-	3	3	2
EC580	Advanced Digital IC Design Lab	-	-	3	3	2
	Total					**28**

M.Tech-VLSI

II YEAR SEMESTER-III

S.No	Subject	L	T	P	To	C
EC605	PROJECT PART-I	-	-	-	-	-
EC607	SEMINAR	-	-	2	2	2

II YEAR SEMESTER-IV

S.No	Subject	L	T	P	To	C
EC605	PROJECT PART-II	-	-	40	40	40

EC557 VLSI TECHNOLOGY

L	T	P	To	C
3	1	-	4	4

Course Objectives :

- To understand the Fabrication of ICs and purification of Silicon in different technologies.
- To impart in-depth knowledge about Etching and deposition of different layers.
- To understand the different packaging techniques of VLSI devices.

Course Learning Outcomes:

- The ability to use metallization techniques to create three-dimensional device structures and devices.
- The ability to know methodology to fabricate an IC's

UNIT – I **(9 hours)**

Crystal Growth, Wafer Preparation, Epitaxy and Oxidation

Metallurgical Grade Silicon, Electronic Grade Silicon, Czochralski crystal growing, Silicon Shaping, Etching, Polishing, Chemical Cleaning, gettering treatment, Vapor phase Epitaxy, Epitaxial Evaluation, Growth Mechanism, Introduction to Oxidation Techniques.

UNIT – II **(9 hours)**

Lithography, Deposition, Diffusion and Ion Implantation

Optical Lithography, Electron Lithography, Deposition process, Poly-silicon, structure, properties of Silicon Dioxide, Annealing, Furnace Annealing.

UNIT – III **(9 hours)**

Metallization, VLSI Process Integration and Packaging

Chemical Vapor Deposition (PVD), NMOS IC Technology, CMOS IC Technology, BICMOS IC Technology, Packaging, packaging types and Packaging Design Considerations.

UNIT – IV **(10 hours)**

Introduction to MOS Technology and Electrical Properties

Introduction to MOS technology, Basic MOS transistors, MOS transistor operation, Drain current Vs voltage derivation, MOS Transistor parameters: threshold Voltage, g_m, g_{ds}, pass transistor, NMOS inverter, Various Pull ups, Determination of pull up to pull down ratio for an NMOS inverter, CMOS inverter, DC Characteristics, Bi-CMOS inverter, Latch up in CMOS circuits.

UNIT – V **(8 hours)**

VLSI Circuit Design Processes and Circuit concepts and characterization

VLSI Design Flow, MOS Layers, Stick diagrams, Design rules, Layout generation- nMOS, CMOS, Bi-CMOS, Sheet Resistance, Standard unit of capacitance, Delay estimation, Power dissipation, Interconnect, Design margin, Scaling.

TEXT BOOK:

1. S.M.Sze, *VLSI Technology*, McGraw Hill, 2003.
2. Kamran Eshraghian, Eshraghian Dougles and A. Pucknell, Essentials of VLSI circuits and systems, PHI, 2005 Edition.

REFERENCES:

1. Amar Mukherjee, *Introduction to NMOS and CMOS VLSI System Design*, PHI, 2000.
2. James D Plummer, Michael D. Deal and Peter B. Griffin, *Silicon VLSI Technology: Fundamentals Practice and Modeling*, PHI, 2000.
3. Wai Kai Chen, *VLSI Technology*, CRC press, 2003.
4. Rainer Waser ,*Nano Electronics and Information Technology* , Wiley VCH – April 2003.6.*6.S.K. Ghandhi, VLSI Fabrication Principles, John Wiley Inc., New York, 1983.*
5. Nandita Das Gupta, *VLSI technology,* NPTEL Courseware.

EC559 DIGITAL IC DESIGN

L	T	P	To	C
3	1	-	4	4

Course Objectives :

- To learn the basic MOS Circuits
- To learn the MOS Process Technology
- To understand the operation of MOS devices.
- To impart in-depth knowledge about analog and digital CMOS circuits.

Course Learning Outcomes :

- Analysis the operation of CMOS
- Analysis of the design rules and layout diagram
- Design of low power Adders and Multipliers
- Analysis the physical design process of VLSI design flow.
- Design of CMOS Memories.

UNIT – I **(9 hours)**

CMOS Inverter: Introduction to MOS transistor, V-I Characteristics, Electrical Parameters, Static behaviour, switching Threshold, Noise Margins, Robustness revisited, Dynamic behaviour: Computing the capacitances, propagation delay, propagation delay from a design perspective, power, energy and energy dealy.

UNIT – II **(15 hours)**

Combinational Logic Design: Introduction, Static CMOS Design: Complementary CMOS, ratioed logic, pass transistor logic dynamic CMOS Design: Dynamic logic, speed and power dissipation of dynamic logic, signal integrity issues in Dynamic design, cascading dynamic gates.

UNIT – III

Sequential Logic Design: Introduction, static latches and registers: The Bistablility principle, multiplexer based laches, master-slave edge-Triggered register, low-voltage static laches, Static SR Flip-flop, dynamic laches and registers, dynamic transmission, Gate Edge - triggered registers, CMOS NORA-CMOS True single - phase clocked register (TSPCER).

UNIT – IV **(7 hours)**

Timing Issues in Digital Circuits: Introduction, Timing classification of digital systems, synchronous design, Self-Timed circuit design, synchronizers and arbiters.

UNIT – V **(7 hours)**

Digital Integrated System Building Blocks: Introduction, Adders, Multiplexers, shifters, Memories, ROM, RAM, Internal structure, ROM 2 D Structure, SRAM, DRAM.

TEXT BOOKS:

1. Digital Integrated Circuits: A Design Perspective, Second Edition, Jan M. Rabaey, Anantha Chandrakasan and Borivoje Nikolic
2. Digital Integrated Circuit Design, Ken Martin

REFERENCES:

1. CMOS VLSI Design, Third Edition, Neil H. E. Weste and D. M. Harris IEEE Trans Electron Devices, IEEE J.Solid State Circuits, and other National and International Conferences and Symposia.

EC561 ANALOG IC DESIGN

L	T	P	To	C
3	1	-	4	4

Course Objectives:

- With an emphasis on CMOS technology, device models are briefly reviewed and developed further to cover channel-length modulation, sub threshold and short channel effects, as well as device parasitic capacitances.
- Integrated-circuit DC biasing techniques are presented starting from simple to more complex current mirrors, leading to analysis and design of current and voltage references.
- Temperature and power supply sensitivity, as well as absolute and mismatch parameter variations are introduced.

Course learning Outcomes:

- Develop an understanding of device and circuit theory sufficient to estimate the low and high frequency behavior of linear circuits, including noise.
- Develop an intuition for analog circuit behavior in both linear and nonlinear operation.
- Be able to calculate transfer functions and Bode plots and use them to estimate the stability of an electronic system.
- Develop an ability to parse large circuits and systems into smaller, analyzable subunits, analyze them, and then apply the understanding gained from that process to analyze the system as a whole, including for noise and variation.
- Implement a circuit or subsystem at the transistor level to solve an open-ended problem and effectively communicate the constraints and critical aspects of that system.

UNIT – I **(8 hours)**

Introduction to analog design - Levels of abstraction, Robust analog design, MOS Device Models, MOS Device Capacitances, MOS small signal model, long channel vs. short channel, Single stage amplifier- Basic concepts, Common Source Stage, Source follower, Common Gate stage, Cascode Stage

UNIT – II **(8 hours)**

Differential amplifiers - Single ended and Differentials Operation, Common Mode Response Differential pair with MOS loads, Gilbert Cell. Passive and Active Current Mirrors – Basic current mirrors, Cascode Current Mirrors, Active Current Mirrors

UNIT – III **(8 hours)**

Frequency Response of Amplifiers – General Considerations, CS stage, Source Followers, CG stage, Cascode stage, Differential Pair. Feed Back – General Considerations, Feedback Topologies, Effect of Loading.

UNIT – IV **(9 hours)**

Operational Amplifiers – General Considerations, Folded cascode type and Classical two stage opamps, Design of Classical two stage opamp , General Considerations, Multipole System, Phase Margin, Frequency Compensation, Compensation of Two Stage Op-Amp.

UNIT – V **(8 hours)**

Noise – Statistical characteristics of Noise, Types of Noise, representation of noise in circuits, Noise in single - stage amplifiers, Noise in differential pairs, Noise bandwidth.

TEXT BOOKS:

1. Design of Analog CMOS integrated circuits Behzad Razavi McGraw-Hill International edition -
ISBN-0-07-118815-0.
2. D. A. Johns and Martin, Analog Integrated Circuit Design, John Wiley, 1997.
3. “Analysis and Design of Analog Integrated Circuits”. Paul B Gray and Robert G Meyer,

REFERENCES:

1. R Gregorian and G C Temes, Analog MOS Integrated Circuits for Signal Processing, John Wiley,1986.
2. R L Geiger, P E Allen and N R Strader, VLSI Design Techniques for Analog & Digital Circuits,McGraw Hill, 1990.
3. Gray, Wooley, Brodersen, “Analog MOS Integrated circuits”, IEEE press, 1989.

EC563 PROGRAMMING AND SCRIPTING LANGUAGES FOR VLSI DESIGN AUTOMATION

L	T	P	To	C
4	4	-	-	4

Course Objectives:

- Students will be able to learn concepts of scripting languages in VLSI like PERL,Java Script

Course Learning Outcomes:

- Students will get benefit of using Scripting languages in their projects.
- Students will get scope for learning Java Script, PERL etc…
- An ability to develop the programming skills

UNIT – I **(9 hours)**

Introduction to Scripts and Scripting

Characteristics and uses of scripting languages, Introduction to PERL, Names and values, Variables and assignment, Scalar expressions, Control structures, Built-in functions, Collections of Data, Working with arrays, Lists and hashes, Simple input and output, Strings, Patterns and regular expressions, Subroutines, Scripts with arguments.

UNIT – II **(10 hours)**

Advanced PERL

Finer points of Looping, Subroutines, Using Pack and Unpack, Working with files, Navigating the file system, Type globs, Eval, References, Data structures, Packages, Libraries and modules, Objects, Objects and modules in action, Tied variables, Interfacing to the operating systems, Security issues.

UNIT – III **(9 hours)**

TCL

The TCL phenomena, Philosophy, Structure, Syntax, Parser, Variables and data in TCL, Control flow, Data structures, Simple input/output, Procedures, Working with Strings, Patterns, Files and Pipes, Example code.

UNIT – IV **(9 hours)**

Advanced TCL

The eval, source, exec and up-level commands, Libraries and packages, Namespaces, Trapping errors, Event-driven programs, Making applications 'Internet-aware', 'Nuts-and-bolts' internet programming, Security issues, running untrusted code, The C interface.

UNIT – V **(8 hours)**

TK and JavaScript

Visual tool kits, Fundamental concepts of TK, TK by example, Events and bindings, Geometry managers, PERL-TK. Other Languages:Broad Details of CGI,VB Script,Java Script with programming Examples,Basic concepts of Pythan.

TEXT BOOKS:

1. The World of Scripting Languages- David Barron, Wiley Student Edition, 2010.
2. Java the Complete Reference - Herbert Schildt, 7th Edition, TMH.
3. Randal L, Schwartz Tom Phoenix, "Learning PERL", Oreilly Publications, 3rd Edn., 2000
4. Tcl and the Tk Toolkit- John Ousterhout, 2nd Edition, 2009, Kindel Edition.

REFERENCES:

1. Tcl/Tk: A Developer's Guide- Clif Flynt, 2003, Morgan Kaufmann SerieS.
2. Tcl/Tk 8.5 Programming Cookbook- Bert Wheeler
3. Eric Foster-Johnson, John C. Welch, and Micah Anderson Beginning Shell scripting, ,Wiley Publication,2005
4. Practical Programming in Tcl and Tk - Brent Welch, Ken Jones and Jeff Hobbs.,Fourth edition.
5. Larry Wall, Tom Christiansen, John Orwant, "Programming PERL", Oreilly Publications, 3rd Edn., 2000

EC545 - DSP Processors & Architectures (Elective I)

L	T	P	To	C
3	1	-	4	4

Course Objectives:

- Architecture of a Real time Signal Processing Platform
- Digital Signal Processor Architecture
- Difference in the complexity of programs between a General Purpose Processor and Digital Signal Processor
- Apply previous signal processing knowledge in real-time digital signal processing systems.
- Learn to program a DSP processor.
- Prepare students with multi disciplinary competency

Course Learning Outcomes:

At the end of the course, students should be able to:

- Define digital signal processor (DSP)
- Comprehend performance enhancements provided by DSP in the areas: memory architecture, pipelining, parallel execution, cache use, direct memory access, addressing methods, hardware loop control etc.
- Different Errors introduced during A-D and D-A converter stage
- Develop tools and methods for DSP.

UNIT – I **(8 hours)**

Architectures for Programmable Digital Signal Processing Devices

Introduction, Basic Architectural Features, DSP Computational Building Blocks, Bus Architecture and Memory, Data Addressing Capabilities, Address Generation Unit, Programmability and Program Execution, Speed Issues, Features for External Interfacing.

UNIT – II **(8 hours)**

Programmable Digital Signal Processors

Introduction, Commercial Digital Signal-processing Devices, Data Addressing Modes of TMS320C54xx Digital Signal Processors, Data Addressing Modes of TMS320C54xx Processors, Memory Space of TMS320C54xx Processors, Program Control.

UNIT – III **(8 hours)**

DSP Programming and Operations

TMS320C54xx Instructions and Programming, Programming for IIR, FIR, FFT etc., On-Chip peripherals, Interrupts of TMS320C54xx Processors, Pipeline Operation of TMS320C54xx Processors.

UNIT – IV **(8 hours)**

Interfacing Memory and Parallel I/O Peripherals to Programmable DSP Devices

Introduction, Memory Space Organization, External Bus Interfacing Signals, Memory Interface, Parallel I/O Interface, Programmed I/O, Interrupts and I/O, Direct Memory Access (DMA),

UNIT – V **(8 hours)**

Interfacing Serial Converters to a Programmable DSP Device

Introduction, Synchronous Serial Interface, A multi-channel Buffered Serial Port (McBSP), McBSP Programming, A CODEC Interface Circuit, CODEC Programming, A CODEC-DSP Interface Example.

TEXT BOOKS:

1. “Digital Signal Processing”, A. Singh & S. Srinivasan, Thomson Learning.

REFERENCES:

“Digital Signal Processors”, B. Venkataramani & M. Bhaskar, Tata McGraw Hill.

EC565 ADVANCED DIGITAL SYSTEM DESIGN (Elective I)

L	T	P	To	C
3	1	-	4	4

Course Objectives:

- *To expose students to the advanced design techniques and methodology in Digital Circuits and Systems design.and*
- *The students will have the chance to implement a practical design project in an HDL language of their choice (VHDL/Verilog HDL) for a chosen target platform (FPGA or ASIC).*

Course learning outcomes:

- The student should after this course have an in-depth knowledge of digital integrated circuit hardware design.
- The emphasis is on FPGA technology, but most of the design techniques can also be applied to ASIC devices.
- The student should be familiar with the latest state-of-the-art system on chip (SoC) design methodologies, including high-level synthesis and partial run-time reconfiguration.
- Students should be able to learn the benefits and drawbacks of the various design methods for solving a problem.
- Through practical assignments, experience will be achieved from both using tools as well as designing their own system.

UNIT – I **(10 hours)**

Design of Digital systems

ASM charts, Hardware description language and control sequence methods, Reduction of state tables, state assignments. Sequential circuit design: design of iterative circuits, design of sequential circuits using ROMs and PLAs, sequential circuit design using CPLD, FPGAs.

UNIT – II **(9 hours)**

Fault modeling

Fault classes and models, stuck at faults, bridging faults, transition and Intermittent faults. Test Generation: Fault diagnosis of combinational circuits by conventional methods, Path sensitization technique, Boolean difference method, Kohavi algorithm, D-algorithm, PODEM

UNIT – III **(9 hours)**

Test pattern generation

Random testing, transition count testing, signature analysis, testing for bridging faults. Fault diagnosis in sequential circuits: state identification and fault detection experiments, machine identification, design of fault detection experiment.

UNIT – IV **(9 hours)**

Programming logic arrays

design using PLAs, PLA minimization and PLA folding. PLA testing: Fault models, test generation and testable PLA design.

UNIT – V **(9 hours)**

Asynchronous sequential machine

Fundamental mode model, flow table, state reduction, minimal closed covers, races, cycles and hazards.

TEXT BOOKS:

1. "Fundamentals of Logic Design", Charles Roth, 5th edition.
2. "Digital Circuit Testing and Testability", Parag. K. Lala
3. N.N.Biswas, "Logic Design theory", PHI3.
4. "VLSI Test principles & Architectures", L. T. Wang, C-W Wu and X. Wen

REFERENCES:

1. Z.Kohavi, "Switching and finite automata theory", TMH2.
2. "Digital System Testing and Testable Design", M. Abramovici, M. A. Breuer
3. N Balabanian, B. Calson, "Digital logic design principles", W iley student edition, 2004
4. Morris Mano, "Digital Design", 4th edition

EC567 SEMICONDUCTOR DEVICE MODELING (Elective I)

L	T	P	To	C
3	1	-	4	4

Course objectiveS:

- This course provides a solid foundation in the physics of semiconductors so that students will be able to not only understand current devices and exploit them in novel applications.
- It also appreciate the workings of new semiconductor devices as they materialize and evolve in future years.

Course learning outcomes:

- At the end of this course you should be able to Explain the equations, approximations and techniques available for deriving a model with specified properties, for a general device characteristic with *known qualitative theory*
- Apply suitable approximations and techniques to derive the model referred to above starting from drift-diffusion transport equations (assuming these equations hold)
- Offer clues to qualitative understanding of the physics of a new device and conversion of this understanding into equations
- Simulate characteristics of a simple device using MATLAB, SPICE and ATLAS / SYNOPSYS
- Explain how the equations get lengthy and parameters increase in number while developing a compact model
- List mathematical functions representing various non-linear shapes

UNIT – I **(10 hours)**

Semiconductor Physics

Metals, insulator, semiconductors, intrinsic and extrinsic semiconductors, direct and indirect band gap, free carrier densities, Fermi distribution, density of states, Boltzmann statistics, thermal equilibrium, current flow mechanisms, drift current, diffusion current, mobility, band gap narrowing, resistance, generation and recombination, lifetime, internal electro-static fields and potentials, Poisson's equation, continuity equations, drift-diffusion equations.

UNIT – II **(9 hours)**

PN-Junction Diodes

Thermal equilibrium physics, energy band diagrams, space charge layers, internal electro-static fields and potentials, reverse biased diode physics, junction capacitance, wide and narrow diodes, transient behavior, transit time, diffusion capacitance, small signal model.

UNIT – III **(8 hours)**

Bipolar Transistors

Basic theory and operation, heavy doping effects, double diffused transistors, Ebers-Moll model, low forward bias, junction and diffusion capacitance, transit times, parasitic, small-signal models, Early effect, saturation and inverse operation, breakdown mechanisms, punch-through.

UNIT – IV **(10 hours)**

MOS Transistors

MOS capacitor, accumulation, depletion, strong inversion, threshold voltage, contact potential, oxide and interface charges, body effect, drain current, saturation voltage, gate work function, channel mobility, sub-threshold conduction, short channel effects, effective channel length, effects of channel length and width on threshold voltage, Compact models for MOSFET and their implementation in SPICE. Level 1, 2 and 3, MOS model parameters in SPICE.

UNIT – V **(8 hours)**

UDSM Transistor Design Issues

Short channel and ultra short channel effects; Effect t_{ox} , effect of high k and low k dielectrics on the gate leakage and Source –drain leakage; tunneling effects; different gate structures in UDSM - impact and reliability challenges in UDSM.

TEXT BOOKS:

1.Y.P. Tsividis, The MOS Transistor, McGraw-Hill, international edition ed., 1988.

2.Nandita DasGupta, Amitava DasGupta, Semiconductor Devices: Modeling and Technology, PHI

3.S.M.Sze, Semiconductor Devices Physics and Technology, John Wiley & Sons Inc, (2/e).

REFERENCES:

1. Getreu, Modeling the bipolar transistor, New York, NY: Elselvier, 1978.
2. D. Roulston, Bipolar Semiconductor Devices, McGraw Hill, 1990.
3. N. Arora, MOSFET Models for VLSI Circuit Simulation, Springer-Verlag, 1993.
4. P. Antognetti and G. Massobrio, Semiconductor Device Modeling with SPICE, McGraw-Hill, 1988.
5. D.W. Greve, Field Effect Devices and Applications, Prentice Hall Series in Electronics and VLSI, 1998

EC550 VLSI SIGNAL PROCESSING (Elective II)

L	T	P	To	C
3	1	-	4	4

Course Objectives :

- To understand the basic concepts of DSP algorithms.
- To analyze the various pipelining and parallel processing techniques.
- To analyze the retiming and unfolding algorithms for various DSP applications.

Course Learning Outcomes :

- To learn DSP algorithms.
- To understand and analysis the concept of pipelining and other processing for DSP applications.

UNIT – I **(7 hours)**

Introduction to DSP systems-Typical DSP algorithms-Representation of DSP Algorithm - Iteration Bound - Pipelined and parallel processing.

UNIT – II **(8 hours)**

Retiming - Unfolding –Folding.

UNIT – III **(10 hours)**

Systolic architecture design -Algorithmic strength reduction in filters and transforms.

UNIT – IV **(10 hours)**

Pipelined and parallel recursive and adaptive filters- Bit level arithmetic architecture.

UNIT – V **(10 hours)**

Numerical strength reduction – Overview of low power design and programmable digital signal processors.

TEXT BOOKS:

1. Keshab K.Parthi, " VLSI Digital Signal Processing systems, Design and implementation ",Wiley, Inter Science, 1999.

REFERENCES:

1. Mohammed Isamail and Terri Fiez, " Analog VLSI Signal and Information Processing ", Mc Graw-Hill, 1994.

2. S.Y. Kung, H.J. White House, T. Kailath, " VLSI and Modern Signal Processing ",Prentice Hall, 1985.

3. Jose E. France, Yannis Tsividis, " Design of Analog - Digital VLSI Circuits for Telecommunication and Signal Processing ", Prentice Hall, 1994

EC569 VERIFICATION METHODOLOGIES (Elective II)

L	T	P	To	C
3	1	-	4	4

Course objectives:

- This course gives a brief idea to Hardware Verification methodologies.
- It gives brief idea about Binary Decision Diagrams (BDDs) and algorithms over BDDs.
- It gives introduction to Combinational equivalence checking, Temporal Logics, Modeling sequential systems and model checking, Symbolic model checking.

Course learning objectives:

- Able to understand about Hardware Verification methodologies.
- Ability to understand the design of different algorithms over BDDS.
- Able to understand digital systems modeling and equivalence checking.

UNIT – I **(7 hours)**

Introduction

Introduction to Digital VLSI Design Flow, High Level Design Representation, Transformations for High Level Synthesis

Scheduling, Allocation and Binding (10hours)

Introduction to HLS: Scheduling, Allocation and Binding,Problem,Scheduling Algorithms, Binding and Allocation Algorithms.

UNIT – II **(7 hours)**

Logic Optimization and Synthesis

Two level Boolean Logic Synthesis, Heuristic Minimization of Two-Level Circuits, Finite State Machine Synthesis, Multilevel Implementation,

UNIT – III **(7 hours)**

Verification

Introduction to formal methods for verification, Temporal Logic: Introduction and Basic Operators, Syntax and Semantics of CTL, Equivalence between CTL Formulas.

UNIT – IV **(7 hours)**

Binary Decision Diagram

Binary Decision Diagram: Introduction and construction, Ordered Binary Decision Diagram, Operations on Ordered Binary Decision Diagram, Ordered Binary Decision Diagram for Sequential Circuits

UNIT – V **(7 hours)**

Verification Techniques

Introduction to Verification Techniques, Model Checking, Symbolic Model Checking.

TEXT BOOKS:

1. D. D. Gajski, N. D. Dutt, A.C.-H. Wu and S.Y.-L. Lin, High-Level Synthesis: Introduction to Chip and System Design, Springer, 1st edition, 1992.
2. S. Palnitkar, Verilog HDL: A Guide to Digital Design and Synthesis, Prentice Hall,2nd edition, 2003.

REFERENCES:

1. G. De Micheli. Synthesis and optimization of digital circuits, 1st edition, 1994.
2. M. Huth and M. Ryan, Logic in Computer Science modeling and reasoning about systems, Cambridge University Press, 2nd Edition, 2004
3. Bushnell and Agrawal, Essentials of Electronic Testing for Digital, Memory & Mixed-Signal Circuits, Kluwer Academic Publishers, 2000

EC571 SYSTEM ON CHIP DESIGN (Elective II)

L	T	P	To	C
3	1	-	4	4

Course Objectives:

- To understand the concepts of System on Chip Design methodology for Logic and Analog Cores.
- To understand the concepts of System on Chip Design Validation.
- To understand the concepts of SOC Testing.

Course Learning Outcomes:

- Able to understand about SoC Design Methodology.
- Ability to understand the design of different embedded memories.
- SoC Design Validation and Testing Concepts can be understood.

UNIT – I **(9 hours)**

Introduction- System tradeoffs and evolution of ASIC Technology- System on chip concepts and methodology – SoC design issues -SoC challenges and components.

UNIT – II **(10 hours)**

Design Methodological For Logic Cores- SoC Design Flow – On-chip buses –Design process for hard cores –Soft and firm cores –Designing with hard cores, soft cores- Core and SoC design examples.

UNIT – III **(8 hours)**

Design Methodology for Memory and Analog Cores- Embedded memories –Simulation modes Specification of analog circuits – A to D converter –Phase-located loops –High I/O.

UNIT – IV **(8 hours)**

Design Validation- Core level validation –Test benches –SoC design validation – Co simulation –hardware/ Software co-verification.Case Study: Validation and test of systems on chip.

UNIT – V **(10 hours)**

Soc Testing- SoC Test Issues – Testing of digital logic cores –Cores with boundary scan – Test methodology for design reuse– Testing of microprocessor cores – Built in self method –testing of embedded memories. Case Study: Integrating BIST techniques for on-line SoC testing.

TEXT BOOKS:

1.Rochit Rajsunah, *System- on - a -chip: Design and Test*, Artech House, 2007.

2.1. Prakash Raslinkar, Peter Paterson & Leena Singh, *System-on-a-chip verification: Methodology and Techniques*, Kluwer Academic Publishers, 2000.

REFERENCES:

1. M.Keating, D.Flynn, R.Aitken, A, GibbonsShi, *Low Power Methodology Manual for System-on-Chip Design Series: Integrated Circuits and Systems*, Springer, 2007.

2. L.Balado, E. Lupon, *Validation and test of systems on chip*, IEEE conference on ASIC/SOC,1999.

3. A.Manzone, P.Bernardi, M.Grosso, M. Rebaudengo, E. Sanchez, M.SReorda, Centro Ricerche Fiat, *Integrating BIST techniques for on-line SoC testing*, IEEE Symposium on On-Line testing, 2005

EC575 DIGITAL IC DESIGN LAB

L	T	P	To	C
-	-	3	3	2

Course Objectives:

- To know and understand HDL and design circuits using it.
- To learn the student will be able to, Write programs in VHDL and Verilog for modeling digital circuits
- To study and verify the combinational and sequential logic circuits with various levels of modeling.

Course Learning Outcomes:

- By studying this subject the student will be able to do the simulation and they can able to write the test bench.
- Design of the different multipliers and their simulation using the filters can also be done using this subject.
- Analysis and design of VLSI circuits.

List of Experments

I. Combinational circuits Adders, multipliers, encodes, de codes comparator, multiplexer, de multiplexer.
   At least 3 in data flow style
   At least 3 in structural
   At least 3 in behavioral level

II. Simulation of sequential circuits
   At least 5 labs to be completed with sequential circuit design

EC577 ANALOG IC DESIGN LAB

L	T	P	To	C
-	-	3	3	2

Course Objectives:

Analysis, design, and applications of modern analog circuits using integrated bipolar and field effect transistor technologies.

Course Outcomes:

- Students will demonstrate the use of analog circuit analysis techniques to analyze the operation and behavior of various analog integrated circuits.
- Students will demonstrate their knowledge by designing analog circuits.
- An understanding of CMOS integrated circuit technology
- An ability to analyze different Current mirrors & Amplifiers
- An ability to analyze the matching properties of CMOS circuits;
- An ability to design and physically implement analog integrated circuit layouts
- An ability to conduct performance simulation and corners analyses of analog integrated circuits
- An ability to analyze, design, and layout CMOS circuit cells for system on chip integration

Note: All the experiments are to be carried out independently by each student, with different specifications.

I) Design and simulate the following analog circuits.

1. Verify the characteristics of nMOS and pMOS Transistor
2. Common Source Amplifier
3. Common Drain Amplifier
4. Common Gate Amplifier
5. Current Mirror
6. Cascaded Current Mirror
7. Differential Amplifier
8. CMOS Op-amp single Stage
9. Two stage operational amplifier
10. Cascade Amplifier

11. Folded Cascode amplifier
12. Push Pull Amplifier
13. Current Controlled Voltage source

II) Layouts

EC558 CAD VLSI

L	T	P	To	C
4	-	-	4	4

Course Objectives:

- To provide an introduction to the fundamentals of Computer-Aided Design tools for the modeling, design, analysis, test, and verification of digital Very Large Scale Integration (VLSI) systems.
- To learn Physical design of VLSI Circuits
- To learn the Basics of Graph Theory Algorithms
- To understand the concept of CAD Tools.
- To Learn the Physical Design of FPGA and MCMS

Course Learning Outcomes:

- Establish comprehensive understanding of the various phases of CAD for digital electronic systems, from digital logic simulation to physical design, including test and verification.
- Demonstrate knowledge and understanding of fundamental concepts in CAD.
- Demonstrate knowledge of computational and optimization algorithms and tools applicable to solving CAD related problems.
- Establish capability for CAD tool development and enhancement.
- Get the Overview of Physical Design of VLSI ICs
- Gain the Knowledge of Graph Theory.
- Able to Design Backend Process using CAD Tools.
- To Get the Knowledge about Physical design of FPGA and MCMS.

UNIT – I **(8 hours)**

Introduction to VLSI Design Automation

Introduction to VLSI Methodologies - VLSI Physical Design Automation - Design and Fabrication of VLSI Devices - Fabrication process and its impact on Physical Design.

UNIT – II **(10 hours)**

Graph Theory

A Quick Tour of VLSI Design Automation Tools - Data structures and Basic Algorithms- Algorithmic Graph theory and computational complexity - Tractable and Intractable problems.

UNIT – III **(15 hours)**

CAD Tools

General purpose methods for combinational optimization - partitioning - floor planning and pin assignment - placement - routing.

UNIT – IV **(9 hours)**

Simulation and Synthesis

Simulation-logic synthesis -Verification-High level synthesis-Layout synthesis-Compaction.

UNIT – V **(8 hours)**

Design Automation of FPGA and MCMS

Physical Design Automation of FPGAs, MCMS-VHDL-Verilog-Implementation of Simple circuits using VHDL and Verilog.

TEXT BOOKS:

1. N.A. Sherwani, “ Algorithms for VLSI Physical Design Automation “, 1999.
2. S.H.Gerez, “ Algorithms for VLSI Design Automation “, 1998.

REFERENCES:

1. Wayne Wolf “Modern VLSI Design”,Third edition.
2. S.Smith “Application Specific Integrated Circuits”. 5. S. Y. Kung, H. J. Whilo House, T.Kailath, “ VLSI and Modern Signal Processing Prentice Hall, 1985.
3. Jose E. France, Yannis Tsividis, “ Design of Analog - Digital VLSI Circuits for Telecommunication and Signal Processing “, Prentice Hall, 1994.

EC560 VLSI TESTING & VALIDATION

L	T	P	To	C
3	1	-	4	4

Course Objective:

- To involve the students in the theory and practice of VLSI test and validations.
- To introduce advanced techniques for efficiently testing and validating the VLSI design
- To introduce the concept of Design for Test and the technique of automated test pattern generation

Course learning Outcomes:

After the completion of the course, students will be able to

- Effectively test VLSI systems using existing test methodologies, equipments, and tools.
- Define a methodology to to test the combinational and sequential circuits
- To construct a Design for Testability (DFT) algorithm for VLSI Circuits

UNIT – I **(8 hours)**

Introduction to VLSI Testing

Introduction - VLSI Testing Process And Test Equipment - Test Economics And Product Quality – Fault Molding-Logic And Fault Simulation.

UNIT – II **(12 hours)**

Test Generation for Combinational and Sequential Circuits

Test generation for combinational logic circuits - Testable combinational logic circuit design - Test generation for sequential circuits - design of testable sequential circuits

UNIT – III **(10 hours)**

Advanced Testing

Memory Test- DSP-based analog and mixed signal test- Model based analog and mixed signal test - Delay Test - IDDQ Test.

UNIT – IV **(8 hours)**

Design For Testability

Design for Testability - Ad-hoc design - Storage cells for scan designs - Generic scan based design - System level DFT approaches

UNIT – V **(10 hours)**

Self Test and Test Algorithms

Built-In Self Test - Test pattern generation for BIST - Circular BIST - BIST Architectures - Testable Memory Design - Test algorithms - Test generation for Embedded RAMs.

TEXT BOOKS:

1. Viswani D.Agarval Michael L.Bushnell, “Essentials of Electronic Testing for
DigitalMemory & Mixed Signal VLSI Circuit “, Kluwer Academic Publications, 2000.
2. L. T. Wang, C. W. Wu, and X. Wen, VLSI Test Principles and Architectures, Morgan

REFERENCES:

1. Kaufmann Morgan Kaufmann Publishers, 2006 M. Abramovici, M.A. Breuer and A.D. Friedman, “Digital Systems and Testable Design”, Jaico Publishing House, 2002.
2. Alfred L.Crouch “Design for Test for Digital IC’s And Embedded Core Systems “, -PHI 1999

EC562 MIXED SIGNAL DESIGN

L	T	P	To	C
3	1	-	4	4

Course Objectives:

- To understand the types of filters.
- To understand the different techniques of ADC and DAC.

Course Learning Outcomes:

- The ability to use DAC and ADC techniques for data conversions.
- The ability to program, Mixed Signal VLSI Circuits.

UNIT – I **(10 hours)**

PLL & Switched Capacitors

Characterization of a comparator, basic CMOS comparator design, analog multiplier design, PLL – simple PLL, charge-pump PLL, applications of PLL. Switched Capacitor circuits – basic principles, switched capacitor sensitive integrated and insensitive integrator , switched capasitor filter, switched capacitor amplifier.

UNIT – II **(9 hours)**

Sampling Circuits

Basic sampling circuits for analog signal sampling, performance metrics of sampling circuits, different types of sampling switches.

Sample-and-Hold Architectures: Open-loop & closed-loop architectures, open-loop architecture with miller capacitance, multiplexed-input architectures, recycling architecture.

UNIT – III **(10 hours)**

Digital - to Analog Conversion

Input/output characteristics of an ideal D/A converter, , performance metrics of D/A converter, D/A converter in terms of voltage, current, and charge division or multiplication, cyclic DAC

D/A converter architectures: Resistor-Ladder architectures, current-steering architectures, pipelined architecture.

UNIT – IV **(10 hours)**

Analog-To-Digital Conversion

Input/output characteristics and quantization error of an A/D converter, performance metrics of A/D converter.

A/D converter architectures: Flash architectures, interpolate and folding architectures, pipelined architectures, Successive approximation architectures.

UNIT – V **(6 hours)**

Analog CMOS Filters

Low Pass filters, active RC integrators,

TEXTBOOKS:

1. Razavi, "Design of analog CMOS integrated circuits", McGraw Hill, 2001.
2. Razavi, "Principles of data conversion system design", S.Chand and company ltd, 2000.
3. Jacob Baker et. all, "CMOS Mixed-Signal circuit design", IEEE Press, 2002.

REFERENCE BOOKS:

1. Gregorian, Temes, "Analog MOS Integrated Circuit for signal processing", John W iley & Sons.
2. Baker, Li, Boyce, "CMOS : Circuit Design, layout and Simulation", PHI, 2000.

EC564 CHIP DESIGN

L	T	P	To	C
4	-	-	4	4

Course Objectives:

- Prepare students to be productive members of an industrial ASIC design team
- Prepare students for graduate projects involving digital circuits using ASIC techniques and synthesis
- Provide an understanding of the ASIC life cycle
- Provide an environment where students learn to enjoy the learning and designing process
- Have students internalize the culture of the design engineer
- To learn the basics of ASICs
- To learn the Programming Technologies and Logic Cells
- To understand the concept of synthesis.
- To Learn the basics of CAD Algorithms

Course Learning Outcomes :

- Understand requirements and translate them to a high level design language
- Understand capabilities and limitations of CMOS logic and adjust designs to best use CMOS ASIC technologies.
- Demonstrate common ASIC team rules, and articulate the purposes for such rules.
- Demonstrate an ability to use industry synthesis tools to achieve desired project objectives.
- Demonstrate an understanding of module interfaces, pipe lining, design for test, test pattern generation, and BIST.
- Modify designs to achieve performance objectives.
- Perform an ASIC design from requirements to timing verification
- To get the knowledge of types of ASICs
- Gain the Knowledge of description about Programmable ASIC in terms of Construction and Application.
- Able to Analyze the synthesis for Programmable ASICs
- Knowledge about Testing of ASIC ICs

UNIT – I **(9 hours)**

Introduction to ASICs

Types of ASICs - Design flow - CMOS transistors CMOS Design rules – Combinational Logic Cell – Sequential logic cell - Data path logic cell - Transistors as Resistors - Transistor Parasitic Capacitance- Logical effort - Library cell design - Library architecture .

UNIT – II **(9 hours)**

Programmable ASICs

Anti fuse - static RAM - EPROM and EEPROM technology - PREP benchmarks Actel ACT - Xilinx LCA - Altera FLEX - Altera MAX DC & AC inputs and outputs Clock & Power inputs - Xilinx I/O blocks.

UNIT – III **(9 hours)**

Programmable ASIC Logic Cells

Actel ACT -Xilinx LCA - Xilinx EPLD - Altera MAX 5000 and 7000 - Altera MAX 9000 - Altera FLEX -Design systems - Logic Synthesis - Half gate ASIC - Schematic entry - Low level design language - PLA tools - EDIF- CFI design representation.

UNIT – IV **(9 hours)**

Logic Synthesis and Test

Verilog and logic synthesis -VHDL and logic synthesis - types of simulation - boundary scan test - fault simulation - automatic test pattern generation.

UNIT – V **(9 hours)**

ASIC Construction

System partition - FPGA partitioning - partitioning methods - floor planning - placement - physical design flow - global routing - detailed routing - special routing - circuit extraction - DRC.

TEXT BOOK:

1. M.J.S .Smith, - “ Application - Specific Integrated Circuits “ - Addison -Wesley Longman Inc., 1997.

REFERENCES:

1. Andrew Brown, - " VLSI Circuits and Systems in Silicon", McGraw Hill, 1991.
2. S.D. Brown, R.J. Francis, J. Rox, Z.G. Uranesic, " Field Programmable Gate Arrays Kluever Academic Publishers, 1992.
3. Mohammed Ismail and Terri Fiez, " Analog VLSI Signal and Information Processing Mc Graw Hill, 1994.
4.S. Y. Kung, H. J. W hilo House, T. Kailath, " VLSI and Modern Signal Processing Prentice Hall, 1985.
5. Jose E. France, Yannis Tsividis, " Design of Analog - Digital VLSI Circuits for Telecommunication and Signal Processing ", Prentice Hall, 1994.

EC566 FPGA & CPLD ARCHITECTURES AND APPLICATIONS (Elective III)

L	T	P	To	C
4	-	-	4	4

Course Objectives :

- Discuss the types of programmable logic, SPLDs and CPLDs, and explain their basic structure
- Describe the basic architecture of two types of SPLDs, the PAL and the GAL
- Describe the architecture of the Altera MAX 7000 family of CPLDs
- Explain the basic structure of a programmable logic array (PLA)
- Discuss the operation of macrocells
- Define intellectual property and platform FPGA
- Describe the architecture of the Altera FPGA family
- Describe the architecture of the Xilinx Virtex FPGA family

Course Learning outcomes:

- Learn important design practices to ensure the best and most stableCPLD & FPGA design
- Learn how to save costs by fitting designs into smaller devices
- Ability to write efficient VHDL code for FPGAs
- Ability to choose the appropriate FPGA architecture given a specific application
- Ability to use FPGA design tools

UNIT – I **(8 hours)**

Introduction to CPLDs- PROM, PLA,PAL,**CPLD-Architectures**, Basic concepts-Macrocell Architecture, Logic array, programmable flip-flops, programmable clock, I/O control block, MAX product family and FLEX Architecture.

UNIT – II **(8 hours)**

Introduction to FPGAs, Commercial FPGAs- programming techniques, Xilinx, Actel, Altera, plessy, plus logic,AMD, quick logic, algotronic Concurrent logic Crosspoint Solutions, Design flow.

UNIT – III **(10 hours)**

Technology Mapping for FPGAs-LUT , Chortle-crf,Chortle-dLUT in mis-pga,LUT in Asyl, Hydra, Xmap, VISMAP, Multiplexer Technology Mapping. **Logic Block Architecture**-Logic Block Functionality versus Area-Efficiency, Impact of Logic Block Functionality on FPGA Performance

UNIT – IV **(9 hours)**

Routing for FPGAs-Routing Terminology, General Strategy for Routing in FPGAs, Routing for Row-Based FPGAs, Routing for Symmetrical FPGAs. **Flexibility of FPGA Routing Architectures-**FPGA Architectural Assumptions, Experimental Procedure, Limitations of the Study.

UNIT – V **(10 hours)**

FSM-introduction, FSMs, State Transition Table, State Assignment for FPGAs,Hazard and One-Hot Encoding, Petrinetes for state machines – basic concepts, properties. **Case Studies** of paraller adder cell, paraller adder sequential circuits, multiplexers, parallel controllers.

TEXTBOOKS:

1. S.Brown, R.Francis, J.Rose, Z.Vransic, “Field Programmable GateArray”, Kluwer Pubin, 1992.
2. S.Trimberger, Edr., “Field Programmable Gate Array Technology”, Kluwer Academic Publicatgions, 1994.

REFERENCES:

1. P.K.Chan & S. Mourad, “Digital Design Using Field Programmable Gate Array”, Prentice Hall (Pte), 1994.
2. J. Old Field, R.Dorf, “Field Programmable Gate Arrays”, John W iley & Sons,Newyork, 1995.

EC568 LOW POWER VLSI (Elective III)

L	T	P	To	C
4	-	-	4	4

Course Objectives:

- This course teaches students the state-of-the-art BiCMOS low- voltage, low-power design techniques for ULSI and giga-scale integration
- The course covers the process integration, device modeling, and characterization
- The course also enables the student to discover the latest MOS and bipolar models; breakthroughs in copper metallization, isolation and deep submicron processes; and new approaches to designing logic gates, latches, and flip-flops.

Course Learning Outcomes:

- Simulate characteristics of a simple device using MATLAB, SPICE and ATLAS / SYNOPSYS
- Explain the equations, approximations and techniques available for deriving a device model with specified properties
- Explore and improvise on the latest techniques used for designing power-efficient logic gates, latches, and flip-flops

UNIT – I **(10 hours)**

Low Power Design Methods

Motivation, Context and Objectives, Sources of Power dissipation in Ultra Deep Submicron CMOS Circuits – Static, Dynamic and Short circuit components. Effects of scaling on power consumption, Low power design flow, Normalized Figure of Merit (PDP, EDP), Power optimization at Algorithmic level, Architectural level, Register Transfer level, Logic level and Circuit level. Power Estimation using Static and Dynamic techniques, Hierarchical sequence compaction for reducing power simulation time.

UNIT – II **(10 hours)**

Algorithmic and Architecture Level Optimization

Hardware/Software co-design, Pipelining and Parallel Processing approaches for low power in DSP filter structures, Multiple supply voltage and Multiple threshold voltage designs for low power, Optimal drivers of high speed low power ICs, Computer arithmetic techniques for low power.

Sleep Transistor Design

Design metrics, switch efficiency, area efficiency, IR drop, normal Vs reverse body bias. Layout design of Area efficiency, Single row Vs double row, Inrush current and current latency.

UNIT – III **(10 hours)**

Register Transfer Level Optimization

Low power clock, Interconnect and layout designs, Reducing power consumption in memory cells, Clock gating, Deglitching for low power, Bus Encoding techniques.

Logic Level and Circuit Level Optimization:

Theoretical background – Calculation of Steady state probability, Transition probability, Conditional probability, Transition density; Estimation and optimization of Switching activity, Power cost computation model, Transistor variable re-ordering for power reduction, Low power library cell design (GDI).

UNIT – IV **(7 hours)**

Low Power Design of Sub-Modules

Circuit techniques for reducing power consumption in Adders, Multipliers. Synthesis of FSM for low power, Retiming sequential circuits for low power.

UNIT – V **(8 hours)**

IP Design for Low Power

Architecture and partitioning for power gating, power controller design for the USB OTG, Issues in designing portable power controllers, clocks and resets, Packaging IP for reuse with power intent.

Software Level Power Optimization

Power analysis of embedded software, OS issues, Power management techniques.

TEXT BOOKS:

1. Kaushik Roy, Sharat Prasad, “Low Power CMOS VLSI circuit design”, John W iley and Sons Inc., 2000.
2. Soudris, Dimitrios, Christian Pignet, Goutis, Costas, “Designing CMOS circuits for low power”, Springer International, 2004.

REFERENCES:

1. G.K.Yeap, Farid N.Najm, “Low Power VLSI design and technology”, World Scientific Publishing, 1996.
2. A.P.Chandrakasan, R.W.Broderson, “Low Power Digital VLSI Design”, IEEE Press, 1998.
3. Gary K.Yeap, “Practical Low Power Digital VLSI Design”, Kluwer Academic Press, 1998.
4. Jan M.Rabaey, Massoud Pedram, “Low power Design methodologies”, Kluwer Academic Press, 1996

Michael Keating, David Flynn “ Low Power Methodology Manual for System-On-Chip Design” SpringerPublication 2007

EC570 RF IC DESIGN (Elective III)

L	T	P	To	C
3	1	-	4	4

Courseobjectives:

- This course introduces the design of RF integrated circuits (RF ICs).
- RF IC's have rapidly advanced in both technology and design over the past 15 years to first create and then meet a high demand for cost effective solutions for mobile communication and ubiquitous access to information.
- Applications include wireless communications, active and passive remote sensing, location sensing, radar, and radio astronomy.
- This course is focused on the key concepts in having RF capability on a chip.
- CMOS technology and the ability to incorporate additional elements is emphasized.
- Parasitic effects and current device modeling will be explained.
- Using this foundation, the design of high-frequency, analog integrated circuits including low noise amplifiers, voltage-controlled oscillators, phase-locked loops, mixers and power amplifiers will be undertaken.
- Along with these specific building blocks, the critical concepts of impedance transformation, filtering, and power delivery will be addressed.

Course learning outcomes:

- Students successfully completing this course will be able to design and evaluate practical circuits for RF ICs from an intuitive approach based on a rigorous understanding of the fundamentals.
- They will have designed and simulated various circuit functions to implement the needs for RF IC used in many of the applications.
- They will be able to understand the relationship and limitations of circuit topology, device characteristics to achieving competitive specifications.

UNIT – I **(10 hours)**

Introduction

Introduction to Communication Circuits, Transmission media and reflections, Maximum power transfer, Passive RLC Networks for matching, Classical two-port noise theory, noise models for active and passive components, Noise figure, Friis equation, Nonlinearity and cascaded stages,

Sensitivity and dynamic range, Passive impedance transformation.

UNIT – II **(10 hours)**

Low Noise RF amplifiers

High frequency amplifier design – zeros as bandwidth enhancers, shunt-series amplifier, Cascode Amplifier.

Low noise amplifier design – LNA topologies, impedance matching, power match versus noise match, linearity and large signal performance, noise canceling LNAs, Constant gm biasing, current reusing technique

UNIT – III **(8 hours)**

Mixers

multiplier-based mixers, sub sampling mixers.

UNIT – IV **(9 hours)**

RF Power amplifiers

Class A, AB, B, C amplifiers,Class D, E, F amplifiers,RF Power amplifier design examples

UNIT – V **(8 hours)**

Voltage Controlled Oscillator

Resonators,Negative resistance oscillators

TEXT BOOKS:

1. Thomas H. Lee, Cambridge, The Design of CMOS Radio-Frequency Integrated Circuits, UK: Cambridge University Press, 2004.
2. Behzad Razavi, RF Microelectronics, Prentice Hall, 1998.

REFERENCES:

1. A.A. Abidi, P.R. Gray, and R.G. Meyer, Integrated Circuits for Wireless Communications, New York: IEEE Press, 1999.
2. Jeremy Everard, "Fundamentals of RF Circuit Design With Low Noise Oscillators",John Wiley & Sons Ltd.

(EC548) MICRO ELECTRO MECHANICAL SYSTEMS (Elective IV)

L	T	P	To	C
3	1	-	4	4

Course Objectives:

- To acquire knowledge on different fabrication techniques.
- To acquire different mechanical transduction techniques.
- To understand the functional and usages of various sensors like, electro static thermal, force, torque and inertial sensors.
- To understand the functional and usages of various actuators like, electro static thermal, and magnetic actuators.
- Understand future applications of MEMS.

Course Learning Outcomes:

After thorough learning of MEMS the student will:

- Understand the different materials-Substrates used in MEMS manufacture.
- Understand the different techniques used in pressure sensors and different types of pressure sensors.
- Be able to apply all these skills to the design of a MEMS system.
- The above can be applied to understand the design and fabrication of NEMS.

UNIT – I **(10 hours)**

Introduction

Intrinsic Characteristics of MEMS – Energy Domains and Transducers-Sensors and Actuators –- Silicon based MEMS processes – New Materials – Review of Electrical and Mechanical concepts in MEMS – Semiconductor devices – Stress and strain analysis – Flexural beam bending- Torsional deflection, Broad response of MEMS to mechanical, thermal and electrical stimuli.

UNIT – II **(10 hours)**

Micro Machining

Introduction to Micro fabrication –Photo lithography-Deposition techniques-Chemical vapour deposition, physical vapour deposition-Silicon Anisotropic Etching – Anisotrophic Wet Etching – Dry Etching of Silicon – Plasma Etching – Deep Reaction Ion Etching (DRIE) – Isotropic Wet Etching – Gas Phase Etchants – Basic surface micromachining processes – Structural and Sacrificial Materials – Acceleration of sacrificial Etch – Striction and Antistriction methods.

UNIT – III **(9 hours)**

Sensors and Actuators-I

Electrostatic sensors – Parallel plate capacitors – Applications – Inter digitated Finger capacitor – Comb drive devices – Thermal Sensing and Actuation – Thermal expansion– Thermal couples – Thermal resistors – Applications –

UNIT – IV **(9 hours)**

Sensors and Actuators-II

Piezoresistive sensors – Piezoresistive sensor materials - Stress analysis of mechanical elements – Applications to Inertia, Pressure, Tactile and Flow sensors – Piezoelectric sensors and actuators – piezoelectric effects – piezoelectric materials – Applications to Inertia , and Flow sensors.

UNIT – V **(7 hours)**

Polymer Mems

Polymers in MEMS– Polimide - SU-8 - Liquid Crystal Polymer (LCP) – PDMS – PMMA – Parylene – Fluorocarbon - Application to Acceleration, Pressure, Flow and Tactile sensors.

TEXT BOOKS:

1. **Tai Ran Hsu**, “MEMS & Micro systems Design and Manufacture” Tata McGraw Hill, New Delhi, 2002.
2. ***Chang Liu,*** ‘Foundations of MEMS’, Pearson Education Inc., 2006.

REFERENCES:

1. *Stephen D.Senturia* “Microsystem Design” Springer International Edition,2010
2. *Julian w. Gardner, Vijay k. varadan, Osama O.Awadelkarim*, “Micro Sensors, MEMS and Smart devices”, John W iley & son LTD,2002
3. Steeve P Beeby, G Ensel, “MEMS Mechanical Sensors” Architect House.
4. Marc J Madou “ Fundamentals of Micro Fabrication”, CRC Press, 2011
5. *Nadim Maluf*, “An introduction to Micro electro mechanical system design”, Artech House, 2000.
6. *Mohamed Gad-el-Hak*, editor, “The MEMS Handbook”, CRC press Baco Raton, 2000
7. *James J.Allen*, “Micro Electro Mechanical System Design”, CRC Press published in 2005

EC572 NANO ELECTRONICS (Elective IV)

L	T	P	To	C
4	-	-	4	4

Course Objectives :

- To acquire knowledge about fundamental quantum mechanics.
- To study about architecture and operations of different nano structures.
- To comprehend the low dimension, high speed and low power design techniques and methodologies.

Course Learning Outcomes:

- Analysis the different types of Nano Structures.
- Analysis the different nano device fabrication technology.
- Analysis about characterization techniques.
- Identification of new areas of nanodevice application.

UNIT – I **(9 hours)**

Challenges with sub-100 nm MOSFETs – Oxide layer thickness, tunneling, power density, non-uniform dopant concentration, threshold voltage scaling, lithography, hot electron effects, sub-threshold current, velocity saturation, interconnect issues, fundamental limits for MOS operation. High-K gate dielectrics, effects of high-K gate dielectrics on MOSFET performance,

UNIT – II **(9 hours)**

Novel MOS-based devices – Multiple gate MOSFETs, Silicon-on-nothing, Silicon-on-insulator devices, FD SOI, PD SOI, FinFETs, vertical MOSFETs, strained Si devices

UNIT – III **(9 hours)**

Hetero structure based devices – Type I, II and III Heterojunction, Si-Ge heterostructure, hetero structures of III-V and II-VI compounds - resonant tunneling devices, MODFET/HEMT

UNIT – IV **(8 hours)**

Carbon nanotubes based devices – CNFET, characteristics, Spin-based devices – spinFET, characteristics

UNIT – V **(9 hours)**

Quantum structures – quantum wells, quantum wires and quantum dots, Single electron devices – charge quantization, energy quantization, Coulomb blockade, Coulomb staircase, Bloch oscillations

TEXT BOOKS:

1. Mircea Dragoman and Daniela Dragoman, Nanoelectronics – Principles & devices, Artech House Publishers, 2005.
2. Karl Goser, Nanoelectronics and Nanosystems: From Transistors to Molecular and Quantum Devices, Springer 2005.
3. Mark Lundstrom and Jing Guo, Nanoscale Transistors: Device Physics, Modeling and Simulation, Springer, 2005.
4. Vladimir V Mitin, Viatcheslav A Kochelap and Michael A Stroscio, Quantum heterostructures, Cambridge University Press, 1999.

REFERENCES:

1. S.M. Sze (Ed), High speed semiconductor devices, Wiley, 1990.
2. Manijeh Razeghi, Technology of Quantum Devices, Springer, ISBN 978-1-4419-1055-4.
3. H.R. Huff and D.C. Gilmer, High Dielectric Constant Materials for VLSI MOSFET Applications, Springer 2005, ISBN 978-3-540-21081-8 , (Available on NITC intranet in Springer eBook section)
4.B.R. Nag, Physics of Quantum Well Devices, Springer 2002, ISBN 978-0-7923-6576-1, (Available on NITC intranet in Springer eBook section).
5. E.Kasper, D.J. Paul, Silicon Quantum Integrated Circuits Silicon-Germanium Heterostructures Devices: Basics and Realisations, Springer 2005, ISBN 978-3-540-22050-3, (Available on NITC intranet in Springer eBook section).

(EC574) SEMICONDUCTOR MEMORY DESIGN

(Elective IV)

L	T	P	To	C
3	1	-	4	4

Course Objectives:

- To acquire knowledge about different types of semiconductor memories.
- To study about architecture and operations of different semiconductor memories.
- To comprehend the low power design techniques and methodologies.

Course Learning Outcomes:

- Analysis the different types of RAM, ROM designs.
- Analysis the different RAM and ROM architecture and interconnects.
- Analysis about design and characterization technique.
- Analysis of different memory testing and design for testability.
- Identification of new developments in semiconductor memory design.

UNIT – I **(10 hours)**

Random Access Memory Technologies: Static Random Access Memories (SRAMs):SRAM cell structure- MOS SRAM architecture, MOS SRAM cell and peripheral circuit operation, bipolar SRAM technologies, silicon on insulator (SOI) technology, advanced SRAM architectures and technologies, application specific SRAMs.

Dynamic Random Access Memories (DRAMs): DRAM technology development, CMOS CRAMs, DRAMs cell theory and advanced cell structures-BiCMOS DRAMs-soft error failure in DRAMs, Advanced DRAM designs and architecture, application specific DRAMs.

UNIT – II **(10 hours)**

Nonvolatile Memories: Masked Read, only memories (ROMs): High density ROMs, programmable read-only memories (PROMs)- bipolar PROMs, CMOS PROMs, erasable (UV)- Programmble read-only memories (EPROMs)- Floating Gate EPROM cell- one, time progammable (OTP) Eproms Electrically Erasable PROMs (EEPROMs), EEPROM technology and architecture, nonvolatile SRAM-Flash memories (EPROMs or EEPROM), Advanced flash memory architecture.

UNIT – III **(8 hours)**

Memory fault modeling, testing and memory design for Testability and fault tolerance, RAM fault modeling, electrical testing, Peusdo random testing, megabit DRAM testing nonvolatile memory modeling and testing, IDDQ fault modeling and testing, application specific memory testing.

UNIT – IV **(10 hours)**

Semiconductor memory reliability and radiation effects: General Reliability issues, RAM failure modes and mechanism, nonvolatile memory reliability, reliability modeling and failure rate prediction, design for reliability, reliability test structures, reliability screening and qualification.

Radiation effects, single event phenomenon (SEP)- radiation hardening techniques, radiation hardening process and design issues, radiation hardened memory characteristics, radiation hardness assurance and testing, radiation dosimetry, water level radiation testing and test structures.

UNIT – V **(7 hours)**

Advanced memory technologies and high-density memory packaging technologies:

Ferroelectric Random Access Memories (FRAMs), Gallium Arsenide (GaAs) FRAMs, Analog memories magnetoresistive random access memories (MRAMs), Experimental memory devices.

Memory hybrids and MCMs (2D), Memory stacks and MCMs (3D), Memory MCM testing and reliability issues- memory cards- high density memory packaging future directions.

TEXT BOOKS:

1. Ashok K.Sharma, Semiconductor Memories Technology, testing and reliability, Prentice hall of India Private Limited, New Delhi 1997.

2. Ashok K Sharna, *Advanced Semiconductor Memories – Architecture, Design and Applications*, Wiley 2002.

REFERENCES:

1. Anjan Ghosh, *High Speed Semiconductor Devices*, NPTEL Courseware, 2009.

EC576 MIXED SIGNAL DESIGN LAB

L	T	P	To	C
-	-	3	3	2

Course Objectives:

This course will teach the fundamentals of CMOS RF and analog circuit design techniques used in today's advanced mixed-signal integrated-circuit applications..

Course Outcomes:

- An understand the concepts of cell based design strategies for integrated circuits
- To provide the skills required to design voltage references.
- An ability to design Nyquist rate DAC, ADC
- An ability to understand and analyze quantization noise
- An ability to analyze, design CMOS integrated filters including gm-C and Switched Capacitor Filter.
- An ability to analyze filter transfer functions
- An ability to analyze and design CMOS sampled data circuits

List of Experiments:

1. Design of Common mode feed-back circuits
2. Design of switched capacitor circuits
3. Design of High Speed Comparator
4. Design of High Gain comparator
5. Design of first order filters
6. Design of full wave rectifier
7. Design of sinusoidal oscillator
8. Design of Ring oscillator
9. Design of PLL
10. Design of ADC
11. Design of DACs
12. Mini project.

EC580 ADVANCED DIGITAL IC DESIGN LAB

L	T	P	To	C
-	-	3	3	2

The objective of this lab in student has to obtain the knowledge to implement a design in FPGA/CPLD.

I. Generation of RTL and Technology specific views of a design.
II. Place and route analysis.
III. Manual and automatic pin assignment using tool.
IV. Validation using validation tool.
V. Development of some real time designs which includes the implementaion of all the above tools.

HS112 MATHEMATICS FOR BIOTECHNOLOGISTS - I

L	T	P	To	C
4	-	-	4	4

Course description and Objectives :

Without mathematics not a single day of an engineer will pass! Aim of this course is to introduce some elementary mathematics to non mathematical students. We study progressions, binomial theorem, partial fractions, trigonometry, plane geometry etc. We also introduce basic vector algebra. Later we introduce the differentiation and integration and later differential equations, which have many applications.

Course Outcomes:

- This course will bridge the gap of biological students to cope up with mathematics during their Engineering programme.
- This course will help them to learn progressions, binominal theorem, partial fractions, trigonometry, and plane geometry along with vector algebra.
- The differentiation and integration will help them to use many applications effectively and efficiently in their engineering course.
- All the above topics will be useful in their research work as well as projects.
- First order first degree differential equations applications will be used in law of cooling, growth and decay problems.
- The concept of maxima-minima has many real time applications.

UNIT I - Mathematical Preliminaries

Arithmetic & geometric progression, finding n^{th} term, sum of n terms, Binomial theorem, Partial fractions, Trigonometric ratios, Sum of angles, compound angles.

UNIT II - Straight line and Vector Algebra

Cartesian co-ordinates (in XY-plane), Straight lines different forms, Angle between straight lines, Point of intersection.

Vector Algebra: Vector addition, Multiplication, Representation, Geometrical resultant Vectors, Orthogonal, Parallel vectors, Angle between vectors.

UNIT III - Differential Calculus

Concept of limit, continuity, differentiation, product rule, quotient rule, differentiation of trigonometric, logarithmic, exponential functions, Introduction to partial differentiation, Euler's theorem, maxima & minima.

UNIT IV - Integral Calculus

Introduction, Integration of different functions, methods of integration, integration by parts, Concept of definite integrals, application of definite integrals, problems on areas.

UNIT V - Ordinary Differential Equations

Formation of differential equation by eliminating arbitrary constants, first order and first degree – variable separables, exact, homogeneous, linear & Bernoulli's equation.

Applications of first order ordinary differential equations to growth and decay problems.

TEXT BOOKS :

1. *P. Seshagiri Rao*, "A Text book of Remedial Mathematics", 1st Edition, Parma Med Press, Hyderabad, 2008.
2. *T.K.V. Iyengar and others*, "Engineering Mathematics" Volume-I, 9th Edition, S. Chand & Company, 2010.

REFERENCE BOOKS :

1. *B.S.Grawal*, "Higher Engineering Mathematics", 40th Edition, Khanna Publishers, 2009.
2. *H.K. Dass*, "Advanced Engineering Mathematics", S.Chand & Co, 2002.

HS113 ENGINEERING PHYSICS

L	T	P	To	C
4	-	-	4	4

Course description and Objectives :

There is a symbiotic relation between physics and engineering. Broadly speaking, engineering is mainly applied physics. Recent technical developments have been the result of joint efforts of physicists and engineers. A proper study of physics is therefore indispensable for an engineering student to excel in his field. The purpose of this course is to present the principles and concepts of physics as relevant to an engineer.

Course Outcomes:

The students will be made to get acquainted to the following learning outcomes:

- Concepts of Physical optics, devices and applications.
- Ultrasonic waves, production, applications in NDT.
- Introduction to Quantum mechanics in relevance to that of modern physics.
- Exposure to latest inventions like lasers, fibers and applications
- Insight into nano technology and applications, solar energy to combat energy crisis.

UNIT I - Physical Optics

Interference – Types - Interference in thin films (Reflection) – Newton's Rings – Michelson's Interferometer, Fabry-perot interferomenter – Applications.

Diffraction – Fraunhoffer Diffraction at single slit – Diffraction grating

Polarization – Production of plane polarized light – Nicol prism – Optical activity – photo elasticity.

UNIT II - Ultrasonics & NDT

Ultrasonics : Introduction – production of ultrasonic waves – piezoelectric method – Properties of ultrasonic waves – Types of ultrasonic waves – Determination of Velocity of ultrasonic waves in solids and liquids – Applications.

NDT : Introduction - Types – Theory and practice of Ultrasonic Testing – Ultrasonic Testing Systems – Ultrasonic Testing Methods – X-Ray Radiography.

UNIT - III Quantum Mechanics & Free electron theory of metals

Quantum Mechanics : Matter waves - Schroedinger's time independent wave equation - Physical significance of the wave function - Particle in one dimensional potential well – tunneling phenomenon.

Free electron theory of metals : Introduction – Classical free electron theory – Electrical conductivity of metal – Fermi - Dirac distribution function and its variation with temperature – Quantum free electron theory.

UNIT IV - Lasers & Fiber Optics:

Lasers: Characteristics of Laser light – Spontaneous and Stimulated emission of radiation – Low power and High power lasers, He-Ne Laser – CO_2 Laser – Nd-Yag laser - Applications of Lasers, Holography and Applications

Fiber Optics: Principle of optical fiber - materials – Numerical Aperture – Types of fibers – Dispersion and Attenuation in optical fibers – Optical sensors – Optical fiber communication system.

UNIT V - Solar Energy & NanoScience and Technology

Solar Energy : Solar radiation – Photovoltaic effect – solar cells – Efficiency of solar cell – Solar thermal energy conversion systems.

NanoScience & Technology : Introduction to nano meterials – Basic principles of nanoscience & Technology – Fabrication of nanomaterials – Physical & Chemical properties of nanomaterials – Applications of nanotechnology.

TEXT BOOKS :

1. M.R.Srinivasan, "Physics for Engineers" New Age International, 2002-2003.
2. M.N. Avadhanulu & P.G. Kshirasagar, "Engineering Physics", 1st edition, S. Chand & Company Ltd, 1992.

REFERENCE BOOKS :

1. Halliday, Resnic and Walker, "Fundamentals of Physics", 6th edition, John Willey publishers, 2003.
2. Grawfor F.S., Berkley Physics courses, "Waves and Oscillations", Volume III McGraw Hill, 1992.
3. V. Raghavan, "Materials Science and Engineering", 5th edition, Prentice-Hall India, 2004.
4. S.O.Pillai, "Solid State Physics", 6th edition, New Age International Publications, Revised, 2005.
5. V.Rajendran, "Engineering Physics", 1st edition, TMH Publications, 2010.

EE111 FUNDAMENTALS OF ELECTRICAL ENGINEERING

L	T	P	To	C
4	-	-	4	4

Course description and Objectives :

To understand the basic concepts, laws, techniques in analyzing various DC and AC circuits and concepts in coupled circuits. Study of construction details, working of various electrical machines and Semiconductor Devices and operation

Course Outcomes:

- Able to explain the notation and components of electric circuits
- Able to analyze DC and single phase and three phase AC circuits using different methods and theorems
- Able to operate various electrical machines.
- Able to explain the concepts of Semiconductor Devices and operation

UNIT I - Fundamentals Of DC Circuits

Circuit Concepts: Concepts of network, Active and passive elements, voltage and current sources, concept of linearity and linear network, unilateral and bilateral elements, R, L and C as linear elements. Ohm's Law – Kirchhoff's Laws –application to simple series, parallel circuits, mesh and nodal analysis of simple resistive circuits.(simple numerical problems).

UNIT II - Fundamentals of A.C. Circuits:

Generation of A.C. voltage - frequency, average value, R.M.S. value, form factor, peak factor for sinusoidal only - phasor representation of alternating quantities. Analysis of simple series and parallel A.C. circuits-(simple numerical problems)

Balanced Three phase systems – relation between phase and line quantities of voltages and currents in star and delta connected systems (Elementary treatment only)

UNIT III - Fundamentals of Electromagnetism and Transformers:

Concepts of Magneto motive force, reluctance, flux and flux density , concept of Self Inductance and Mutual Inductance, Coefficient of coupling-only elementary treatment. (simple numerical problems).

Transformers: Principle of operation of single phase transformer – constructional features – EMF equation (simple numerical problems)

UNIT IV - Electrical Machines:

DC Machines: Constructional details of a D.C. Machine.

D.C. Generator – Principle of operation – EMF equation – types of D.C. generators (simple numerical problems)

D.C. Motor – Principle of operation – Torque equation – types of D.C. motors (simple numerical problems)

A.C Machines: Principle of operation of three phase induction motors – slip ring and squirrel cage motors – Torque equation derivation, Constructional details of synchronous machines.

UNIT V - Semiconductor Devices:

Classification of solids based on energy band theory - Intrinsic semiconductors - Extrinsic semiconductors - P type and N type semiconductors - P-N junction diode and its characteristics –Half and Full wave rectifiers- Zener diode and its characteristics - Voltage regulator. Bipolar junction transistor – Operation-Types- Applications.

TEXT BOOKS:

1. Mittle, V.N., "Basic Electrical Engineering", 2nd ed., TMH, New - Delhi, 1990.
2. V.K.Mehta,"Principles of Electrical Engineering and Electronics", 3rd ed., S. Chand Publications, New Delhi, 2010.

REFERENCE BOOKS:

1. Millman & Halkias, "Integrated Electronics", McGraw Hill, 1979.
2. A.K. Thereja & B.L. Thereja, "Electrical Technology", Vol. – II, S.Chand Publications, 2007.
3.. U.Bakshi & A.Bakshi, "Basic Electrical Engineering", 1st ed., Technical Publications, Pune, 2005.
4. U.Bakshi & A.Bakshi, "Basic Electrical Engineering", 1st ed., Technical Publications, Pune, 2005.

HS114 TECHNICAL ENGLISH COMMUNICATION

L	T	P	To	C
3	2	-	5	5

Course description and Objectives :

To introduce students to the specific use of language for the purposes of Technical Communication which would be an essential prerequisite for success in the areas of writing and speech. The teaching efforts in this course will be directed towards making students develop their technical and non-technical writing abilities using the fundamental principles that apply to the correct use of the English language free of grammatical and other related errors.

Course Outcomes:

Students shall achieve the ability to write and demonstrate college-level proficiency in the following:

- Clear and effective communication of meaning in speaking and writing.
- The ability to perform effectively the essential steps of the writing process (Note making, organizing, composing, revising, and editing).
- The ability to explain, develop, and criticize ideas effectively.
- Effective organization within the paragraph and the essay.
- Accuracy, variety, and clarity of sentences.
- Appropriate diction.
- Control of conventional mechanics (e.g., punctuation, spelling)

UNIT - I

- Text : Environmental Consciousness (Climate Change – Green Cover – Pollution)
- Grammar : Articles – Prepositions – Sentence Types and Construction
- Vocabulary : Root – Prefixes - Suffixes
- Composition : Paragraph Writing (Descriptive & Narrative)
- Lab Practice : Introduction to Phonetics (Organs of Speech; Consonants, Vowels & Diphthongs; Syllable, Stress & Intonation)

UNIT - II

- Text : Emerging Technologies
  (Solar Power – Cloud Computing – Nanotechnology)
- Grammar : Time and Tense (Present-Past-Future; Helping Verbs; Modals)
- Vocabulary : Synonyms – Antonyms
- Composition : Note-making
- Lab Practice : Grammar Practice (Speaking of past, present & future)

UNIT - III

- Text : Energy
  (Renewable and Non-renewable Sources – Alternative Sources – Conservation – Nuclear Energy)
- Grammar : Subject-Verb Agreement - Sentence Construction (Characteristics of Technical Writing)
- Vocabulary : Idioms & Phrases
- Composition : Summarizing
- Lab Practice : Situational Conversations – Role-Plays (Introducing; Greeting; Enquiring; Informing; Requesting; Inviting)

UNIT - IV

- Text : Engineering Ethics
  (Challenger Disaster – Biotechnology – Genetic Engineering – Protection from Natural Calamities)
- Grammar : Sentence Transformation (Degrees, Voice, Speech & Synthesis)
- Vocabulary : Phrasal Verbs
- Composition : Letter Writing (Informal)
- Lab Practice : Situational Conversations – Role-Plays (Emotions; Directions; Descriptions; Agreements; Refusals; Suggestions)

UNIT - V

- Text : Travel and Tourism
  (Advantages and Disadvantages of Travel-Tourism – Atithi Devo bhava – Tourism in India)
- Grammar : Common Errors
- Vocabulary : One-word Substitutes
- Composition : Letter Writing (Formal)
- Lab Practice : Group Discussions

TEXT BOOKS :

Mindscapes - English for Technologists and Engineers, Orient Black Swan, 2012.

REFERENCE BOOKS :

1. V. R. Narayana Swamy***, "Strengthen Your Writing",*** 1st edition, Orient Longman, 2003.
2. Thomas Elliott Berry***, "The Most Common Mistakes in English Usage",*** 1st edition, Tata McGraw Hill, 2004.
3. T. Balasubramanyam, ***A Textbook of English Phonetics for Indian Students***, Macmillan Ltd., 2000.
4. Sasikumar.V and P.V. Dhamija,. ***Spoken English: A Self-Learning Guide to Conversation Practice,*** 34th Reprint, Tata McGraw Hill, New Delhi, 1993.
5. Margaret M Maison, **"Examine your English",** 1st edition**,** Orient Longman, 1999.
6. Ashraf Rizwi, "***Technical English Communication***", Tata McGraw Hill, Latest Edition.

CS101 PROBLEM SOLVING AND COMPUTER PROGRAMMING

L	T	P	To	C
4	-	-	4	4

Course description and Objectives :

Aim of this course is to introduce the techniques of problem solving and concepts of programming language to the students. Because of its popularity and suitability to develop different types of applications, 'C' language has become the de-facto programming language to engineers. A comprehensive introduction of C language is offered through this course to enable the students to write diversified programs.

Course Outcomes:

On Completion of this course student should be able to

- Able to understand the basic terminology used in computer programming and to write, compile and debug programs in C language.
- Use different data types in a computer program and design programs involving decision structures, loops and functions.
- Able to understand the allocation of dynamic memory using pointers
- Use different data types to create/update basic data files.

UNIT I - Fundamentals of computers

Basic functional units and discrete components of a computer, computer networks, networking components, Binary representation of integers and real numbers, ASCII, EBCDIC, Unicode, Generations of computer languages.

UNIT II - Problem Solving Steps and Basic of C Language

Problem understanding, Formulating a mathematical model, Development of an algorithm, Representation of an algorithm, Flow chart and Pseudo code, Coding, Testing and Debugging, Comments, Processor statement, Function header statement, Variable declaration statement and Executable statement, C Character Set, constants, identifiers, operators, punctuations, keywords, Basic data types, modifiers, identifiers, variables, C scopes, type qualifiers, storage class specifiers, variable initializations, constants, reading and writing characters, formatted I/O.

UNIT III – Preliminaries of C

Assignment, arithmetic , relational, logical, bitwise, ternary, address, indirection, sizeof, dot, arrow, and parentheses operators, Expressions Precedence of operators and associatively, Category of Statements, Selection, Iteration, jump, label, expression and block, Function declaration, prototype, definition, calling by value and address, standard library functions and recursive functions.

UNIT IV - Arrays and Pointers

Declaration, initialization, reading, writing, accessing and passing as a parameter to functions, Multidimensional arrays and String functions, pointer expressions, pointer and arrays, multiple indirection, initializing pointers, pointer to functions, Dynamic memory allocation functions.

UNIT V - Structures and File Processing

declaration, initialization and accessing, array of structures and passing structures to functions, structure pointers, arrays and structures within structures, unions, bit-fields, typedef and enumerations, I/O and processing operations on text and binary files. pre-processor directives.

TEXT BOOKS :

1. Reema Thareja, "Introduction to C Programming", Oxford University Press, India, 2013
2. Herbert Schildt, C: "The Complete Reference", 4th Edition, Tata McGraw-Hill, 2000.

REFERENCE BOOKS :

1. E. Balagurusamy, " Programming in ANSI C", 4TH Edition, Tata McGraw- Hill, 2008.
2. R Ravichandran and T Jeyapoovan, " Computer Programming with C", Soni Graphics, India, 2014.

HS116 MATHEMATICS FOR BIOTECHNOLOGISTS - II

L	T	P	To	C
4	-	-	4	4

Course description and Objectives :

Without mathematics not a single day of an engineer will pass! In this course we start with matrices, solving system of equations. Continue with higher order differential equations. We also study Laplace Transformations using which we can solve differential equations. When data is given at only a finite points, we use numerical methods for find the approximate values of functions, also to solve differential equations approximately etc.

Course Outcomes:

- The students will be able to use Laplace transformations in solving differential equations.
- Definite integrals can be evaluated using Laplace transforms.
- They will analyze the data, when the data is given at only a finite point.
- They will use numerical methods for finding the approximate values of functions and will solve differential equations.
- Numerical integration can be applied in finding approximate areas.

UNIT I - Matrices :

Types of Matrices, determinants, Inverse of a square matrix, Rank of matrix, Echelon form, Solving of simultaneous equations by Cramer's method, Matrix inversion, Gauss Jordan methods, Solutions for linear equations, Eigen values & Eigen Vectors, Cayley-Hamilton theorem (without proof).

UNIT II - Higher Order O.D.E :

Non homogenous linear differential equations of second and higher order with constant coefficients with RHS term of the form e^{ax}, Sin ax, Cos ax, Polynomials in x.

UNIT III - Laplace Transforms :

Laplace transforms of some standard functions, linearity property, shifting theorems, change of scale properties, multiplication by powers of t, division by t, Inverse Laplace transforms, shifting properties, finding inverse Laplace transforms by partial fractions, multiplication by powers of s, division by s, Applications of L.T. for solving ordinary differential equations.

UNIT - IV

Numerical Methods – 1 : Bisection, Newton Raphson, Successive approximation methods.

Interpolation: Lagrange, Newton's forward & backward, Guass's forward & backward interpolation methods.

UNIT V - Numerical Methods – 2 :

Numerical integration by trapezoidal & Simpson's Rules.

Numerical solutions to differential equations : Euler, Runga Kutta Methods.

TEXT BOOKS :

1. *T.K.V.Iyengar, and others*, "Engineering Mathematics" Volume – I, 2009, S.Chand and Company.
2. *T.K.V. Iyengar, and others*, "Mathematical Methods, S.Chand and Company, 2009.

REFERENCE BOOKS :

1. *B.S.Grawel*, "Higher Engineering Mathematics", Khanna Publishers.
2. *Peter V.O Neil*, "Advanced Engineering Mathematics", Thomson Broocks/ cole.
3. *Erwin Kreyszig*, "Advanced Engineering Mathematics", 8th Edition, John Wiley & Sons (Asia) Pvt. Ltd. 2001.

HS117 ENGINEERING CHEMISTRY

L	T	P	To	C
4	-	-	4	4

Course description and Objectives :

Chemistry is the backbone in designing and understanding the nature and properties of various engineering materials. Currently, the electronics and computer engineers are waiting for suitable polymers for using miniature super computers. So this subject develops fundamental knowledge about new engineering materials and their significance in technical fields and industrial sectors. Water is an essential element for the existence of human, plant and animal lives, besides that it has greater industrial applications. The knowledge about water is the basic requirement for a professional student. Characterization of materials with instrumental techniques is essential for engineers.

Course Outcomes:

- Differentiate between soft and hard water. Understand the disadvantages of using hard water domestically and industrially. Select and apply suitable softening methods (Soda-lime, zeolite, ion-exchange methods, etc.) to soften the hard water for industrial and domestic applications.
- Acquaintance of primary and secondary cells, Hydrogen-Oxygen and Methanol fuel cells, dry and wet corrosions, corrosion controlling methods
- Acquaintance of the properties and engineering applications of Ceramics, Refractories, Glasses, Cement, Abrasives, Lubricants
- Acquaintance of Preparation, properties and applications of different polymers (Polyethylene, PVC, Tefflon, Bakelite,Urea-Formaldehyde, Silicones, Rubber – Vulcanization, Synthetic Rubbers-(Buna-S, Buna-N, Neoprene); treatment of membranes.
- Acquaintance of various spectroscopic methods (UV-visible / IR), Beer-Lambert's Law, qualitative and quantitative analysis, block diagrams of UV and IR spectrophotometers.

UNIT I - Water Technology :

Introduction-Hardness of water-Determination of hardness by EDTA-Disadvantages of hard water-Scales & Sludges-Caustic embrittlement-Boiler corrosion-Priming & Foaming, WHO, BIS Standards of water-Softening Methods- Lime Soda process, Zeolite process, Ion Exchange process -Desalination of brackish water-Reverse osmosis, Electro dialysis.

UNIT II - Electrochemical cells and AND Corrosion:

Electrochemical cells: primary cell-(Dry or lecalanche cell), Secondary cell-(Lead-acid storage cell, Lithium ion battery), Hydrogen-Oxygen Fuel cell, Methanol fuel cell.

Corrosion: Introduction-Dry corrosion (chemical)-Wet corrosion (electrochemical)-Mechanism of wet corrosion-Bimetallic corrosion-Concentration cell corrosion-Factors influencing corrosion-Corrosion control methods- Cathodic protection and Electroplating.

UNIT III - Engineering Materials :

Properties and engineering applications of Ceramics, Refractories, Glasses, Cement,Abrasives, Lubricants.

UNIT IV - Polymers :

Introduction –Types of polymerization-Preparation, properties and applications of Polyethylene, PVC, Tefflon, Bakelite, UreaFormaldehyde, Silicones, Rubber – Vulcanization, Synthetic Rubbers - (Buna-S, Buna-N, Neoprene). Elementary treatment of Membranes

UNIT V - Instrumental Techniques :

Interaction of radiation with matter,UV-Visible Spectroscopy-Beer –Lambert's law ,Qualitative and Quantitative Analysis,Block diagram of UV-Visible Spectrophotometer.IRSpectroscopy-Types of Vibrations,Identification of functional groups,Block diagram of IR Spectrophotometer**.**

TEXT BOOKS :

1. P.C Jain and Monica Jain, "Engineering Chemistry", 15th edition, Dhanpat Rai Publications 2009.
2. Gurudeep Raj and Chatwal Anand, "Instrumental Methods of Analysis", 5th edition, Himalaya Publications, 2007.

REFERENCE BOOKS :

1. S.S.Dara, "Text book of Engineering Chemistry" 1st edition, S. Chand Publications, 2009.
2. C.V. Agarwal, C.P. Murthy, A.Naidu, "Chemistry of Engineering materials", 9th edition, BSP Publications, 2008.
3. M.R. Senapati, "Advanced Engineering Chemistry" 2nd edition, Lakshmi Publications, 2006
4. H.W. Wilard and Demerit, "Instrumental methods of Analysis", 7th edition, CBS Publications, 1986.

HS122 ENGINEERING MATERIALS

L	T	P	To	C
4	-	-	4	4

Course description and Objectives :

The course will help students to learn about the elementary relationships between structure and properties of materials how materials can be classified. It also reveals the engineering applications of metals, alloys, semi conductors and magnetic materials and relation between properties and engineering applications.

Course Outcomes:

The students will be made to get acquainted to the following learning outcomes:

- The bonding in solids. Crystal systems and their structural features
- Fundamentals related to phase equilibria and relevance in Materials Science
- Mechanical properties of solids, factors affecting such properties in order to gain materials information.
- Classification of solids based on band theory, sources of resistivity in metals, semi conductors transport mechanism and applications.
- Classification of magnetic materials, hysteresis, ferrites and applications
- Super conductors, classification and their applications. Dielectric materials, types of polarization and new engineering materials and their usefulness.

UNIT I - Bonding in Solids & Crystallography:

Bonding in Solids: Inter atomic forces – Types of bonds – Primary & Secondary bonded materials and their properties – Cohesive energy.

Crystallography: Introduction – classification of Crystal systems – SC, BCC & FCC structures –Miller indices of planes & directions – Separation between successive planes – X-ray diffraction – Bragg's Law – Powder method – Crystal imperfection – Point and line imperfections – Grain boundaries

UNIT II - Phase Equilibria & Mechanical Properties :

Phase Equilibria: Gibb's phase rule & terms involved – Reduced phase rule - Two component systems–invariant reactions – Eutectic system & Iron – Carbon system - Lever rule.

Mechanical Properties : Introduction – mechanical properties of materials – Stress-Strain relations of various solids – Elastic moduli- deformations in solids- Fracture – Creep- Fatigue – Factors affecting mechanical properties of materials.

UNIT III - Conducting Materials & Semiconductors :

Conducting Materials: Introduction – Classification of solids based on the band models - Relaxation time and electrical conductivity of a metal – Collision time & mean free path – Sources of resistivity of metals.

Semiconductors: Introduction – Generation & recombination – Intrinsic semiconductors – Extrinsic semiconductors – Drift and diffusion (Qualitative treatment) – Einstein relation – Hall effect – Direct and Indirect band gap.

UNIT IV - Magnetic Properties & Superconductivity

Magnetic Properties: Introduction – Origin of magnetic moment – Classification of magnetic materials – Domain theory of ferromagnetism – Hysteresis curve - Soft and hard magnetic materials – Ferrites and their applications.

Superconductivity – Introduction - Meissner Effect – Types of superconductors – High Temperature superconductors – Applications.

UNIT V - Dielectrics & Functional materials

Dielectrics : Introduction – Dielectric polarization – Internal electric field – Clausius – Mossotti relation – Ferro and Piezo electricity - Electrets – Applications.

Functional materials: Introduction – Metallic glasses – Biomaterials – Composites – Metal matrix composites - Fiber reinforced plastics – Conducting polymers - shape memory alloys – smart materials.

TEXT BOOKS :

1. V. Raghavan, "Materials Science and Engineering", 3 rd ed., PHI, 1996.
2. Lawrence H. Van Vlack, "Element s of Materials Science and Engineering", 6th ed., Wesley Publication, 1989.

REFERENCE BOOKS :

1. Arumugam. M "Material Science" Anuradha Technical Book Publishers, Kumbakonam.K, 1997.
2. Manas Chandra, "Science of Engineering Materials", Vol 1-3, Mc - Millian Company of India, Delhi.
3. Pillai, S.O, "Solid State Physics", New Age International, 1998.
4. William F. Smith, "Principles of Materials Science and Engineering", MGH, Publishers, 1988.
5. Structure and Properties of Materials – John Wulff – Wiley Eastern Ltd.

ME101 ENGINEERING MECHANICS

L	T	P	To	C
4	-	-	4	4

Course description and Objectives :

The course aims to impart the knowledge to understand the forces and their reactions on various static and dynamic conditions.

Course Outcomes:

- Use scalar and vector analytical techniques for analyzing forces in statically determinate structures.
- Solve the engineering problems in case of equilibrium conditions and to calculate the reaction forces of various supports of different structures.
- Determine the centroid, centre of gravity and moment of inertia of various surfaces and solids.
- Solve the problems involving dry friction.
- Apply fundamental concepts of kinematics and kinetics of particles to the analysis of simple, practicalproblems.

UNIT I - Basic Concepts and Principles of Statics :

Introduction to Engineering Mechanics, Scalar and Vector quantities, Forces, Characteristics of a force, Definitions and examples of various types of force systems, Law of transmissibility, Definition of resultant, Composition and resolution of forces, Moment of a force, Principles of moments of force, Couples, characteristics of a couple, Transformations of a couple, Resultants of Force Systems, Possible resultants of different types of force systems, Resultant of a concurrent coplanar force system, Resultant of a non concurrent coplanar force system

UNIT II - Equilibrium of Rigid Bodies

Free body diagrams, Types of supports and their reactions, requirements of stable equilibrium, Equations of equilibrium of a concurrent coplanar force system, Equilibrium of Bodies acted on by two or three forces, Equilibrium of bodies acted on by non-concurrent coplanar force system

UNIT III - Properties of Surfaces and Solids :

Centroid and Center of Gravity: Centre of gravity of parallel forces in a plane, centroids and center of gravity of composite bodies, Distributed Loads on Beams.

Moments of Inertia: Definition, Parallel axis theorem and perpendicular axis theorem for areas, Polar Moment of inertia, Second moment of area by

integration, Radius of gyration of areas, Moments of inertia of composite areas.

UNIT IV - Friction :

Nature of friction, Laws of friction, Coefficient of friction, Angle of friction, Cone of friction, Types of Friction - Sliding Friction, Rolling Friction, Belt Friction, Ladder Friction, Wedge friction.

UNIT V - Kinematics and Kinetics :

Absolute Motion: Introduction, Recapitulation of basic terminology of mechanics, Displacement, Velocity and acceleration their relationship, Rectilinear motion of a particle

Relative Motion: Introduction to kinematics of relative motion, Relative displacement, Relative velocity

Kinetics: Introduction to Kinetics, Force, Mass and Acceleration, Newton's Laws of motion, Equation of motion for a particle, D Alembert's principle, Rectilinear translation of a rigid body, Work done by a force, Work done by a force system, Energy, Potential energy, Kinetic energy, Principle of Work and kinetic energy, Conservation of energy, Linear impulse, Linear momentum, Principle of linear impulse and linear momentum, Conservation of linear momentum.

TEXT BOOKS :

1. J. L. Meriam, L. G. Kraige, "Engineering Mechanics: Dynamics", 7th ed., John wiley & sons, 2012
2. A. K. Tayal, "Engineering Mechanics", Umesh Publications, 2005.

REFERENCE BOOKS :

1. L. Singer - Harper, "Engineering Mechanics", 3rd ed., Fedinand . , Collins, 1975.
2. Timoshenko & Young, "Engineering Mechanics", 4th ed., Tata McGraw Hill, New Delhi, 2007.
3. S. S. Bhavakati & J. G. Rajasekharappa, "Engineering Mechanics", 3nd ed., New Age International Publications, New Delhi, 2008.

HS118 ENVIRONMENTAL STUDIES

L	T	P	To	C
4	-	-	4	4

Course description and Objectives :

The objective of this course is to heighten on awareness of nature and its importance to students

and make them understand the need to make judicious use of all natural resources for long team sustenance of life on this planet.

Course Outcomes:

- To provide Knowledge on importance of natural resources and integrate technical "field" knowledge with analytical skills to prevent natural resources depletion
- To maintain healthy and Diverse Ecosystems ,
- Work together to conserve the biodiversity
- Take immediate measures to control the Pollution
- Adopt Ecofriendly technology.
- Maintenance of hygienic conditions

UNIT I - Environment and Natural Resources :

Environment: Definition, Scope and Importance – Need for Public Awareness

Natural Resources: Renewable and non-renewable resources – Natural resources and associated problems – Forest Resources: Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources: Use and over utilization of surface and ground water – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources - Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity–Energy resources: renewable and non-renewable energy sources, alternate energy sources. Land resources: Land as a resource, land degradation, Soil erosion – case studies - Role of an individual in conservation of natural resources.

UNIT II - Ecosystems and Biodiversity :

Ecosystem: Concept of an ecosystem. – Complete and incomplete ecosystem - Structure and functions of an ecosystem - Ecological succession. - Food chains, food webs -Structure and functional features of the following ecosystem: a. Forest ecosystem b. Grassland ecosystem c. Desert ecosystem, d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) **Biodiversity**: introduction of biodiversity, Bio-geographical classification of India - Value of biodiversity- Biodiversity at global, National and local levels - Hot-spots of biodiversity - Threats to biodiversity - Endangered and endemic species of India – Conservation of biodiversity

UNIT III - Environmental Pollution and Applications of Remote Sensing / GIS on Environment

Definition, Cause, effects and control measures of: Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution - Solid waste Management: Causes, effects and control measures of municipal and industrial wastes - Climate change, global warming, acid rain, ozone layer depletion -Case Studies - Role of an individual in prevention of pollution - Pollution case studies. – Green technology and its concept, role of green technology in controlling environmental problems.

UNIT IV - Social issues and EIA :

Sustainable development -water conservation: Cloud Seeding (Artificial rain making system), rainwater harvesting, watershed management - Disaster management: floods, earthquake, cyclone and landslides - Environment Protection Act. - Air (Prevention and Control of Pollution) Act. - Water (Prevention and control of Pollution) Act - Wildlife Protection Act - Forest Conservation Act

EIA: introduction to E.I.A.-definition of E.I.A and E.I.S – scope and objectives of E.I.A.- methods of E.I.A –CEIA, REIA, MOEF, CPCB, SPCB – Importance of E.I.A in proposed Projects / Industry /

Developmental activity - Remote sensing / GIS: Introduction of remote sensing / GIS, definition of remote sensing, applications of the remote sensing on environment (site selection, land use/land cover pattern, water/air/soil quality models, a criteria of environmental information systems)

UNIT V - Environmental Sanitation :

Food sanitation: food and drugs Act, food preservations, food borne diseases- Milk sanitation: tests for milk, pasteurization of the milk - water borne diseases-

air borne diseases-viral diseases (HIV/AIDS, SARS, bird-flu, anthrax)-maintenance of sanitary and hygienic conditions

Field Work/Environmental Visit: Visit to a local area to document environmental assets – river/ forest/ grassland / hill /mountain - Study of local environment - common plants, insects, birds - Study of simple ecosystems – pond, river, hill, slopes etc - Visits to industries, water treatment plants, effluent treatment plants

TEXT BOOKS :

1. Y. Anjaneyulu, "Introduction to Environmental Science", B S Publications, 2008.
2. Dr. M. Chandrasekhar, "A Text book of Environmental Studies", HI-TECH publications, 2006

REFERENCE BOOKS :

1. Dr. M. Anji Reddy, "A Text book of environmental science and Technology", B S Publications, 2008
2. Dr. K. Mukkanti, "A Text book of Environmental Studies", S.CHAND Company Ltd, 2009.
3. EHILRS and ST, "Text book of Municipal and Rural Sanitation", M.S Hill, 1998.
4. C. S. Rao, Wiley Eastern Ltd, "Environmental Pollution Control Engineering", New Age International Ltd, 2001
5. Dr. M. Anji Reddy, "Introduction to Remote Sensing", B S Publications, 2004.
6. Kurian Joseph and R.Nagendram, "Essentials of environmental studies", Pearson Education Pt Ltd, Delhi, 2007.
7. Sharma & Kour "Text book of Environmental pollution".
8. H.C Perkins "Text book of Air Pollution".

CS105 NETWORK SECURITY

L	T	P	To	C
2	-	-	2	-

Course description and Objectives :

This Course focuses towards the introduction of System, Information and Network security using various methodologies. It also focuses on the practical aspects that have been used to provide e_mail and web security.

Course Outcomes:

On Completion of this course student should be able to

- understand the Importance of Information Security
- Know the ways to protect the information
- understand the Firewall importance
- understand the need of Virtual Private Networks.

UNIT I - History of security :

History of security – Physical security, communications security, emissions security, computer security, network security and information security. Security process - Anti-virus software, access controls, firewalls, smart cards, biometrics, intrusion detection, policy management, vulnerability scanning, encryption, physical security mechanisms.

UNIT II - Access attacks

Snooping, eavesdropping, interception; Modification attacks - Changes, insertion and deletion; Denial of service attacks- Denial of access to information, applications, systems and communication; Repudiation attacks - Masquerading and denying an event. Hacking - Hacker motivation, historical hacking techniques, IP spoofing and malicious code.

UNIT - III

Confidentiality of files, information in transmission and traffic flow, integrity, availability and accountability; Integrity of files and information during transmission; Availability - backups, failover and disaster recovery; Accountability – identification and authentication, and audit.

UNIT - IV

Concepts of firewalls, Application layer and packet filtering firewalls; Virtual Private Networks.

UNIT - V

Basic encryption concepts, Private Key encryption standards-DES, triple DES and AES. Public key encryption – RSA. Concepts of digital signatures.

TEXT BOOKS :

1. Eric Maiwald, Fundamentals of Network security, Dreamtech Press, 2007.

REFERENCE BOOKS :

1. William Stallings, “Cryptography and Network security”, 4th edition, Pearson Education, 2010.

HS119 PROFESSIONAL ETHICS, VALUES AND HUMAN RIGHTS

L	T	P	To	C
2	-	-	2	-

Course description and Objectives :

• *To create an awareness on Engineering Ethics and Human Values.*

• *To instill Moral and Social Values and Loyalty*

• *To appreciate the workplace rights of Others, responsibilities and Safety of others.*

Course Outcomes:

The course will enable the students to attain the following:

- an understanding of professional and ethical responsibility in workplace
- the broad education necessary to understand the impact of engineering solutions in a global and societal context
- a knowledge of contemporary issues related to human and professional interactions at workplace
- an engineer's life-long commitment to serve the disadvantaged

UNIT I - Human Values :

Morals, Values and Ethics – Integrity – Work Ethic – Service Learning – Civic Virtue – Respect for Others – Living Peacefully – Caring – Sharing – Honesty – Courage – Valuing Time – Co-operation – Commitment – Empathy – Self-Confidence – Character – Spirituality.

UNIT II - Engineering Ethics & **Engineering as social experimentation :**

Engineering Ethics : Variety of moral issues – types of inquiry moral dilemmas – moral autonomy – The problems of Many Hands – Kohlburg's theory – Gilligan's theory Impediments to Responsible Action.

Engineering as social experimentation - Codes of ethics - a balanced outlook on law - the challenger case study.

UNIT III - Engineer's Responsibility for Safety :

Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis – Reducing Risk – The Government Regulator's Approach to Risk - Chernobyl Case Studies and Bhopal.

UNIT IV - Workplace Rights and Responsibilities & Work Environment :

Workplace Rights and Responsibilities : Engineers and Managers. Oganizational complaint procedures. Government agencies. Resolving Employee concerns. Limits on acceptable behaviour in large corporation.

Work Environment : Ethical and legal considerations, Organizational responses to offensive behaviour and harassment. Ethics in a Global Context.

UNIT V - Global Issues :

Multinational Corporations – Business Ethics - Environmental Ethics – Computer Ethics - Role in Technological Development – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Honesty – Moral Leadership – Sample Code of Conduct.

TEXT BOOKS :

1. Mike Martin and Roland Schinzinger, “Ethics in Engineering”, McGraw Hill, New York, 2005.

REFERENCE BOOKS :

1. Prof. (Col) P S Bajaj and Dr. Raj Agrawal, “Business Ethics – An Indian Perspective”, Biztantra, New Delhi, 2004
2. Charles E Harris, Michael S. Protchard and Michael J Rabins, “Engineering Ethics – Concepts and Cases”, Wadsworth Thompson Learning, United States, 2000 (Indian Reprint now available)
3. Engineering Ethics-An industrial Perspective, Gail Dawn Baura
4. Charles E Harris, Michael S Pritchard and Michael J Rabins, “Engineering Ethics – Concepts and Cases”, Thompson Learning, 2000.
5. Charles E Harris, Michael S Pritchard and Michael J Rabins, “Engineering Ethics – Concepts and Cases”, Thompson Learning, 2000.
6. PSR Murthy, “Indian Culture Values and Professional Ethics”, BS Publications
7. Edmund G Seebauer and Robert L Barry, “Fundamentals of Ethics for Scientists and Engineers”, Oxford University Press, Oxford, 2001.

HS120 ENGINEERING PHYSICS LAB

L	T	P	To	C
-	-	3	3	2

Course description and Objectives :

This lab is intended to make the students realize the theoretical concepts of physics having hands on experience in conducting the following experiments. Students may have to take up any 10 experiments from each section.

Course Outcomes:

- Students realize concept of resonance of sound conducting the experiment of Sonometer Melde's experiment and volume generator.
- The students understand the concepts of light conducting the experiments of dispersion of light, diffraction of light, optical fibers and lasers.
- The students acquire the knowledge of magnetic field theory, thermal energy and elastic properties by conducting the experiments of field along the axis of circular coil, Lee's experiment, Seebeck effect and Torsional pendulum.

PHYSICS LAB

1. Verification of laws of transverse vibrations in stretched string - Sonometer
2. Melde's Experiment - Transverse and Longitudinal modes.
3. Determination of Rigidity modulus of a material in the form of a wire - Torsional pendulum
4. Dispersive power of the material of a Prism - Spectrometer
5. Determination of wavelength of a monochromatic light source - Diffraction Grating.
6. Field along the axis of a circular coil – stewart Gee's apparatus.
7. Volume Resonator.
8. Band gap of semiconductor
9. Hall coefficient
10. Thermal conductivity of bad conductor Lee's method
11. Optical Fiber – Determination of numerical aperture
12. Solar Cell
13. Seebeck effect

REFERENCE BOOKS:

1. Vogel's Text book of qualitative Chemical Analysis J.Mendham, R.C Denney, J.D. Bares, M.Thomas & B. Siva Sankar, Pearson Publications – Volume I (2009).

EE113 FUNDAMENTAL OF ELECTRICAL ENGG. LAB

L	T	P	To	C
-	-	3	3	2

Course description and Objectives :

To understand basic electrical elements, electrical energy its consumption and measurement. To develop practical knowledge on electrical machines, electronic devices and circuits

Out Comes :

- Able to realize characteristics of electrical elements.
- Able to analyze given simple ac and dc networks.
- Able to work on different electrical machines.
- Able to reflect the knowledge of electronic devices to verify experimentally.

List of Experiments

1. Familiarization with basic components such as Resistors, Capacitors, Diodes, Transistors
2. Familiarization with basic electrical measuring instruments
3. Verification of ohm's law
4. Verification of KVL and KCL
5. Calculation of power factor in simple RL and RC circuits
6. Magnetization characteristic of a D.C. self excited generator
7. Measurement of power and energy.
8. Measurement of transformation ratio of single phase transformer.
9. Measurement of Power, Power factor of 3-phase induction motor.
10. Characteristics of PN junction diode.
11. Characteristics of Zener diode.
12. Operation of Full wave Rectifier
13. Operation of half wave Rectifier
14. Study and Working of fluorescent lamp
15. Measurement of armature and field resistances of d c machine using voltmeter-ammeter method.

Note : Any 10 of above experiments are to be conducted.

CS107 COMPUTER PROGRAMMING LAB

L	T	P	To	C
-	-	3	3	2

Course description and Objectives :

To familiarize the students in preparation of documents and presentations with office automation tools. A comprehensive problem solving skills through C language is offered to enable the students to write diversified solutions using this language.

Course Outcomes:

- Able to write, compile and debug programs in C language.
- Able to formulate problems and implement algorithms in C.
- Able to effectively choose programming components that efficiently solve computing problems in real-world

1. Write A Program to find simple Interest, compound interest
2. Write A Program to covert given temperature from C to F & F to C
3. Write A Program to check Entered number is positive or zero or Negative
4. Write A Program to print given year is Leap year or not
5. Write A Program to do arithmetic operations using switch
6. Write A Program to find biggest among 3 Numbers
7. Write A Program to print grade of a student for 5 sub avg>70(A), 60-70(B), 50-60(C),<50(F)
8. Write A Program to find Roots fo Quadratic Equation
9. Write A Program to find sum of individual digits of a given number
10. Write A Program to check whether the given number is PALINDRAM or not
11. Write A Program to check whether the given number is PERFECT or not
12. Write A Program to check whether the given number is PRIME or not
13. Write A Program to check whether the given number is ARMSTRONG or not
14. Write A Program to check whether the given number is STRONG or not
15. Write A Program to find sum of Natural Numbers

16. Write A Program to print the following triangle

```
      1
    2   3
  4   5   6
7   8   9   10 etc……….
```

17. C Progrm to find Factorial of Given number using Recursive and Non Recursive Functions.
18. Write A Program to print Fibonacci Series upto given limit using recursive, Non recursive
19. Write program in C for determining the minimum and maximum and sum of elements of an array of 'n' elements and searching for a given element.
20. C Program for computing range, mean and standard deviation of a given numeric dataset.
21. Write A Program in C for performing addition, subtraction, multiplication and transpose operations on matrices.
22. Write program to perform the following string operations on the given string. a) string length b) string copy c) string concatenation d) string comparison e) reverse string f) sub string
23. Write A Program to read student record (no, name, marks1, marks2, marks3, marks4, marks5, calculate average and Grade) and display the student record.
24. Write A Program to do arithmetic operations using pointers.
25. Write A Program to create two data files and copy the content of these two data files as a single file in another new file?

HS121 ENGINEERING CHEMISTRY LAB

L	T	P	To	C
-	-	3	3	2

Course description and Objectives :

This lab is intended to make the students enlighten with the theoretical concepts of chemistry. Instrumental techniques are useful for characterization of materials for future engineers.

Students may have to take up any 10 experiments from the following experiments.

Course Outcomes:

- To enable the students to analyse the hardness & chlorides in the potable water.
- To help students to determine the Alkalinity in water used especially in industries.
- To impart knowledge on polymers used as insulators.
- To provide an idea about Advanced techniques in chemical analysis using conductometer and spectrophotometer.

Volumetric Analysis:

1. Determination of total Alkalinity of water
2. Determination of Percentage purity of Washing soda
3. Determination of Fe(II) by Dichrometry
4. Determination of Percentage of available chlorine in Bleaching powder
5. Determination of chlorides by Argentometry
6. Determination of Total hardness of water

Preparations:

7. Preparation of Bakelite
8. Preparation Of Urea- Formaldehyde Resin

Instrumental methods of Analysis:

9. Determination of Viscosity of a Lubricating oil
10. Determination of Strength of acid by conductometry
11. Determination of Mn^{+7} by Colorimetry
12. Demonstration of UV-Visible Spectrophotometer with Ferrothiocyanate

REFERENCE BOOKS:

1. Vogel's Text book of qualitative Chemical Analysis J.Mendham, R.C Denney, J.D. Bares, M.Thomas & B. Siva Sankar, Pearson Publications – Volume I (2009).
2. Experiments in Applied Chemistry by Dr.Sunita Rattan. S.K. Kataria & Sons publications,2008.

ME103 ENGINEERING GRAPHICS

L	T	P	To	C
1	-	3	4	3

Course description and Objectives :

To familiarize students with the conventional concept of engineering drawing and application through AutoCAD.

Course Outcomes:

After completion of this course, student will be able to prepare plan and elevation of any pictorial view either conventional or through AutoCAD.

UNIT - I

Introduction to Engineering drawing: Introduction to Engineering Drawing – Types of lines, lettering, dimensioning Construction of polygon & Conics. (Ellipse, Parabola & Hyperbola by general method)

UNIT - II

Orthographic Projections: Principle of projection-Planes of projections.

Projections of points:

Projection of straight lines: Inclined to one plane and both the planes.

Projections of planes: Simple planes, Planes inclined to reference planes.

UNIT - III

Projections & Sections of solids – projections of prisms – cylinders – cones - pyramids – solid axis inclined to one plane, simple sections- prism, cylinder, pyramid and cone. AutoCAD Fundamentals.

UNIT - IV

Isometric projections: Isometric drawing of simple objects through AutoCAD

UNIT - V

Orthographic projections: Conversion of Pictorial view into orthographic view using AUtoCAD and Conventional.

TEXT BOOKS :

1. N.D.Bhatt, “Engineering Drawing”, 49th ed., Charotar Publication, 2007.
2. K. Venugopal, “Engineering Drawing through Auto CAD”, 1st ed., New Age Publication, 2008.

REFERENCE BOOKS :

1. Jhole, “Engineering Drawing”, 2nd ed., Tata McGraw Hill, 2008.
2. K.L. Narayana, “Engineering drawing” 2nd ed., Scitech Publications, 2008.

ME105 WORKSHOP PRACTICE

L	T	P	To	C
-	-	3	3	2

Course description and Objectives :

To provide the hands on experience to the students on basic workshop skills.

Course Outcomes:

After completion of this course, students will be able to identify various tools connected to all the trades. They are also able to make various objects to the given dimension by using various types of tools.

Trades for exercises:

1. Carpentry:
2. Fitting
3. Tin Smithy & Black smithy4. House wiring
5. Foundry & Welding (Demonstration)
6. Machine shop & CNC (Demonstration)
7. IT Workshop
8. Study of discrete components of computer and networking (1 session)
9. Demonstration of assembling a computer, disk partitioning and installation of system and application software. installation of modem etc. (2 sessions).

Note: In each trade, the students has to perform at least two jobs

TEXT BOOKS :

1. S.K. Hazra Choudhury, Elements of workshop Technology, 11th Edition, Media Promoters, 1997
2. Gopal, T.V., Kumar, T., and Murali, G., A first course on workshop practice – Theory, Practice and Work Book, Suma Publications, Chennai, 2005.
3. Venkatachalapathy, V. S., First year Engineering Workshop Practice, Ramalinga Publications, Madurai, 1999.

VIGNAN'S UNIVERSITY

II Year - B.Tech

SYLLABUS

I SEM & II SEM

II Year B.Tech. Food Tech. I-Semester

L	T	P	To	C
4	0	-	4	4

HS 213 PROBABILITY & STATISTICS

Course Description & Objectives:

This course is to impart knowledge to the students concerned with the laws governing random events. The collection, analysis, interpretation, and display of numerical data and its applications in Food Science and Technology.

Course Outcomes:

Students who successfully complete this course should be able to demonstrate understanding of:

1. *Basic probability axioms and rules and the moments of discrete and continuous random variables as well as be familiar with common named discrete and continuous random variables.*
2. *How to derive the probability density function of transformations of random variables and use these techniques to generate data from various distributions.*
3. *How to calculate probabilities, and derive the marginal and conditional distributions of bivariate random variables.*
4. *Discrete time Markov chains and methods of finding the equilibrium probability distributions.*
5. *How to calculate probabilities of absorption and expected hitting times for discrete time Markov chains with absorbing states.*

UNIT I - Descriptive Statistics

Basic Definitions, Frequencies, Graphical Representation, Histogram, Ogive curves, Measures of Central tendency, Arithmetic mean, Median, Mode, mean deviation, standard deviation, Symmetry and Skewness, Karl Pearson's Coefficient of skewness.

UNIT II - Curve Fitting and Correlation, Regression

Least squares method, curve fitting (straight line and parabola only)

Covariance, Correlation, Types, Pearson's Coefficient of correlation, Rank correlation, Spearman's rank correlation. Regression, Regression lines, multiple regression.

UNIT III - Probability

Introduction, Definition (Classical and Axiomatic approach), Addition theorem, Conditional probability, Multiplication theorem, Total probability, Bayes theorem.

UNIT IV - Distributions

Random variables, Discrete and Continuous variables, Introduction to Distributions.

Binomial distribution : Definition, Mean and Standard deviation, Recurrence relation, Applications, Fitting of binomial distribution.

Poisson Distribution : Definition, Mean and Standard deviation, Recurrence relation, Poisson Distribution is an approximation of Binomial distribution, Applications, Fitting of Poisson distribution.

Geometric Distribution : Definition, Properties.

Normal Distribution : Definition, Normal curve, Mean and Standard deviation, Median, Mode, Normal Distribution applications, Normal Distribution is an approximation to Binomial distribution.

Exponential Distribution : Definition, Properties.

UNIT V - Sampling Methods

Population and Sampling, Parameters and Statistics, Types of sampling, Sampling Distributions, Central limit theorem, Standard Error of mean from infinite population, Standard deviation of variance.Test of hypothesis and test of significance, confidence limits, confidence interval, Test of significance of Large samples, T-distribution, Chi square test.

TEXT BOOKS :

1. *H. K. Dass* and *Er. Rajnish Verma*, Higher Engineering Mathematics, S. Chand & Co., New Delhi, 2011.
2. *Miller and Fruinds*, Fundamentals of Probability and Statistics, PHIP Publication.

REFERENCE BOOKS :

1. *S.C. Gupta* and *V.K .Kapoor*, “Fundamentals of Mathematical Statistics”, Sultan Chand & Co., New Delhi, 2005.
2. *B.V. Ramana*, “Higher Engineering Mathematics”, 3rd Edition, Tata McGraw-Hill Publishing Co, 2008.
3. *R K Jain, S R K Iyengar*, “Advanced Engineering Mathematics”, 2nd Edition, Narosa Publishing House.
4. *Erwin Kreyszig*, “Advanced Engineering Mathematics”, 8th Edition, John Wiley & Sons (Asia) Pvt. Ltd. 2001.

II Year B.Tech. Food Tech. I-Semester

L	T	P	To	C
4	0	-	4	4

FT201 FOOD CHEMISTRY

Course Description & Objectives:

This course will impart knowledge to the students on the chemistry of micronutrients & macronutrients and its application in food industry.

By the end of the course, the students will be able to gain knowledge on different chemical & enzymatic reactions occurring in foods, understand Industrial application of different macronutrients and apply their knowledge of biomolecules to understand the changes that occur in foods during processing

Course Outcomes:

1. *Analyse and predict how the composition and conditions within a food influence the functional properties of food molecules.*
2. *Analyze and predict how the composition of foods with regard to carbohydrates, lipids, protein and water influence their stability.*
3. *Examine and assess implications for food formulations for achieving objectives of food quality and palatability, cost and healthfulness.*
4. *Analyze and interpret the role of food chemistry in practical food situations.*

UNIT I - Introduction to Food Chemistry

Food chemistry - Definition, Introduction, Importance and History of Food Chemistry. Moisture in foods – Role and type of water in foods. Water activity and sorption isotherm - Role of water activity in enhancing the shelf life of foods -Humectants - Role of Humectants in enhancing the shelf life of foods. Dispersed systems of foods - Colloidal system - Types of colloidal system. Sols - Types of sols, lyophilic sols, lyophobic sols, Preparation, purification and Properties of sols. Gels-Types of Gels, properties of gels, Food gels. Emulsions - Types of emulsions, Preparation and properties of emulsions. Foam - Formation and structure Changes of carbohydrates on cooking - Changes in pecticsubstances,Changes in starch. Starch - Starch granules, Granule gelatinization (Gelatinization of starch), Hydrolysis of starch,Crude fibre. Browning reactions - Enzymatic browning and non-enzymatic browning.

UNIT II - Protein

Functional properties of sugars. Pure proteins of plant and animal origin with their functional characteristics. Plant proteins - cereal proteins, tuber proteins and pulse storage proteins. Milk proteins - Casein, whey proteins and colostrums. Egg proteins - Egg white proteins, Egg yolk proteins. Lipids - Introduction - Fatty acids, Acylglycerols, Phospholipids. Classification of edible fats - Milk fats, lauric acids, vegetable butters, oleic-Linoleic acids,linolenic acids, Animal fats, Marine oils. Physical aspects of lipids - Crystallization, Consistency. Chemical aspects of lipids - Lipolysis, Auto-oxidation, Thermal decomposition, polymerization Edible fats and oils - Melting properties, chemical properties. Technology of edible fats and oils - Rendering, pressing, solvent extraction.

UNIT III - Chemistry of fat and oil processing

Chemistry of fat and oil processing: Refining, Hydrogenation, Interesterification. Frying technology of edible fats and oils - Chemistry of frying, Behaviour of frying oil. Behaviour of food during frying, chemical and physical changes, Tests for assessing the quality of frying oils. Anti-oxidants-Natural and synthetic anti-oxidants, Mechanism of action, examples and mode of application. Rancidity and its types, detection techniques. Enzymes in food industry - Carbohydrases-Amylases, pectinolytic enzymes, cellulases and hemicellulases. Proteases - Endopeptidases, Metalo peptidases. Lipid hydrolyzing enzymes - Lipases, Phospholipases. Chemical reactions of interest to food processing.

UNIT IV- Micronutrient

Introduction - Definition of Micronutrient, Classification of Micronutrients, Significance and Scope. Flavor - Definition, Methods for Flavor Analysis, Taste and Nonspecific Saporous Sensations, Taste Substances; Sweet, Bitter, Sour, and Salty sensations, Structural basis of taste modalities, Non specificSaporous substances; Flavour Enhancers, Astringency, Pungency and Cooling. Flavours related to spices, fruits and vegetables. Flavour volatiles. Pigments - Introduction - Pigments in animal and plant tissue - heme compounds, Chlorophyll, carotenoids, Flavonoids and other phenols, Betalains. Flavonoids and other phenols - Anthocyanins - Structure - Color and Stability of Anthocyanins. Factors affecting stability of Anthocyanins - Structural transformation and pH – Temperature – oxygen and Ascorbic acid - Light, Sugars and their degradation products, metals, Sulfur dioxide, Co pigmentation, Enzyme reactions

UNIT V- Flavonoids

Other flavonoids - physical properties - Importance in foods. Vitamins - Introduction, Toxicity of vitamins - Different sources of vitamins – Dietary recommendations. Minerals - Introduction - Principles of mineral chemistry - Nutritional aspects of minerals - Essential mineral elements - Recommended Dietery allowances –Bioavailability. Thickeners and Stabilizers in foods - Chemical composition of Acacia gum, Agar, Alginic acid, Carrageenan, guar gum, Specific function and utilization in foods. Antinutritional factors in foods - Saponin, Phytic acid, hemagglutenins or lectins. Modification of food using enzymes. Role of endogenous enzymes in food quality - color - Texture - Flavor and aroma changes in foods - Nutritional quality. Enzymes in baking and brewing.

TEXT BOOKS:

1. HD. Belitz, Dr.W.Grasch 1987, *Food Chemistry* – Spirigerverl, Newyork.
2. Fenema O.R. Maraceladikllor, *Food Chemistry* – London.

REFERANCES:

1. Harry H. Sisler, Calvin: A.VanderWerf. *Food Chemistry*
2. N.A. Michael Eskin*Biochemistry of Foods* 2nd edition.

3. Dr. Ling HD. Belity, Dr.Ing, W.Grach 1987, *Food Chemistry* - Spirigerverl, New York.
4. Eeskin - herderson*Food Biochemistry* - Town send.
5. R. Marceladikllor, *Food Chemistry* - Fenema, London.
6. Meyer. *Food Chemistry - Food Chemistry* - HARRY H. SISLER, Calvin : A Vander werf.
7. Braverman*Introduction to the Biochemistry of Foods* - Elsevier Scientific Publishing Company
8. Sadasisivam - *Biochemical Methods*

II Year B.Tech. Foof Tech. I-Semester

L	T	P	To	C
4	0	-	4	4

PRINCIPLES OF COST ACCOUNTING

Course Description & Objectives:

This course willenable the students to imbibe the fundamentals of cost accounting.

By the end of the course the students will be able to understand concerned with Ascertainment of Cost, Ascertainment of Profitability, Classification of Cost and Control of Cost that play very important role in running food industry.

Course Outcomes:

1. *After completion of this course students will be able to understand .*
2. *Basics of cost accounting, its scope and objective.*
3. *Treatment of stock practical problems on cost sheets..*
4. *Differential Piece rate system, Tailor's differential piece rate, Halsey and Rowan Plan, Labour Productivity.*
5. *Overheads and its importance, classification*

UNIT I - Introduction to cost accounting

Introduction, Evolution and Definition of Cost Accounting, Scope, Objectives and Functions of Cost Accounting, Cost concept and cost classification. Purchase procedure, material issue, operating and transport cost.

UNIT II - Stock and cost sheet

Elements of Cost, Treatment of Stock, Stock of Raw Materials, Stock of Work-in Progress, Stock of Finished Goods, Practical Problems on Cost Sheet

UNIT III- Material and costing

Material Cost- purchase procedure, fixation of stock levels, store keeping, pricing of material issue (FIFO and LIFO only), methods of costing (operating costing-transport only)

UNIT IV- Labour cost

Labour cost- Remuneration methods, time wage payments, payments, payment by results, differential Piece rate system, Tailor's differential piece rate, Halsey and Rowan Plan, Labour Productivity.

UNIT V- Introduction to overhead

Overheads: Definition of Overheads, Importance of Overhead, Classifications of Overhead, Machine hour rate

TEXTBOOKS:

1. Cost Accounting: Method & Problems-B.K.Bhar, Academic Publishers
2. Cost Accounting-A Managerial Emphasis, Horngren, Foster & Dater, Prentice Hall.

REFERANCE BOOKS:

1. A Text Book of Cost Accountancy-M.N.Arora, Vikas Publishing Pvt., Ltd.
2. Cost Accounting- N.K.Prasad&A.K.Prasad, Book Syndicate.
3. Principles and Practice of Cost Accounting- Asish Bhattacharya, Sultan Chand.
4. Fundamental Managerial Accounting Concept- Edmonds, Edmonds AndTsay, Irwin McGraw Hill.
5. Cost Accounting – Theory and Practices-Bhabatosh Banerjee, Sultan Chand & Sons.

II Year B.Tech. Food Tech. I-Semester

L	T	P	To	C
4	0	-	4	4

FT203 FOOD MICROBIOLOGY

Course Description & Objectives:

This course will impart basic knowledge about micro-organisms associated with foods

By the end of the course, the students will be able to gain knowledge on the sources, contamination and spoilage of micro-organisms, the preservation of food for future use.

Course Outcomes:

1. *Identify the important pathogens and spoilage microorganisms in foods and the conditions under which they will grow.*
2. *Identify the conditions under which the important pathogens are commonly inactivated, killed or made harmless in foods.*
3. *Utilize laboratory techniques to identify microorganisms in food.*
4. *Know the principles involving food preservation via fermentation processes.*

UNIT I - Microorganism and Food Spoilage

Microbial spoilage of foods. Cause of spoilage classification of foods by ease of spoilage. Factors affecting kinds and numbers of microorganisms in food. Factors affecting growth and survival of microorganismsinfoods. Intrinsic factors – Nutrient content, pH, buffering capacity, redo potential (En), Inhibitory substances andbiological structures (Antimicrobial barriers and constituents) water activity. Extrinsic factors – Relative Humidity, Temperature, and Gaseous Atmosphere. Chemical changes caused by microorganisms - changes in nitrogenous organic compounds, non-nitrogenous organic compounds, organic acids, other compounds, Lipids, Pectic substances. Contamination of Foods. Sources of contamination. Green plants and Fruits, Animals, Sewage, Soil, Water, Air.

UNIT II - Classification of Micro-Organism

Microorganismsimportance in Food Microbiology. Moulds - General characteristic of moulds, classificationand identification of moulds. Yeasts and Yeast like fungi - General characteristics of yeasts, classification andidentification of yeasts, yeasts of industrial importance. Bacteria - Morphological characteristics important inFood Bacteriology. Cultural and Physiological characteristics important in food bacteriology. Genera of bacteria important in Food Bacteriology groups of bacteria important in food bacteriology. Principles of FoodPreservation. Methods of Food preservation, application in food preservation. Asepsis, removal of Microorganisms. Maintenance of Anaerobic conditions.

UNIT III - Methods of Food Preservation

Food Preservation by use of high temperature. Factors affecting heat resistance (Thermal death time). Heat resistance of Microorganisms and their spores. Determination of heat resistance. Heat penetration - Pasteurization, Heating at about 100 C. Heating above 100 C, canning.Preservation by use of low temperatures. Growthmicroorganisms at low temperatures. Common or Cellar storage. Chilling or cold storage. Freezing or Frozenstorage. Sharp Freezing and quick freezing. Changes during freezing, storage and thawing. Preservation bydrying, methods of drying. Intermediate moisture foods. Preservation by food additives - The ideal antimicrobial preservatives.Organic acids and their salts, nitrites and nitrates, sulfur dioxide and sulfites. Ethylene and propylene oxide,sugar and salt. Preservation by Food Additives - Alcohol, formaldehyde, wood smoke, spices and othercondiments and other additives. Other groupings of chemical agents, antibiotics, developed preservatives. FoodPreservation by Radiation - U.V. Radiation, ionizing radiations, definition of terms, xrays, gamma rays andcathode rays, Microwave processing. High pressure processing, pascalization

UNIT IV - Microbial spoilage and preservation of milk and milk Products

Microbiology of milk and milk products. Contamination, preservation, pasteurization and ultra pasteurization,vat pasteurization. Vacreation, use of low temperatures, freezing, drying etc. Spoilage of milk and cream, gasproduction proteolysis, ropiness, changes in milk fat. Alkali production. Flavours changes & colour changes. Spoilage of milk at different temperatures. Condensed and dry milk products. Flavour defects, colour defects.Microbiology of fruits and vegetables, contamination, preservation of vegetables, asepsis, chilling, freezing,drying, preservatives, CA storage, MA storage. Spoilage of fruits and vegetables. Microbiology of cereal andcereal products contamination, preservation and spoilage of flours. Microbiology of cereal and cereal products.Spoilage-Bread, Mold, Rope, Red bread, Chaky Bread.

UNIT V- Spoilage and preservation of Meat

Microbiology of Meat and Meat Products. Contamination, preservation. Spoilage of meat and meat products. Invasion of tissues by microorganisms and growth of microorganisms in meat General types of spoilage of meats. Spoilage under anaerobic conditions, spoilage of different kinds of meats. Contamination, preservation, spoilage. Factors influencing kind and rate of spoilage, evidences of spoilage, bacteria causing spoilage. Microbiology of eggs. Contamination, preservation, spoilage. Changes during storage. Changes not caused by microorganisms and changes caused bymicroorganisms. Microbiology of canned foods. Causes of spoilage, appearance of the unopened container, types of biologicalspoilage of canned foods. Flat sour spoilage, TA spoilage, sulphide spoilage. Types of spoilage of canned foodsby bacteria, yeasts, molds. Spoilage of canned meat.

TEXTBOOKS:

1. Food Microbiology, TMH, New Delhi *by* W C Frazier & D C Westhoff
2. Modern Food Microbiology, CBS Publication, New Delhi *by* J M Jay

REFERENCE BOOKS:

1. G.L. Ganwart (1987), *Basic Food Microbiology,* AVI Publishing Co. Inc., USA. Frazier and WesUobb.
2. Adam M R and Moss M.O., *Food Microbiology,* New Age International (P) Ltd., Publishers, NewDelhi.
3. Frazer, Math and Deibel, *Laboratory Manual for Food Microbiology*, Burgers Publishers –Minnesota, USA.
4. CarlvanDerzant and Splittsoessev, *Methods for Microbial Examination of Foods*, APHAPublishers, Washington DC, USA.

II Year B.Tech. Food Tech. I-Semester	**L**	**T**	**P**	**To**	**C**
	4	0	-	4	4

FT205 BIOCHEMISTRY & NUTRITION

Course Description & Objectives:

This course will impart knowledge to the students on the fundamentals of Biochemistry to understand the concepts of Biochemistry.

By the end of the course, the students will be able to understand the structural organization of plant cell, study the chemical properties and metabolism of biomolecule and understand the biochemical reactions occurring in plant cell.

Course Outcomes:

By the end of the course, the students will be able to

1. *Understand the concepts of Biochemistry*
2. *Know the structural organization of plant cell*
3. *Study the chemical properties and metabolism of biomolecules*
4. *Understand the biochemical reactions occurring in plant cell*

UNIT I - Introduction to Carbohydrate

Introduction - Importance of biochemistry - Scope of biochemistry - Historical aspects of biochemistry andbranches of Bio-chemistry. Plant cell - Animal cell - Various organelles in plant cell and animal cell – Theirfunctions. Carbohydrates - Introduction - Definition of carbohydrates, functions, classification of carbohydrates- Monosaccharaides, disaccharides, polysaccharides. Reducing sugars - monosaccharaides, glucose, fructose,disaccharides - Maltose, Lactose, Non reducing sugars - Sucrose, trehalose, inversion of sucrose. Polysaccharides - starch, Glycogen, Cellulose, Chitin, - Structures, functions, uses.

UNIT II - Protein : classification and function

Carbohydrates physical properties - Isomerism, Structural isomerism, Stereoisomerism, optical isomerism,Enantiomers, Anomers, Mutarotation, Epimers. Chemical properties of carbohydrates - Dehydration, oxidation,reduction, formation of esters, amination, glucoside formation, formation of osazones, cyanohydrine reaction,oximes formation. Amino acids

- occurrence - classification - Protein and non-protein amino acids – essentialAndnon-essential amino acids - classification based on Hydrophobicity of R-side chain groups, based on thestructure, based on the polarity, based on the nutritional and metabolic rate. Chemical properties of amino acids- Ninhydrin - peptide bond reaction - decarboxylation - Schiff base formation - Transamination - oxidative andnon - oxidative deamination – sangers reagent - Edmans reagent - Dansyl chloride test..

UNIT III - Protein and Enzyme

Structure of proteins - primary, secondary, tertiary and quaternary structure and forces involved in thestabilizing proteins. Classification of proteins - based on solubility, function, properties of proteins -U.V.absorption Denaturation, Renaturations and immune reaction. Purification techniques of proteins – saltingin, salting out, Gel filtration, Ion exchange chromatography. Enzymes - characteristics of enzymes, chemicalnature, specificity, active site and mechanism of action - Lock and key model, Induced fit model. Measurementof enzymatic activity, factors affecting enzymes activity. Enzymatic inhibitions, Iso enzymes, co-enzymes, haloenzymes, prosthetic group classification and Nomenclature of enzymes.

UNIT IV- Lipids

Lipids - occurrence - Classification, functions and structures of saturated and unsaturated fatty acids, importanceof essential fatty acids. Chemical properties of fatty acids Rancidity, saponification, Iodine number, ReichartMeissel number, acid value. Nucleic acids - functions, structure of Nitrogen bases, Nucleosides and Nucleotides- ATP, GTP, CTP, UTP, TTP, Secondary structure of DNA. Various types of DNA and RNA. Metabolism - Anabolism - Catabolism - stages of respiration, overall metabolic view of carbohydrate, protein and lipids.Glycolysis and its energetics

UNIT V- Metabolic pathway

TCA cycle and its energetics. Gluconeogenesis. Glycogen metabolism - Glycogenesis, Glycogenolysis. Hexosemono phosphate pathway Metabolism of lipids - Anabolism of saturated fatty acids , unsaturated fatty acid.Catabolism of lipids - Triacylglycerol and W - oxidation of fatty acids in brief and â-oxidation in detail.Vitamins - occurrence, chemistry and structure of vitamins. Metabolic functions of fat. Bio chemical functions ofvitamins. Biochemical functions of Minerals

TEXTBOOKS:

1. Lehninger, A.L., Nelson, D.A and Cox, M.M. 2005. *Principles of Biochemistry*. CBS Publishers and Distributors, Delhi
2. Conn, E.E., Stumpf, P.K., Bruening, G. and Doi, R.H. 1995. *Outlines of Biochemistry.* John Wiley and Sons Inc., Singapore.

REFERENCE BOOKS:

1. Buchanan, B.B., Gruissem, W. and Jones, R.L. 2002. *Biochemistry and Molecular Biology of Plants.* JohnWiley and Sons, UK..
2. Jayaraman, J. 1980. *Laboratory Manual in Biochemistry*. Wiley Eastern Publishers, New Delhi.
3. Plummer, D.T. 1979. *An introduction to Practical Biochemistry*. Tata McGraw-Hill Publishing Co., NewDelhi.
4. Rameshwar, A. 2006. *Practical Biochemistry*. Kalyani Publishers, Ludhiana.
5. Sadasivam, S. and Manikckam, A. 1996. *Biochemical methods for Agricultural Sciences*. New AgeInternational Publisher, New Delhi

II Year B.Tech. Food Tech. I-Semester	L	T	P	To	C
	-	-	3	3	2

HS 217 SOFT SKILLS LAB

Course Description & Objectives:

The Soft Skills Laboratory course is aimed at training undergraduate students and enabling them to acquire employability skills. Designed to impart work related skills, the course will help trainees develop interpersonal communication, leadership and team skills. It will give them the required competence and confidence to handle professional tasks.

Training Methodology:

The training methodology is designed to bring about changes in attitudes through experience-based learning. Activities in simulated environments such as role plays, group discussions, micro-presentations, audio-video clippings, case studies, psychometric tests etc., will provide students insights into their strengths and weaknesses.

Learning Outcomes:

1. *To help students to develop formal communication skills in a work place*
2. *To make them acquire team skill by working in group activities*
3. *To equip them with suitable language and speech patterns in a workplace*
4. *To enhance the ability of critical & lateral thinking while addressing the issues at any situation*
5. *To enable them to present themselves confidently in job interviews*

UNIT I - Personality Development Skills

a) Role of language in Personality – How language reflects, impacts personality – Using gender-neutral language in MNCs – being culturally sensitive.

Activity – Appraising each other – Worksheets related to the above

b) Career Planning- job vs. career- goal setting- SWOT analysis- planning and prioritization - four quadrant time management system - time management – self-management – stress-management.

Activity: Setting a SMART goal - SWOT analysis of the self – Writing a Statement of Purpose (SOP).

c) Effective Resume-Writing: structure and presentation - planning and defining the career objective - projecting one's strengths and skill-sets – summarizing - formats and styles - covering letter.

Activity: Resume preparation –writing a covering letter.

UNIT II - Language Skills

a) Functional English - Formal/informal context – purpose - interpersonal dynamics - ideation –content organization - initiating a conversation – responding appropriately - right body language.

Activity - Role play in different situations, - self-introduction - social background (family, home town etc.,) - role model - my future - likes/dislikes (movies, persons, places, food, music etc.,) - a mini project on functional English.

b) Vocabulary-Building - Etymology of words - word roots - prefixes & suffixes - synonyms & antonyms- collocations - one-word substitutes – analogies - idioms and phrases - contextual guessing of unfamiliar words – task-oriented learning (100 words).

Activity: Flash cards (200 words) – vocabulary exercises with hand-outs.

UNIT III - Communication Skills

a) Group Discussion: Articulation and flow of oral presentation - dynamics of group discussion – intervention – summarizing - voice modulation – content generation – Key Word Approach (KWA) – Social, Political, Economic, Legal and Technical Approach (SPELT) – View Point of Affected Part (VAP) - language relevance - fluency and coherence.

Activity: Mock sessions on four types of GD topics.

b) Facing Interviews: Interview process - understanding employer expectations - pre-interview planning - opening strategies - answering strategies – stress-based interviews - tele-interviews, video interviews-frequently asked questions (FAQs).

Activity: Writing responses to FAQs - mock interviews.

UNIT IV - Comprehensive Skills

a) Reading Comprehension: Reading as a skill- techniques for speed reading-skimming- scanning- appreciating stylistics - impediments for speed reading - eye fixation - sub-vocalisation - critical reading - reading based on purpose - reading for information - reading for inference -understanding tone.

Activity: Reading comprehension exercises with texts drawn from subject areas. (Hand-outs)

b) Listening Comprehension: Listening as skill - different types of listening - hidden data of communication - active listening - top-down approach - bottom-up approach.

Activity: Following different accents (Indian, British, American) listening comprehension exercises with audio and video excerpts.

UNIT V - Analytical Skills

a) Data Commentary: Deductive & inductive reasoning - data interpretation - tables & charts - bar charts - pie charts - line graphs - ratios & proportions – percentages - coding and decoding - reasoning by analogy - artificial language etc.,

b) Analytical Thinking: Statement and Conclusion - Data Sufficiency - Statement and Argument - Statement and Assumption - Logical Deduction - Logical Problems.

Activity: Exercises with handouts.

REFERENCE BOOKS :

1. *Edward Holffman, **Ace the Corporate Personality**, McGraw Hill,2001*
2. Adrian Furnham, ***Personality and Intelligence at Work***, Psychology Press, 2008.
3. John Adair Kegan Page, "***Leadership for Innovation"*** 1st edition, Kogan, 2007.
4. M.Ashraf Rizvi, "***Effective Technical Communication",*** 1st edition, Tata McGraw Hill, 2005.
5. Krishna Mohan & NP Singh , "***Speaking English Effectively"*** 1st edition, Macmillan, 2008.

II Year B.Tech. Food Tech. I-Semester

L	T	P	To	C
-	-	3	3	2

FT207 FOOD MICROBIOLOGY LAB

Course Outcomes:

This lab will impart knowledge regarding

1. *Isolation of microorganism from the food material*
2. *Identification and isolation of the micro-organism in fruits & vegetable, meat & meat product, milk, sugar spices, egg etc.*

List of Experiments:

1. Isolation of molds from foods
2. Microbial examination of cereal or cereal Products – Identification, Isolation
3. Microbial examination of vegetable – Identification, Isolation
4. Microbial examination of fruits – Identification, Isolation

5. Microbial examination of meat and meat products – Identification, Isolation
6. Microbial examination of fish and other sea foods – Identification, Isolation
7. Microbial examination of Eggs – Identification, Isolation
8. Microbial examination of milk or milk products – Identification, Isolation
9. Microbial examination of sugar and salts – Identification, Isolation
10. Microbial examination of spices – Identification, Isolation
11. Thermal Death Time determination

II Year B.Tech. Food Tech. I-Semester	**L**	**T**	**P**	**To**	**C**
	-	**-**	**3**	**3**	**2**

FT209 BIOCHEMISTRY LAB

Course Outcomes:

By the end of the practical exercises, the students will be able to

1. *Have clear concepts of the structures of biomolecules*
2. *Differentiate between qualitative identification and quantitative estimations, standard*
3. *Graph preparation*
4. *Understand the separation of biomolecules using various biochemical techniques*

Lit of Experiments:

1. Safety measures in the laboratory.
2. Preparation of standard acid, and alkali solutions.
3. Qualitative test for all carbohydrates - Solubility, Molisch, Anthrone, Iodine test.
4. Qualitative test for Pentoses, reducing sugars, (Bials,Fehlings, Benedicts, Barfoeds test).

5. Qualitative test for Glucose, Fructose, Sucrose (Osazone, Acid hydrolysis, Selewanoffs).
6. Quantitative test for all Amino acids, aromatic amino acids, Sulphur containing amino acids (Ninhydrin, Xanthoproteic, Nitro Prusside test)
7. Quantitative tests for peptide bonds and proteins (Biuret test &Folin Lowry test)
8. Precipitation of proteins with heavy metals, acidic reagents, organic solvents, salting out of proteins.
9. Qualitative test for lipids - Solubility test ,Translucency test, Emulsification test, litmus and Saponification test
10. Test for glycerol and Test for cholestrol
11. Separation of amino acids by Paper chromatography
12. Verification of Beer's law using colorimeter
13. Preparation of standard graph

II Year B.Tech. Food Tech. II-Semester

L	T	P	To	C
4	0	-	4	4

CS218 DATA STRUCTURES

Course Description & Objectives:

The main objective of this course is to provide an introduction to basic data structures and manipulating them, by using C programming language.

The fundamental design and implementation of basic data structures. The evaluation of the data structure needs of particular problems & The design and implementation of C programs by using basic data structures.

Course Outcomes:

Having successfully completed this course, the student will be able to:

(1) Apply advance C programming techniques such as pointers, dynamic memory allocation, structures to developing solutions for particular problems;

(2) Design and implement abstract data types such as linked list, stack, queue and tree by using C as the programming language using static or dynamic implementations;

(3) Evaluate and choose appropriate abstract data types to solve particular problems;

(4) Design and implement C programs that apply abstract data types.

UNIT I - Data Types

Introduction – Data, Data type, Data Structures – Primitive and Non-primitive, Storage structures – Sequential and linked storage representations, File structures, Abstract Data Type (ADT). Overview of Structures-arrays, operations on arrays(retrieval of an element, search an element, insertion deletion of an element), manipulations on arrays such as finding the sum of elements of an array, adding two arrays, and reversing an array. Maximum sub sequence problem, Multi dimensional arrays.

UNIT II - Linked Lists

Linked Lists : Types of Linked Lists Singly Linked List, Doubly Linked List, Circular Linked List. Operations on linked lists-insertion, deletion, traversing forward/reverse order. Multi lists, Applications of Linked Lists.

UNIT III - Stacks

Stacks – ADT, array and linked representations, Implementation and their applications. Queues – ADT, array and linked representations, Implementation of linear, circular and doubly-ended queues, and their applications.

UNIT IV - Types of Trees

Preliminaries – Binary Tree – ADT, array and linked representations, Binary tree properties, tree traversal, Implementation, Expression trees. The Search Tree ADT – Binary Search Trees, Implementation. AVL Trees – Single Rotations, Double rotations.

UNIT V - Graphs

Graphs – ADT, definitions and properties, modeling problems as graphs, representation – adjacency matrix and adjacency list, basic graph traversals – breath first search and depth first search. Applications of graphs.

TEXT BOOKS :

1. Richard F.Gilberg, Behrouz A. Forouzan, Data Structures - A Pseudo code Approach with C, Second Edition, Cengage Learning, 2005.
2. Y. Langsam, M.J.Augeustein and A.M.Tenenbaum, “Data Structures Using C”, Pearson Education Asia, 2006.

REFERENCE BOOKS :

1. Mark Allen Weiss, “Data Structures and Algorithm Analysis in C”, Second Edition, Pearson Education, 2005
2. Sartaj Sahni, Data Structures, Algorithms and Applications in C++ , Universities Press, Second Edition, 2005.
3. Jean Paul Tremblay and Paul G. Sorenson, An Introduction to Data Structures with Applications,Tata Mc-Graw Hill, Second Edition, 26th Reprint 2004.

II Year B.Tech. Food Tech. II-Semester

L	T	P	To	C
4	0	-	4	4

FT202 PRINCIPLES OF FOOD PRESERVATION

Course Description & Objectives:

This course will impart the basic knowledge of different principles involved in food preservation and processing to the under graduate students.

By the end of the course students will be aware of different concepts involved in food spoilage and its prevention by using different food preservation principles and technologies.

Course Outcomes:

1. *To describe actions taken to maintain foods with the desired properties or nature for as long as needed*
2. *To identify quality-loss mechanisms as biological, chemical, and physical*
3. *To develop food handling practices that reduce the potential for foodborne illness (i.e., training to obtain a California Food Handler Card)*
4. *To implement preservation methods that make use of heat/cold, drying, acid, added chemicals, controlled air, pressure, and high-energy radiation.*
5. *To identify indirect approaches to food preservation: packaging, hygienic design, sanitation, GMP*
6. *To use SOPs and SSOPs during laboratory exercise*

UNIT I - Food Classification and Preservation

Sources of food, scope and benefit of industrial food preservation, perishable, non perishable food, causes of food spoilage. Preservation by salt & sugar – Principle, Method, Equipment and effect on food quality.

UNIT II - Food Preservation by Thermal Processing

Thermal processing methods of preservation – Principle and equipment, Canning, blanching, pasteurization, sterilization, evaporation. Use of low temperature – Principal, equipment and effect on quality. Chilling, cold storage, freezing.

UNIT III - Food Drying and Dehydration

Preservation by drying dehydration and concentration – Principle, Methods, Equipment and effect on quality :Difference, importance of drying & dehydration over other methods of drying and dehydration, equipments and machineries, physical and chemical changes in food during drying and dehydration. Need and Principle of concentration, methods of concentration – Thermal concentration, Freeze concentration, membrane concentration, changes in food quality by concentration.

UNIT IV- Food preservation: Irradiation and Preservatives

Preservation by radiation, chemicals & preservatives. Definition, Methods of Irradiation, Direct & Indirect effect, measurement of radiation dose, dose distribution, effect on microorganisms. Deterioration of Irradiated foodsphysical, chemical and biological; effects on quality of foods.

UNIT V-Food Fermentation and Recent Methods in Preservation

Preservation of foods by chemicals, antioxidants, mould inhibiters, antibodies, acidulates etc. Preservation by fermentation- Definition, Advantages, disadvantages, types, equipments. Recent methods in preservation: Pulsed electric field processing, high pressure processing, processing using ultrasound, dielectric, ohmic and infrared heating. Theory, equipments and effect on food quality.

TEXT BOOKS:

1. Fellows. J.P. Food Processing Technology, Principles and Practices II Edition. Wood Head Publishing, Cambridge, 1999.
2. Norman N. Potter, Joseph H. Hotchkiss , Food Science – 5th ed. Springer, 1998 - Technology & Engineering.

REFERENCE BOOKS:

1. GiridhariLal, G.S. Siddappa and G. L. Tandon, Preservation of Fruits and Vegetables; CFTRI, ICAR , New Delhi -12
2. Vijayakhadar. Text Book on Food Storage and Preservation. Kalyani publishers, Delhi.
3. Srilakshmi. B. Food Science. New Age Publishers, New Delhi.
4. Shakuntalamanay and ShadaksharSwamy. Foods, Facts and Principles. New Age Publishers, New Delhi.

II Year B.Tech. Food Tech. II-Semester

L	T	P	To	C
4	0	-	4	4

FT204 FLUID MECHANICS & HYDRAULICS

Course Description & Objectives:

This course will enable the students to design efficient water conveyance systems principles of mechanics of fluids, water measurement and regulation. By the end of the course students will be able to gain knowledge on Bernoulli's theory, Buckingham's Pi theorem, Darcy's and Chezy's theorem, and Archimedes' principles.

Course Outcomes:

By the end of the course the students will be able to

1. Gain knowledge on Bernoulli's theory, Buckingham's Pi theorem, Darcy's and Chezy's theorem
2. Gain the knowledge on mechanical gauges, flow of fluids in the pumps, and Archimedes' principles and theory
3. Understand flow through mouth pieces, flow through orifices and pumps
4. Know the measurement of fluid pressure, measurement of discharge and measurementof time
5. Know how to determine the Coefficient of discharge from the pitot tube experiment.

UNIT I - Introduction to fluids

Fluids - definitions-classification - properties, units and dimensions - fluid pressure - Introduction - Measurement of fluid pressure - Hydraulic pressure, absolute and gauge pressure - pressure head of the liquid. Pressure on vertical rectangle surfaces - Compressible - non compressible fluids – surface tension and capillarity. Pressure measuring devices- simple, micro, inclined manometers

UNIT II - Fluid flows theorem

Mechanical gauges - piezometer - floating bodies - Archimedes' principle-stability of floating bodies. Equilibrium of floating bodies - Buoyancy of flotation - metacentric height - Kinematics of fluid flow - introduction - classification of flows - steady, uniform, non uniform, laminar and turbulent - continuity of fluidflow. Bernoulli's theorem and its applications. Practical applications of Bernoulli's theorem, Venturimeter, Pitot tube, Orifice meter and rotameter.

UNIT III - Fluid flow through pipes

Flow through simple pipes - Loss of head in pipes, Darcy's formula for loss of Head in pipes, Chezy's formula for loss of head in pipes - determination of pipe diameter - determination of discharge - friction factor – critical velocity. Flow through orifices (Measurement of Discharge) - Types of orifices, Jet of water, vena contract, Hydraulic coefficients, Experimental Method for Hydraulic Coefficients, Discharge through a rectangular orifice. Flow through Mouthpieces - Types of Mouthpieces - Loss of Head of a liquid flowing in a pipe, Discharge through a Mouthpiece - flow over weirs - Types of weirs, Discharge over a weir.

UNIT IV- Fluid flow through orifice

Flow through Orifices (Measurement of Time) - Time of Emptying a square, rectangular or circular tankthrough an orifice at its bottom, Time of emptying a hemispherical tank through an orifice at its bottom. Flowthrough Weirs (Measurement of Time) - Time of Emptying a square, rectangular or circular tank through an orifice at its bottom, Time of emptying a hemispherical tank through an orifice at its bottom. Loss of head due to contraction - enlargement at entrance and exit of the pipe-water level point gauge - Hook gauge.

UNIT V- Flow over Notches

Flow over Notches - Types of Notches, Discharge over a Rectangular Notch, Triangular Notch, Stepped Notch.Time of emptying a tank over a Rectangular Notch, Triangular Notch. Dimensional analysis and similitude - Buckingham's pi theorem - Froude Number, Reynolds number, Weber number and hydraulic similitude. Pumps-classification - reciprocating - centrifugal pumps - pressure variation, work efficiency - types of chambers - selection and sizing.

TEXT BOOKS:

1. Modi, P. M. and Seth, S.M. 1973. *Hydraulics and Fluid Mechanics*, Standard Book House, Delhi
2. Chow, V. T. 1983. *Open Channel Hydraulics,* Mc Graw Hill Book Co., New Delhi

REFERENCE BOOK:

1. Jagdish Lal, 1985. *Fluid Mechanics and Hydraulics.* Metropolitan Book Co. Private Limited., New Delhi

II Year B.Tech. Food Tech. II-Semester

L	T	P	To	C
4	0	-	4	4

FT206 HEAT AND MASS TRANSFER

Course Description & Objectives:

This course will impart knowledge about fundamentals of heat and mass transfer and its application in food industry.

By the end of the course students will be able to understand Conduction, convection, radiation, heat transfer during boiling and condensation to learn about the design of heat exchangers and understand the principles of mass transfer.

Course Outcomes:

By the end of the course students will be able to gain knowledge on

1. *Heat transfer, Stefan Boltzmann constant, overall heat transfer coefficient, one dimensional steady stateconduction,Theory, Fourier's law etc.*
2. *Concept of electrical analogy and its applications*
3. *Heat transfer through composite walls and insulated pipelines, through slab, sphere, cylinder with uniform heat generationetc.*
4. *Concept of Nusselt's number, Prandtl number, Reynold's number,Grashoff number, some important empirical relations used for determination of heat transfer coefficient*
5. *Heat exchangers design and application in food industry*

UNIT I - Introduction to heat and mass transfer

Basic heat transfer process, thermal conductivity, convective film co-efficient, StefanBoltzman'sconstant,overall heat transfer coefficient. Physical properties related to heat transfer, one dimensional steady stateconduction,Theory of heat conduction, Fourier's law, Derivation of Fourier's equation. Linear heat flowthrough slab, cylinder and sphere, heat flow through slab, cylinder andsphere with non-uniform thermalconductivity

UNIT II - Heat transfer and equation of temperature

Concept of electrical analogy and its applications for thermal circuits, heat transfer throughcomposite walls and insulated pipelines.One dimensional steady state heat conduction with heatgeneration, heat flow throughslab, sphere, cylinder with uniform heat generation. Development ofequations of temperature distribution with different boundary condition.

UNIT III - Introduction to FINS

Steady state heat conduction with heat dissipation to environment-Introduction to extendedsurfaces (FINS) of uniform area of cross section. Equation of temperature distribution with differentboundary conditions, Effectiveness and efficiency of the FINS. Introduction to unsteady state heatconduction, Convection, types of convection, use of dimensional analysis for correlating variablesaffecting convective heat transfer. Concept of Nusselt's number, Prandtl number, Reynold's number,Grashoff number, some important empirical relations used for determination of heat transfer coefficient.

UNIT IV- Heat Exchanger

Radiation - heat radiation, emissivity, absorptivity, transmissivity, radiation through black and greysurfaces, and determination of shape factors. Introduction to condensing and boiling heat transfer, Film anddropwise condensation, effect of non-condensable gases, boiling heat transfer. Heat exchangers- generalintroduction, fouling factors, jacketed kettles, LMTD, parallel and counter flow heat exchangers.

UNIT V- Types of heat exchanger and mass transfer

Shell and Tube and plate heat exchangers, heat exchanger design, application of different types ofexchangers in dairy and food industry. Mass transfer-introduction, Fick's law of diffusion, steady statediffusion of gases and liquids through solids. Equimolar diffusion, isothermal evaporation of water into air,mass transfer coefficient, application in Dairy and Food industry.

TEXT BOOKS:

1. Geankoplis, C.J. 1978. *Transport Processes and Unit Operations.* Allyn and Bacon Inc., Newton,Massachusetts.

2. Holman, J. P. 1989. *Heat Transfer*. McGraw Hill Book Co., New Delhi.

REFERENCE BOOKS:

1. Incropera, F. P. and De Witt, D .P. 1980. *Fundamentals of Heat and Mass Transfer.*

2. John Wileyand Sons, New York.Gupta, C. P. and Prakash, R. 1994. *Engineering Heat Transfer*. Nem Chand and Bros., Roorkee.

II Year B.Tech. Food Tech. II-Semester

L	T	P	To	C
4	0	-	4	4

FT208 THERMODYNAMICS & HEAT ENGINES

Course Description & Objectives:

This course will impart knowledge regarding fundamentals of thermodynamics and heat engines and their application in food processing. By the end of the course students will be able to understand various laws of thermodynamics, heat engines and boilers.

Course Outcomes:

By the end of the course, the students will be able to

1. *Understand the basic concepts of Thermodynamics, Thermodynamic systems,*
2. *Thermodynamic cycles and Laws of Thermodynamics*
3. *Solve engineering problems by the application of Thermodynamics*
4. *Different types of boilers and their application*

Unit I- Introduction to thermodynamics

Introduction; Microscopic and macroscopic viewpoints in thermodynamics; Fundamental concepts of system, control volume, state properties, equilibrium, processes Survey of units and dimensions; forms of energy and energy interaction

UNIT II- Basic concept of thermodynamics

Basic concept of thermodynamics: Introduction, States, Work, Heat, Temperature, Zeroth, 1st, 2nd and 3rd law of thermodynamics, Concept of internal energy, enthalpy and entropy. Properties of Steam: Formation of steam at constant pressure, Thermodynamic properties of Steam. Numerical on steam quality measurement.

Unit III- Heat and Work

Heat and work; State postulate; thermodynamic properties of pure substance in solid, liquid and vapour phases; P-V-T behaviour of simple compressible substances; phase rule; thermodynamic property tables and charts; ideal and real gases; equations of state; compressibility factor; generalised compressibility chart; First law of thermodynamics for closed loop system, internal energy and enthalpy; First law for control volumes, Steady flow and unsteady flow applications. Process calculations for ideal and real gases using equations, tables and charts.

UNIT IV-Heat Engine

Definitions of Heat Engine, Heat Pump, Thermal efficiency, COP; Carnot cycle. Second Law of thermodynamics; Statements and corollaries; entropy; concept of reversibility and irreversibility

UNIT V- Steam Generators

Steam Generators: Classification of boilers, Comparison of fire tube and water tube boilers, Function of mountings and accessories, Constructional and operational details of Cochran and Babcock and Wilcox boiler

TEXT BOOKS:

1. R E Sonntag, C Borgnakke and G J Van Wylen, Fundamentals of Thermodynamics, 6th Ed., John Wiley, 2003.
2. G F C Rogers and Y R Mayhew, Engineering Thermodynamics Work and Heat Transfer, 4th Ed., Pearson 2003.

REFERENCE BOOKS:

1. J P Howell and P O Buckius, Fundamentals of Engineering Thermodynamics, McGraw Hill, 1992.
2. Y. A. Cengel and M. A. Boles, Thermodynamics, An Engineering Approach, 4th Ed., Tata McGraw Hill, 2003.

II Year B.Tech. Food Tech. II-Semester	L	T	P	To	C
	-	-	3	3	2

HS304 PROFESSIONAL COMMUNICATION LAB

Course Description & Objectives:

The Professional Communication exposes students to conventions of corporate communication and documentation procedures involved in the day-to-day functioning of the business world. The course is aimed at improving written communication skills of undergraduate students and preparing them to meet professional challenges in the work spheres. Writing and Personality are not two exclusive spheres of influence and this course will work on the *relationship between professional writing and a personality that is able to meet the goals of an organization in creative and innovative ways.*

Course Outcomes:

1. *To enable students to write logical sentences and paragraphs, use appropriate diction, grammar and punctuation.*
2. *To expose them to the world of business and business register*
3. *To make them compose clear and concise business messages*
4. *To produce business documents for mailing to external recipients or intra-organizational circulation*
5. *To enable them to speak business English for handling various business situations.*

UNIT I - Writing

- Elements of Technical Writing : Sentence structure - reducing verbosity - arranging ideas logically – building coherence - paragraph level and document level - topic sentence - cohesive devices – transitionals – paraphrasing – précis-writing.
- Mechanics of Writing: Stylistic elements – the rapporteur- the purpose- the reader (audience) - elementary rules of grammar- choice of diction - elementary principles of composition - matters of form – punctuation - conventions of business communication - language and tone - weak links in business correspondence - ethical concerns in business writing.

UNIT II - Reports

- Parts of the Report: Writing an abstract - features of a good abstract – approach - compare and contrast - cause and effect.
- Types of Technical Reports : Drafting a technical proposal - formal and informal proposals - factual reports, feasibility reports, survey reports – parts of a report - title page –declaration – acknowledgements – table of contents - abstract – introduction – conclusion – citations – references - appendices - oral reports and presentations.

UNIT III - Letter Writing

- Letter-Writing - Formal and informal letters - structure of formal letters - expressions of salutations, introductory and concluding paragraphs -

different types of letters - sales letter - complaint letter - adjustment letter - letter to the editor - covering letter - claim letter – letter of condolence.

UNIT IV - Correspondence

- **Business Correspondence :** E-mail – nature and scope - e-mail etiquette - Common Errors in composing e-mails – Quotations - Inviting quotations - sending quotations – placing orders - Office Communication - agenda - notice - circular
- **Effective Resume-Writing:** Structure and presentation - defining career objective - projecting one's strengths and skill-sets
- Summarizing - formats and styles - covering letter.

UNIT V - Drafting

- Business Proposals: Drafting business proposals - calculating profit and loss-averages - ratios and proportions – partnership - simple interest - compound interest - calculating volumes and areas
- course of action - cause and effect- theme detection - making judgments - logical deductions - analyzing arguments – syllogisms - Venn diagrams - matching definitions -verbal reasoning - numerical reasoning - working out justifications.

REFERENCE BOOKS :

1. Strunk , William, Jr.*The Elements of Style*, Fourth Edition,1999.
2. Rozakis, Laurie, Ph.D, (2003). *English Grammar for the Utterly Confused*, McGraw-Hill.

II Year B.Tech. Food Tech. II-Semester

L	T	P	To	C
-	-	3	3	2

FT210 FLUID MECHANICS LAB

Course Description & Objectives:

To understand various flows, application of basic equations, transportation and metering of fluids.This course covers identification of flows, measurement of fluids, pressure drop calculations, performance of fluid flow machinery.

Course Outcomes:

1. *Identify, name, and characterize flow patterns and regimes.*
2. *Utilize basic measurement techniques of fluid mechanics.*
3. *Measure fluid pressure and relate it to flow velocity.*
4. *Demonstrate practical understanding of friction losses in flows.*

List of Experiments:

1. Identification of Laminar and Turbulent Flows (Reynolds Apparatus).
2. Verification of Bernoulli's Equation
3. Measurement of flowing fluid using Venturi Meter
4. Measurement of flowing fluid using Orifice Meter
5. Measurement of flowing fluid using Pitot Tube
6. Measurement of flowing fluid using Rotameter
7. Determination of Friction loss in fluid flow through pipes
8. Determination of Pressure drop in packed bed
9. Determination of Pressure drop in fluidized bed
10. Characteristics of single stage centrifugal pump
11. Characteristics of multistage centrifugal pump
12. Characteristics of Reciprocating pump
13. Coefficient of discharge in V – notch

II Year B.Tech. Food Tech. II-Semester

L	T	P	To	C
-	-	3	3	2

FT212 FOOD PROCESSING LAB

Course Outcomes:

This lab will impart knowledge about

1. *Various equipment used for food processing,*
2. *Various methods of food preservation.*

List of Experiments:

1. Introduction to different equipments, accessories in food science & technology laboratory.
2. Survey on availability of different varieties of processed foods, raw materials, cost and technology used.
3. A visit to the nearby warehouse.
4. Different processing methods used in food preparation &changes in food.
5. Preservation of foods using high concentration of sugar.
6. Preservation of food using Salt.
7. Preservation of food using Acid.
8. Preservation of foods by different drying /dehydration methods and reconstitution of foods by dehydration methods.
9. Methods of processing of foods using different temperatures-Dry heat methods.
10. Methods of processing of foods using different temperatures-moist methods.
11. Preservation of foods by freezing.
12. Preservation of foods by fermentation.
13. Preservation of foods by irradiation & ionizing radiation.

VIGNAN'S UNIVERSITY :: VADLAMUDI -522 213
DEPARTMENT OF CIVIL ENGINEERING
M.Tech:- Two-year Structural Engineering Degree Program
Proposed Course Structure For The Academic Year 2014-2015

FIRST YEAR
(I Semester)

S.NO	Subject Code & Title	Periods per week		Maximum Marks			Credits
		L	P	Int	Ext	Total	
1	CE501 Theory of Elasticity	4		40	60	100	4
2	CE503 Plasticity and Limit State Design of Steel Structures	4		40	60	100	4
3	CE505 Structural Dynamics	4		40	60	100	4
4	CE521 Numerical methods	4		40	60	100	4
5	Electives-I	4		40	60	100	4
6	Electives-II	4		40	60	100	4
7	CE519 Structural Engg. Lab		3	50	50	100	2
8	CE521 Computational Laboratory		3	50	50	100	2
	Total	24	6	340	460	800	28

L:Lecture, P:Practical

Duration of Internal Examination: 2 Hours Duration of External Examination:3 Hours

II Semester

S.NO	Subject Code & Title	Periods per week		Maximum Marks			Credits
		L	P	Int	Ext	Total	
1	CE502 Finite Element analysis	4		40	60	100	4
2	CE504 Earthquake Resistant Design of Structures	4		40	60	100	4
3	CE506 Theory of Plates and Shells	4		40	60	100	4
4	CE524 Applied Mathematics	4		40	60	100	4
5	Electives-III	4		40	60	100	4
6	Electives-IV	4		40	60	100	4
7	CE520 Structural Design Project(Mini Project)		3	50	50	100	2
8	CE522 Introduction to Ansys Lab		3	50	50	100	2
	Total	24	3	340	460	800	28

L:Lecture, P:Practical

Duration of Internal Examination: 2 Hours Duration of External Examination:3 Hours

SECOND YEAR

I Semester

S.NO	Subject Code & Title	Maximum Marks			Credits
		Int	Ext	Total	
1	CE601 Seminar	100	00	100	2
	Total			100	2

II Semester

S.NO	Subject Code & Title	Maximum Marks			Credits
		Int	Ext	Total	
1	CE602 Project Phase-2	50	50	100	40
	Total			100	40

List of electives:

Electives-I

CE507	Advanced Reinforced Concrete Design
CE509	Fracture Mechanics
CE511	Construction Planning and Project Management

Electives-II

CE513	Advanced Foundation Engineering
CE515	Matrix Methods of Structural Analysis
CE517	Mechanics of composite materials

Electives-III

CE508	Ground Improvement Techniques
CE510	Bridge Engineering
CE512	Wind Analysis and Design of Tall Structures

Electives-IV

CE514	Advanced Prestressed Concrete
CE516	Stability of Structures
CE518	Repair and Rehabilitation of Structures

CORE SUBJECTS
(CE501) THEORY OF ELASTICITY

Objective of the Course:

The course will provide a basic treatment of the formulation of linear elasticity theory and its application to problems of stress and displacement analysis. The fundamental field equations will be developed including strain energy concepts. Applications will involve the solution to problems of engineering interest including two-dimensional problems of plane strain and plane stress, fracture mechanics, torsion, bending and stress concentration, and an introduction to three-dimensional solutions.

UNIT-I:

Plane stress and plane strain

Components of stress, strain, Hooks law, Stress and Strain at a point, Plane stress, Plane strain, Equations of equilibrium, Boundary conditions, compatibility equations, stress foundation.

UNIT-II:

Two Dimensional Problems in Rectangular Coordinates

Solution by polynomials, Saint Venant's principle determination of displacements, bending of cantilever loaded at the end, bending of a beam subjected to uniform load.

UNIT-III:

Two Dimensional Problems in Polar Coordinates

General equations of equilibrium, stress function and equation of compatibility with zero body forces. Analysis of thick cylindrical shells with symmetrical loading about the axis, pure bending of curved bars, Strain components in polar coordinates, rotating disks.

UNIT-IV:

Three Dimensional State of Stress

Differential equations of equilibrium – Boundary conditions of compatibility–displacements – Equations of equilibrium in terms of displacements – Principle of superposition – Uniqueness of solution. Analysis of Stress and Strain in Three Dimensions. Introduction - Principal stresses - Determination of principal stress – Stress invariants–Maximum shearing stress & strain at a point.

UNIT-V:

Torsion

Torsion of straight bars – St.Venant solution; Stress function; Warp function – Elliptic cross section –Membrane analogy torsion of bar of narrow rectangular cross section.

TEXT BOOKS:

1“Theory of Elasticity” by Timoshenko & Goodier, McGraw Hill Company. 3rd edition, 1970.

2. “Advanced Strength of Materials” by Denhorteg, Dover Publishing, 1987

REFERENCE BOOKS:

1. Sadhu Singh, "Theory of Elasticity", Khanna Publishers, New Delhi 1988.
2. Hearn , E.J. “Mechanics of Materials”, Vol.2, Pergamon Press, Oxford, 1985.

(CE502) FINITE ELEMENT ANALYSIS

Objective of the Course:

To provide the students an overview on Finite Element Method and equip them with the Finite Element Analysis fundamentals, enable the students to formulate the design problems into FEA.

UNIT-I

Introduction

A brief history of FEM, Need of the method, Equilibrium equations boundary conditions, compatibility; Strain-displacement relations; linear constitutive relations; Principle virtual work; Principle of stationary potential energy.

UNIT-II

Element Properties

Different types of elements; Displacement models; Relation between nodal degrees of freedom and generalized coordinates; Convergence requirements; Compatibility requirement; Geometric invariance; Natural coordinate systems; Shape functions; Element strains and stresses; Element Stiffness matrix ;Element nodal load vector. Isoparametric elements– Definition, Two dimensional isoparametric elements – Jacobian transformation, Numerical integration.

UNIT-III

Direct Stiffness method and Solution Technique

Assemblage of elements–Obtaining Global stiffness matrix and Global load vector; Governing Equilibrium equation for static problems; Storage of Global stiffness matrix in banded and sky line form; Incorporation of boundary conditions; Solution to resulting simultaneous Equations by Gauss elimination method.

UNIT-IV

Plane-stress and Plane-strain analysis

Solving plane stress and plane-strain problems using constant strain triangle and four noded isoparametric element.

UNIT-V

Analysis of plate bending

Basic theory of plate bending; Shear deformation plates; Plate bending analysis using four noded isoparametric elements.

TEXT BOOKS:

1. Introduction to Finite Elements in Engineering by R.T. Chandrupatla and A.D. Belegundu, Prentice Hall of India, 1997.
2. "The Finite Element Method in Engineering Science" by P.Zienkiewiez, McGraw Hill, 1971.

REFERENCE BOOKS:

1. Finite Element Analysis by Abel and Desai, New Age Publishers, 2007.
2. Finite Element Analysis: Theory and Programming by C. S. Krishnamoorthy, Tata McGraw-Hill, 1995
3. Finite Element Procedures in Engineering Analysis by K. J. Bathe, Prentice Hall Inc., 1996.

(CE503) PLASTICITY AND LIMIT STATE DESIGN OF STEEL STRUCTURES

Objective of the Course:

The objectives are to provide students with advanced knowledge of steel structural design and confidence to apply the underlying principles to solve a wide range of structural steel problems. This subject will provide students the basic principles of reliability based design on steel structures and an understanding of the relationship between structural analysis and design provisions.

UNIT-I:

Plastic Analysis of Structures

Introduction, Shape factor, Moment redistribution, Combined mechanisms, Analysis of portal frames, Effect of axial force - Effect of shear force on plastic moment, Connections -Requirement – Moment resisting connections. Design of Straight Corner Connections –
Haunched Connections – Design of continuous beams.

UNIT-II:

Design Of Connections

Types of connections – Welded and riveted – Throat and Root Stresses in Fillet Welds –
Seated Connections – Unstiffened and Stiffened seated Connections – Moment Resistant
Connections – Clip angle Connections – Split beam Connections– Framed Connections.

UNIT-III:

Analysis and Design of Steel Towers

Analysis and Design of Microwave / Transmission Line Towers - Types of bracing patterns -Sag and Tension calculations. Design of Self supporting Chimney – Design of Base Plates, Foundations and Anchor bolts and Guyed Steel Chimney - Guy ropes - Stresses due to wind. Along with load calculation - Gust Factor Method.

UNIT-IV:

Design of Industrial Structures

Design of members subjected to lateral loads and axial loads, Analysis and design of
Industrial Buildings and bents, Sway and non-sway frames, Design of Purlins, Louver rails, Gable column and Gable wind girder - Design of Moment Resisting Base Plates – Analysis of Gable Frames.

UNIT-V:

Design of Light Gauge Steel Structures

Behaviour of Compression Elements - Effective width for load and deflection determination – Behaviour of Unstiffened and Stiffened Elements – Design of webs of beams – Flexural members – Lateral buckling of beams – Shear Lag – Flange Curling – Design of Compression Members – Wall Studs.

TEXT BOOKS:

1. Subramanian.N, "Design of Steel Structures", Oxford University Press, 2008.

2. Dayaratnam.P, "Design of Steel Structures", A.H.Wheeler, India, 2007.

3 Linton E. Grinter, "Design of Modern Steel Structures", Eurasia Publishing House, New Delhi, 1996.

(CE504) EARTHQUAKE RESISTANT DESIGN OF STRUCTURES

Objective of the Course:

This course integrates information from various engineering and scientific disciplines in order to provide a rational basis for the design of earthquake-resistant structures.

UNIT-I:

Design forces for buildings

Introduction; Equivalent static method; Mode superposition technique; Dynamic inelastic-time history analysis; Advantages and disadvantages of these methods; Determination of lateral forces as per IS1893(Part 1) – Equivalent static method, Model analysis using response spectrum.

UNIT-II:

Earthquake resistant design of a long two-storey , two-bay RCC building

Determination of lateral forces on an intermediate plane frame using Equivalent static methods and Model analysis using response spectrum; Analysis of the intermediate frame for various load combinations as per IS1893(Part 1); Identification of design forces and moments in the members; Design and detailing of typical flexural members ,typical column, footing and detailing of a exterior joint as per IS13920.

UNIT-III:

Steel Buildings

Behavior of steel; Materials and workmanship; Steel frames – unbraced, braced; Ductile design of frame members; Flexural members; Frame members subjected to axial compression and bending; Connection design and joint behaviour ; Stee Panel zones; Bracing members

UNIT-IV:

Seismic protection of structures

Introduction; Considerations for seismic isolation; Basic elements of seismic isolation; seismic-isolation design principle; Feasibility of seismic isolation; Seismicisolation configurations-Seismic dampers - Types of Dampers: Viscous, Friction, Yielding dampers – Seismic vibration control-Seismic Strengthening Measures.

UNIT-V:

Ductility considerations in earthquake resistant design of RCC buildings

Introduction; Impact of ductility; Requirements for ductility; Assessment of ductility–Member/element ductility, Structural ductility; Factor affecting ductility; Ductility factors; Ductility considerations as per IS13920.

TEXT BOOKS :

1. Earthquake resistant design of structures by Pankaj Agarwal and Manish Shrikhande, Prentice-Hall of India, 2006.
2. Seismic design of reinforced concrete and masonry buildings by T.Paulay and M.J.N.Priestley, John Wiley & Sons, 1991.

REFERENCE BOOKS:

1. Earthquake resistant design of structures by SK Duggal , Oxford University Press.2007
2. The seismic design handbook, Edited by F.Naeim, Kluwer Academic publishers,2001

(CE505) STRUCTURAL DYNAMICS

Objective of the Course:

The objective is to provide the fundamental understanding of the structural dynamics and the problem solving ability for dynamic response in civil engineering design, analysis and research. Introduce students to analytical and numerical methods in structural dynamics with emphasis on vibration and to opportunities to optimize system for desired dynamic response.

UNIT-I:

Equation of Motions, Problem Statement, Solution Methods of Single Degree of Freedom Systems (SDOF)

Basic concepts of structural dynamics; single degree of freedom system, force displacement relationship, damping force, equation of motion, mass-spring-damper system, methods of solution of differential equation.

Free Vibration (SDOF):

Undamped free vibration, viscously damped free vibration, energy in free vibration.

UNIT-II:

Response to Harmonic and Periodic Excitations (SDOF)

Harmonic vibration of undamped systems, Harmonic vibration with viscous damping, response to vibration generator, natural frequency and damping from harmonic test, force transmission and vibration isolation, vibration measuring instruments, energy dissipated in viscous damping. Response to periodic force.

UNIT-III:

Response to Arbitrary, Step and Pulse Excitations (SDOF)

Response to unit impulse, response to arbitrary force, step force, ramp force, response to pulse excitations, solution methods, effects of viscous damping.

Numerical Evaluation of Dynamic Response (SDOF)

Time stepping methods, methods based on interpolation of excitation, central difference method, newmark’s method, stability and computational error, analysis of nonlinear response by newmark’s method.

UNIT-IV:

Earthquake Response to Linear Systems (SDOF)

Earthquake excitation, equation of motion, response quantities, response history, response spectrum concept, deformation, pseudo-velocity and pseudo acceleration response spectra, peak structural response from the response spectrum, response spectrum characteristics, elastic design spectrum, comparison and distinction between design and response spectra.

Generalised Single Degree of Freedom Systems

Generalised SDOF systems, rigid body assemblages, systems with distributed mass and elasticity, lumped mass system-shear building, natural vibration frequency by Rayleigh's method.

UNIT-V:

Multi -degree of freedom systems (MDOF)

Equation of motions: simple system-two storey shear building, general approach for linear systems, static condensation, symmetric plan systems: ground motion. Multiple support excitation, methods of solving the equation of motions.

Free Vibration (MDOF) Natural frequencies and modes: systems without damping, modal and spectral matrices, orthogonality of modes, normalization of modes. Solution of undamped free vibration systems, solution methods for eigen value problem.

TEXT BOOKS:

1. Dynamics of structures by Anil K Chopra; Prentice-Hall of India Limited, New Delhi.3rd edition 2006.
2. "Structural dynamics" byMario Paz and leigh; CBS Publishers, 1st edition 1985.

REFERENCE BOOKS:

1. Structural Dynamics for Structural Engineers by G. C. Hart & K. Wang; John Wiley & Sons.1st edition 1991.
2. Dynamics of Structures by R.W. Clough and P.E. Penzien, McGraw-Hill. 1st edition 1975

(CE506) THEORY OF PLATES AND SHELLS

Objective of the Course:

To enable the student analyse and design thin shell structures including domes, hyperbolic, paraboloid, elliptic and cylindrical shells.

UNIT-I:

Bending of Long Rectangular Plates to a Cylindrical Surface

Differential equation for cylindrical bending of plates – Uniformly loaded rectangular plates with simple supported edges and with built in edges.

UNIT-II:

Pure bending of plates

Slopes – Curvatures of bent plates – Relations between bending moments and curvature – Particular cases – Strain energy in pure bending – Limitations. Symmetrical bending of circular plates: Differential equation – Boundary conditions.

UNIT-III:

Simply supported rectangular plates under sinusoidal loading

Naviers solution and its application to concentrated load – Levy's solution for uniformly distributed load or hydrostatic pressure.

UNIT-IV

Introduction to Shells

Parametric representation of a surface; The first quadratic form; Equation to the normal of a surface; The second quadratic form; Principal curvatures, Gauss curvature, and lines of curvature; Some definitions; Classification of shell surfaces.

UNIT-V

Cylindrical shells

Membrane theory of cylindrical shells; Bending theory of cylindrical shells loaded Symmetrically –Approximate solution by Schorer's method, Beam method of analysis

TEXT BOOKS :

1. Theory of plates and shells by S.P.Timoshenko and S.Woinowsky-Krieger, McGraw-Hill, 1959.
2. Stresses in plates and shells by A.C.Ugural, McGraw-Hill, 1999.

REFERENCE BOOKS:

1. Analysis of plates by T.K.Varadan and K.Bhaskar , Narosa Publishing House, 1999.
2. "Stresses in Shells" by Flugge. Blaisdell Publishing Co, 1966
3. Design and construction of concrete shell roofs by G.S.Ramaswamy, CBS Publishers& Distributors,1986.

Master Level Advanced Mathematics
CE521 Numerical methods

UNIT-I

TRANSCENDENTAL AND POLYNOMIAL EQUATIONS

Introduction, Bisection Method, Iteration Methods based on First & Second degree Equation, Rate of Converge, Iteration Methods.

UNIT-II

SYSTEM OF LINEAR ALGEBRAIC EQUATION AND EIGEN VALUE PROBLEMS

Introduction, Direct Methods, Error Analysis, Iteration Methods, Eigen Values and Eigen Vectors, Model Problems, Choice of Method.

UNIT-III

INTERPOLATION

Introduction, Lagrange & Newton Interpolation, Finite Difference Operator, Interpolating Polynomials Using Finite Differences, Hermite Interpolation, Piecewise and Spline Interpolation.

UNIT-IV

DIFFERENTIATION & INTEGRATION.

Introduction, Numerical differentiation, Optimum Choice of Step Length, Extrapolation Methods, Partial Differentiation, Numerical Integration, Methods Based on Interpolation, Methods Based on Undetermined coefficients, Composite Integration Methods, Romberg Integration, Double Integration.

UNIT-V

ORDINARY DIFFERENTIAL EQUATIONS

Boundary Value Problems, Initial Value Problems, Finite Difference Methods.

Texts Books/References

1. Numerical Methods For Scientific And Engineering Computation by M. K. Jain, S. R. K Iyengar and R. K. Jain

CE524 APPLIED MATHEMATICS

UNIT-I
Polar co-ordinates - Expressions of gradient of scalar point function -divergence and curlof a vector point function in orthogonal curvilinear co-ordinates - Summation convention tensors - Quotient law - Christoffel symbols.

UNIT-II
Maxima and minima of functions of two variables - Lagrange Multipliers - Functional -Externals -Euler-Lagrange Equation-Fourier Analysis and Transformation.

UNIT-III
Solution in power series by the method of Frobenious - Legendre and Bessel equations Fourier, Bessel and Legendre series and functions.

UNIT-IV
Two dimensional wave equations - Transverse vibrations of rectangular and circular membranes Two dimensional heat flow in transient state.

UNIT-V
Three dimensional heat flow in transient state - Laplace equations - Steady state temperature distribution in solid spheres and spherical shells.

Text Books/References
1. Grewal B.S, Higher Engineering Mathematics, Khanna publishers, 42nd edition, 2012.
2.Venkataraman, M.K., Higher Mathematics for Engineers, National Publishing Co., 1986.

ELEVTIVE SUBJECTS
(CE507) ADVANCED REINFORCED CONCRETE DESIGN

Objective of the Course:
The main objective of is to provide students with a rational basis of the design of reinforced concrete members and structures through advanced understanding of material and structural behavior.

UNIT-I:
Serviceability design of Reinforced Concrete Elements
Deflection of Reinforced Concrete Beams and Slabs: Introduction, Short-term deflection of beams and slabs, deflection due to imposed loads, short-term deflection of beams due to applied loads, Calculation of deflection by IS 456. Estimation of Crack width in Reinforced Concrete Members: Introduction, Factors affecting crack width in beams, Calculation of crack width, simple empirical method, estimation of crack width in beams by IS 456, Shrinkage and thermal cracking.

UNIT-II:
Design of Flat Slabs
Direct Design Method- Distribution of moments in column strips and middle strip-Moment and shear transfer from slabs to columns-Shear in flat slabs-Check for one way shear- Introduction to the equivalent frame method. Limitations of direct design method-
Distribution of moments in column strips and middle strip.

UNIT-III:
Design of Reinforced Concrete Members for Fire Resistance
Introduction, ISO 834 standard heating conditions, grading or classifications, effect of high temperature on steel and concrete, the effect of high temperatures on different types of structural members, fire resistance of structural detailing from tabulated data, analytical determination of the ultimate bending moment, capacity of reinforced concrete beams under fire, other considerations.

UNIT-IV:
Design of RC elements

Design of Shear Walls: Analysis of shear walled structures, end-zone resisting moment: Truss Models: Design of Stair Slabs, Sizing: Stair Slabs spanning in the transverse direction, Stair slabs spanning longitudinally: Design of Grid Floor.

UNIT-IV:

Ductile Detailing of RC Elements

Detailing, Increased values of a seismic effect for vertical and horizontal projections, Proposed changes in IS1893 (Fifth revision). Ductile Detailing of Frames for Seismic Forces: Introduction, General principles, Factors that increase ductility, Specifications for material for ductility, ductile detailing of beams – Requirements.

TEXT BOOKS:

1. “Advanced Reinforced Concrete Design” by P.C.Varghese, Prentice Hall of India, 2008

2. N. Krishna Raju, Advanced Reinforced Concrete Design, CBS Publishers and Distributors, 2007.

3. Punmia B.C, Ashok Kr. Jain, Arun Kr. Jain, RCC Designs (Reinforced Concrete Design), 10th Edition, Lakshmi Publishers, 2006

REFERENCE BOOKS:

1. “Reinforced Concrete” by Park & Paulay , Robert Publisher,1975

2. “Reinforced Concrete”, Ashok.K. Jain, Nem Chand & Bors. Tata McGraw-Hill Publishing Company Limited, New. Delhi, 2003

(CE508) GROUND IMPROVEMENT TECHNIQUES

Objective of the Course:

At the end of course work the student is expected to learn various techniques of insitu ground modification. He is also expected to know other stabilization techniques depending upon the soil characteristics.

UNIT - I

Ground Improvement in Cohesion less Soil

Need for Ground Improvement, Different types of problematic soils, Emerging trends in ground Improvement. Shallow and deep compaction requirements, Principles and methods of soil compaction, Shallow compaction and methods. Properties of compacted soil and compaction control, Deep compaction and Vibratory methods Dynamic compaction.

UNIT - II

Ground Improvement in Cohesive Soil

Drainage and Dewatering-Drainage techniques - Well points - Vacuum and electro osmotic methods.Preloading with and without vertical drains. Compressibility, vertical and radial consolidation, preloading methods. Types of Drains, Design of vertical Drains, Construction techniques. Stone Column: Function Design principles, load carrying capacity, construction techniques, settlement of stone column foundation.

UNIT - III

Reinforced Earth

Principles, components of reinforced earth, governing design of reinforced earth walls, design principles of reinforced earth walls. Geotextiles-Introduction, types of Geotextiles, functions and their applications, tests for Geotextiles, Geogrids and their functions.

UNIT - IV

Mechanical Stabilization

Soil aggregate mixtures, properties and proportioning techniques, soft aggregate stabilization, compaction, field compaction control. In situ soil treatment methods-Soil nailing, rock anchoring, micro-piles, construction techniques.

UNIT - V

Chemical Stabilization

Cement Stabilization-Mechanism, factors affecting and properties, use of additives, design of soil cement mixtures, construction techniques. Lime and Bituminous Stabilization-Type of admixtures, mechanism, factors affecting, design of mixtures, construction methods-Grouting Techniques-Types of grouts - Grouting equipment and machinery - Injection methods – Grout monitoring – Stabilization with cement, lime and chemicals - Stabilization of expansive soils.

TEXT BOOKS:

1. Purushothama Raj. P, "Ground Improvement Techniques", 2nd ed., Laxmi Publications (p) Ltd., New Delhi, 1998.
2. Craig, R.F., "Soil Mechanics", 3rd ed., Van Nostrant Reinhold Co.,New York, 1993.
3. Koerner R.M., "Construction and Geotechnical Methods in Foundation Engineering", 3rd ed., McGraw Hill, 1994.

REFERENCE BOOKS:

1. Moseley M.P., "Ground Improvement Blockie Academic and Professional", 2nd ed., Chapman and Hall, Glasgow, 1993.
2. Jones J.E.P., "Earth Reinforcement and Soil Structure", 3rd ed., Butterworths, 1995

(CE509) FRACTURE MECHANICS

Objective of the Course:

To examine the concept of failure in members with pre-existing flaws. The purpose of this course is for the student to acquire basic skills, to work professionally as an engineer. This means applying fracture mechanics theory and to calculate stress areas and the "energy release rate" around crack tips and crack growth due to fatigue. Failure of structural components will be examined from both the mechanics and micro structural points of view.

UNIT-I

Introduction to fracture mechanics of concrete

Structural failure based on material performance; Concepts of linear elastic fracture mechanics; Fracture mechanics of concrete.

UNIT-II

Principles of linear elastic fracture mechanics

Airy stress functions for problems in elasticity; Complex stress function; Elastic stress and displacement fields at crack tip; Stress intensity factors and crack opening displacements for useful geometries; Superposition of stress intensity factors; Plastic zone at crack tip; Griffith's fracture theory; Strain energy release rate for crack propagation; Relationship between stress intensity factor and strain energy release rate; Design based on linear elastic fracture mechanics.

UNIT-III

Principles of non-linear fracture mechanics

Energy principles for crack propagation in non-linear materials; J-integral for nonlinear elastic materials; Fracture resistance (R curve); Crack tip opening displacement.

UNIT-IV

Structure and fracture process of concrete

Constituents and microstructure of concrete; Fracture behaviour and strain localization of concrete; Fracture process zone and toughening mechanisms; Experimental determination of fracture zone; Influence of fracture process zone on fracture behaviour of concrete.

UNIT-V

Fracture behavior of different materials. Test methods.

Variation of plastic zone over the thickness, Slip planes in plane strain and plane stress, Experimental evidence, Minimum thickness for fracture toughness specimen based on plastic zone, Fracture testing – early attempts, Fracture toughness as a function of specimen thickness, Requirements of the test, Candidate fracture toughness, Compact tension and three point bend specimens, Chevron notch – visualization exercise.

TEXT BOOKS:

1. Elements of fracture mechanics by Prashant Kumar, Wheeler Publishing, 1999
2. Rock and Other Quasi-Brittle Materials by Surendra P. Shah, Stuart E. Swartz, Chengsheng Ouyang, Publisher :Wiley , 1995.
3. David Broek, Elementary Engineering Fracture Mechanics, 3rd Rev Edition, Springer, June 1982.

REFERNCE BOOKS:

1. Analysis of Concrete Structures by Fracture Mechanics by by L. Elfgren, Publisher: Routledge, 1990.
2. Fracture mechanics – Applications to concrete , Edited by Victor C.Li and Z.P.Bazant, ACI SP118.
3. CT Suri and ZH Jin, Fracture Mechanics, 1st Edition, Elsevier Academic Press, 2012

(CE510) BRIDGE ENGINEERING

Objective of the Course:

The main aim of this course is to enable students to choose the appropriate bridge type for a given project, and to analyses and design the main components of the chosen bridge. The course also provides students with fundamental knowledge in a wide range of state-of-the-art practices, including code specifications, in bridge engineering. Upon completion of this course, students should have learned the analysis and design of bridge superstructures, foundations, bearings and deck joints.

UNIT-I

Components of Bridges

Classification – Importance of Bridges – Investigation for Bridges –Selection of Bridge site – Economical span – Location of piers and abutments – Subsoil exploration – Scour depth – Traffic projection – Choice of bridge type.

UNIT-II

IRC Standards

Specification of road bridges – width of carriageway – loads to be considered – dead load – IRC standard live load – Impact effect.

UNIT-III

General Design Considerations

Design of culvert – Foot Bridge - Slab Bridge – T-beam Bridge – Box Culvert-Fly over bridges.

UNIT-IV

Bridge sub structure

Evaluation of sub structures – Pier and abutments caps – Design of pier – Abutments – Type of foundations.

UNIT-V

Bearings for Bridges

Importance of Bearings – Bearings for slab bridges – Bearings for girder bridges – Electrometric bearing – Joints – Expansion joints.

TEXT BOOKS

1. Bridge engineering by S.Ponnuswamy, TataMcGraw-Hill, 1986.
2. Bridge superstructure by N.Rajagopalan, Narosa Publishing House, 2006.

REFERENCE BOOKS

1. Victor, D.J., Essentials of Bridge Engineering, Oxford & IBH Publishers Co., New Delhi,1980.

(CE511) CONSTRUCTION PLANNING AND PROJECT MANAGEMENT

Objective of the Course:

At the end of this course the student is expected to have learnt how to plan construction projects, schedule the activities using network diagrams, determine the cost of the project, control the cost of the project by creating cash flows and budgeting and how to use the project information and decision making tool.

UNIT-I

Construction Planning

Basic concepts in the development of construction plans-choice of Technology and construction method-Defining Work Tasks-Precedence relationships among activities- Estimating Activity Durations-Estimating Resource Requirements for work activities-coding system.

UNIT-II

Scheduling Procedures and Techniques

Relevance of construction schedules-Bar charts-The critical path method-Calculations for critical path scheduling. Activity float and schedules-Presenting project schedules-Critical path scheduling for Activity-on –node and with leads, Lags and Windows. Calculations for scheduling with leads, Lags and Windows-Resource oriented scheduling-Scheduling with resource constraints and precedences- Use of Advanced Scheduling Techniques-Scheduling with uncertain durations-Crashing and time/cost trade offs-Improving the Scheduling process.

UNIT-III

Cost Control Monitoring and Accounting

The cost control problem-The project Budget-Forecasting for Activity cost control-Financial accounting systems and cost accounts-Control of project cash flows-Schedule and Budget updates-Relating cost and schedule information.

UNIT-IV

Quality Control Monitoring and accounting

Quality and safety concerns in Construction-Organizing for Quality and safety-Work and Material Specifications. Total Quality control- Quality control by statistical methods- Statistical Quality control with sampling by Attributes-Statistical Quality control by Sampling and Variables-Safety.

UNIT-V

Construction Methods and Equipment

Factors affecting selection of equipment - technical and economic, construction engineering fundamentals, Analysis of production outputs and costs, Characteristics and performances of equipment for Earth moving, Erection, Material transport, Pile driving, Dewatering, Concrete construction (including batching, mixing, transport, and placement) and Tunneling.

.TEXT BOOKS:

1. Chitkara,K.K. "Construction Project Management Planning", Scheduling and Control, Tata McGraw-Hill Publishing Co., New Delhi, 1998.
2. Srinath,L.S., "PERT and CPM Principles and Applications", Affliated East West Press, 2001.
3. Sharma S.C.. Construction Equipment and Management, Khanna Publishers, New Delhi,2011.

REFERENCE BOOKS:

1. Chris Hendrickson and Tung Au, "Project management for Construction-Fundamentals Concepts for Owners", Engineers, Architects and Builders, Prentice Hall,Pitsburgh,2000.
2. Moder.J., C.Phillips and Davis, "Project management with CPM", PERT and Precedence Diagramming, Van Nostrand Reinhold Co., Third Edition, 1983.
3. Peurifoy, R.L., Ledbetter, W.B. and Schexnayder, C, Construction Planning Equip

(CE512) WIND ANALYSIS AND DESIGN OF TALL STRUCTURES

Objective of the Course:

To study the behaviour, analysis and design of tall structures. At the end of this course the student should have understood the problems associated with large heights of structures with respect to loads (wind and earthquake and deflections of the structure).

UNIT-I:

Introduction

Basic wind speed, Design wind speed, Design wind pressure, offshore wind velocity, Wind pressures and forces in buildings/ structures. External pressures coefficients for various roofs, Dynamic effects. Design of Tall Buildings: Analysis of tall building for lateral loads, cantilever method, Portal method, Factor method; Design of structures for wind; Computer application in analysis & design.

UNIT-II:

Design of shear wall

Introduction, Types of shear walls, behaviour of cantilever walls with rectangular cross section, Flange cantilever shear walls, Moment – Axial load interaction for shear wall section, Interaction of shear walls and Rigid jointed frames, Shear walls with openings, Coupled shear walls.

UNIT-III

Design of Steel Towers, Trestles and Masts

Introduction, Loads on towers, Analysis of towers, Masts, Trestles, Stresses in trestles due to vertical loads and horizontal loads, Design of members in towers, Design of foundations.

UNIT-IV

Design of Chimneys (RCC)

Introduction, Wind pressure, Stresses in chimney shaft due to self weight and wind, Stress in horizontal reinforcement due to wind shear, Stresses due to temperature difference, Design of RCC chimney.

UNIT-V

Design of steel chimneys

Introduction, Types of chimneys, Forces acting on steel chimneys, design of various components, Stability of steel chimney.

TEXT BOOKS :

1. Design of Steel Structures by S.K.Duggal.
2. Design of Steel Structures- vol-II by Ramachandra

REFERENCE BOOKS:

1 .Reinforced Concrete Structures by Punmia, Jain & Jain
2. Tall Chimneys design by S.N. Manohar.

(CE513) ADVANCE FOUNDATION ENGINEERING

Objective of the Course:

The primary objective of this course is to equip the student with the knowledge of how to explore the soil, design the foundations for different conditions and check the stability of structures.

UNIT - I

Sub–Soil Investigation and Sampling

Introduction; Methods of exploration; Methods of Boring; Soil Samples; Soil samplers and Sampling; Number and disposition of trial pits and borings; Depth of exploration; Ground water observations; Field test, Laboratory tests; Plate load test; Penetrometer tests; Geophysical methods.

UNIT – II

Shallow Foundations

Concept of foundations; Types of foundations and their applicability; General requirements of foundations; Location and Depth of foundation, Bearing Capacity & Settlement Methods for bearing capacity estimation, total and differential settlements of footing and raft, code provisions. Design of individual footings, strip footing, combined footing.

UNIT – III

Pile Foundations

Estimation load carrying capacity of single and pile group under various loading conditions. Pile load testing (static, dynamic methods and data interpretation), settlement of pile foundation, code provisions, design of single pile and pile groups, and pile caps

Well Foundations Types, components, construction methods, design methods (Terzaghi, IS and IRC approaches),check for stability, base pressure, side pressure and deflection.

UNIT – IV

Lateral Earth Pressure & Retaining Walls:

Introduction; Effect of wall movement on Earth Pressure; Earth Pressure at rest; Rankine's theory of Earth pressure; Coulomb's theory of earth pressure; Culmann's graphical method for active earth pressure; Types of retaining walls, Design of cantilever retaining wall.

UNIT – V

Dynamic Soil Properties

Stresses in soil element; Determination of dynamic soil properties; Field tests; Laboratory tests; Model tests; Stress-strain behavior of cyclically loaded soils; Cyclic plate load test; Liquefaction.

Machine Foundations

Types of machines; Basic design criteria; Methods of analysis; Mass-Spring-Dashpot model; Elastic-Half-Space theory; Tschebotarioff's reduced natural frequency method; Types of foundations; Modes of vibrations; Vertical, sliding, torsional (yawing) and rocking (and pitching) modes of oscillations; Design guidelines as per codes; Typical design problems.

TEXT BOOKS:

1. ManojDatta, Shashi K Gulhati, "Geotechnical Engineering", Tata McGraw – Hill Education (2005)
2. K.R. Arora, "Soil Mechanics and Foundation Engineering", 7th ed., Standard Publishers and Distributors, Delhi, 2009.
3. B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, "Soil Mechanics and Foundation", 16th ed., Laxmi Publications Pvt. Ltd., New Delhi, 2005.
4. Dass, B.M, "Principles of Geotechnical Engineering", 5th ed., Thompson books, Singapore, 2002.
5. P. Srinivasalu, C. V. Vaidyanathan "Handbook of Machine Foundations" 1st EditionTata McGraw - Hill Education (2004)

REFERENCE BOOKS:

1. B. J. Kasmalkar; "Foundation Engineering", 6th ed., Pune VidyarthiGrihaPrakashan, Pune, 1989.
2. Bowles, J.E., "Foundation Analysis and Design" 4th ed., McGraw-Hill Publishing company, Newyork, 1988.
3. P.PurushotthamaRaj , "A Text book of Soil Mechanics

(CE514) Advanced Prestressed Concrete

Objective of the Course:

To develop an advanced understanding of the behaviour, analysis and design of prestressed concrete members and connections. By the end of the course, students should be able to calculate prestress losses , Design a post-tensioned continuous beam for transfer, serviceability and strength, Design a post-tensioned slab and Specify detailing and material.

UNIT-I:

Introduction, Prestressing Systems and Material Properties

Basic concepts of pre-stressing; Historical development; Advantages and Types of Prestressing, Pre-tensioning Systems and Devices, Post-tensioning Systems and Devices, Need for High strength steel and High strength concrete; Losses Of Prestress: Nature of losses of pre-stress; Loss due to elastic deformation of concrete, shrinkage of concrete, creep of concrete, relaxation of stress in steel, friction and anchorage slip; Total losses allowed for in design.

UNIT-II:

Analysis of Prestressed Member

Analysis of Members under Axial Load: Analysis at Transfer, Analysis at Service, Analysis for Ultimate Strength, Analysis of Member under Flexure:, Analysis at Transfer and at Service, CrackingMoment, Kern Point, Pressure Line, Analysis for Ultimate Strength, design loads and strength, Calculation of Crack Width, Variation of Stress in Steel, Analysis of a Rectangular Section, Analysis of a Flanged Section.

UNIT-III:

Deflections of Prestressed Concrete Members

Importance of control of deflections; Factors influencing deflections; Short term deflections of uncracked members. Long term deflection of cracked member; Transmission Of Pre-Stress: Transmission of Pre-stressing force by bond; Transmission length; Bond stresses; Transverse tensile stresses; End zone reinforcement; Flexural bond stresses in pre –tensioned and post –tensioned grouted beams, stress distribution in end block, Anchorage zone reinforcements. Shear

And Torsion Resistance Of Prestressed Concrete Member Shear and Principal stresses; Ultimate shear resistance of pre-stressed concrete members; Design of shear reinforcement, pre-stressed concrete members in torsion, Design of reinforcements for torsion, shear and bending.

UNIT-IV:

Design of Pre-Stressed Members

Design of sections for flexure, Design of Sections for Axial Tension, Design of Sections for compression and bending, design of pre-stressed section for shear and torsion, design of prestressed member for bond. Dimensioning of flexural member, design for pre-tensioning member, design of post-tensioning members.

UNIT-V:

Composite Construction of Prestressed Concrete

Composite structural member, types of composite construction, analysis of stresses, differential shrinkages, deflection of composite member, flexural strength of composite sections, shear strength of composite section; Design of Continuous Prestressed Concrete Member Advantages of continuous members, ultimate load analysis of continuous pre-stressed member, design of continuous pre-stressed concrete beams.

TEXT BOOKS:

1. Prestressed Concrete by N. Krishna Raju; Tata Mc Graw - Hill Publishing Company Limited, New Delhi.3rd edition, 1995.
2. Design of Prestressed Concrete Structures by T.Y. Lin & Ned H. Burns; John Wiley & Sons, 3rd edition, 1981.

REFERENCE BOOKS:

1. Prestressed concrete by N. Rajagopalan; Narosa Publishing House.2nd edition, 2005.
2. Design of Prestressed Concrete by A. Nilson; John Willey & Sons.2nd edition, 1987

(CE515) MATRIX METHODS OF STRUCTURAL ANALYSIS

Objective of the Course:

The main objective is to expand the student knowledge of the stiffness and flexibility methods studied in the basic structural analysis courses. This course is also expected to enable a good understanding of how standard software packages and students will be able to implement the method developing their own computer program to analyze structures.

UNIT-I

Generalized Measurements

Degrees of freedom - Constrained Measurements - Behaviour of structures – Principle of superposition- Stiffness and flexibility matrices in single, two and n-co-ordinates - Structures with constrained measurements.

UNIT-II

Stiffness and flexibility matrices from strain energy

Betti's law and its applications- Determinate and indeterminate structures - Transformation of element matrices to system matrices - Transformation of system vectors to element vectors.

UNIT-III

Flexibility method

Application to statically determinate and indeterminate structures – Choice of redundant - Transformation of redundant-Internal forces due to thermal expansion and lack of fit.

UNIT-IV

Displacement method

Internal forces due to thermal expansion and lack of fit - Application to symmetrical structures - Comparison between stiffness and flexibility methods.

UNIT-V

Matrix Substructuring

Tridiagonalization- Analysis by Iteration method - frames with prismatic members – nonprismatic members.

TEXT BOOKS:

1. Kanchi, Matrix Structural Analysis, Wiley Eastern Ltd., Newdelhi 1981.
2. Rajasekaran S, Computational Structural Mechanics, Prentice Hall of India. New Delhi, 2001.

REFERENCE BOOKS:

1. Matrix Analysis of Framed Structures by W. Weaver & J.M.Gere, CBS Publishers,1986.
2. Computational structural mechanics by S.Rajasekharan and Sankarasubramanian, Prentice Hall of India , 2001.

(CE516) STABILITY OF STRUCTURES

Objective of the Course:

The students will able to evaluate and compare modern techniques and methods in structural stability. The students will become familiar with calculation and experimental methods for defining critical external loads of sleek construction elements and constructions where unstable situations appear, which makes the construction unstable and results in inward or outward flexing.

UNIT-I

Buckling of columns

Introduction – concepts of stability – methods of Neutral Equilibrium– Euler column – Eigen value problem – Axially loaded column – Eccentrically loaded column.

UNIT-II

Energy principle

Raleigh Ritz method – Galerkin method – Numerical methods (New mark's difference and matrix methods).

UNIT-III

Beams and Beam columns

introduction – lateral buckling of beams – beam column with concentrated and distributed loads – effect of axial load on bending stiffness.

UNIT-IV

Buckling of frames

Introduction – modes of buckling – critical load using various methods –Neutral equilibrium – slope deflection equations, matrix method.

UNIT-V

Buckling of plates

Differential equation of plate bucklings – critical loan on plates for various boundary conditions – Energy method – Finite difference method.

TEXT BOOKS:

1. Alexandar Chajes, Principles of Structural Stability Theory, Prentice Hall, New Jersey, 1980.
2. "Theory of Elastic Stability" by Timoshenko and Gere.

REFERENCE BOOKS:

1. Background to buckling by Allen and Bulson, McGraw-Hill, 1980.
2. Elastic stability of structural elements by N.G.R.Iyengar, Macmillan India Ltd., 2007

(CE517) MECHANICS OF COMPOSITE MATERIALS

Objective of the Course:

To identify the properties of fiber and matrix materials used in commercial composites, as well as some common manufacturing techniques and to predict the elastic properties of both long and short fiber composites based on the constituent properties.

UNIT-I:

Introduction

Introduction to Composites, Classifying composite materials, commonly used fiber and matrix constituents, Composite Construction, Properties of Unidirectional Long Fiber Composites, and Short Fiber Composites

UNIT-II:

Stress Strain Relations

Concepts in solid mechanics, Hooke's law for orthotropic and anisotropic materials, Linear Elasticity for Anisotropic Materials, Rotations of Stresses, Strains, Residual Stresses

UNIT-III:

Analysis of Laminated Composites

Governing equations for anisotropic and orthotropic plates. Angle-ply and cross ply laminates. Static, dynamic and stability analysis for simpler cases of composite plates. Inter laminar stresses.

UNIT-IV:

Failure and Fracture of Composites

Netting Analysis, Failure Criterion, Maximum Stress, Maximum Strain, Fracture Mechanics of Composites, Sandwich Construction.

UNIT-V:

New Cement Composites

FRC-Ferro cement-Nano cement composite- SIFCON-Polymer concretes.

TEXT BOOKS:

1. Daniel and Ishai, “Engineering Mechanics of Composite Materials”, Oxford University Press, 2005.

2. Jones R.M., “Mechanics of composite materials”, McGraw-Hill, Kogakusha Ltd., Tokyo, 1975.

REFERENCE BOOKS:

1. Agarwal.B.D. and Broutman.L.J., “Analysis and Performance of fiber composites”, John-Wiley and Sons, 1980.

2. Michael W.Hyer, “Stress Analysis of Fiber-Reinforced Composite Materials”, McGraw Hill, 1999.

3. Mukhopadhyay.M, “ Mechanics of Composite Materials and Structures”, University Press, India, 2004.

(CE518) REPAIR & REHABILITATION OF STRUCTURES

Objective of the Course:

The course seeks to recognize the mechanisms of degradation of concrete structures, provide the students with the knowledge of available techniques and their application for strengthening or upgrading existing structural systems. It also provides how to conduct field monitoring and non-destructive evaluation of concrete structures.

UNIT-I

Introduction

Deterioration of structures with aging; Need for rehabilitation. Effects due to climat, temperature, chemicals , wear and erosion , design and construction errors , corrosion mechanism , Effects of cover thickness and cracking, Method of corrosion production., corrosion inhibitors , corrosion resistant steels , coatings , cathodic production Distress in concrete /steel structures Types of damages; Sources or causes for damages; effects of damages; Case studies.

UNIT-II

Structural Health Monitoring

An overview of Structural Health Monitoring, Structural Health Monitoring and Smart Materials, Structural Health Monitoring versus Non Destructive Testing, A broad overview of smart materials, Overview of Application potential of SHM.

UNIT-III:

Maintenance and Repair Strategies

Definitions: Maintenance, Repair , Rehabilitation, Facets of maintenance , Importance of maintenance , preventive measures on various aspects , assessment procedure for evaluating damaged structure, causes of deterioration – Testing techniques.

UNIT-IV:

Materials and Methods of Repair

Special concrete and mortar , Concrete chemicals , special elements for accelerator, strength gain, expansive cement , polymer concrete , sulphur infiltrated concrete , ferro cement, fibre reinforced concrete. Shortcreting; Grouting; Epoxy-cement mortar injection; Crack ceiling

UNIT-V:

Seismic Retrofitting of reinforced concrete buildings

Introduction; Considerations in retrofitting of structures; Source of weakness in RC frame building – Structural damage due to the discontinuous load path; Structural damage due to lack of deformation; Quality of workmanship and materials; Classification of retrofitting techniques; Retrofitting strategies for RC buildings – Structural level (global) retrofits methods; Member level (local) retrofit methods; Comparative analysis of methods of retrofitting.

TEXT BOOKS:

1. Diagnosis and treatment of structures in distress by R.N.Raikar, Published by R&D Centre of Structural Designers & Consultants Pvt.Ltd., Mumbai, 1994.
2.Earthquake resistant design of structures by Pankaj Agarwal and Manish Shrikhande, Prentice-Hall of India, 2006.

REFERENCE BOOKS:

1. Handbook on Repair and Rehabilitation of RCC buildings, Published by CPWD, Delhi, 2002.
2. Denison Campbell, Allen and Harold Roper , Concrete Structures, materials, maintenance and repair , Long man, Scientific and Technical UK 1991.

CE519 STRUCTURAL ENGG. LAB

Any 07 of the following experiments are to be carried out:

1. Study of the effect of water/cement ratio on workability and strength of Concrete.
2. Study of the effect of aggregate /cement ratio on strength of concrete.
3. Mix design methods using I.S. Code method.
4. A study of correlation between cube strength, cylinder strength, split tensile strength and modulus of rupture.
5. A study of behavior of under-reinforced and over-reinforced beams
6. A study on the effect of span to depth ratio on the failure pattern of RC beams
7. A study of the effect of pre-stressing on the flexural behavior of beams
8. Mix design methods using A.C.I Code method.
9. Rebound hammer test.

CE521 COMPUTATIONAL LABORATORY

Any 07 of the following problems are to be solved using Computer Programs like Excel / Application software like STAAD, SAP, NISA (Civil) etc.

1. Design of reinforced concrete beam (Singly/Doubly).
2. Design of reinforced concrete slab (One-way/Two-way).
3. Design of reinforced concrete column subjected to biaxial bending.
4. Design of footings.
5. Lateral forces on a building due to an earthquake using equivalent static method

6. Analysis of pin jointed plane trusses

7. Analysis of rigid jointed plane frames

8. Analysis & Design of multi storey buildings.

9. Analysis & Design of industrial Buildings.

CE522 Introduction to Ansys Lab

Analyze The Following Problems by Using ANSYS

1. Analysis of Beams with UDL Loads and Different Boundary Conditions.
2. Analysis of Beam with Multiple Loads.
3. Analysis of 2D Trusses.
4. Non Linear Analysis of Cantilever Beams.
5. Analysis of plate With/With out Central Hole.

VFSTR UNIVERSITY

M.Tech. I Year - Course Structure

SEMESTER - I

Code	Subject	L	T	P	To	C
AG501	Machinery Systems for Precision Agriculture	4	0	-	4	4
AG503	Design of Farm Machinery Systems	4	0	-	4	4
AG505	Soil Dynamics in Tillage and Traction	4	0	-	4	4
	Elective-I	4	0	-	4	4
	Elective-II	4	0	-	4	4
	Elective-III	4	0	-	4	4
	Practicals					
AG525	Tractor Systems Laboratory	-	-	3	3	2
AG527	Farm Machinery Design Laboratory	-	-	3	3	2
	Total	**24**	**00**	**06**	**30**	**28**

SEMESTER - II

Code	Subject	L	T	P	To	C
AG502	Alternative Energy Sources	4	0	-	4	4
AG504	Tractor Systems Design	4	0	-	4	4
AG506	Computer Aided Analysis and Design of Farm Machinery	4	0	-	4	4
	Elective-IV	4	0	-	4	4
	Elective-V	4	0	-	4	4
	Elective-VI	4	0	-	4	4
	Practicals					
AG526	CAD Design & Simulation Lab	-	-	3	3	2
AG528	Farm Machinery Testing Laboratory	-	-	3	3	2
	Total	**24**	**00**	**06**	**30**	**28**

L = Lecture ; **T =** Tutorial ; **P =** Practicals ; **To =** Total ; **C =** Credits

VFSTR UNIVERSITY

II M.Tech. COURSE STRUCTURE
SEMESTER - I

Code	Subject	L	T	P	To	C
	Seminar - I	0	0	1	1	1
	Project - I	0	0	20	20	20
	Total	**0**	**0**	**21**	**21**	**21**

SEMESTER - II

Code	Subject	L	T	P	To	C
	Seminar - I	0	0	1	1	1
	Project - I	0	0	20	20	20
	Total	**0**	**0**	**21**	**21**	**21**

List of subjects for electives – I, II & III

Code	Subject	L	T	P	To	C
AG507	Land Grading and Earth Moving Machinery	4	0	0	4	4
AG509	Internal Combustion Engine	4	0	0	4	4
AG511	Production Technology of Automotive Components	4	0	0	4	4
AG513	Instrumentation and Research Techniques	4	0	0	4	4
AG515	System Engineering and Productivity	4	0	0	4	4
ME508	Optimization Techniques	4	0	0	4	4
AG519	Agro-Energy Audit and Management	4	0	0	4	4
AG521	Finite Element Methods in Engineering	4	0	0	4	4
AG523	Ergonomics and Safety in Farm Operations	4	0	0	4	4

L = Lecture ; **T =** Tutorial ; **P =** Practicals ; **To =** Total ; **C =** Credits

VIGNAN'S UNIVERSITY

List of subjects for electives – IV, V & VI

Code	Subject	L	T	P	To	C
AG508	Tractor Ergonomics	4	0	0	4	4
AG510	Research Methodology and Data Analysis	4	0	0	4	4
AG512	Simulation Modeling in Farm Machinery and Power Engineering	4	0	0	4	4
AG514	Energy Conservation and Management in Farm Machinery and Power Engineering	4	0	0	4	4
AG516	Advances in Hydraulics and Electro Pneumatic Controls	4	0	0	4	4
AG518	Introduction to Intellectual Property Law	4	0	0	4	4
AG520	Project Engineering and Management	4	0	0	4	4
ME504	Mechanical Vibrations	4	0	0	4	4
ME516	Experimental Stress Analysis	4	0	0	4	4

L = Lecture ; **T =** Tutorial ; **P =** Practicals ; **To =** Total ; **C =** Credits

VFSTR UNIVERSITY

I Year - M.Tech

SYLLABUS

I SEM & II SEM

I Year I Semester

L	T	P	T	C
4	0	-	4	4

AG 501 Machinery Systems for Precision Agriculture

Course Description & Objective:

To acquaint and equip with the farm machinery used for natural resources management and machinery for precision farming. Use of GIS and GPS in farm machinery.

Course outcomes:

1. *Students interested in technology will learn how satellite based guidance systems and other related technologies can be utilized to track and manage agricultural inputs (i.e. seed, fertilizer, fuel) and better manage their farming operation*
2. *Students would take this knowledge directly to industry working for agricultural consults and manufacturers*
3. *Students would be able to understand how to set up an auto guidance system is only a small piece of the puzzle.*
4. *Students master precision agriculture technologies like soil and crop health sensors, yield monitors, GNSS, GIS and mapping, variable rate controllers, and automated guidance.*
5. *Graduates of this program are challenged to understand management and troubleshooting of the entire agricultural system*

UNIT I: Introduction to machinery system for precision agriculture

Functional design, specifications, requirements and working of farm machinery needed for natural resources management like rotavator, Precision sowing and planting machines, laser guided leveller, power sprayer ,straw chopper cum spreader, straw bailer , combine harvester etc.

UNIT II: Tools for precision agriculture

Ag GPS parallel swathing option, data base management, functional systems documentation. Application of relevant software.

UNIT III: Techniques for precision agriculture

An introduction to precision farming. GIS/GPS positioning system for precision farming, Yield monitoring and mapping, soil sampling and analysis. Computers and Geographic information systems. Precision farming- Issues and conditions. Role of electronics in farm machinery for precision farming.

UNIT IV: Fundamentals of earth moving machinery

Engineering fundamentals related to earth moving machinery: Swell, shrinkage and compaction measurements. Use of tractors & Crawlers and effects of altitude & temperature on their performance. Grade resistance and gradability.

UNIT V: Land reclamation and development

Land cleaning and reclamation equipment. Land leveling equipment. Power shovels, drag lines, cam shells. Rubber tire for earth moving machinery. Trenching machineries and wagons. Economic analysis of land development machinery. Application of PERT and CPM to the problems related to land development.

Suggested Readings

1. De Mess M. N. Fundamental of Geographic Information System. John Willy and Sons, New York
2. Dutta SK. 1987. Soil conservation and land management. International distributors, Dehradun.
3. Kuhar, John. E. 1977. The precision farmimg guide for agriculturalist. Lori J. Dhabalt, USA.
4. Lille Sand, T and Kaiffer, R. Remote Sensing and Image Interpretation, John Willy and Sons, London.
5. Nichols HL& Day DH.1998. Moving the earth. The work book of excavation. Mcgraw Hill.
6. Peurifoy RL 1956.Construction, planning, equipment and methods. Mcgraw Hill
7. Sabbins, F. Remote Sensing Principle and Interpretation. Freeman, New York
8. Singh G.1991. Manual of soil and water conservation engineering. Oxford and IBH, Co.
9. Sigma & Jagmohan.1976. Earth moving machinery. Oxford & IBH
10. Wood & Stuart. 1977. Earth moving machinery. Prentice Hall.

I Year I-Semester

L	T	P	To	C
4	0	-	4	4

AG 503 Design of Farm Machinery Systems

Course Description & Objective:

To acquaint and equip with the latest design procedures of farm power and machinery systems.

Course outcomes:

At the end of the course, the student would be

1. *able to design the agricultural machines for tillage, planting/ sowing, threshing and combine harvesting etc.*
2. *able to testing of agricultural machines for tillage, planting/ sowing, threshing and combine harvesting etc.*
3. *mastering the methods and processes of design.*
4. *having fundamental knowledge of theories of agricultural machinery and equipment.*
5. *having knowledge and transfer of new technologies in the field of design and construction of agricultural machines and equipment.*
6. *monitoring and implementation of new and contemporary solutions*

UNIT I: Design principles and trends

Modern trends, principles, procedures, fundamentals and economic considerations for design and development of farm machinery systems. Design considerations, procedure and their applications in agricultural machines.

UNIT II: Design considerations and applications

Analytical design considerations of linkages/ components in farm machinery and its application. Reliability criteria in design and its application.

UNIT III: Design of farm equipment

Design of selected farm equipments: – tillage, seeding, planting, interculture, plant protection, harvesting and threshing. Design of rotary, vibrating and oscillating machines.

UNIT IV: Matching implement to power

Design and selection of matching power unit, Power calculation, Design of farm transport equipment.

UNIT V: Safety and performance analysis

Safety devices for tractors & farm implements. Test codes. Performance indices. Selection of machine for various farming operations.

Suggested Readings

1. Bernacki C, Haman J & Kanafajski CZ.1972. *Agricultural Machines.* Oxford & IBH.
2. Bindra OS & Singh Harcharan 1971. *Pesticides Application Equipments*. Oxford & IBH.
3. Bosoi ES, Verniaev OV & Sultan-Shakh EG. 1990. *Theory, Construction and Calculations of Agricultural Machinery.* Vol. I. Oxonian Press.
4. Klenin NI, Popov IF & Sakoon VA. 1987. *Agricultural Machines. Theory f Operations, Computing and Controlling Parameters and theCondition of Operation.* Amrind Publ.
5. Lal R & Dutta PC. 1979. *Agricultural Engineering* (through solved examples). Saroj Parkashan.
6. Ralph Alcock.1986. *Tractor Implements System*. AVI Publ.
7. Raymond N, Yong Ezzat A & Nicolas Skiadas 1984. *Vehicle Traction Mechanics*. Elsevier.
8. Sharma PC & Aggarwal DK. 1989. *A Text Book of Machine Design*. Katson Publishing House.
9. Thornhill EW & Matthews GA. 1995. *Pesticide Application Equipment for Use in Agriculture*. Vol. II. *Mechanically Powered Equipment*. FAO Rome.
10. Yatsuk EP.1981*. Rotary Soil Working Machines Construction, Calculation and Design*. American Publ. Co.

I Year I Semester

L	T	P	To	C
4	0	-	4	4

AG 505 Soil Dynamics in Tillage and Traction

Course Description & Objective:

To acquaint and equip with the dynamic properties of soil, soil failure and design of tillage tools, prediction of traction performance and dimensional analysis of different variables related to soil- tire system.

Course outcomes:

Upon completion of this course, students will:

1. *be able to measure and utilize physical and mechanical properties of soil in order to interpret and predict soil stress-strain behavior.*
2. *be able to design and implement safe and cost-effective mechanical soil tillage systems for producing desired physical states*
3. *be able to design and implement and cost-effective mechanical traction/transport systems which produce specified performance and acceptable alteration of affected soil profiles*

UNIT I: Soil properties

Dynamic properties of soil and their measurement, stress-strain relationships, theory of soil failure.

UNIT II: Mechanics of tillage implements

Mechanics of tillage tools and geometry of soil tool system, design parameters and performance of tillage tools.

UNIT III: Assessment and evaluation of variables in soil-tyre system

Dimensional analysis of different variables related to soil-tyre system; soil vehicle models; mechanics of steering of farm tractor; special problems of wet land traction and floatation.

UNIT IV: Traction mechanics

Introduction of traction devices, tyres-types, function & size, their selection; mechanics of traction devices. Deflection between traction devices and soil, slippage and sinkage of wheels.

UNIT V: Design and performance evaluation of traction devices

Evaluation and prediction of traction performance, design of traction and transport devices. Soil compaction by agricultural vehicles and machines.

Suggested readings

1. Daniel Hill. 1962. *Fundamentals of Soil Physics*. Academic Press.
2. Gill & Vandenberg.1968. *Soil Dynamics in Tillage and Traction*. Supdt. Of Documents, U.S. Govt. Printing Office, Washington, D.C.
3. Sineokov GN. 1965. *Design of Soil Tillage Machines*. INSDOC, New Delhi.
4. Terzaghi K & Peck Ralph B.1967. *Soil Mechanics in Engineering Practices*. John Wiley & Sons.

I Year I Semester	L	T	P	To	C
	-	-	3	3	2

AG525 Tractor Systems Laboratory

The following experiments may be conducted for this lab

1. Measurement of dynamic properties of soil in compression and shear.
2. Measurement of rheological properties of soil.
3. Measurement of rolling resistance of towed and powered wheels.
4. Draw bar performance evaluation.
5. Performance testing of tractor engines using conventional and non-conventional fuels.
6. Testing of tractor hydraulic systems.
7. Testing of mechanical and power steering systems.
8. Testing of tractor from ergonomic considerations.
9. Design and drawing of tractor transmission systems.
10. Testing of clutches and brakes.

I Year I Semester

L	T	P	To	C
-	-	3	3	2

AG527 Farm Machinery Design Laboratory

The following experiments may be conducted for this lab

1. Design of agricultural implements.
2. Design of tractor drawn and power tiller drawn tillage machinery,
3. Design of seeding implements
4. Design of weeding machinery,
5. Design of plant protection equipment
6. Design of harvesting and threshing machines.
7. Design of animal and manually drawn implements.
8. Design of crop processing equipments

I Year II Semester

L	T	P	To	C
4	0	-	4	4

AG 502 Alternative Energy Sources

Course Description & Objective:

To acquaint with the knowledge on various energy sources like biofuels, wind and solar systems, their use, design and applications in different farming activities.

Course outcomes:

After completion of the course, students will be able to:

1. *describe the fundamentals and main characteristics of renewable energy sources and their differences compared to fossil fuels.*
2. *explain the technological basis for harnessing renewable energy sources*
3. *recognize the effects that current energy systems based on fossil fuels have over the environment and the society*
4. *describe the main components of different renewable energy systems*
5. *compare different renewable energy technologies and choose the most appropriate based on local conditions*
6. *perform simple techno-economical assessments of renewable energy systems*
7. *perform and compare basic environmental assessments of renewable energy systems and conventional fossil fuel systems*
8. *design renewable/hybrid energy systems that meet specific energy demands, are economically feasible and have a minimal impact on the environment*
9. *suggest the best combination of technological solutions to minimize the emission of greenhouse gases and increase the sustainability of the energy system in specific areas/regions*

UNIT I: Solar energy

Solar system. Design of solar energy operated systems for heating, cooling, distillation, drying, dehydration, water pumping and power generation for application in agriculture. Photo voltaic devices

UNIT II: Wind energy

Wind energy fundamentals, Utilization of wind energy for generation of electricity and mechanical power.

UNIT III: Design and analysis of wind mills

Types of wind mills and their characteristics. Mechanics of wind mills. Design of wind mills. Applications.

UNIT IV: Waste recycling

Recycling of agricultural waste. Microbial conversion of plant materials to fuel. Biochemistry of anaerobic fermentation of bio-mass.

UNIT V: Biogas generation and cost analysis

Design of biogas systems for heating, lighting and running IC engines. Economics of biogas utilization. Biofuels.

Suggested readings

1. James F. Manwell, Jon G. McGowan, Anthony L. Rogers. 2009. Wind Energy Explained: Theory, Design and Application, 2nd Edition, Wiley Publishers.

2. V V N Kishore. 2010. Renewable Energy Engineering And Technology: Principles And Practice, The Energy and Resources Institute

3. John A. Duffie, William A. Beckman. 2013. Solar Engineering of Thermal Processes, John Wiley & Sons.

4. Hemant Pathak. 2013. A Hand Book of Energy Conservation and Management, CreateSpace Independent Publishing Platform.

5. Solanki Chetan Singh. 2011. Solar Photovoltaics: Fundamentals, Technologies and Applications, PHI; 2 edition.

6. Sameer A Zodgekar . 2008. Biofuels: Introduction and Country Experiences, ICFAI University Press. Walter Eshenaur . 1985. Understanding Agricultural Waste Recycling, Vita Publications.

I Year II Semester

L	T	P	To	C
4	0	-	4	4

AG 504 Tractor Systems Design

Course Description & Objective:

To acquaint and equip with the latest design procedures of tractor and its systems.

Course outcomes:

At the completion of the course the student will:

1. *have knowledge and skills on power transmission system of a tractor*
2. *know the design procedures of hydraulic systems and steering system.*
3. *understand design features and selection of engine for tractor.*
4. *know the testing procedures for tractor and engine components*

UNIT I: Introduction to tractor design

Technical specifications of tractors available in India, modern trends in tractor design and development, special design features of tractors in relation to Indian agriculture.

UNIT II: Engine and transmission system design and selection

Engine performance. Selection of engine for tractors. Design of principal engine components. Design of engine systems. Parameters affecting design of tractor engine and their selection. Design of fuel efficient engine components and tractor systems like transmission, steering, front suspension.

UNIT III: Hydraulic system of tractor

Hydraulic system & hitching, chassis, Tire selection. Tractor stability analysis. Single and three point hitch systems. Drawbar performance. Quick attaching couplers. Hydraulic controls and systems.

UNIT IV: Design of drive components of tractor

Tractor clutches and brakes. Design of power transmission systems. Design and selection of ground drive components. Mechanics of tractor. Computer aided design and its application in agricultural tractors.

UNIT V: Safety and comfort in tractor operation

Design and performance evaluation of traction and transport devices. Human factors engineering in tractor design. Driver's seat, work-place area and controls.

Suggested Readings

1. Arther W Judge 1967. *High Speed Diesel Engines*. Chapman & Hall.
2. Barger EL, Liljedahl JB & McKibben EC. 1967. *Tractors and their Power Units*. Wiley Eastern.
3. Macmillan RH. *The Mechanics of Tractor - Implement Performance, Theory and Worked Example*. University of Melbourne.
4. Maleev VL. 1945. *Internal Combustion Engines*. McGraw Hill.
   Ralph Alcock 1986. *Tractor Implements System*. AVI Publ. Co.

I Year II Semester	L	T	P	To	C
	4	0	-	4	4

AG 506 ComputerAided Analysis and Design of Farm Machinery

Course Description & Objective:

To acquaint and equip with the computer aided design, analysis and manufacturing of farm machinery with the help of CAD.

Course outcomes:

Upon completion of the course, the student will have:

1. *ability to create fully constrained solid models that can be quickly modified using standard software tools.*
2. *ability to use, identify and explain standard features in solid modeling including protrusions, revolutions, cutouts, and patterns*
3. *ability to use standard software tools to create engineering drawings, or other documents, to fully describe the geometries and dimensions of parts, as well as to document assemblies according to standard practice*
4. *ability to use standard software tools to create part assemblies and check for clearances.*
5. *ability to use finite element analysis software to mesh a solid model, apply meaningful loads and boundary conditions, complete a linear static stress analysis, and interpret the results*
6. *ability to create the drawings of farm implements and their analysis pertaining to structural, fluid/ gas pressure etc.*

UNIT I: Introduction to CAD and requirements

Introduction to CAD – the design process – modelling using CAD – architecture of CAD system. Geometric modelling – requirements – geometric construction methods

UNIT II: Standards in CAD

Representation of curve – desirable modeling facilities. – CAD standards – Graphical Standard system – Exchange of modeling data.

UNIT III: System analysis

System analysis – Relevance of system approach to biological systems and engineering systems. Role of a system analyst in design of a system and development of computer systems.

UNIT IV: Agricultural system analysis and faesibility

Characteristics of Agricultural systems. Tools of structured analysis.-The data flow model. Object oriented approach. Feasibility study – Steps in feasibility analysis – cost analysis. System design process – structured design.

UNIT V: Application of CAD to farm machinery design

Application to farm machinery scheduling problem. Application to farm – factory co-ordination – case study. Design of farm machinery with the help of CAD.

Suggested Readings

1. Chris McMahon & Jimmie Browne. 2000. *CAD /CAM/ Principles, Practice and Manufacturing Management*. Pearson Edu.
2. Grover Mikell P. 2003. *Automation, Production Systems and Computer Integrated Manufacturing*. Prentice-Hall of India.
3. Radhakrishnan P, Subramanyan S & Raju V. 2003. *CAD/CAM/CIM*. New Age International.
4. Rao PN. 2002. *CAD/CAM Principles and Applications*. Tata McGraw Hill.
5. Zeid Ibrahim.1998. *CAD/CAM Theory and Practice*. Tata McGraw Hill.

I Year II Semester

L	T	P	To	C
-	-	3	3	2

AG526 CAD Design & Simulation Lab

The following experiments may be conducted in this lab:

1. Understanding CAD software and its uses and application in design of farm machinery.
2. Exercise on agricultural engineering system analysis
3. Description of the machinery scheduling problem in harvesting and transport system.
4. Investigation of existing software models – cases studies.

I Year II Semester

L	T	P	To	C
-	-	3	3	2

AG 528 Farm Machinery Testing Laboratory

The following experiments may be conducted for this lab

1. Performance evaluation of tractor and power tiller drawn tillage implements
2. Performance evaluation of seeding machinery
3. Performance evaluation of weeding machinery
4. Performance evaluation of plant protection machinery
5. Performance evaluation of harvesting and threshing machines.
6. Testing of animal drawn and manually drawn operated implements.
7. Testing of crop processing equipments.
8. Using Test codes of agricultural machines.

I Year I Semester

L	T	P	To	C
4	0	-	4	4

AG 507 Land Grading and Earth Moving Machinery (DEPT. ELECTIVE)

Course Description & Objective:

To equip with the applications of land grading machinery, their design, operation and maintenance. To understand the different types of earth moving systems and their applications.

Course outcomes:

On completion of this course, the student would be able to:

1. *clarify basic concepts associated with earth-moving machinery*
2. *understand the properties of soil and ground in earth-moving*
3. *recognize the basic tools used in the mechanization of leveling of land for what purpose these tools, learning how to use and where to use*

UNIT I: Fundamentals of earth moving machinery:

Engineering fundamentals related to earth moving machinery, swell, shrinkage and compaction measurements, use of tractors and crawlers and effect of altitude and temperature on their performance.

UNIT II: Equipment for earth moving:

Grading of sloppy lands. Principles of mechanisms used in crawler mounted tractors. Dump trucks and their mechanisms. Load hoisting equipment.

UNIT III: Reclamation machinery:

Land cleaning and reclamation equipment, power shovels, drag lines and cam shells, rubber tyre for earth moving machinery.

UNIT IV: Diggers and trenchers:

Earth diggers and ditchers. Bull dozers and scrapers. Elevating and self powered graders. Trenching machineries and wagons.

UNIT IV: Automation and economics:

Automation of earth moving and grading machines. Boring machines. Different methods of boring. Economic analysis of land development machinery.

Suggested Readings

1. Dutta S K. 1987. Soil conservation and land management, International Distributors, Dehradun.
2. Nicolas H L, Day D H. 1998. Moving the earth, The work book of

excavation, McGraw Hill
3. Sigma and Jagmohan. 1976. Earth moving machinery, Oxford and IBH
4. Wood and Stuart. 1977. Earth moving machinery, Prentice Hall.

I Year I Semester	L	T	P	To	C
	4	0	-	4	4

AG 509 Internal Combustion Engine (DEPT. ELECTIVE)

Course Description & Objective:

This course studies the fundamentals of how the design and operation of internal combustion engines affect their performance, operation, fuel requirements, and environmental impact.

Course outcomes:

Upon completing the course the student should be able to:

1. *describe and explain different types of reciprocating internal combustion engines (ICE), their typical design features and performance characteristics.*
2. *describe and analyse the power cycle of internal combustion engines using ideal gas cycles, air cycles, and fuel-air cycles. Compute indicated power and thermal efficiency.*
3. *describe and explain the gas exchange process and power boosting by means of turbo charging.*
4. *describe and explain engine heat transfer and its relation to thermal loading of engine components and cooling.*
5. *explain the characteristic of homogeneous combustion in SI-engines and spray combustion in CI-engines.*
6. *fuel quality requirements of SI- and CI-engines.*

UNIT I: Engine classification and performance:
Introduction Engine classification, Engine Design and Operating Parameters Engine geometry Brake Performance, Indicated Performance, Friction Relationships among performance parameters

UNIT II: Cycles:

Ideal Properties Models of Engine Processes and Cycles Constant volume (Otto) Constant pressure (Diesel) Limited pressure (Dual) Comparisons of ideal cycle results Ideal intake/exhaust processes Open Cycle calculation with residual. Combustion Thermodynamics Air and Fuels Combustion Stoichiometry First law analysis of open reacting systems Combustion efficiency

UNIT III: Engine Working Fluids & Properties

Thermodynamic Properties of Engine Working Fluids Working fluids for engine processes Ideal gas mixtures Tables for species properties Curve fits for species properties Computer routines for properties and composition, Fuel/ Air Cycle Analysis Fuel/air cycle computer simulation Fuel/air cycle results: efficiency and performance Comparison with actual cycles Deviation from Ideal Cycle Behavior

UNIT IV: Combustion features:

Spark-Ignition, Engine Combustion, Features of process. Flame structure and propagation Factors affecting burning rate. Abnormal combustion and knock Combustion chamber design.

Diesel Engine: Combustion Features of diesel combustion process. Ignition delay. Knock in diesel engines, SI and Diesel Engine Emissions

UNIT V: Future Engine development

IC Engines: The Future Engine development prospects Stratified charge, direct injection systems Homogeneous charge, compression ignition Low temperature diesel combustion Advanced electronic-controlled engines Hybrids and fuel cells

Suggested reading

1. V Ganesan. Internal Combustion Engines.
2. Maleev VL. 1945. *Internal Combustion Engines*. McGraw Hill.
3. Mathur ML & Sharma RP. 1988. *A Course in Internal Combustion Engines*. Dhanpat Rai & Sons.
4. John B Heywood, Internal Combustion Engine Fundamentals
5. Charles Fayette Taylor. The Internal Combustion Engine in Theory and Practice: Vol. 1 & 2
6. Willard W. Pulkrabek. Engineering Fundamentals of the Internal Combustion Engine
7. Gill P W., ýJ H. Smith, ýE J. Ziury. Fundamentals of Internal Combustion Engines

I Year I Semester

L	T	P	To	C
4	0	-	4	4

AG 511 Production Technology of Automotive Components (DEPT. ELECTIVE)

Course Description & Objective:

To equip with awareness on the methodology related to production aided manufacturing and its technology.

Course outcomes:

1. *Promote, implement and maintain procedures that support safety, health, the environment, quality and risk management.*
2. *Prepare for and set-up production machines in an automotive or related environment.*
3. *Troubleshoot machine functioning in an automotive components environment.*
4. *Discuss the importance of changing and setting tooling for production machines*

UNIT I: Introduction

Elasticity-forms - Stress and strain relationship in engineering materials - Deformation mechanism -Strengthening material - Strain hardening, alloying, polyphase mixture, martensitic precipitation, dispersion, fibre and texture strengthening - iron carbon diagram.

UNIT II: Powder metallurgy process

Powder metallurgy process, process variables, Manufacture of friction lining materials for clutches and brakes – plastics-raw material –automobile components – molding – injection, compression and blow – PU foam molding - Machining of plastics. Forging materials - process flow chart, forging of valves, connecting rod, crank shaft, cam shaft, propeller shaft, transmission gear blanks, steering column.

UNIT III: Extrusions

Extrusions: Basic process steps, extrusion of transmission shaft, housing spindle, steering worm blanks, piston pin and valve tappets. Hydro forming - Process, hydro forming of manifold and comparison with conventional methods- Hydro forming of tail lamp housing – forming of wheel disc and rims. Stretch forming - Process, stretch forming of auto body panels –Super plastic alloys for auto body panels.

UNIT IV: Casting

Sand casting of cylinder block and liners - Centrifugal casting of flywheel, piston rings, bearing bushes, and liners, permanent mould casting of piston, pressure die casting of carburetor other small auto parts. Machining of connecting rods - crank shafts - cam shafts - pistons - piston pins - piston rings - valves - front and rear axle housings - fly wheel - Honing of cylinder bores - Copy turning and profile grinding machines.

UNIT V: Injection molding

Powder injection molding - Production of aluminum MMC liners for engine blocks - Plasma spray coated engine blocks and valves - Recent developments in auto body panel forming –Squeeze Casting of pistons - aluminum composite brake rotors. Sinter diffusion bonded idler sprocket – gas injection molding of window channel – cast con process for auto parts.

Suggested Reading

1. Kalpakjian, “Manufacturing Engineering and Technology”, 4th ed., Pearson Education, 2005.
2. P.C. Sarma, “Production Technology”, 3rd ed., S. Chand, 2009.
3. M.P. Groover, “Automation, Production Systems and Computer Integrated Manufacturing”, 3rd ed., PHI Publications, 2008.
4. Kodgire UD, “Material Science &Matellurgy”, 12thed., Eve rest Publishing House.
5. William D. Callister, “ Materials Science and Engineering an Introduction”,Eigth edition - John Wiley & Sons, Inc.

I Year I Semester

L	T	P	To	C
4	0	-	4	4

AG 513 Instrumentation and Research Techniques (DEPT. ELECTIVE)

Course Description & Objective:

To acquaint and equip with the concept of instrumentation used in farm power & machinery and measuring devices for force, torque and other parameters.

Course outcomes:

By the end of the module the student should be able to...

1. *understand and respond to the need for rigorous and formal metrology concepts in designing and using measurement systems.*
2. *recognize the limits on data imposed by measurement and analyse uncertainty in an appropriate manner.*
3. *use basic statistical methods to aid data evaluation and decision making.*
4. *appreciate how to identify and specify sensors (or complete instruments) for controlling machines and processes.*
5. *understand the operating principles of a range of widely used instrumentation techniques and appreciate how to use them in the design of measurement systems*

UNIT I: Introduction

Strain and stress, strain relationship, strain gauges. Mechanical, optical, electrical acoustical and pneumatic etc. and their use. Various methods of determining strain/stresses experimentally.

UNIT II: Measuring Devices-1

Measuring devices for displacement (linear and rotational), velocity, force, torque and shaft power. Strain gauges: types and their application in two and three dimensional force measurement. Design and analysis of strain gauges.

UNIT III: Instruments and characteristics

Introduction to functional elements of instruments. Active and passive transducers, Analog and digital modes, Null and deflection methods. Performance characteristics of instruments including static and dynamic characteristics.

UNIT IV: Measuring Devices-2

Devices for measurement of temperature, relative humidity, pressure, sound, vibration, flow etc. Recording devices and their type. Measuring instruments for calorific value of solid, liquid, and gaseous fuels. Measurement of gas composition using GLC.

UNIT V: Data management

Basic signal conditioning devices - data acquisition system – micro computers for measurement and data acquisition. Data storage and their application.

Suggested Readings

1. Ambrosius EE. 1966. *Mechanical Measurement and Instruments*. The Ronald Press.
2. BeckwithTG. 1996. *Mechanical Measurements*. Addison-Wesley.
3. Doeblin EO. 1966. *Measurement System - Application and Design*. McGraw Hill.
4. Ernest O Doebelin.1995. *Measurement Systems - Application and Design*. McGraw Hill.
5. Holman P 1996. *Experimental Methods for Engineers*. McGraw Hill.
6. Nachtigal CL. 1990. *Instrumentation and Control. Fundamentals and Application*. John Wiley & Sons.
7. Oliver FJ. 1971. Practical; Instrumentation Transducers. Hayden Book Co.
8. Perry CC & Lissner HR.1962. *The Strain Gauge Primer*. McGraw Hill.

I Year I Semester

L	T	P	To	C
4	0	-	4	4

AG 515 System Engineering and Productivity (DEPT. ELECTIVE)

Course Description & Objective:

To acquaint and equip with the concept of analysis of data, economic analysis techniques, network theory, dynamic programming and computer use in solving problems of optimization, writing of algorithms for problem solutions and decision making.

Course outcomes:

The student would have:

1. *ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.*
2. *ability to function on multidisciplinary teams.*
3. *ability to identify, formulate and solve industrial and management systems engineering problems.*

UNIT I: Introduction to system

System definition and concept. System engineering function, management and problems. Classification of system analysis models. Economic analysis techniques: Interest and interest estimation of single and multiple alternatives, break even analysis.

UNIT II: Modeling and analysis

Mathematical modeling and analysis: Application of linear programming, Network theory – CPM and PERT, Queuing theory and its application, assignment & transportation models and job scheduling/ allocation for the synthesis of agriculture machine systems.

UNIT III: Programming

Dynamic programming, Markov chains, application of forecasting in agricultural engineering systems and products.

UNIT IV: Mathematical formulation

Concept utilization and mathematical formulation of the labor, equipment and material factors affecting productivity.

UNIT V: Computer in optimization

Computer use in solving problems of optimization, writing of algorithms for problem solutions and decision making.

Suggested Readings

1. Danovan SS. 2000. *System Programming*. Tata McGraw.
2. Gillett G. 2001. *Introduction to Operations Research*. Tata McGraw Hill.
3. Grawham WJ & Vincent TL. 1993. *Modern Control System Analysis and Design*. John Wiley & Sons.
4. Lewis FL & Syrmos VL. 1995. *Optimum Control*. 2nd Ed. John Wiley & Sons.
5. Loomba D. 2000. *Linear Programming*. Tata McGraw.
6. Puttaswamaiah K. 2001. *Cost Benefits Analysis*. Oxford & IBH.

I Year I Semester	L	T	P	To	C
	4	0	-	4	4

ME508 Optimization Techniques (DEPT. ELECTIVE)

Course Description & Objective:

To familiarize the students with the modeling of mechanical engineering systems and obtaining the optimum solution.

Course outcomes:

Upon completion of the subject, students will be able to

1. *analyze real-life problems, especially, logistics problems, through the use of mathematical modeling techniques;*
2. *gain familiarity with various modeling techniques to build mathematical models for real problems;*
3. *employ some optimization methods and techniques and apply them to some practical problems.*

UNIT – I: Introduction & Linear Programming Problems

Introduction: Engineering applications of optimization, statement of an optimization problem, classification of optimization problems.

Linear programming: Simplex method, Applications of linear programming, Two-phases of simplex method, Big-M method.

UNIT – II: Transportation & Assignment Problems

Allocation problems: Formulation - Optimal solution, unbalanced transportation problems. Assignment problem – Formulation – Optimal solution – Variations i.e., non (m x n) Matrix.

UNIT – III: Classical optimization techniques

Single variable optimization with and without constraints, multivariable optimization without constraints, multi – variable optimization with constraints – solution, by method of constrained variation method of Lagrange multipliers, Kuhn – Tucker conditions. Non linear programming unconstrained optimization techniques: (Numerical methods for optimization) Direct search methods – Random search methods; Univariate method Pattern Directions, Hooke and Jeeves' method, Powell's method, Nelder Mead's Simplex search method.

UNIT – IV: Non Linear programming unconstrained optimization techniques

Indirect search methods: Gradient of a function, Steepest descent method, Newton's method. Davidon-Fletcher – Powell method, types of penalty methods for handling constraints.

UNIT – V:Non – traditional optimization algorithms

Genetic algorithms (GA) – working principle, reproduction, crossover, mutation, advanced GA operators. GA for constrained optimization, multimodal function optimization. Simulated annealing, working principle, Metropolis algorithm, differences and similarities between conventional and non-conventional algorithms, introduction to Neural networks and fuzzy logic as an optimization tool.

Suggested Readings

1. S.S.Rao, "Engineering Optimization", 3rd Edition, New Age Publishers, 2008.
2. Kalyanmoy Deb, "Optimization for Engineering Design", 1st Edition, PHI Publishers, 2009.
3. Jasbir Arora, "Optimal Design", Mc Graw Hill (International) Publishers.
4. D.E.Goldberg, "Genetic algorithms in Search, Optimization and Machine Learning", 1st Edition, John Wiley Publishers, 2009.
5. Kalyanmoy Deb, "Multi Objective Optimization Using Evolutionary Algorithms", 1st Edition, PHI Publications

I Year I Semester

L	T	P	To	C
4	0	-	4	4

AG519 Agro-Energy Audit and Management (DEPT. ELECTIVE)

Course Description & Objective:

To acquaint and equip about the sources of energy, conservation of energy and its management. Energy use scenario in agricultural production system, agro-based industry. Study of energy efficiency, energy planning, forecasting and energy economics.

Course outcomes:

1. *understand need to differentiate between conventional, non-conventional & renewable energy sources.*
2. *reason out why the non-conventional energy sources need to be used as replacement to conventional form of energy.*
3. *to know the importance & role of government all over the world to promote use of the renewable energy sources*
4. *recognizing of energy sources and types of energy used in agricultural production and agro-industry*
5. *collecting of necessary data for pre-energy audit in an agricultural enterprise or agro-industry*
6. *performing of organization and planning of necessary infrastructure studies for establishing of energy management system*
7. *understanding of relationship between energy consumption and production as for energy efficiency and savings*
8. *determining of potential of energy efficiency and energy savings*

UNIT I: Introduction

Energy resources on the farm: conventional and non-conventional forms of energy and their use. Heat equivalents and energy coefficients for different agricultural inputs and products.

UNIT II: Energy use pattern

Pattern of energy consumption and their constraints in production of agriculture. Direct and indirect energy. Energy audit of production agriculture, and rural living and scope of conservation.

UNIT III: Analysis and utilization

Identification of energy efficient machinery systems, energy losses and their management. Energy analysis techniques and methods: energy balance, output and input ratio, resource utilization, conservation of energy sources.

UNIT IV: Conservation

Energy conservation planning and practices. Energy forecasting, Energy pricing and incentives for energy conservation,

UNIT V: Economics

Energy economics, Factors affecting energy economics. Energy modelling.

Suggested Readings

1. Kennedy WJ Jr. & Wayne C Turner.1984. *Energy Management*. Prentice Hall.
2. Pimental D. 1980. *Handbook of Energy Utilization in Agriculture*. CRC
3. Fluck RC & Baird CD.1984. *Agricultural Energetics*. AVI Publ.
4. Rai GD. 1998. *Non-conventional Sources of Energy*. Khanna Publ.
5. Twindal JW & Anthony D Wier 1986. *Renwable Energy Sources*. E & F.N.Spon Ltd.
6. Verma SR, Mittal JP & Surendra Singh 1994. *Energy Management and Conservation in Agricultural Production and Food Processing*. USG Publ. & Distr., Ludhiana.

I Year I Semester

L	T	P	To	C
4	0	-	4	4

AG523 Ergonomics and Safety in Farm Operations (DEPT. ELECTIVE)

Course Description & Objective:

To acquaint and equip with the ergonomic aspects in the design of farm machinery for safety of human beings

Course outcomes:

On completion of the course, the student would be able to:

1. *demonstrate an awareness of the unique attributes involved with farm work and planning for safety on a farm*
2. *understand the ergonomic principles involved in designing a machine or system*
3. *design workplace in accordance with anthropomeric principles*
4. *understand basic occupational health and safety principles (including terminology)*
5. *demonstrate an awareness of the legal responsibilities in farm safety planning*
6. *assess the impact of vibration and noise effects on various farm machinery*
7. *assess the thermal effects on operators performance and its remedies.*
8. *understand the difference between swp and general safety guidelines and when to use each understand how attitudes on a farm emerge and how farm climate can be altered regarding the importance of safety*

UNIT I: Introduction and Work Physiology:

Concept and design criteria for optimum mutual adjustment of man and his work: Importance of ergonomics and its application in agriculture, liberation and transfer of energy in human body, concept of indirect calorimeter, work physiology in various agricultural tasks.

UNIT II: Stress Indices:

Physiological stress indices and their methods of measurement: Mechanical efficiency of work, fatigue and shift work.

UNIT III: Anthropometry and Biomechanics:

Anthropometric data and measurement techniques, joint movement and method of measurement, analysis and application of anthropometric data, measurement of physical and mental capacities.

UNIT IV: NVH & Heat stress:

Human limitations in relation to stresses and demands of working environments. Mechanical environment; noise and vibration and their physiological effects, thermal environment; heat stress, thermal comfort, effect on performance and behavior, field of vision, color discrimination, general guidelines for designing visual display.

UNIT V: Safety and Comfort assessment:

Safety standards at work place during various farm operations and natural hazards on the farm. Farm safety legislation. Man-machine system concept. Human factors in adjustment of man and his work. Design aspects of foot and hand controls on tractors and farm equipment. Design of operator's seat for agricultural equipment.

Suggested Readings

1. Bridger RS. 1995. *Introduction to Ergonomics*. McGraw Hill.
2. Charles D Reese. 2001. *Accident / Incident Prevention Techniques*. Taylor& Francis.
3. Gavriel Salvendy. 1997. *Hand Book of Human Factors and Ergonomics*. John Wiley & Sons.
4. Kromer KHE. 2001. *Ergonomics*. Prentice Hall.
5. Mathews J & Knight AA.1971. *Ergonomics in Agricultural Design*. National Institute of Agric. Engineering, Wrest Park Silsoe, Bedford.
6. Mathews J Sanders, Cormicks MS & MCEj. 1976. *Human Factors in Engineering and Design*. 4th Ed. McGraw Hill.
7. William D McArdle. 1991. *Exercise Physiology*.1991. Lea & Febiger.
8. Zander J. 1972. *Principles of Ergonomics*. Elsevier.
9. Zander J.1972. *Ergonomics in Machine Design.* Elsevier.

I Year II Semester

L	T	P	To	C
4	0	-	4	4

AG508 Tractor Ergonomics (DEPT. ELECTIVE)

Course Description & Objective:

To acquaint and equip with the ergonomic aspects in the design of tractors for safety and comfort of human beings

Course outcomes:

On completing this course successfully the student will be able to:

1. *understand and apply ergonomic principles to the creation of safer, healthier and more efficient and effective activities in the workplace;*
2. *understand ergonomic risk assessments and appropriate control measures;*
3. *understand the causes of upper limb disorders and how to reduce them;*
4. *appreciate workplace layout and equipment design;*
5. *appreciate environmental aspects of good ergonomic design.*

UNIT I: Principles

Ergonomic principles. Man-machine system, tractor reliability. Fatigue in tractor operation. Energy cost of tractor operation. Work rest cycle

UNIT II: Workplace and anthropometry

Tractor operator's working environment. Thermal stresses in tractor operation. Operator workplace design. Application of anthropometry in workplace design.

UNIT III: Noise and Vibration

Vibration and noise: Theory, evaluation, analysis and reduction, use of isolators, application in tractor seat design.

UNIT IV: Biomedical aspects and ROPS

Biomedical aspects of tractor operation; Visual perception in tractor control panel design. Principle and design of ROPS, International standards and testing of ROPS.

UNIT V: Computer applications and use

Computer application and automation in tractor design. Simulation of tractor cabin enclosure in view of ergonomics.

Suggested Readings

1. Bridger RS. 1995. *Introduction to Ergonomics*. McGraw Hill.
2. Gavriel Salvendy. 1997. *Hand Book of Human Factors and Ergonomics*. John Wiley & Sons.
3. Kromer KHE. 2001. *Ergonomics*. Prentice Hall.
4. Mathews J Sanders, Cormicks MS & MCEj. 1976. *Human Factors in Engineering and Design*. 4th Ed. McGraw Hill.
5. William D McArdle. 1991. *Exercise Physiology*.1991. Lea & Febiger.
6. Zander J. 1972. *Principles of Ergonomics*. Elsevier.

I Year II Semester	L	T	P	To	C
	4	0	-	4	4

AG510 Research Methodology and Data Analysis (DEPT. ELECTIVE)

Course Description & Objective:

To equip with basic concepts of research and its methodologies, to identify appropriate research topics and define appropriate research problem and parameters and to organize and conduct research in appropriate manner

Course outcomes:

1. *Understand the meaning of 'research' and 'research methodology' in the humanities*
2. *Understand the dynamic relationships between your chosen research questions and your research methodology*
3. *Recognize different research methodologies, and be able to select those relevant or appropriate for your research topic and questions*
4. *Understand the need for appropriate research methodologies for different kinds of research material Understand the place of different research methodologies in multidisciplinary and interdisciplinary contexts*

UNIT I: Basics of Research Methodology

Nature, scope, and design of social research; Review of literature: qualitative (literary), quantitative (meta-analysis); Hypothesis: sources, types and characteristics;

UNIT II: Survey

Sample survey: sample and census survey, probability, nonprobability and mixed sampling; Methods of data collection: historical method, case study, observation, ethnographic methods, interview, questionnaire, focus group discussion, participatory rural appraisal, experimental method, pretesting, and pilot survey;

UNIT III: Data Collection

Scaling techniques different scales, item analysis, reliability, validity; Method of secondary data collection: sources, sample criteria, characteristics;

UNIT IV: Data analysis

Data analysis: descriptive statistics, mean difference test, analysis of variance and experimental design; Bivariate and multivariate correlation and regression; Factor analysis, Cluster analysis, Discriminant analysis,

UNIT V: Data Interpretation and report writing

Structural equation modelling, non-parametric statistics, Content analysis; Report writing: review, qualitative, and empirical article writing.

Suggested Readings

1. Hamdy A Taha. 2001. *Operations Research*. Prentice Hall of India.
2. Holman JP 1996. *Experimental Methods for Engineers*. McGraw Hill.
3. Rudra Pratap. 2003. *Getting Started with MATLAB. A Quick Introduction for Scientists and Engineers*. Oxford Univ. Press.
4. Santhosh Gupta. 1979. *Research Methodology and Statistical Techniques*. Khanna Publ.
5. Steven C Chapra & Raymond P Canale. 2000. *Numerical Methods for Engineers with Programming and Software Applications*. Tata McGraw.

I Year II Semester

L	T	P	To	C
4	0	-	4	4

AG512 Simulation Modeling in Farm Machinery and Power Engineering (DEPT. ELECTIVE)

Course Description & Objective:

To acquaint and equip with the mathematical modeling of farm machinery, development of models using various techniques.

Course outcomes:

1. *Student will be acquainted with the concepts of modelling and simulation from an interdisciplinary point of view.*
2. *Student will be able to implement and simulate models using MATLAB®.*
3. *Depending on the selected applications in the selectable chapters section student will acquire further knowledge of Image Processing, Optical Character Recognition, Machine Learning, Business Case Modelling and Knowledge Management.*
4. *If you are an enthusiastic student with only rudimentary programming knowledge Student can acquire an understanding of basic MATLAB programming.*

UNIT I: Simulation models

System performance and modelling methodologies – transformation of units of measurement – dimensional homogeneity. Buckingham's Pi Theorem. Simulation for system modelling, Formulations of simulation model, validation and testing of the simulation model.

UNIT II: Properties and use of models

Experimentation with physical models and their application in farm machinery design. Sensitivity of models, scale effects, scale factors. Use of models. Complete similarity, kinematics and dynamic similarity.

UNIT III: Mathematical modeling

Model laws, empirical methods in model engineering. Principle of similarity in mathematical investigations. Mathematical modelling and its limitations, etc.

UNIT IV: Advanced modeling

Mathematical modeling through ordinary differential equation of first order, second order, partial differential equations. Similarity conditions and abstract parameters determining characteristics of engines.

UNIT V: Applications of modeling

Similitude in tillage tool studies, prediction models for traction devices. Analysis of modelling behaviour in problems related to tillage, traction and earthmoving equipment

Suggested Readings

1. Langhaar HL.1954. *Dimensional Analysis and Similitude*. McGraw Hill.
2. Sedov LI. 1991. *Similarity and Dimensional Methods in Mechanics*. Mir Publ., Moscow.

I Year II Semester	L	T	P	To	C
	4	0	-	4	4

AG514 Energy Conservation and Management in Farm Power and Machinery (DEPT. ELECTIVE)

Course Description & Objective:

To acquaint and equip with the energy use pattern in agriculture production systems, conservation of energy, energy planning and economics.

Course outcomes:

1. *Determine what farm practices use the most energy for producing a crop.*
2. *Describe farm equipment options for reducing energy use.*
3. *Describe management options for reducing energy use*

UNIT I: Energy requirement

Energy requirement of different operations in agricultural production systems viz. crop, livestock and aquaculture.

UNIT II: Energy conservation

Energy conservation through proper management and maintenance of farm machinery

UNIT III: Management of production system

Planning and management of agricultural production systems for energy conservation and energy returns assessment.

UNIT IV: Computer application in management

Development of computer program for efficient energy management in a given agricultural production system.

UNIT V: Forecasting

Energy use planning and forecasting for a given system.

Suggested Readings

1. Mittal JP, Panesar BS, Singh S, Singh CP & Mannan KD. 1987. *Energy in Production Agriculture and Food Processing*. ISAE and School of EnergyStudies, Ludhiana. ISAE Publ.
2. Pimental D. 1980. *Handbook of Energy Utilization in Agriculture*. CRC Press.

I Year II Semester	L	T	P	To	C
	4	0	-	4	4

AG516 Advances in Hydraulics and Electro Pneumatic Controls (DEPT. ELECTIVE)

Course Description & Objective:

To acquaint and equip with the latest developments in the field of hydraulics and pneumatics with special reference to the usage of these on the modern day tractors.

Course outcomes:

Upon completion of this chapter, the student should be able to:

1. *explain the meaning of fluid power.*
2. *list the various applications of fluid power.*
3. *differentiate between fluid power and transport systems.*
4. *list the advantages and disadvantages of fluid power.*
5. *explain the industrial applications of fluid power.*
6. *list the basic components of the fluid power.*
7. *list the basic components of the pneumatic systems.*
8. *differentiate between electrical, pneumatic and fluid power systems.*
9. *appreciate the future of fluid power in india.*

UNIT I: Basics of fluid flow

Fluid power, its advantages, properties of hydraulic fluids, viscosity, bulk modulus, density. Concepts of energy of hydraulic systems, laws of fluid flow.

UNIT II: System for fluid flow

Distribution system, pressure rating of tubing and hoses, couplings. Basics of hydraulic flow and hydraulic circuit analysis – pumps, types and theory of operation. Pressure intensifiers.

UNIT III: Components and properties

Fluid power actuators, hydraulic rams, gear motors, piston motors and their performance characteristics, electro hydraulic motors and hydrostatic transmissions, control components.

UNIT IV: Flow circuits

Directional pressure safety and servo valves. Hydraulic circuit design. Regenerative pump unloading, pressure intensifier circuits. Speed control of hydraulic motors, mechanical hydraulic servo systems for tractors.

UNIT V: Control elements and trouble shooting

Pneumatic circuits – properties of air. Compressors, control elements. Design of pneumatic circuits. Electrical control for fluid power circuits. Electronic sensors/ circuits used as controls in modern farm equipment. Maintenance of hydraulic and pneumatic circuits and devices. Trouble shooting.

Suggested Readings

1. Anthony Esposito. 2003. *Fluid Power with Applications*. Pearsons Edu.
2. Krutz G.1984. *Design of Agricultural Machines*. John Wiley & Sons.
3. Merritt HE. 1991. *Hydraulic Control System*. John Wiley a& Sons.
4. Majumdar SR. 2003. *Oil Hydraulic System*. Tata McGraw Hill.

I Year II Semester

L	T	P	To	C
4	0	-	4	4

AG518 Introduction to Intellectual Property Law (DEPT. ELECTIVE)

Course Description & Objective:

To equip with the fundamentals of intellectual property rights, its significance and applications.

Course outcomes:

At the end of the course, the participants should be able to:

1. *define in a very clear manner the role of intellectual property in the modern economy;*
2. *discuss the fundamentals of copyright protection and the laws pertaining thereto;*
3. *examine the fundamentals of patent law in the international community; and*
4. *explain the trademark law, what can be trademarked, and the various treaties and conventions which cover the law in the international realm.*

UNIT I: Introduction

Place of Intellectual Property in other Forms and Kinds of Property and Respective Characteristics

UNIT II: Requirements of IPR

Development of Right Jurisprudence and Significance of Proprietary Rights, Need for Development and Protection of Intellectual Property,

UNIT III: Types

Types of Intellectual Property: Patent, Copyright, Design, Trademark, Farmer and Breeders Right on Plant Breeding, Integrated Circuit, Trade Secret,

UNIT IV: Process of IPR

Geographical Indication, Nature, Term and Conditionality in Each Right, process of applying for a patent

UNIT V: Laws

Laws Dealing with the Rights, Expiration of the Right. Requirements and limitations of patentability

Suggested Readings:

1. Merges, Menell & Lemley, Intellectual Property in the New Technological Age (5th edition, Aspen 2010) (IPNTA)
2. Merges, Menell & Lemley, Intellectual Property in the New Technological Age: 2011 Case and Note Supplement (Aspen 2011)
3. Bagley, and Dauchy. Chapter 14 in *The Entrepreneur's Guide to Business Law*. Cengage Learning, 2011, pp. 558–69. ISBN: 9780538466462.

I Year II Semester	**L**	**T**	**P**	**To**	**C**
	4	**0**	**-**	**4**	**4**

AG520 Project Engineering and Management (DEPT. ELECTIVE)

Course Description & Objective:

To Acquire and fine-tune the skills and techniques for the life cycle of a project, to gain an understanding of essential principles associated with effective project management and to understand and apply methods for solving and avoiding common difficulties associated with project management

Course outcomes:

Student would gain:

1. *concepts to address specific management needs at the individual, team, division and/or organizational level*
2. *practical applications of project management to formulate strategies allowing organizations to achieve strategic goals*
3. *a perspective of leadership effectiveness in organizations*
4. *team-building skills required to support successful performance*
5. *critical-thinking and analytical decision-making capabilities to investigate complex business problems to propose project-based solutions*
6. *skills to manage creative teams and project processes effectively and efficiently*

UNIT I: Fundamentals

Introduction: Foundations of Project Management, Project Life Cycle, Project Environment, Project Selection, Project Proposal, Project Scope, Work Breakdown Structure.

Network Scheduling, Critical Path Method, Program Evaluation & Review Technique, Planning and Scheduling of Activity Networks, Assumptions in PERT Modelling,

UNIT III: Accounting

Time-cost Trade-offs, Linear Programming and Network Flow Formulations, PERT/COST Accounting. Scheduling with limited resources, Resource Planning, Resource Allocation

UNIT IV: Activity

Project Schedule Compression, Project Scheduling Software, Precedence Diagrams, Decision CPM, Generalized Activity Networks, GERT. Estimation of Project Costs, Earned Value Analysis

UNIT V: Progress assessment

Monitoring Project Progress, Project Appraisal and Selection, Recent Trends in Project Management.

Suggested Readings:

1. Khanna R. B. 2011. Project Management, PHI Publishers.
2. Garold D. Oberlender. 2014. Project Management for Engineering and Construction, McGraw Hill Education (India) Private Limited
3. Nigel J Smith. 2002. Engineering project Management, Blackwell science.

I Year II Semester	L	T	P	To	C
	4	0	-	4	4

ME504 Mechanical Vibrations (DEPT. ELECTIVE)

To enlighten the concepts of natural frequencies and resonance of mechanical systems.

Course outcomes:

1. *Appreciating the need and importance of vibration analysis in mechanical design of machine parts that operate in vibratory conditions*
2. *Ability to analyze the mathematical model of a linear vibratory system to determine its response*
3. *Ability to obtain linear mathematical models of real life engineering systems*
4. *Ability to use Lagrange's equations for linear and nonlinear vibratory systems*
5. *Ability to determine vibratory responses of SDOF and MDOF systems to harmonic, periodic and non-periodic excitation*
6. *General notion on frequency and time response of vibratory systems*

UNIT-1: Introduction

Introduction: Harmonic and periodic motions, vibration terminology, Vibration model, Single-DOF Free Vibrations: Equation of motion-Natural Frequency,Energy method, Rayleighmethod, damping models.Viscously damped free vibration Special cases: oscillatory, non-oscillatory and critically damped motions. Logarithmic decrement, Experimental determination of damping coefficient.Forced harmonic vibration, Magnification factor.Rotor unbalance, Transmissibility, Vibration Isolation, Equivalent viscous damping, Sharpness of resonance.

UNIT-2: Two-DOF Free Vibrations

Generalized and Principal coordinates, derivation of equations of motion, Lagrange's equation, Coordinate coupling, Forced Harmonic vibration, Vibration Absorber:Tuned absorber, determination of mass ratio.Tuned and damped absorber,

UNIT-3: Multi-DOF

Derivation of equations of motion, influence coefficient method, Properties of vibrating systems: flexibility and stiffness matrices, reciprocity theorem, Modal analysis: undamped, Modal analysis: damped Calculation of natural frequencies: Rayleigh method, Stodala method, Matrix iteration method, Holzer method and Dunkerley's method Torsional vibration: Simple systems with one or two rotor masses, Multi-DOF systems-transfer matrix method, Geared system

UNIT-4: Continuous systems

Closed form solutions, Vibration of strings, Longitudinal and torsional vibration of rods, Transverse vibration of beams: equations of motion and boundary conditions, Transverse vibration of beams: natural frequencies and mode shapes Continuous systems: Approximate solutions, Rayleigh's energy method, Rayleigh-Ritz method, Assumed modes and Galerkin's method

UNIT-5: Signature analysis and preventive maintenance

Vibration testing equipment's: signal generation, measuring and conditioning instruments, Vibration testing equipment's: signal analysis instruments

Suggested Readings:

1. Meirovitch, "Fundamentals of Vibration Analysis", 3rdEdition, McGraw Hill, 2001.
2. G.K. Groover, "Mechanical Vibrations", 8thEdition, S Chand and Brothers, 1996.
3. S. Graham Kelly, "Theory and Problems of Mechanical Vibrations", 8th Edition,
4. W.T. Thomson, "Theory of vibration with applications", 5thEdition, Prentice Hall, 1997.
5. Singiresu S. Rao, "Vibration of Continuous Systems, John Wiley & Sons, 2007

I Year II Semester

	L	T	P	To	C
	4	0	-	4	4

ME516 Experimental Stress Analysis
(DEPT. ELECTIVE)

Course outcomes:

The student would be gaining the following:

1. *the application basic science systematization thought excavation, the evaluation, the diagnosis project question, and plans and carries out ability of the special study and the solution.*
2. *have independent research, collection the data, standard problem take into analytical the identification acquire conclusion, and have development innovation and compose the ability of professional thesis.*
3. *usage mathematics engineering realm is related analysis and design software, explanation data with independently solve the ability of problem.*
4. *effectively communicate, expression integrity, leadership management, team cooperation division of labor and moderate integration of ability.*
5. *has mathematical and the project professional field self-study, the innovation ponder and ability of the sustained development.*
6. *have international machine and aviation of control to develop trend and technique ability.*
7. *comprehend a professional and social responsibility.*

UNIT – I: Introduction

Theory of Elasticity, Plane stress and plane strain conditions, Compatibility conditions, Problems using plane stress and plane strain conditions. Three-dimensional stress strain relations.

UNIT – II: Strain measurement methods

Various types of strain gauges, Electrical Resistance strain gauges, semiconductor strain gauges, gauge factor, strain gauge circuits. Calibration of strain gauges, temperature compensation in strain gauges.

UNIT – III: Brittle coatings

Introduction, coating stresses, failure theories, brittle coating crack patterns, crack patterns, crack detection, ceramic based brittle coatings, resin based brittle coatings, test procedures for brittle coatings analysis, calibration procedures, analysis of brittle coating data.

UNIT – IV: Moire Methods

Introduction, mechanism of formation of Moire fringes, the geometrical approach to Moire-Fringe analysis, the displacement field approach to Moire-Fringe analysis, out of plane displacement measurements, out of plane slope measurements, sharpening and multiplication of moiré-Fringes, experimental procedures and techniques. Birefringent Coatings: Introduction, Coating stresses and strains, coating sensitivity, coating materials, application of coating effects of coating thickness, Fringe-order determinations in coatings, stress separation methods.

UNIT – V: Photo elasticity

Polari scope – Plane and circularly polarized light. Bright and dark field setups, Photo elastic materials – Isochromatic fringes – Isoclinics, three-dimensional Photo elasticity: locking in model deformation, materials for three dimensional photo elasticity, machining, cementing and slicing the three dimensional models, slicing the model and interpretation of the resulting fringe patterns, effective stresses, the shear-difference method in three dimensions, application of the Frozen-stress method, the scattered-light method.

Suggested Readings:

1. Dally and Riley, “Experimental stress analysis”, 3rd Edition, Mc Graw Hill, 1991.
2. Sadhu Singh, “Experimental stress analysis”, 2rd Edition, Khanna Publications, 1990.
3. Timoshenko and Goodier JN, “Theory of Elasticity”, 3rd Edition, Tata McGraw Hill, 2010
4. Frocht, “Photo Elasticity”, 3rd Edition, Wiley Sons & Co., 2008.

MBA Course Structure

I Year I Semester (I Year)						
Subject Code	**Title of the Paper**	**External Marks**	**Internal Marks**	**Total Marks**	**Lecture**	**Credits**
MS149	Principles and Practices of Management (PPM)	50	50	100	4	4
MS150	Managerial Economics (ME)	50	50	100	4	4
MS151	Business Environment & Ethics (BEE)	50	50	100	4	4
MS152	Accounting for Managers (AFM)	50	50	100	4	4
MS153	Operations Research (OR)	50	50	100	4	4
MS154	Organizational Behavior (OB)	50	50	100	4	4
MS155	Business Laws (BL)	50	50	100	4	4
MS156	Managerial Communication (MC)	50	50	100	4	4
	Total			800	32	32

I Year II Semester (I Year)						
Subject Code	**Title of the Paper**	**External Marks**	**Internal Marks**	**Total Marks**	**Lecture**	**Credits**
MS157	Marketing Management (MM)	50	50	100	4	4
MS158	Corporate Finance (FM)	50	50	100	4	4
MS159	Human Resource Management (HRM)	50	50	100	4	4
MS160	Business Research Methods (BRM)	50	50	100	4	4
MS161	MIS & IT for Managers	50	50	100	4	4
MS162	Operations Management (OM)	50	50	100	4	4
MS163	E-Business (EB)	50	50	100	4	4
MS164	Project Management (PM)	50	50	100	4	4
	Total			800	32	32

II Year I Semester (II Year)						
Subject Code	**Title of the Paper**	**External Marks**	**Internal Marks**	**Total Marks**	**Lecture**	**Credits**
MS165	Strategic Management (SM)	50	50	100	4	4
MS166	Entrepreneurship & Business Plan (EBP)	50	50	100	4	4
	Specialization-I Elective-1	50	50	100	4	4
	Specialization-I Elective-2	50	50	100	4	4
	Specialization-I Elective-3	50	50	100	4	4
	Specialization-II Elective-1	50	50	100	4	4
	Specialization-II Elective-2	50	50	100	4	4
	Specialization-II Elective-3	50	50	100	4	4
MS167	Summer Internship Assessment	50	50	100		4
	Total			**900**	**32**	**36**

II Year II Semester (II Year)						
Subject Code	**Title of the Paper**	**External Marks**	**Internal Marks**	**Total Marks**	**Lecture**	**Credits**
MS188	International Business (IB)	50	50	100	4	4
	Specialization-I Elective-1	50	50	100	4	4
	Specialization-I Elective-2	50	50	100	4	4
	Specialization-I Elective-3	50	50	100	4	4
	Specialization-II Elective-1	50	50	100	4	4
	Specialization-II Elective-2	50	50	100	4	4
	Specialization-II Elective-3	50	50	100	4	4
MS189	Project Work	-	100	100		4
	Total			**800**	**28**	**32**

II Year I Semester Electives

Electives – Marketing

MS168 - Marketing Research
MS169 - Supply Chain Management
MS170 - Retailing Management
MS171 - Consumer Behavior
MS172 - Tourism Marketing

Electives – Finance

MS173 - Security Analysis and Portfolio Management
MS174 - International Financial Management
MS175 - Banking and Financial Services
MS176 - Financial Markets and Institutions
MS177 - Project Finance

Electives – HR

MS178 - Industrial Relations and Labour Laws
MS179 - Talent Planning and Acquisition
MS180 - Learning and Development
MS181 - Talent Management & Succession Planning
MS182 - Industrial and Organizational Psychology

Electives - Operations & Business Analytics

MS183 - Service Management
MS169 - Supply Chain Management
MS185 - Essentials of Business analytics
MS186 - Technology Management
MS187 - Operations Strategy

II Year II Semester Electives

Electives – Marketing

MS190 - Innovation and Product Development
MS191 - Advertising and Brand Management
MS192 - Services Marketing
MS193 - Sales & Distribution Management
MS194 - Integrated marketing Communication

Electives – Finance

MS251 - Financial Derivatives
MS252 - Fixed Income Securities
MS253 - Corporate Re-Structuring Finance
MS254 - Commodities Market
MS255 - Strategic Cost Management

Electives – HR

MS256 - Performance and Compensation Management
MS257 - Strategic and International HRM
MS258 - HR Analytics and Metrics
MS259 - Organization Development and Change
MS260 - Leadership & People Management

Electives - Operations & Business Analytics

MS190 - Innovation and Product Development
MS261 - Competitive Manufacturing Management
MS262 - Predictive Analytics for Managers
MS263 - Enterprise Resource Planning
MS264 - Productivity Improvement and Cost Control

I MBA I SEMESTER
MS149-PRINCIPLES AND PRACTICE OF MANAGEMENT

Course Objective:
This course objective is to offer an overview of the major functions of management. Emphasis is on planning, organizing, controlling, directing, and communicating. Upon completion, students should be able to work as contributing members of a team utilizing these functions of management.

Course Outcomes:
On completion of this course, learners will be able to:

- Evaluate the global context for taking managerial actions of planning, organizing and controlling.
- Assess global situation, including opportunities and threats that will impact management of an organization.
- Integrate management principles into management practices.
- Specify how the managerial tasks of planning, organizing, and controlling can be executed in a variety of circumstances.

UNIT - I
Introduction to Management: Concept of management - Management functions - Managerial roles- Is management science or art?- History and current thinking: Classical approach, Behavioral approach, Management science approach, The contingency approach, The systems approach.
UNIT - II
Planning & Decision Making: Concept of planning - Purpose of planning-Planning process-Management by objectives- Defining decision making- Types of decisions- Decision making process-Decision making conditions- Group decision making and Decision trees.
UNIT - III
Organizing: Concept of organizing - Organizing process - Organization structures-Departmentation- Responsibility, authority and delegation- Span of management.
UNIT - IV
Directing: Concept of motivation-Theories of motivation: Process theories of motivation, Content theories of motivation- Strategies for motivating organization members- Concept of leadership,-Trait approach to leadership.
Situational approach to leadership- Communication- Communication process- Barriers to communication - Interpersonal communication in organization.
UNIT - V
Controlling: Concept of controlling- Controlling process- Types of control - Techniques of controlling

TEXT BOOKS:
1. Samuel C.Certo, S.Trevis Certo: Modern Management, 10/e, Prentice-Hall, New Delhi, 2007
2. Stoner, Freeman, and Gilbert, Jr. Management, 6/e, Pearson education, New Delhi, 2006

REFERENCE BOOKS:
1. Heinz Weihrich, Harold Koontz: Management A Global perspective, 10/e, Tata McGraw Hill, 2007.
2. Daft, The New Era of Management, Thomson, 7/e, New Delhi, 2007.
3. Schermerhorn: Management, 8/e, Wiley, India, 2006.

MS 150-MANAGERIAL ECONOMICS

Course Objective:
This course provides students with the knowledge, tools and techniques to make effective economic decisions under conditions of risk and uncertainty. Demand, cost and pricing decisions are emphasized. Topics include decision-making criteria and procedures, demand and cost theory and estimation, pricing theory and practice (including price positioning), pricing new products and competitive bids and price quotes.

Course Outcomes:
On completion of this course, learners will be able to:

- Apply the economic way of thinking to individual decisions and business decisions.
- Understand how prices get determined in markets, how market participants benefit in the form of consumer surplus and producer surplus, and what are the consequences of government intervention.
- Understand the different costs of production and how they affect short and long run decision.
- Derive the equilibrium conditions for cost minimization and profit maximization.
- Understand economies of scale, diseconomies of scale, economies of scope, and cost complementarities, and how each affects the cost of production.

UNIT - I
Introduction to Managerial Economics: Definition, Nature and Scope, Relationship with other areas in Economics, Significance of Managerial Economics in functional areas of business. The role of managerial economist. Basic economic principles.
UNIT - II
Theories of firm and Demand & Supply Analysis: Managerial theories of firm, Behavioral theories of firm, Elasticity of demand, types and significance of Elasticity of Demand. Measurement of price Elasticity of Demand, Law of Supply, Elasticity of Supply. Need for Demand forecasting, Types of forecasting techniques.
UNIT - III
Production Analysis: Production function, Marginal Rate of Technical Substitution, Production function with one/two variables, Isoquants and Isocosts, Cobb-Douglas Production Function, Returns to Scale and returns to factors.
UNIT - IV
Cost theory and estimation: Cost concepts, determinants of cost, Cost – output relationship in the short run and long run, Average cost curves, Economies of scale. Cost-volume-profit analysis.
UNIT - V
Pricing and Profit Management: Features and Types of different competitive situations, Price-Output determination in Perfect competition and Monopolistic competition both in the long run and short run. Pricing methods in practice. Profit Management- Nature, scope and theories of profit.

TEXT BOOK:

1. Maheshwari K. L. , Varshney R.L. , Managerial Economics, 22nd Revised Edition 2014, Sultan Chand & Sons.

REFERENCE BOOKS:

1. Dominick Salvatore, Managerial Economics in a global economy, Indian Edition ; Fourth Edition, McGrawHill.
2. Craig H Peterson, W.Cris Lewis, Sudhir.k.Jain; Managerial Economics, Pearson Publications.
3. P.L.Mehta; Managerial Economics, Sultan Chand Sons.
4. M.L.Trivedi; Managerial Economics Theory and Applications, McGrawHill.

MS 151-BUSINESS ENVIRONMENT & ETHICS

Course Objective:
To analyse the overall business environment and evaluate its various components in business decision making. And provides an analysis and examination of significant contemporary ethical issues and challenges existing throughout the professional business arena. Emphasis will be placed upon the manager's social and environmental responsibilities to a wide variety of stakeholders, including employees, customers and the public.

Course Outcomes:
On completion of this course, learners will be able to:
- Familiarize with the nature of business environment and its components.
- The students will be able to demonstrate and develop conceptual framework of business environment and generate interest in international business.
- Understand the definition of ethics and the importance and role of ethical behavior in the business world today.

UNIT - I
The Concept of Business Environment: Meaning of business environment – Types of environment – Nature and scope of business – Business objectives and its characteristics – Environmental Analysis and Forecasting – Importance of business environment.
UNIT - II
Economic systems and their impact on business: Capital Market – Money Market – Investor Protection and role of SEBI –Stock Exchange and its regulation - Liberalization – Privatizaton – Globalization.
UNIT - III
Industrial Policies: A brief review of industrial policies since independence, Industrial policy of 1991 and recent developments – policy on foreign direct investment in Indian Industry – Privatisation and disinvestment.
UNIT - IV
Business Ethics: Nature of ethics - Ethical Principles in Business - Relationship between ethics and business – Ethical organization – Characteristics of ethical organization- ethical corporate code – Ethical leadership.
UNIT - V
Ethics in HRM: Ethics in Marketing - Ethics in Finance - Ethics at workplace – Corporate Social Responsibility – Corporate Governance – KM Birla Committee Report on Corporate Governance - Consumer Protection Act – Small Investor Protection.

TEXT BOOKS:
1. Francis Cherunilam: Business Environment: Text and Cases, 17/e, Himalaya, 2007.
2. Manuel G. Velasquez, Business Ethics: Concepts and Cases, PHI, New Delhi, 2009.
REFERENCE BOOKS:
1. Justin Paul: Business Environment, 1e 2006, Tata MH.
2. Misra and Puri: Indian Economy, Himalaya, 2007.
3. Dutt and Sundaram, Indian Economy, S. Chand, New Delhi, 2007.

MS 152- ACCOUNTING FOR MANAGERS

Course Objective
The objective of the course is to provide an understanding of practical aspects of accounting, managing assets, financial analysis, cost behavior and improve decision making skills.

Course Outcomes:
On completion of this course, learners will be able to:
- Demonstrate knowledge of the business accounting cycle for the corporate form of business.
- Understand the framework for preparation and presentation of financial statements.
- Develop decision making skills in the application of Revenue and monetary Assets.
- Acquire practical knowledge on application of cash flows and Ratio Analysis. Prepare and interpret cost behavior in organization.
- Demonstrate knowledge on strategic planning and Budgeting process.

UNIT - I
Basic Accounting Concepts: The income statement-Nature of Income - Recognition of Expenses-Gains and Losses- other concepts of Income-Accounting and Changing Prices. The Balance sheet-Ratios-Balance sheet changes.
UNIT - II
Revenue and Monetary Assets: Timing and Amount of Revenue Recognition-Monetary Assets and their Analysis. Cost of Sales and Inventories: Types of companies-Inventory Costing Methods- lower of cost- Analysis of Inventory. Long –Lived Nonmonetary Assets and Their Amortization: nature of Long –Lived Assets- Accounting for Depreciation-Plant and Equipment Disposal- Income tax Consideration-natural Resources- Intangible Assets.
UNIT - III
The statement of cash Flows: The cash Flow Statement- Misconceptions about depreciation-Preparation and Analysis of Cash Flow Statements. Financial Statement Analysis: overall Measures- profitability Ratios- Investment Utilization Ratios-Financial Condition Ratios-Dividend Policy-Growth measures-Making Comparisons.
UNIT - IV
The Behavior of costs: Relation of costs to Volume-Profit. Full Costs And Their Uses: Cost Concepts- product Costing Systems- Nonmanufacturing Costs-Uses of Full Cost. Additional Aspects of product Costing Systems: Job Order Costing and process Costing Systems-Measurement of Direct Costs-Allocation of Indirect Costs.Cost System Design Choices.
UNIT - V
Strategic Planning and Budgeting: Budgeting- Operating Budget and it's preparation – Cash Budget- capital Expenditure Budget-Beyond Budgeting.

TEXTBOOK:
1. Accounting Text and Cases by Robert Anthony, David Hawkins and Kenneth Merchant (13th Edition), The McGraw-Hill Companies

REFERENCE BOOKS:
1. Financial Accounting by Needles & Powers (11th Edition), South Western Cengage Learning
2. Financial Accounting by Gary Porter & Curtis Norton (6th Edition), Cengage Learning
3. Managerial Accounting by Garrison, Noreen & Brewer (11th Edition), Tata Mcgraw Hill
4. Introduction of Management Accounting by Horngreen, Sundem, Stratton, Burgstahler and Schatzberg (14th Edition), Pearson
5. Indian Accounting Standards (Ind AS) & IFRSs for Finance Executives by T.P Ghosh (2nd Edition), Taxmann Publications Pvt Ltd
6. IFRS – A Briefing for Chief Executives, Audit Committees and Board of Directors issued by IASB
7. Red Book on International Financial Reporting Standards issued by IASB

MS 153-OPERATIONS RESEARCH

Course Objective:

This course aims to enable students to use quantitative methods and techniques for effective decisions–making; model formulation and applications that are used in solving business decision problems.

Course Outcomes:

On completion of this course, learners will be able to:

- Identify and develop operational research models from the verbal description of the real system.
- Understand the mathematical tools that are needed to solve optimization problems. Use mathematical software to solve the proposed models.
- Develop a report that describes the model and the solving technique, analyze the results and propose recommendations in language understandable to the decision-making processes in Management Engineering.

UNIT - I

Linear programming: Origin and scope of Operations Research-Introduction-formulation of linear programming problem-general statement of linear programming problem-assumptions underlying linear programming problem-solution to linear programming problem: Graphical method-some special cases.

UNIT - II

Simplex Method: Introduction-Simplex Method-Solution of Maximization problem-solution of Minimization problems: Big-M method and Two-phase method.

UNIT - III

Transportation problem and Assignment problem: Transportation problem: Introduction-problem statement-solution to the transportation problem: North-west corner rule- Least cost entry method-Vogel's approximation method-MODI method. Assignment problem: Introduction-Solution to the assignment problem: Hungarian Method-some special cases.

UNIT - IV

Theory of Games: Introduction-Game models-Two person zero-sum game and their solutions: Saddle point-when no saddle point exists-dominance rules-solution of 2 x n and m x 2 games.

UNIT - V

PERT & CPM: Introduction-PERT/CPM networks-Rules of network construction-Network analysis: determination of earliest and latest times-critical path-calculation of floats-programme evaluation and review technique.

TEXT BOOK:

1. Quantitative techniques in management, N D VOHRA, Third edition, TATA McGRAW HILL.

REFERENCE BOOKS:

1. An introduction to management science: Quantitative approach to Decision making, Anderson, Sweeney, Williams, 11th edition, CENAGE Learning.
2. Operations Research: An introduction, Hamady A. Taha, 9th edition, PEARSON.
3. Principles of Operations Research with application to managerial decisions, Wagner H.M., 2nd Ed. PHI Learning Pvt. Ltd.
4. Data Analysis, Optimization and Simulation Modeling, Albright, Zappe& Winston, 4th Ed., CENAGE Learning.

MS 154 - ORGANIZATIONAL BEHAVIOR

Course Objective:
This course deals with human behavior in organizations. Conceptual frameworks, case discussions, and skill-oriented activities applied to course topics which include: motivation, learning and development, group dynamics, leadership, communication, power and influence, change, diversity, organizational design, and culture. Class sessions and assignments are intended to help participants acquire skills and analytic concepts to improve organizational relationships and effectiveness.

Course Outcomes:
On completion of this course, learners will be able to:

- Recognize and discuss the different perspectives of working culture in organizations.
- Interpret key concepts and theories with regard to individual differences and apply these appropriately to specific situations.
- Interpret the key concepts and theories with regard to group behaviour and apply these appropriately to specific situations.
- Understand how organizational performance can be improved through the effective management of human resources.

UNIT - I

Introduction to OB: Introduction, Disciplines That Contribute to the OB Field – Challenges and Opportunities for OB – The Individual: Diversity in Organizations, Biographical Characteristics, Ability, Implementing Diversity Management Strategies – Attitudes, Components, Job Attitudes – Job Satisfaction, Measuring, Causes of Job satisfaction, The Impact of Satisfied and Dissatisfied Employees on the Workplace.

UNIT - II

Emotions, Moods & Values: Emotions and Moods, Functions & Sources of Emotions and Moods – Affective Events Theory - Emotional Intelligence – Personality, The MBTI, The Big Five Personality Models – Values, Importance, Terminal, Instrumental, and Generational Values – Linking Personality and Values to the Workplace, Person-Job Fit, Person-Organization Fit

UNIT - III

Perception & Motivation: Perception, Meaning, Factors That Influence Perception- Person Perception, Attribution Theory, Common Shortcuts in Judging others, Applications – Perception and Decision Making, The Rational Model, Bounded Rationality- Ethics in Decision Making – Motivation, Defining Motivation, Motivating by Job Design: The Job Characteristics Model – Employee Involvement, Using Rewards to Motivate Employees

UNIT - IV

The Group: Defining and Classifying Groups, Stages of Group Development – Group Properties: Roles, Norms, Status, Size, and Cohesiveness – Group Decision Making, Group Think and Group Shift, Group Decision-Making Techniques – Teams, Differences between Groups and Teams, Types of Teams – Creating Effective Teams, Factors of Success, Team Composition, Team Processes – Turning Individuals into Team Players

UNIT - V

Power and Politics: Power, Bases, Power Tactics - Politics, Causes and Consequences of Political Behavior, Ethics of Behaving Politically – Conflict, Transitions in Conflict Thought, The Conflict Process – Negotiation, Strategies, The Negotiation Process – Organizational Culture, Definition, Strong versus Weak Cultures, Culture's Functions – Creating and Sustaining Culture, How Employees Learn Culture – Work Stress and Its Management

TEXT BOOK:

1. Robbins, Judge, and Vohra: Organizational Behavior, 15e, Pearson Education India, 2014.

REFERENCE BOOKS:

1. Fred Luthans: Organisational Behavior, 12/e, McGraw-Hill, 2010.
2. Debra L. Nelson, James C. Quick : ORGB, 4/e, Cengage Learning, 2014.
3. John R. Schermerhorn, Organizational Behavior, 12/e, John Wiley & Sons, 2011.

MS 155-BUSINESS LAWS

Course Objective:
This course is designed to provide the student with knowledge of the legal environment in which a consumer and businesses operates, and to provide the student with knowledge of legal principles.
Course Outcomes:
On completion of this course, learners will be able to:
- On completion of this course, learners will be able to: appreciate the relevance of business law to individuals and businesses and the role of law in an economic, political and social context.
- Identify the fundamental legal principles behind contractual agreements.
- Examine how businesses can be held liable in tort for the actions of their employees.
- Understand the legal and fiscal structure of different forms of business organizations and their responsibilities as an employer.
- Acquire problem solving techniques and to be able to present coherent, concise legal argument.

UNIT - I
Contract Law: The Indian Contract Act 1872; Establishing the contract, Offer and Acceptance, Consideration, Competency of Parties, Free consent, Legality of Object, Void agreements, Contingent Contracts, Performance and Discharge of Contract, Remedies for Breach of Contract, Indemnity and Guarantee, Bailment and Pledge, Agency

UNIT - II
Sale of Goods Act: The Sales of Goods Act 1930; Nature of Contract of Sale; Conditions and Warranties; Transfer of Ownership and Delivery; Rights of Unpaid Seller and Rights of Buyer**.** **Partnership Act:** The Indian Partnership Act 1932; Nature of Partnership; Formation of Partnership; Rights, Duties and Liabilities of Partners; Dissolution of a Partnership Firm**.** **Intellectual Property Laws:** Subject /matter of Intellectual Property; Aim & objectives; Classification of Intellectual Property Rights; Emerging issue in Intellectual Property

UNIT - III
Negotiable Instruments Act: The Negotiable Instruments Act 1881; Meaning and Definition of Negotiable Instruments; Competence and Liability of Parties to Negotiable Instruments, Negotiation and Assignment; Presentment of Negotiable Instruments; Dishonor and Discharge of Negotiable Instruments; Banker and Customer. **Competition Act:** The competition Act 2002; Aim and objectives of competition commission; concept and provisions

UNIT - IV
Company Law: The Companies Act 1956; Nature and Kinds of Companies; Formation of Companies; Company Management; Company Meetings; Winding Up of a company. **Consumer Protection Act:** The Consumer Protection Act 1986; Features, aim and objectives; Rights of consumer

UNIT - V
Information Technology Act: The Information Technology Act 2000; Aim, objectives, scopes, concept, provisions; Attribution, Acknowledgement and dispatch Electronic record; Digital Signature Certificate; Penalties and Adjudication **Environment Protection Act:** Environment vs Environmental Law; General Legislation; Forest & Wildlife Protection Legislating; Water Pollution Protection Legislation; Air Pollution Protection Legislation

TEXT BOOK:
1. Legal Aspects of Business 3rd Edition, Ravinder Kumar, Cengage Learning
2. Elements of Mercantile Law by N.D. Kapoor, Sultan Chand & Sons

REFERENCE BOOKS:
1. Business Law by N.D. Kapoor, Sultan Chand & Sons
2. Legal Aspects of Business by Akhileshwar Pathak, Tata McGraw Hill
3. Business Law by Tejpal Sheth, PEARSON
4. Business Law by D. Chandra Bose, PHI Learning Private Limited
5. Business Law (6th Edition) by MC Kuchhal & Vivek Kuchhal, Vikas.

MS 156-MANAGERIAL COMMUNICATION

Course Objectives:
This course is designed to enable students to understand the nature and scope of communication and its implications in the real time business world. Expose to the receptive and productive skills of English language to attain proficiency. Familiarize the basic writing skills which lay a strong foundation for writing business documents.

Course Outcomes:
On completion of this course, learners will be able to:
1. Understand the scope of communication and learn its importance and implication strategies.
2. Recognize and learn the sub-skills of listening and speaking and be able to deliver effectively in the real time contexts.
3. Imbibe the mechanics of writing and construct effective paragraphs which befit in a longer composition.
4. Use different forms of written communication techniques to make effective internal and external business correspondence.
5. Produce different types of reports with appropriate format, organization and language.

UNIT - I

Communication – Nature and Scope: Communication – Significance – Process – Types – Flow of Communication – Basic Communication Skills – LSRW – Verbal and Non-verbal Communication – Formal Vs Informal Communication – Oral and Written Communication – Barriers to effective communication – organizational communication – Strategic implications of modern communication.

UNIT–II

Aural and Oral Communication: Listening – Active and Passive Listening – Barriers to effective listening – Strategies for effective listening – Introduction to presentations – Conversations – Role play – JAM – Debate – Extempore – Individual and Group Presentations – Group Discussions – Procedure – participation – Interviews - Business presentations - Addressing large groups – Public Speaking.

UNIT–III

Written Communication: Sentence Structure – Requisites of a good sentence – Writing paragraphs – Principles of writing a good paragraph – Development of paragraphs – Describing people, places, things and processes – Narrating events, incidents – Persuasive communication – Longer composition – Common errors in writing.

UNIT–IV

Business Correspondence: Internal Communication – External Communication – Writing a memo – Letter Vs memo – Form and Structure – Circular – Notice – Agenda – Proceedings of meetings – Minutes – Business Letters – Sales Letters – Enquiry – Quotations – Placing orders – Claims – Adjustments – Inviting – Appreciating – Thanking etc. – Writing Emails – Standard Email practices – Email etiquette – Sample Emails.

UNIT–V: Reports, Proposals and Presentations: Purpose of writing Reports – Format and Style – Types of reports – Regular reports – Factual reports – Survey reports – Feasibility reports – Business presentations – Format – Key elements for winning business proposals – Business presentations – Planning – Preparing – Organizing – Rehearsing – Improving – Visual aids – Nuances of delivery.

TEXT BOOKS:
1. Koneru, A., “Professional Communication”, 2008, Tata McGraw Hill.
2. Bill Mascull, “Business Vocabulary in Use”, 2010, Cambridge University Press.

REFERENCE BOOKS:
1. Bovee, C. and Thill, J.V., “Business Communication Today”, 11th edition, 2011, Prentice Hall.
2. Francis Soundararaj, “Speaking and Writing for Effective Business Communication”, 2008, Macmillan.
3. RK Madhukar, “Business Communication”, 2010, Vikas Publishing House Pvt. Ltd.
4. Mallika Nawal, “Business Communication”, 2012, Cengage Learning India.
5. Meenakshi Raman & Prakash Singh, “Business Communication”, 2012, OUP.

I MBA II Semester
MS157 - MARKETING MANAGEMENT

Objective of the course:
The course is designed to provide students with an overview of the decision making process in marketing. Marketing decision-making is a process that is essentially wrapped around the fundamental goal of creating value in the marketplace. This requires a professional knowledge of market drivers, competitors' capabilities, technological trends and the market dynamics of value. The orientation is toward the kinds of marketing decisions that managers must make within the modern business environment. The primary goal of this course aims at making students understand concepts, philosophies, processes and techniques of managing the marketing operations of a firm.

Course outcomes
By the end of this course it is expected that the student will be able to:

- Understand basic concepts of marketing and elements of marketing environment
- Understand how to segment markets, target and launch with apt product positioning strategies.
- Determine the factors that influence product and pricing decisions.
- Take correct and situational based channel and promotional decisions.
- Understand advanced concepts of marketing, changing trends and their applicability in today's competitive world.

UNIT - I: Introduction- Definition, Importance and Scope of Marketing, Philosophies of Marketing Management, Elements of Marketing - Needs, Wants, Demands, Customer, Consumer, Markets and Marketers; Marketing Vs Selling, Consumer Markets and Industrial Markets.
Concept of Marketing Management, Marketing – Mix, Marketing Organizations – Evolution and functions, Marketing Environment, Factors Affecting Marketing Environment, Marketing Information System and Marketing Research.

UNIT - II :Market Segmentation, Targeting and Positioning- Segmenting the Market – Levels and patterns of segmentation, Market Segmentation Procedure, Basis for Consumer/Industrial Market Segmentation. Market Targeting – Introduction, Factors to be considered for targeting, Evaluating and selecting market segments, Product Positioning - Introduction, Developing and communicating a positioning strategy – Positioning errors and possibilities, Positioning strategies.

UNIT - III: Marketing - Mix Decisions - Product & Pricing Decisions- New Product Development-Concept and Necessity for Development, Challenges in New Product Development, New Product Planning and Development Process, Product-Mix, Branding and Packaging Decisions, Product Life cycle - Stages and Strategies. Pricing Decisions - Pricing Objectives, Process of pricing, Methods of Setting Price, Pricing Strategies.

UNIT - IV :Marketing - Mix Decisions - Channel and Promotional decisions- Channels of Distribution for Consumer/ Industrial Products, Channel functions, Management of Channels, Factors affecting Channel decisions, Wholesaling and Retailing, Promotion - Promotion-mix, Advertising, Sales Promotion, Personal Selling, Direct marketing, Publicity and Public Relations.

UNIT - V: Changes in Marketing Practices: A brief account of Marketing of Services, Rural Marketing, CRM, Electronic Marketing; B2C,C2B, B2B and C2C, Internet Marketing, International Marketing, Strategic Marketing Planning.

TEXT BOOK:

1. Philip Kotler: "***Marketing Management***", 11/e, Pearson Publishers, New Delhi, 2011

REFERENCE BOOKS:

1. Stanton William.J., Fundementals of Marketing, McGraw Hill, New Delhi , 10th edition.
2. Boone and Kurtz: "***Principles of Marketing*** ", Cengage Learning, New Delhi.
3. Rajan Saxena: "***Marketing Management***, 4/e, Tata McGraw Hill, New Delhi, 2009.
4. Tapan K Panda: "***Marketing Management Text and Cases***", Excel Books, New Delhi.
5. VS Ramaswamy, S.Namakumari:, "***Marketing Management***", 4/e, Macmillan, New Delhi, 2009
6. Karunakaran: "***Marketing Management***", Himalaya Publishing House, Mumbai.
7. M.Govindarajan: "***Marketing Management, Concepts, Cases, Challenges and Trends***", PHI Private Limited, New Delhi, 2007.

MS158 - CORPORATE FINANCE

Course Objective

This course aims to provide a framework of fundamental concepts, principles and approaches of corporate finance. It enables the students to apply their knowledge in solving problems of corporate organizations and help them to improve their overall capacities in the field of corporate finance.

Course outcomes

Students who successfully complete this course will be able to:

- Understand the concepts of time value of money relating to corporate investment decisions.
- Analyze and evaluate investment opportunities and apply capital budgeting techniques in investment decisions.
- Demonstrate conceptual and practical knowledge of capital structure and dividend policy and how it affects a firm value.
- Understand the concepts of time working capital management and ability to communicate their view point's relating to the financial health of firms.

UNIT - I

Perspectives on Corporate Finance: Finance Function & Inter linkages with other functions. Objective of the finance Function, Investment, Financing and dividend, firm value maximization, Agency Problems, Time value of Money.

UNIT - II

Capital Budgeting Decisions: Investment Appraisal Methods- NPV, Alternate decision rules, mutually exclusive investment opportunities. Fundamentals of Capital Budgeting- Forecasting earnings, determining free cash flow, NPV, Risk Analysis in capital Budgeting.

UNIT - III

Capital Structure: Cost of Capital- Component cost of capital and WACC. Capital structure and impact on firm value- MM Hypothesis with and without taxes, traditional models, bankruptcy costs, Agency costs.

UNIT - IV

Dividend Policy: Forms of dividend, Theories of dividend, Dividend payout theory- Payout theories, and comparison of dividends versus buy backs.

UNIT - V

Working capital management: Cash cycle, operating cycle, estimation, Factors affecting working capital, Types of working capital- Receivables management, Cash Management, Short term financing.

TEXT BOOK:

1. Ross, Westerfield and Jaffe and Kakani (RWJK) Corporate Finance, Tata Mc Graw Hill, 2009.

REFERENCE BOOKS:

1. Michael C Ehrhardt and Eugene F Brigham, Corporate Finance- A Focused Approach, Cengae Learning, 2011.
2. Rajiv Srivastava and Anil Misra, Financial Management, Oxford University Press, 2011
3. I.M.Pandey, Financial Management (10th edition), Vikas Publishing 2011.
4. Anthony, Hawkins and Merchant, Accounting: Text & Cases.

MS159 - HUMAN RESOURCE MANAGEMENT

Objective of the Course:

The course provides an understanding of how the human resources management function is led in organizations. By the end of the course the learner will be able to appraise HRM functions and know how they can be executed in the organizations.

Course outcomes:

By the end of the course the learners are expected to

- Gain knowledge of the overall functions of Human Resource Management and role of HR Dept. in organizations.
- Understand how the specific operational functions of HRM are executed in the organizations.
- Appraise the various HR needs and corresponding programmes to be implemented in organizations.
- Develop perspective to deal with Human Resources in organizations.

UNIT - I

Introduction, HRM at work – The Changing Environment and Changing Role of HRM– The HR Manger's Proficiencies – Labor Legislations in India – Equal Employment Opportunity and the Law in US – Discriminatory Employment Practices, EEOC Enforcement, Diversity Management and Affirmative Action Programs.

UNIT - II

Job Analysis: Basics, Methods – Writing Job Descriptions and Job Specifications – The Recruitment and Selection Process: Planning and Forecasting – Effective Recruiting, Internal and External Sources of Candidates – Recruiting a more Diverse Workforce, Developing and Using Application Forms – e-Recruitment – Recruitment Process Outsourcing.

UNIT - III

Selection: Importance, Basic Testing Concepts, Types of Testing, Work Samples and Simulations – Background Investigation and other Selection Methods – Basic Features of Interviews – What can Undermine and Interview's Usefulness, Designing and Conducting an Effective Interview – Orientation: Purpose, Process – Training: Process –Training Methods –Management Development, Change Management, Evaluating the Training Effort.

UNIT - IV

Basic Concepts in Performance Management and Appraisal, Introduction to Appraising Performance – Steps and Methods in Performance Appraisal – Appraising Performance: Problems and Solutions, The Appraisal Interview – Career Management, Career Planning and Career Development – Managing Promotions and Transfers

UNIT - V

Factors Determining Pay, Establishing Pay Rates – Competency Based Pay and other Compensation Trends – Incentives: Individual, Group and Organization wide Plans – Employee Benefits in India: Pay for Time Not Worked, Insurance, Retirement, Family Friendly Benefits and Flexible Benefits– Employee Relations: HRM's Role in Ethics and Fair Treatment – Collective Bargaining Process and Grievances – Trends in HR - HR Metrics – HR Analytics

TEXT BOOK:

1. Dessler, Varkkey: Human Resource Management, 12/e, Pearson Education India, 2014.

REFERENCE BOOKS:

1. Armstrong, Taylor: Armstrong's Handbook of Human Resource Management Practice, 13/e, Kogan Page, 2014.
2. Decenzo, Robbins: Fundamentals of Human Resource Management, 11/e Wiley, 2013.

MS160 - BUSINESS RESEARCH METHODS

Course Objective:

Business research is a systematic enquiry whose objective is to provide information to solve managerial problems. This course is an introduction on how to do business research with an emphasis on applied problem solving. It has a major emphasis on applied problem solving strategies and communication skills.

Course outcomes:

Upon completion of this course you should able to:

- Understand thse steps in conducting research and survey methods of data collection.
- Understand the meaning and importance of questionnaire and sampling.
- Undrstand the concepts of Correlation, Regression and Multiple Regression analysys.
- Understand the concepts of tesing Quantitative data uing Statistical inference.
- Understand the concepts analyzing Qualitative data and effevtive way of Report preparation.

UNIT - I

Business Research and Sources of Data: Business Research: Introduction, Difference between Basic and Applied research, Business Research Process Design, Types of research: Exploratory Research, Descriptive Research.

Sources of Data: Secondary Data Sources, Survey methods of data collection.

UNIT - II

Questionnaire design and Sampling: Questionnaire: Introduction, Questionnaire design process-Pre-Construction Phase, Construction Phase, Post-Construction Phase.

Sampling: Introduction, Random Sampling methods: Simple random Sampling, Stratified Random Sampling, Cluster Sampling, Systematic Sampling, Multi Stage Sampling. Non-Random Sampling: Quota sampling, Convenience Sampling, Judgment Sampling.

UNIT - III

Correlation and Linear Regression: Correlation, Karl Pearson's Coefficient of Correlation, Introduction to Simple linear Regression, Determining the equation of a Regression line, Multiple Regression model, Multiple Regression Model with two independent variables.

UNIT - IV

Hypothesis Testing: Introduction to Hypothesis testing, Hypothesis testing procedure, Two-tailed and One-tailed tests of hypothesis, Type and Type –II errors, Hypothesis testing for single mean, Two Population means using t-test, Hypothesis testing with z Statistic for the difference in the means of two populations, Statistical Inference about the difference between the means of two related Populations.

UNIT - V

Hypothesis Testing for Categorical Data and Report Writing: Introduction, Defining Chi-square statistic, Conditions for applying χ^2 test, χ^2 Goodness of fit, χ^2 test of independence. Analysis of variance,Completely Randomozed Design(ONE-WAY ANOVA), Rnadomozed Block Design (TWO-WAY ANOVA), Introduction to Report Writing, Organization of the Writing Report.

TEXT BOOK:

1. Business Research Methods, Navel Bajpai, Pearsons.

REFERENCE BOOKS:

1. Business Research Methods 8e – Zikmund et al, Cengage Learning.
2. Business Research Methods - Donald R. Cooper, Pamela S. Schindler, Tata McGraw-Hill.
3. Statistics for Business and Economics, Anderson et al, 9e, Cengage Learning.

MS161 - MANAGEMENT INFORMATION SYSTEM & IT FOR MANAGERS

COURSE OBJECTIVE:
Considering today's tough job market, it is important that the students should develop the expertise and critical thinking skills that give them a competitive edge. This course is designed to give students an edge when they face the challenges and opportunities that business careers present. It will give students an in-depth look at how today's business firms use information technologies and systems to achieve corporate objectives.

Course Outcomes: After completion of this course, students will know,

- How today's business firms use information technologies and systems to achieve corporate objectives.
- Information systems are major tools available to business managers for achieving operational excellence, developing new products and services, improving decision making, and achieving competitive advantage.
- The complications and issues associated with each business intelligence system, and discuss the role of the business manager in developing and using these systems.
- How organizations use knowledge management to identify, select, organize, and disseminate that information.
- The description Of project management knowledge areas of scope, time, cost, quality, human resources, communications, risk, procurement, and integration.

UNIT - I

Organizations, Management, and the Networked Enterprise: The Role, Perspectives and Contemporary Approaches of Information Systems in Business Today, Business Processes and Information Systems function in business, Using Information Systems to Achieve Competitive Advantage, Ethical Dimensions of Information Systems.

UNIT - II

Information Technology Infrastructure: IT Infrastructure and Components, Database Approach to improve Business Performance and Managing Data Resources, Telecommunications and Networking in today's Business World, System Vulnerability and Abuse, Technologies and Tools for Protecting Information Resources.

UNIT - III

Information Technology Applications: Business Process and IT outsourcing, Corporate Governance and IT, Enterprise Resource Planning, Enterprise Architecture, Supply Chain and Customer Relationship Management Systems.

UNIT - IV

Key Systems Applications for the Digital Age: Enterprise Applications, E-commerce and Mobile Digital Platform, Enterprise-Wide Knowledge Management Landscape an Systems, Knowledge Work Systems, Decision Making and Information Systems, Business Intelligence in the Enterprise.

UNIT - V

Building and Managing Systems: Systems as Planned Organizational Change, Systems Development, The Importance and selection of Project Management, Establishing the Business Value of Information Systems.

TEXT BOOKS:

1. Kenneth C Laudon and Jane P. Laudon, "Management Information Systems", 12th Edition, Pearson.
2. Efraim Turban and Linda Volonino, "Information Technology for Management", 8th Edition, Wiley.

REFERENCE BOOKS:

1. W S Jawadekar, "Management Information Systems", 2nd Edition, TMH
2. James A. Obrein, "Management Information Systems", TMH
3. George W. Reynolds, "Information Technology for Managers", Cengage Learning
4. Steven Alter, "Information Systems", Pearson
5. C.S.V. Murthy, "Management Information Systems", Himalaya

MS162 - OPERATIONS MANAGEMENT

Course Objectives:

This course is designed to address the key operations and quality issues in service and manufacturing organizations that have strategic as well as tactical implications. The specific objectives include:

Course Outcomes:

At the end of the course students will be able :

- To apply analytical skills and problem-solving tools to the analysis of the operations problems
- To understand the strategic role of operations management in creating and enhancing a firm's competitive advantages
- To understand key concepts and issues of OM in both manufacturing and service organizations
- To understand the application of operations management policies and techniques to the service sector as well as manufacturing firms.

UNIT - I

Operations Management Systems: Systems concept of production, types of production systems, operations management functions, challenges in operations management, current priorities for operations management, operations strategy: break even analysis, world class manufacturing, emerging trends and implications for operations

UNIT - II

Planning and Controlling of Operations: Production planning and controlling activities, Aggregate planning, Resources planning: MRP-1, MRP-2

UNIT - III

Productivity Improvement in Operations: Factors affecting productivity, Techniques for improving productivity, Facility location and factors influencing facility location, Methods for facility location decision, Plant layout: types of layouts – process layout, product layout, hybrid layout, fixed position layout, Work study: method study, time study

UNIT - IV

Supply Chain Management: Components of supply chain management, Supply chain management process, Supply chain structure, Design of supply chain, IT in supply chain management, Strategic sourcing, Approaches to supply management, Developing reliable vendors, Measures for sourcing and supply chain management

UNIT - V

Quality Improvement and Certification Systems: TQM, TPM, six sigma, ISO, CMM, quality standards related to safety, food, drug, health, and environment

TEXT BOOKS:

1. Mahadevan, "Operations Management" , 2nd edition., Pearson, 2010
2. J.K Rajewski, Larry P Ritzman "Operations Management" , 5th edition., Addision Wesley, 1998.

REFERENCE BOOKS:

1. R.Paannerselvam, "Production and Operations Management", 2nd edition, PHI, 2006
2. S.N.Chary "production and Operations Management", 6th edition., THM, 2006
3. Buffa, "Production and Operations Management", 6th edition.,Willey, 2008
4. Joseph S Matrinich, "Production and Operations Management", 8th edition., Willey 2008

MS163 - E-BUSINESS

Course Objective

By studying the course the students are able to understand the meaning and nature of e-commerce. The application of technology in the business environment. The strategies for easing the business transactions and the various business models designed with the help of technology.

Course Outcome

By the end of the course students will be able to

1. Understand the nature of e-commerce.
2. Understand the business applications using technologies.
3. Understand electronic payment system and electronic fund transfer
4. Understand emerging trends in e-business and internet based business models
5. Understand dynamics of online retailing

UNIT - I

Introduction: E-Business - Origin and Need of E-Commerce, Factors affecting E-Commerce, Business dimensions and technological dimensions of E-Commerce, Types of Electronic Commerce.

UNIT - II

Internet and E-Business: Introduction to internet and its application, Intranet and Extranets, World Wide Web, Business Applications through Internet, E - Shopping, Electronic Data Interchange.

UNIT - III

Electronic Payment System: Concept of Money, Electronic Payment System, Types of Electronic Payment Systems, Smart Cards and Electronic Payment Systems, Electronic Fund Transfer.

UNIT - IV

E-Business Applications & Strategies: Business Models & Revenue, Emerging Trends in e - Business, Digital Commerce, Mobile Commerce and Apps development , Strategies for Business over Web, Internet based Business Models.

UNIT - V

E-Commerce and retailing: On-line retail industry dynamics, On-line mercantile models from customer perspective, Management challenges in on-line retailing.

TEXT BOOKS:

1. E-Commerce Strategy, Technologies and Applications, Whitley, David, Tata McGraw Hill.
2. Electronic Commerce. , Schneider Gary P. and Perry, James T, Thomson Learning.

REFERENCE BOOKS:

1. E-Commerce: The Cutting Edge of Business, Bajaj, Kamlesh K & Nag, Debjani, McGraw Hill.
2. E-Commerce: Business, Technology, Society, Laudon and Traver, Pearson Education.
3. E-Commerce Strategies, Trepper Charles, Prentice Hall of India.
4. E-commerce Real Issues & Cases, Knapp C. Michel, Thomson Learning.

MS164 - PROJECT MANAGEMENT

Course Objective

The objective of this course is to enable the students to gain knowledge about the modern project management, project life-cycle, estimation of project times and costs. This course will develop skills of students in the area of project management techniques, managing project risks and teams and out sourcing project works and monitoring of project progress and project closure; to acquaint the students about various issues of project management.

Course Outcomes

At the end of the course the student will be able to

1. Understand concepts, develop skills and formal project management processes that are used by managers to propose, plan secure resources, budget and lead project teams for successful completion of projects.
2. Apply decision tools, frame works and fast experiences to critically analyze various project management issues and challenges
3. Initiate actions when needed, make mid – course adjustments in plans and recover from unexpected problems.
4. Hone their abilities to build the projecting and implement the project systematically

UNIT - I: Modern Project Management: Project life cycle, characteristics of Project, drivers of project management, project governance, project management – a socio technical approach Project portfolio management system, Project selection criteria project request for proposal (RFP) defining the project scope, establishing project priorities, creating work breakdown structures (WBS), integrating WBS with the organization responsibilities, matrices, responsibility matrics, project communication plan.

UNIT - II: Estimating project times, costs and project management techniques: Factors influencing quality estimates, top – down versus bottom – up estimates, methods for estimation of project times and costs, bottom – up approaches for estimating project times and costs, types of costs, creating database for estimation.

Network Analysis – PERT and CPM – application of network techniques to engineering problems.

UNIT - III: Managing project risk and scheduling resources and costs: risk management processes, risk identification, risk assessment, risk response development, contingence planning, opportunity management, risk response control, change control management.

Scheduling resources and costs: overview of resource scheduling problem, types of resource constrains, classification of scheduling problem, resource allocation methods, benefits of scheduling the resources, assigning project work.

UNIT - IV: Managing Project Teams and outsourcing Project work: Five stage team development model, situational factors affecting team development, building high performance project team, managing virtual project teams, project team pitfalls.

Outsourcing project works, best practices in outsourcing project work, the art of negotiations.

UNIT - V: Monitoring and Project closure: Structure of a project monitoring information system, project control process, monitoring time performance, forecasting final project cost, other control issues.

Types of project closure wrap – up closure activities: post – implementation evaluation.

TEXT BOOK:

1. Clifford F. Gray, Erik W. Larson and Gowtham.V.Desai "Project Management, the Managerial Process " 6e, Mc Graw Hill, 2014.

REFERENCE BOOKS:

1. Merydith, Montel and Gopal " Project Management" wiley India
2. Prasanna Chandra, "Projects, Planning, Analysis, Selection, Financing, Implementation and Review", TataMcGraw Hill Company Pvt. Ltd., New Delhi.
3. L.S Srinath "PERT and CPM" 3e EWP.
4. Subhash Chandra Das "Project Management And Control" PH

MBA Course Structure

I Year I Semester (I Year)				
Subject Code	**Title of the Paper**	**External Marks**	**Internal Marks**	**Total Marks**
MS141	Principles and Practices of Management (PPM)	60	40	100
MS142	Managerial Economics (ME)	60	40	100
MS143	Business Environment & Ethics (BEE)	60	40	100
MS144	Accounting for Managers (AFM)	60	40	100
MS145	Quantitative Techniques for Decision Making (QTDM)	60	40	100
MS146	Organizational Behavior (OB)	60	40	100
MS147	Business Laws (BL)	60	40	100
MS148	Managerial Communication (MC)	60	40	100
	Total			800

I Year II Semester (I Year)				
Subject Code	**Title of the Paper**	**External Marks**	**Internal Marks**	**Total Marks**
MS242	Marketing Management (MM)	60	40	100
MS243	Financial Management (FM)	60	40	100
MS244	Human Resource Management (HRM)	60	40	100
MS245	Business Research Methods & Project (BRMP)	60	40	100
MS246	Management Information System (MIS)	60	40	100
MS247	Production and Operations Management (POM)	60	40	100
MS248	E-Business (EB)	60	40	100
MS249	Computer & IT Applications (CIT)	60	40	100
	Total			800

MS141 - Principles and Practices of Management

Objective of the Course:

The main object of the course is to explain about concepts, principles and practice of management. To imbibe in-depth knowledge to the students on planning, decision making, organizing and directing and controlling aspects of management.

UNIT – I **(10 Hours)**

Management – Overview: Definition, nature, purpose and scope of management - Functions and Roles of a manager – an overview of planning, organizing and controlling - Is managing a science or art? Ethics in managing and social responsibility of managers - Evolution of management thought. Contributions made by Taylor, Fayol, Weber, Elton Mayo, Maslow, Herzberg, and McGergor. Various approaches to Management - Decision Theory approach. Systems Approach: Key concepts in systems - Closed system versus open system. Subsystems, System Boundary. McKinsey's 7-S Approach

UNIT – II **(10 Hours)**

Planning & Decision Making: Types of plans, steps in planning, and process of planning. Nature of objectives, setting objectives. Concept and process of Managing by Objectives. Nature and purpose of strategies and policies. Strategic planning process. SWOT analysis, Portfolio matrix, premising and forecasting. Decision Making: Meaning, Importance and steps in Decision Making - Traditional approaches to decision-making - Decision making under certainty, programmed decisions – Introduction to decision-making under uncertainty, non-programmed decisions, decision tree- group-aided decisions; Brain storming – Creativity, creative problem solving

UNIT – III **(10 Hours)**

Organizing: Concept of organization, process of organizing, bases of Departmentation, Authority & power - concept & distinction. Various types of organization structures - Delegation - concept of delegation; elements of delegation - authority, responsibility, accountability. Reasons for failure of delegation & how to make delegation effective. Decentralization - concept, reasons for decentralization and types (or methods) of decentralization. Span of Management - concept, early ideas on span of management.

UNIT – IV **(10 Hours)**

Directing: Motivation and Motivators: Concept, Theories of Motivation: Hierarchy of Needs, Motivation-Hygiene Expectancy, Equity, Reinforcement, McClelland’s needs - Leadership: Meaning, Definition, Ingredients of Leadership – Trait Approaches of Leadership – Leadership Behavior and Styles – Contingency Approaches to Leadership – Communication: Meaning, Process, and Importance in Functions of Organization – Barriers in Communication – Effective Communication

UNIT – V **(10 Hours)**

Coordination and Control: Concept and importance of coordination; factors which make coordination difficult; techniques or methods to ensure effective coordination. Control: Concept, planning-control relationship, process of control - setting objectives, establishing standards, measuring performance, correcting deviations. Human response to control. Dimensions or Types of Control: Feed forward control, Concurrent Control (Real Time Information & Control), Feedback Control - Techniques of Control: Brief review of Traditional and Modern Techniques of Control.

NOTE: One case study be discussed – per unit – in the class

Text Books:

1. Stoner, Freeman and Gilbert, Jr. Management, 6/e, Pearson Education, New Delhi, 2006.
2. Heinz Weihrich, Harold Koontz: Management A Global Perspective, 10/e, Tata McGraw Hill, 2007.

Reference Books:

1. Daft, The New Era of Management, Thomson, 7/e New Delhi, 2007.
2. Schermerhorn: Management 8ed,Wiley India 2006.

MS142 - Managerial Economics

Objective of the Course:
Objective of this course is to understand the relevance of economics in business management. This will enable the students to learn functional areas of management such as Marketing, Production and Costing from a broader perspective.

UNIT - I **(08 Hours)**
Introduction to Managerial Economics: Definition, Nature and Scope, Relationship with other areas in Economics, Production Management, Marketing, Finance and Personnel, Operations Research - The role of managerial economist. *{Ref:1,2,3}*

UNIT - II **(12 Hours)**
Objectives of the firm & Basic Economic Principles:
Objectives of the firm: Managerial theories of firm, Behavioural theories of firm, Basic economic principles – the concept of opportunity cost, incremental concept, scarcity, marginalism, Equi-marginalism, Time perspective, discounting principle, risk and uncertainty. *{Ref:1,2,3}*

UNIT - III **(10 Hours)**
Theory of Demand: Demand Analysis, Elasticity of demand, types and significance of Elasticity of Demand. Demand estimation – Marketing research approaches to demand estimation. Need for forecasting, forecasting techniques. Supply Analysis – Supply function, the Law of Supply, Elasticity of Supply. *{Ref:2,4,7}*

UNIT - IV **(10 Hours)**

A. **Production Analysis:** Production function, Marginal Rate of Technical Substitution, Isoquants and Isocosts, Production function with one/two variables, Cobb-Douglas Production Function, Returns to Scale and Returns to Factors, Economies of scale.
B. **Cost theory and estimation:** Cost concepts, determinants of cost, cost-output relationship in the short run and long run, short run vs. long run costs, average cost curves. *{Ref:4,5,6,7}*

UNIT - V **(10 Hours)**
Pricing & Profit Management: Features and Types of different competitive situations – Price-Output determination in Perfect competition, Monopoly, Monopolistic competition and Oligopoly both the long run and short run. Pricing philosophy – Pricing methods in practice: Profit Management: Nature, scope, Theories of profit, Cost – Volume- Profit Analysis. *{Ref:1,3,5,7}*

NOTE: One case study be discussed – per unit – in the class

Reference Books:

1. Hirschey: Economics for Managers, Thomson, 2007.
2. Petersen, Lewis and Jain: *Managerial Economics*, Pearson/PHI, 2006.
3. Dominic Salvatore, Managerial Economics, Thomson, 2006.
4. Keat, Managerial Economics : Economic Tools for Today's Decision Makers, Pearson Education, 2007.
5. Froeb: Managerial Economics—A Problem Solving Approach, Thomson, 2007.
6. Mehta,P.L, *Managerial Economics - Analysis, Problems, Cases*, Sultan Chand and Sons, New Delhi, 2001.
7. James L.Pappas and Engene F.Brigham: *Managerial Economics*, Pearson Education, New Delhi, 2006.

MS 143 - Business Environment and Ethics

UNIT- I **(10 Hours)**

The concept of Business Environment - Social and Cultural Environment - Political Environment -Legal Environment - Technological Environment - Demographic Environment - Natural Environment - Economic Environment - Impact of political – cultural – legal – economic and social environment on business and strategic decisions.

UNIT - II **(10 Hours)**

Economic systems and their impact of business – Macro Economic parameters like GDP - Capital Market - Investor Protection and role of SEBI - Changes in Business Environment in India since 1991- Liberalization, privatization and globalization.

UNIT - III **(10 Hours)**

Industrial Policies: A brief review of industrial policies since independence, Industrial policy of 1991 and recent developments - Policy on foreign direct investment in Indian industry - India's Trade Policy – Magnitude and direction of Indian International trade, bilateral and multilateral trade agreements - Dumping and Anti-dumping measures – Critical review of WTO functioning.

UNIT - IV **(10 Hours)**

Business Ethics - Nature of ethics - Ethical Principles in Business - Relationship between ethics and business - Utilitarianism: weighing social costs and benefits - Ethical organization - Characteristics of ethical organization - Ethical corporate code - Ethical leadership - Managerial integrity and decision making

UNIT - V **(10 Hours)**

Ethics in HRM - Ethics in Marketing - Ethics in Finance - Ethics at workplace - Corporate Social Responsibility; Historical perspective of CSR in Indian corporate sector- Corporate governance - KM Birla Committee Report on Corporate Governance - Changes in the Company Law - Small Investor Protection

NOTE: One case study be discussed – per unit – in the class

Text Books

1. Manuel G. Velasquez, *Business Ethics: Concepts and Cases*, PHI, new Delhi, 2009
2. K.Aswathappa, *Essentials of Business Environment*, 9/e Himalaya, 2007.

Reference Books:

1. Dutt and Sundaram , *Indian Economy*, S. Chand, New Delhi, 2007.
2. Justin Paul: *Business Environment*, 1e 2006, Tata MH.
3. Misra and Puri: *Indian Economy*,, Himalaya, 2007.
4. Francis Cherunilam: *Business Environment: Text and Cases*, 17/e, Himalaya, 2007.
5. Recent Economic Survey Report of Government of India.
6. Suresh Bedi: *Business Environment*, Excel, 2007.

MS144 - Accounting for Managers

Objective of the Course:
The Objective of the course is to provide the basic knowledge of book keeping and accounting and enable the students to understand the Financial Statements and make analysis of financial accounts of a company.

UNIT – I **(12 Hours)**
Introduction to Accounting: Significance – Objectives - GAAP concepts & principles books of Accounts – Accounting Cycle – Preparation of books of Accounts – journal, ledger problems.

UNIT – II **(10 Hours)**
Financial Statements: Trial Balance, Final Accounts with Adjustment problems - Depreciation of fixed assets.

UNIT – III **(10Hours)**
Financial Statement Analysis: Fund Flow – Cash Flow – Ratio Analysis.

UNIT – IV **(8 Hours)**
Costing: Meaning – Importance – Classification of Costing – Preparation of Cost Sheet.

UNIT – V **(10 Hours)**
Methods of costing - Process, Contract, Marginal costing – Cost Volume Profit Analysis and Managerial decisions.

NOTE: One case study be discussed – per unit – in the class

Text Books:

1. M.E. Thukaram Rao, "Accounting for Managers", 1/e, New Age International Publishers, New Delhi, 2006.
2. Asish K. Bhattacharyya, "Financial Accounting for Business Managers", 6/e, Prentice Hall of India, 2006.
3. Horngreen, "Financial Accounting", 8/e, Pearson Education, 2007.
4. Ashok Banerjee, "Financial Accounting", 2/e, Excel Books, New Delhi, 2006.
5. Jain ,S.P & Narang, K.L, " Cost and Management Accounting",

Reference Books:

1. Ambrish Gupta, "Financial Accounting Management An Analytical Perspective", 3/e, Pearson Education, 2007
2. Robert N.Anthony, David F.Hawkins and Kenneth A.Merchant, "Accounting –Text and Cases", 12/e, TMH, 2007.
3. Dr.S.N. Maheshwari and Dr.S.K. Maheshwari, "Financial Accounting", 4/e, Vikas Publishing House Pvt. Ltd., 2007.

MS145 - Quantitative Techniques for Decision Making

Objective of the Course:
The objective of the course is to introduce some of the tools that facilitate better understanding about the operations in a quantitative form and help them in taking right decision about the business through mathematical approach.

UNIT I **(10 Hours)**
Probability: Concept of Probability, Addition and Multiplication theorems of probability- Baye's theorem of probability and their Applications

UNIT II **(10Hours)**
Theoretical distributions: Binomial Distribution, Poisson Distribution , normal Distribution and its applications

UNIT-III **(10 Hours)**
History and Development of Operations Research: Linear programming, Introduction to linear programming - formulation, Graphical solution, The Simplex method, Big-M, Two phase method, Duality and Dual simplex method and its applications.

UNIT - IV **(10 Hours)**
Transportation Models: Definition and applications of the Transportation Model, solution of the transportation problem, the Assignment model, Travelling salesman problem.

UNIT - V **(10 Hours)**
Game Theory: Introduction - Two person Zero-sum Game, strategies, Games with saddle point, Rules of Dominance, solution methods of games without saddle point, Graphical solution of 2xn and mx2 games.

NOTE: One case study be discussed – per unit – in the class

Text Books:

1. Fundamentals Of Mathematical Statistics, S. C. Gupta,2nd, Himalaya Publishing House, (2011).
2. Sharma J.K., Operations Research; Theory and Applications, Macmillian India Ltd., New Delhi, 1997.
3. Pannerselvam, Operations Research, Prentice Hall of India.

Reference Books:

1. Budnik, Frank S. Dennis Mcleavey, Richard Mojena Principles of Operations Research, 2nd Edition, Richard Irwin Illinois - All India Traveller Bookseller, New Delhi, 1995.
2. Gould F.J.etc., Introduction to Management Science, Englewood Cliffs, New Jersey, Prentice Hall of India, 1993.
3. Mathur. K. and Solow.D., Management Science, Englewood Cliffs, New Jersery, Prentice Hall of India, 1994.
4. Narag A.S. Linear Programming and Decision Making, Sultan Chand, New Delhi, 1995.
5. Taha.H.A., Operations Research - An Introduction, Pearson Education, New York, 2002.
6. Hiller, Introduction to Operation Research, TMH, 2002.
7. Samir Kumar Chakravarthy, Theory and Problems in Quantitative Techniques, Management Information System and Data Processing I,II & III New Central Agency, Calcutta.

MS 146 - Organizational Behaviour

Objective of the Course:
The course provides a basic knowledge of various dimensions of human behavior. This will form the foundation to study and to understand the behavior of the human beings working in organizations.

UNIT - I **(10 Hours)**
Introduction to OB: Introduction, Definition, Nature and scope - Theoretical Frameworks - Environmental Organisational context: Role of IT, Globalization – Diversity: Nature of Diversity, Managing Diversity - Ethics, Culture: The organizational culture context, Creating and Maintaining culture.

UNIT - II **(10 Hours)**
Cognitive Processes: Perception, Learning objectives, Nature and Importance, Perceptual Selectivity and Organization, Social Perception – Attribution: Theory, Errors, Impression Management
Personality: Meaning of Personality – Attitudes: Nature and Dimensions, Job Satisfaction

UNIT – III **(10 Hours)**
Motivational Needs and Processes: Meaning, Primary Motives, General Motives, Secondary Motives - The Content Theories, The Process Theories, The Contemporary Theories – Motivation across Cultures
Positive Organizational Behavior: Optimism, Emotional Intelligence, Self Efficacy

UNIT - IV **(10 Hours)**
Dynamics of OB: Decision Making, Behavioral Decision Making, Creativity and Group Decision Making – Stress and Conflict: Emergence of Stress Causes of Stress, Coping Strategies for Stress and Conflict – Power and Politics: Meaning of Power, Political Implications of Power – Groups and Teams: The Nature of Groups, Teams in the Modern Workplace

UNIT - V **(10 Hours)**
Managing and Leading for High Performance: Job Design – Quality of Work Life – Principles of Learning - Behavioral Performance Management - Effective Leadership Processes: Traditional Theories, Modern Theories – Great Leaders: Leadership Styles, Activities of Leaders, Leadership Skills

NOTE: One case study be discussed – per unit – in the class

Text Books:
1. Fred Luthans: Organisational Behaviour, 10/e, THM, 2007.
2. Robbins, Essentials Of Organizational Behavior, 10/e, Pearson Education India, 2010.

Reference Books:
1. Debra L. Nelson, James C. Quick : Understanding Organizational Behavior, 3/e, Cengage Learning EMEA, 2007.
2. John R. Schermerhorn, Richard N. Osborn, Mary Uhl-Bien, James G. Hunt, Organizational Behavior, 12/e, John Wiley & Sons, 2011.
3. G. A. Cole, Organisational Behaviour: Theory and Practice, Cengage Learning EMEA, 2000.

MS 147 - Business Laws

Objective of the Course:
The main objective of the course is to make the students know the legal framework for carrying out a business. Issues related to drafting contracts, partnerships, company management & protection laws will be discussed.

UNIT - I **(10 Hours)**
Contract Law: Law of Contract -1872 - Nature of contract - Essential elements of valid contract – Legal rules to Offer – Legal rules to Acceptance – Legal rules to Consideration - Capacity to contract – Free consent - Legality of object - Performance of contract - Discharge of contracts - Remedies for breach of contract,

UNIT – II **(10 Hours)**
Partnership Act & NI Act: Indian Partnership Act–1932: Constitution of partnership - Rights of Partners – Duties of Partners - Dissolution of partnership.
Negotiable Instruments Act – 1881: Characteristics of Negotiable Instruments - Promissory Note, Bills of Exchange, & Cheque, and their definitions and characteristics – Discharge of Parties.

UNIT – III **(10 Hours)**
Company Act 1956: Company - Definition & its Characteristics – Company distinguished from partnership – Kinds of companies - Steps and procedure for incorporation of the company - Memorandum of Association - Articles of Association and their Alteration.

UNIT – IV **(10 Hours)**
Company Management: Directors - Appointment/Reappointment, Duties of Directors - Powers of Directors, Liabilities of Directors - Meetings: Kinds of Meetings – Requisites of valid meeting, Proxies - Resolutions - Winding-up of a Company: By Tribunal – Duties of Liquidator - Powers of Liquidator – Voluntary winding up: By Members – By Creditors – Consequences of winding up.

UNIT - V **(10 Hours)**
Special Acts: Consumer Protection Act, 1986: Consumer Protection councils – Redressal Machinery – The Air (Prevention and Control of Pollution) Act, 1981 - The Water (Prevention and Control of Pollution) Act, 1974 - The Environment (Protection) Act, 1986.

NOTE: One case study be discussed – per unit – in the class

Text Books:

1. C.L.Bansal, Business and Corporate Laws, 1/e, Excel Books, 2006.
2. S.N.Maheshwari & Maheshwari, Business Regulatory Framework, Himalaya Publishing House, 2006.
3. Consumer Protection in India, V.K. Agarwal, Deep & Deep Publications, 1988.

Reference Books:

1. N.D.Kapoor, Mercantile Law, Sultan Chand & Sons, 2006.
2. S.S. Gulshan, Mercantile Law, 2/e, Excel Books, 2004.
3. Akhileshwar Pathak, Legal Aspects of Business, 3/e, Tata McGraw-Hill, 2007.

MS 148 - Managerial Communication

Objective of the Course:

The purpose of Business Communication is to develop the students' competence in communication at an advanced level. Assuming that the students are fairly proficient in the basic communication skills of listening, speaking, reading and writing in English. The course aims to train them in communicating efficiently in the workplace and professional contexts. The course has both laboratory and class work content.

UNIT - I **(10 Hours)**

Functional Grammar – Parts of Speech, Tense, Agreement of Subject with verb, articles, Active and Passive forms – Requisites of good sentence and paragraph writing – What is a sentence – Effective sentence structures, Paragraph writing – Principles of Paragraph Writing, coherence, Development of a paragraph – Longer composition – Describing objects, process, places etc. – Summarizing - Idioms & Phrasal Verbs. *{Ref:6,7,8,9}*

UNIT - II **(10 Hours)**

Communication –Importance – Written communication – differences between spoken and written communication - Common errors in written Communication – Common errors in oral communication – Improving communication – Sentence formation – Logical organization of ideas for clarity - Informal conversation Vs Formal expression Verbal and Non – Verbal communication, barriers to effective communication –Types of Communication – Oral, aural, Writing and reading – Vocabulary – Jargon – rate of speech, pitch, tone, Accent – Clarity of voice - *{Ref:1,2,8,9}*

UNIT - III **(10 Hours)**

Interpersonal communication – Role plays in different situations – Intra (small groups) group communication – Group Presentations - Management presentations – Group Discussions – Procedure of Group Discussions – participation in meetings – Addressing large groups – Public Speaking Skills – Classroom Exercises on all the contents. *{Ref:1,2,3,7,9}*

UNIT - IV **(10 Hours)**

Professional Correspondence -Note taking-Writing a Memo-Writing Minutes-Writing a Business letter- Sales letters - Welcome Letter - Thank you Letter-Appreciation Letter - Request letters -Goodwill letters -Acknowledgement letters - Apology Letter -Credit and collection letters -Inquiry letters - Rejection Letter -Demand letters - Writing an E-mail – E mail etiquettes – Sample e mails and exercises - *{Ref:1,2,4,5,6}*

UNIT - V **(10 Hours)**

Report Writing and Letter writing – business letters- pro-forma culture – format – style – effectiveness, promptness- Technical report writing - Analysis of sample reports from industry – Synopsis and thesis writing -Report Writing - Purpose of Report writing- Writing an Abstract-Factual Report- Survey Report-Feasibility Report- Project Report. *{Ref:1,2,4,5,6}*

NOTE: One case study be discussed – per unit – in the class

Reference Books:

1. Essentials of Business Communication, Rajendra Pal, JS Korlahhi: Sultan Chand & Sons, New Delhi.
2. Basic Communication Skills for Technology, Andre J. Rutherford: Pearson Education Asia, patparganj, New Delhi 92
3. Advanced Communication Skills, V. Prasad, Atma Ram Publications, New Delhi.
4. Raymond V.Lesikar, John D. Pettit Jr.: Business Communication; Theory and Application, All India Traveller Bookseller, New Delhi 51
5. Business Communication, RK Madhukar, Vikas Pulishing House Pvt. Ltd.,
6. KR Lakshiminarayana: English for Technical Communication – vols. 1 and 2, SCITECH Publications (India Hrs) Pvt. Ltd., T.Nagar, Chennai 600 017
7. Edmund H weiss: Writing Remedies: Practical Exercises for Technical Writing. Universities Press, Hyderabad.
8. ‘Communication skills for Technical Students’, T M Farhatullah, Orient Longman.
9. ‘Success with Grammar & Composition’, K R Narayanaswamy, Orient Longman.

II Semester

MS242 - Human Resource Management

Objective of the Course:
To provide the base knowledge of functional areas of Human Resource Management to enable the learners understand, involve and undergo HR functions.

UNIT - I **(10 Hours)**
Introduction to HRM: HRM - The Semantics, Functions and Objectives – HRM Models - Evolution of HRM – Human Capital Management, Jobs and Careers in HRM – Strategic Management & Role of HRM

UNIT - II **(10 Hours)**
HR Planning & Job Analysis: HR Planning - Nature, Importance, Factors – HR Planning Process – Job Analysis: Nature, Process – Methods of Collecting Job Data – Job Design: Factors, Approaches – Contemporary Issues in Job Design

UNIT - III **(10 Hours)**
Recruitment & Selection: Recruitment - Nature, Importance, Factors – Recruitment Process - Selection: Nature, Process, Barriers – Induction: Requisites, Evaluation, Problems of Orientation Programme – Typical Orientation Programme, Placement

UNIT - IV **(10 Hours)**
Training & Appraisal: Training & Development - Nature, Inputs, Gaps – T&D: Process – Management Development: Methods, Career Development - Performance Appraisal: Process – Challenges and Legal Issues in Performance Appraisal – Job Evaluation: Process

UNIT - V **(10 Hours)**
Compensation, Industrial Relations and e-HRM: Remuneration - Components and Theories – Factors influencing Employee Remuneration – Employee Safety: Types of Accidents, Need, Safety Programme, Health – Industrial Relations: Nature, Approaches, Parties – e- HRM: e-Recruitment, e-Selection, e-Performance Management, e-Learning, e-Compensation Management

NOTE: One case study be discussed – per unit – in the class

Text Books:

1. K. Aswathappa, Human Resource Management, 6E , Tata McGraw-Hill Education, 2010, ISBN - 0070682135, 9780070682139.
2. Gary Dessler & Biju Varkkey, Human Resource Management, Pearson Education India, 2011, ISBN 813175426X, 9788131754269.

Reference Books:

1. C.B.Mamoria & V.S.P.Rao , Personnel Management, 13 E, Himalaya Publishing House, 2012, ISBN - 978-93-5051-468-9.
2. Kenneth M York, Applied Human Resource Management, Sage Publications, 2009.

MS243 - Marketing Management

Objective of the course:
The course aims at making students understand concepts, philosophies, processes and techniques of managing the marketing operations of a firm.

UNIT-I **(10 Hours)**
Introduction: Definition, Importance and Scope of Marketing, Core marketing concepts, Elements of Marketing - Needs, Wants, Demands, Consumer, Markets and Marketers; Marketing Vs Selling, Consumer Markets and Industrial Markets. Concept of Marketing Management, developing marketing plans and strategies. Marketing Environment, Factors Affecting Marketing Environment, Marketing Information System and Marketing Research and demand forecasting ,Buyer behavior and influencing factors, Buying decision process

UNIT-II **(10Hours)**
Market Segmentation: Segmenting the Market, Benefits, of Market Segmentations, Market Segmentation Procedure, Basis for Consumer/Industrial Market Segmentation. Market Targeting – Introduction, Procedure. Product Positioning - Introduction, Objectives, Usefulness, Differentiating the Product, Product Positioning Strategy.

UNIT-III **(10 Hours)**
Marketing: Mix Decisions, Product Decisions, New Product Development-Concept and Necessity for Product Development, Failure of New Products, New Product Planning and Development Process, Product-Mix, Branding and Packaging Decisions, Product Life cycle - Stages and Strategies for Different Stages of PLC.

UNIT-IV **(14 Hours)**
Pricing, Distribution, and Promotion Decision: Pricing Decisions, Pricing Objectives, Policies Methods of Setting Price, Pricing Strategies, Channels of Distribution for Consumer/ industrial Products, Factors Affecting Channel Distribution, Management of Channels, channel conflicts:. **Marketing Communication:** The communication process, Communication mix, Managing advertising sales promotion, Public relations and Direct Marketing. Sales force Objectives, Sales force structure and size, Sales force Compensation

UNIT-V **(6 Hours)**
Service Marketing Aspect: A Brief Account of Marketing of Services, Social Marketing, Online Marketing.

NOTE: One case study be discussed – per unit – in the class

Text Books:
1. Rajan Saxena: Marketing Management, 4/e, TMH, 2009.
2. V.S.Ramaswamy , S.Namakumari: Marketing Management, 4/e, Macmillan, 2009

Reference Books:
1. Phillip Kotler: Maketing Management, 11/e, Pearson Publishers, 2011.
2. Stanton William J., Fundamentals of Marketing, McGraw Hill, N. Delhi 10th Ed.
3. Czinkota and Kotabe: Marketing Management, 2/e, Thomson,2007

MS244 - Production and Operations Management

Objective of the Course:
The objective of the course is to enable students to learn the basics of production and operations management, productivity, inventory and quality management, which will help them in understanding actual business process.

UNIT – I **(10 Hours)**
Production systems: Systems concept of Production, Types of production Systems, Flow, Shop, Batch, Cellular, flexible Manufacturing. Group Technology. Computer Integrated manufacturing. (T_1, T_2)

UNIT – II **(10 Hours)**
Production Management: Production Planning and control activities, Aggregate planning, MRP, MRP II. (T_1, T_2)

UNIT – III **(10 Hours)**
Productivity Improvement: Factors affecting productivity, techniques for improving productivity. Facilities Layout – Types of layout – Process, product, fixed position, mixed; Applicability, advantages and disadvantages. Work Study – Method Study, Time Study, Work Sampling. (T_1, T_2)

UNIT – IV **(10 Hours)**
Purchasing and Inventory Management: Purchase function, Procedures. Economic Order quantity. Inventory analysis Methods – ABC, VED, XYZ methods – their utility. Inventory Valuation Methods: Periodic and perpetual systems; FIFO, LIFO, Average cost and Weighted Average Cost Methods.
(T_1, R_1)

UNIT – V **(10 Hours)**
Quality Management: Inspection, Quality, Total Quality – Deming, Juran concepts. Total Quality Management. Statistical Quality Control – Control Charts. Concept of Quality Assurance. Principles of ISO and BIS. ISO standards and Certification process. (T_1, R_1)

NOTE: One case study be discussed – per unit – in the class

Text Books:
1. R.Paannerselvam, "Production and Operations Management", 2nd ed., PHI 2006.
2. K.Aswathappa, K.Sridhara Bhat, "Production and Operations Management", 2nd ed., HPH, 2010.

Reference Books:
1. S. N. Chary, "Production and Operations Management", 6th ed., TMH 2006.
2. Buffa, "Modern Production Operation Management", 6th ed., Willey 2008.
3. Joseph S Matrinich, "Production and Operations Management", 8th ed., Willey 2008.

MS245 - Business Research Methods &Project

Objective of the Course:

Objective of the course is to enable students to have a general understanding of business research methods and application of statistical tools and techniques to business and its use in areas of management research.

*Statistical table is required for students at the time of examination

UNIT - I **(10 Hours)**

Introduction: Nature and Importance of research, the role of business research, aims of social research, research process, types of research. Data Base: discussion on primary data and secondary data, Random Vs Non-Random sampling techniques, Questionnaire and Schedule.

UNIT - II **(10 Hours)**

Measurement and scaling concepts, attitude measurement, levels of measurement and types of scales, criteria for good measurement. Research design: Meaning of research design. Functions and goals of research design.

UNIT - III **(10 Hours)**

Report Writing: Mechanics of report writing, Preliminary pages, Main body and appendices including bibliography, oral presentation, Tabulation of data diagrammatic and graphical presentation of data, discriminate analysis, cluster analysis, conjoint analysis.

UNIT - IV **(10 Hours)**

Introduction to statistics, origin and growth of statistics. Measures of central tendency, measures of dispersion, measures of variation, measures of skewness. Correlation and Regression. Types of correlation, measures of correlation, properties of regression coefficient.

UNIT - V **(10 Hours)**

Statistical Inference: Introduction to hypothesis, Null hypothesis, Alternative hypothesis, Two-types of errors, procedure for testing of hypothesis, Tests of significance for small samples, t-test, F-test, Chi-Square test and ANOVA-one way and two way classifications.

NOTE: One case study be discussed – per unit – in the class

Text Books:

1. ***Research Methodology***, C.R. Kothari, 2ND,Wishwa Prakashan, 2009.
2. Panneerselvam R: "***Research Methodology***", 2ND ,PHI Learning Private Limited, New Delhi, 2009.
3. Bhattacharya, D. K., Research Methodology, Excel Books, New Delhi.
4. Gupta S.P., Statistical Methods, Sultan Chand, New Delhi, 2001.

Reference Books:

1. "Business Research Methods", Willam G.Zikmund,Cengage Learning, New Delhi, 2006.
2. Business Research Methods,cooper,6th edition,TMH.
3. Research Methodology, Dipak Kumar Bhattacharya,2ND,EXCEL BOOKS.
4. Business research methods, Naval Bajpai,1st edition,pearson,2011
5. Business Research Methods , S. L. Gupta, Hitesh Gupta, 1ST Edition, MC Graw Hill Education (2012).

MS246 - Management Information System

Objective of the Course:
The objective of the course is to make the student understand the use of information for better management and the role and functioning of Management Information Systems.

UNIT – I **(10 Hours)**
Information Systems Overview: Role of Information Systems in Business –Perspective on Information Systems – Contemporary Approaches to IS – Business Process and IS – Types of Business Information Systems: Systems from a functional Perspective, Systems from a contingency Perspective – Systems that Span the Enterprise - The Information System Functions in Business - How Information Systems Impact Organizations and Business Firms

UNIT – II **(10 Hours)**
IS and Decision Making: Decision Making and IS: Types of Decisions, The Decision Making Process, Managers and Decision Making Process in the Real World - Systems for Decision Support: Management Information Systems – Decision Support Systems – Business Value of DSS – Data Visualization and Geographic information Systems, Web-based Customer-Decision Support Systems - Executive Support Systems: Role, Business Value - Group Decision Support Systems: Overview, Business Value

UNIT – III **(10 Hurs)**
IS Infrastructure: IT Infrastructure: Defining, Evolution, Technology Drivers – Infrastructure Components – Hardware Platforms and Emerging trends – Software platform trends and emerging technologies – The Database Approach to Data Management – Using Database to improve Business Performance and Business Decision Making – Telecommunication and Networking in Today's Business World – Communications Network – The Internet and The Wireless Revolution .

UNIT – IV **(10 Hours)**
IS Security System Vulnerability and Abuse: Why, Malicious Softwares, Hackers and Cyber vandalism, Computer Crime, Internal Threats, software vulnerability – Business Value of Security and Control – Establishing a Framework for Security and Control - Technologies and Tools for Security – Enterprise Systems – Supply Chain Management Systems – Customer Relationship Management Systems- Enterprise Applications: New Opportunities and Challenges

UNIT – V **(10 Hours)**
Electronic-Commerce: Key Concepts, Internet Business Models – Types of Electronic Commerce – M-Commerce: Services and Applications - Knowledge Work Systems – Intelligent Techniques – Overview of Systems Development – Alternative systems-building Approaches- Project Management: The Importance, Runaway projects and systems failures, Project Management Objectives – Selecting Projects – Establishing The Business Value of Information Systems: IS Cost benefit, Capital Budgeting, ROPM, Limitations of Financial Models – Managing Project Risk: Dimensions, Change Management, Controlling Risk Factors.

NOTE: One case study be discussed – per unit – in the class

Text Books:

1. Kenneth C Laudon and Jane P.Laudon, et al, “Management Information Systems”, 9/e, Pearson Education, 2005.
2. W S Jawadekar, “Management Information Systems”, 2/e, TMH, New Delhi, 2002.

Reference Books:

1. James A. Obrein, “Management Information Systems”, TMH, 10/e, 2004.
2. Steven Alter, “Information Systems”, Pearson, 3/e, 2002.
3. C.S.V.Murthy, “Management Information System”, Himalaya ,2003.

MS247 - Financial Management

Objective of the Course:
The objective of the course is to provide the necessary basic tools for the students to manage the finance function. After the completion of the course, the students would be able to understand the management of the financing of working capital needs and the long term capital needs of the business organization

UNIT-I **(8 Hours)**
Introduction to Financial Management: Meaning, objectives & functions of Financial Management, Concept of Time Value of Money- Basic valuation models.

UNIT-II **(10 Hours)**
Investment Function: Investment decision process, Meaning & process of Capital Budgeting, Techniques of Capital Budgeting, Merits and Demerits. Capital budgeting decision under the conditions of risk.

UNIT-III **(12 Hours)**
Financing Function: Sources of Finance, Concept and measurement of Cost of Capital, Weighted Average Cost of Capital, Concept of leverage. Capital Structure - EBIT-EPS analysis.

UNIT-IV **(10 Hours)**
Dividend decisions: Forms of dividend, Theories of dividend – Walter model, Gordon model, MM hypothesis, concept of cash and bonus shares.

UNIT-V **(10 Hours)**
Current assets Management: Working Capital management - measuring, Cash Management- measuring optimum cash balance, Inventory Management.

NOTE: One case study be discussed – per unit – in the class

Text Books:

1. Khan and Jain., Financial Management, Tata McGraw Hill (2008).
2. Pandey, I.M., Financial Management, Vikas Publication (2008).

Reference Books:

1. Chandra P., Financial Management, Tata McGraw Hill.
2. Pradip kumar sinha., Financial Management, Excel Books(2012).
3. James C. Van Horne, Financial Management, Prentice Hall of India (2009).

MS 248 - E-Business

Objective of the Course:
The course is designed to provide students with a good knowledge of e-commerce and e-business principles and practices.

UNIT – I **(10 Hours)**

E – Business technology basics: introduction, the internet and World Wide Web

UNIT – II **(10 Hours)**

Web server and E – mail technologies: introduction, web server basics, software for web servers, electronic mail (E – mail), web site utility programs.

UNIT – III **(10 Hours)**

selling to consumers online: introduction, web marketing strategies, communicating with different market segments, beyond market segmentation – customer behaviour and relationship intensity, advertising on the web, e – mail marketing, technology enabled customer relationship management, creating and maintaining brands on the web.

UNIT – IV **(10 Hours)**

E – Business law and taxation: introduction, the legal environment of electronic commerce.

UNIT – V **(10 Hours)**

Implementing e –business initiatives: introduction, identifying benefits and estimating costs of electronic commerce initiatives, strategies for developing electronic commerce implementations.

NOTE: One case study be discussed – per unit – in the class

Text Books:

1. Schneider, P. Gray, " E – commerce strategy, technology". 9 'th edition, cengage publications.
2. Kamalesh K Bajaj & Debjani Nag: E-Commerce, the Cutting Edge of Business- Tata McGraw-Hill, 2006.
3. Kamalesh K Bajaj & Debjani Nag: E-Commerce, the Cutting Edge of Business- Tata McGraw-Hill, 2006.

Reference Books:

1. Michael P.Papazoglou & Pieter M.A. Ribbers, e-Business, 1/e, WILEY – India, 2006.
2. Napier, Creating a winning e-business, 2/e Thomson, 2007.
3. Kalakota, e-business2.0 : Roadmap for success, Pearson Education, 2006.
4. Canzer, e-business and e-commerce, 1/e. Biztantra, 2005.

MS249 - Computer & IT Applications For Managers

Objective of the course:
To provide basic knowledge of computer applications for decision making.

UNIT – I **(10 Hours)**
An overview of computer system, classification of computers, standard methods of input and output, Transforming data into information, Types of storage devices.

UNIT – II **(10 Hours)**
Word Processing programs and their uses, entering and editing text, formatting text, special features of word.

UNIT – III **(10 Hours)**
Excel Basics, Rearranging worksheets, Excel formatting tips and techniques, Organizing large projects, An introduction to functions, EXCEL CHARTS, GRAPHICS AND FUNCTIONS Excel's chart features, Working with graphics in Excel, Introduction to Excel's command macros, Using worksheets as databases.

UNIT – IV **(10 Hours)**
Introduction to Access, Creating a simple database and tables, Forms, Entering and editing data, Finding, sorting and displaying data, Printing reports, forms, letters and labels, Relational databases.

UNIT – V **(10 Hours)**
The Internet and the World Wide Web, Email and other Internet Services, Connecting to the Internet, Doing business in the online world.

NOTE: One case study be discussed – per unit – in the class

Text Books:
1. Ron Mansfield, Working in Microsoft office, Tata McGraw Hill (2008)
2. Peter Norton, Introduction to computers, Sixth Edition Tata

Reference Books:
1. Michael Miller, Absolute Beginner's guide to computer Basics, Fourth Edition, Pearson Education (2007).
2. Deborah Morley, Charles S.Parker, understanding computers today and tomorrow, 11th edition, Thomson (2007).
3. Ed Bott, woody Leonhard, using Microsoft Office 2007, Pearson Education (2007).
4. Rajkamal, Internet and web Technologies, Tata McGraw Hill(2007)

SYLLABUS Year I Semester I

MC115-Computer Programming and Problem Solving

Objective: This course is intended to teach the basics of computer hardware and software. This includes the understanding of algorithms and method of problem solving. To make the student understand the logical structure of a computer program and problem solving using C language.

Learning outcomes:

The student will be able to:

- Identify and understand the working of key components of a computer system (hardware, software, firmware etc).
- Understand computing environment, how computers work and the strengths and limitations of computers.
- Identify and understand the various kinds of input-output devices and different types of storage media commonly associated with a computer
- Identify and understand the representation of numbers, alphabets and other characters in computer system
- Understand, analyze and implement software development tools like algorithm, pseudo codes and programming structure
- Study, analyze and understand logical structure of a computer program, and different construct to develop a program in 'C' language
- Write small programs related to simple/ moderate mathematical, and logical problems in 'C'.
- Study, analyze and understand simple data structures, use of pointers, memory allocation and data handling through files in 'C'.
    - Identify and understand the working of different operating systems like windows and Linux etc.

UNIT - I

Computer and Data: Introduction - Computer Hardware, Data, Computer Software, History, Classification of computers- Workstations, Mainframe, Super computers, client and server, Data Inside the computer, Representing Data. Algorithm - Concept, Algorithm representation, Sub algorithms. Evolution of Programming languages, Building a program, Program execution, categories of languages. CPU, Main memory, Input or Output, Interconnection of subsystems Operating systems- Definition, Evolution, Components.

UNIT - II

Introduction to C and Control Statements: Desirable Program Characteristics. Data types, Constants, Variables and Arrays, Declarations, Expressions Statements, Symbolic Constants, Operators and Expressions, Data Input and Output. Preparing and Running A Complete C Program.

Branching, looping, The Switch Statement, The break Statement, The continue Statement, The comma Statement, The go to Statement.

UNIT - III

Functions, Storage classes and Arrays: A Brief Overview, Defining a Function, Accessing a Function, Function Prototypes, Passing Arguments to a Function, Recursion. Storage Classes, Automatic Variables, External (Global) Variables, Static Variables. Defining an Array, Processing an Array, Passing Arrays to Functions, Multidimensional Arrays, Arrays and Strings.

UNIT - IV

Structures, Unions and Pointers: Defining a Structure, Processing a Structure, User-defined Data Types (Typedef), Structure and Pointers, Passing Structures to Functions, Self-referential Structures, Unions.

Pointer Declarations, Passing Pointers to a Function, Pointers and One-dimensional Arrays, Dynamic Memory Allocation, Operations on Pointers, Pointers and Multidimensional Arrays, Arrays of Pointers, Passing Functions to Other Functions

UNIT - V **(11 Hrs)**

Files: Why Files, Opening and Closing a Data File, Reading and Writing a Data File, Processing a Data File, Unformatted Data Files, Concept of Binary Files

Text Books:

1. Foundations of computer science, Behrouz A. Forouzan, 2nd edition.
2. Introduction to computers, 6/e, Peter Norton TMH.
3. Byron S Gottfriend, "Programming with C", Second Edition, Schaum Out Lines, TATA Mc Graw Hill (2007)

Reference Books:

1. Sinha P., "Foundation of Computing", BPB Publication, 1st Edition, 2003
2. Rajaraman V, "Fundamental of Computers" (2nd edition), Prentice Hall of India, New Delhi. 1996.
3. Behrouy A. Foreuyan & Richard F. Gilberg, "Computer Science A structured programming Approach using C", Third Edition, Cengage Learning (2008).

4. Herbert Schildt, “The Complete Reference C”, Fourth Edition, TMH (2008)

5. Ashok N. Kamthane, “Programming with ANSI and Turbo C”, Pearson Education (2008)

MC117-Internet and Web Technologies

Objective:

This course is intended to teach the basics involved in publishing content on the World Wide Web. This includes the 'language of the Web' – HTML, the fundamentals of how the Internet and the Web function, a basic understanding of graphic production with a specific stress on creating graphics for the Web, and a general grounding introduction to more advanced topics such as programming and scripting. This will also expose students to the basic tools and applications used in Web publishing.

Learning Outcomes:
The student will be able to:

- Analyze a web page and identify its elements and attributes.
- Create web pages using XHTML and Cascading Style Sheets.
- Build dynamic web pages using JavaScript (Client side programming).
- Create XML documents and Schemas.
- Build interactive web applications using AJAX.

UNIT-I

Networking Protocols and Internet: Introduction, Protocols in Computer Communications, the OSI Model, OSI Layer Functions.

Why Internet Working?, Problems in Internet Working, Dealing with Incompatibility Issues, A Virtual Network, Internet Working Devices, Repeaters, Bridges, Routers, Gateways, A Brief History of the Internet, Growth of the Internet.

UNIT-II

WWW, HTTP, TELNET:

Introduction, Brief History of WWW, the Basics of WWW and Browsing, Hyper Text Markup Language, Common Gateway Interface, Remote Login.

UNIT-III

JavaScript and AJAX:

Introduction, JavaScript, Basic Concepts, Controlling JavaScript Execution, Miscellaneous Features, JavaScript and Form Processing, Pop-up Boxes.

AJAX: Introduction, How AJAX Works? , Life without AJAX, AJAX Coding, Life with AJAX.

UNIT-IV

Introduction to XML:

What is XML?, XML versus HTML, Electronic Data Interchange, XML Terminology, Introduction to DTD,Document-Type Declaration,Element-Type Declaration,Attribute Declaration,Limitations of DTDs, Introduction to Schema, Complex Types, Extensible Stylesheet Language Transformations, Basics of Parsing, JAXP

UNIT-V

Creating Good Web Pages:

Introduction, Top Level Navigation, Creating Sample Layouts, Metaphor, Theme, and Storyboard, Screen Resolution,3-Column Layout, Using Frameworks, Using Graphics, Usability for the Handheld Devices, Creating Multilingual Web sites, XHTML and Web Browser Compatibility Issues, Designing the Basic Elements of a Home Page.

TEXT BOOKS:

1. Achyut Godbole,Atul Kahate"Web Technologies:TCP/IP,Web/Java Programming, and Cloud Computing”,Third Edition,McGraw Hill Education.

Reference Books:

1. Deitel, Deitel, Goldberg, "Internet & World Wide Web How to Program", Third Edition, Pearson Education, 2006.
2. Raj Kamal, “Internet and Web Technologies”, Tata McGraw-Hill.

MC119-Computer Organization

Objective: This course is intended to teach the basics involved in data representation and digital logic circuits used in the computer system. This includes the general concepts in digital logic design, including logic elements, and their use in combinational and sequential logic circuit design. This course will also expose students to the basic architecture of processing, memory and i/o organization in a computer system.

Learning Outcomes:

The student will be able to:

- Identify, understand and apply different number systems and codes.
- Understand the digital representation of data in a computer system.
- Understand the general concepts in digital logic design, including logic elements, and their use in combinational and sequential logic circuit design.
- Understand computer arithmetic formulate and solve problems, understand the performance requirements of systems

UNIT - I

Data representation and Logic circuits: Number System, complements, fixed point representation, floating point representation, binary codes, error detection codes. Logic gates, Boolean algebra, maps simplification, combinational circuits, flip flops, sequential circuits.

UNIT - II

Digital components and RTL: integrated circuits, decoders, multiplexers, registers, shift registers, binary counters, memory unit. Register Transfer language, Register Transfer, Bus and memory transfers, Arithmetic Mircrooperatiaons, logic micro operations, shift micro operations, Arithmetic logic shift unit.

UNIT - III

Basic Processing Unit: Instruction codes, Computer Registers, Computer instructions – Instruction cycle, Memory – Reference Instructions. Input – Output and Interrupt. STACK organization, Instruction formats, Addressing modes, DATA Transfer and manipulation, Program control, Reduced Instruction set computer.

UNIT - IV

Micro Programmed Control and Computer Arithmetic: Control memory, Address sequencing, microprogram example, design of control unit, Hard-wired control. Microprogrammed control unit

Addition and subtraction, multiplication Algorithms, Division Algorithms, Floating – point Arithmetic operations. Decimal Arithmetic unit, Decimal Arithmetic operations.

UNIT -V

The Memory System and IOP: Memory Hierarchy, Main memory, Auxiliary memory, Associative memory, Cache memory, Virtual memory. Peripheral Devices, Input-Output Interface, Asynchronous data transfer Modes of Transfer, Priority Interrupt, Direct memory Access.

Text Books:

1. Computer System Architecture, Morris Mano, 3rd Edition.
2. Computer organization – Carl Hamacher, Zvonks Vranesic, SafeaZaky, Vth Edition, McGraw Hill.

Reference Books:

1. Computer System Architecture, Naush Jotwani- 7MM.
2. Digital Electronics, James W Bignel, Robert Donovan, 5th Edition, Cengage Learning Publications.
3. Digital Design – Morris Mano, PHI, 3rd Edition, 2006.
4. Taub & Schilling: Digital integrated electronics , McGraw-Hill
5. R P Jain : Digital Electronics, 4th Edition TMH.

MC121-Discrete Mathematical Structures

Objective: Discrete mathematics is the study of mathematical structures that are discrete rather than continuous. Discrete mathematics deals with discrete objects. Its objective is to extend student's Logical and Mathematical ability to deal with abstraction. Also its goal is to introduce most of the basic terminologies used in computer science courses and application of ideas to solve practical problems.

Course Outcomes:

At the end of the course, students would have knowledge of the concepts needed to test the logic of a program.

- Have an understanding in identifying structures on many levels.
- Be aware of a class of functions which transform a finite set into another finite set which relates to input output functions in computer science.
- Be aware of the counting principles
- Be exposed to concepts and properties of algebraic structures such as semi groups, monoids and groups.

UNIT I - Mathematical reasoning

Propositions; negation disjunction and conjunction; implication and equivalence; truth tables; predicates; quantifiers; natural deduction; rules of Inference; methods of proofs; use in program proving; resolution principle; application to PROLOG.

UNIT II - Set theory

Paradoxes in set theory; inductive definition of sets and proof by induction; Peono postulates; Relations; representation of relations by graphs; properties of relations; equivalence relations and partitions; Partial orderings; Posets; Linear and well-ordered sets;

UNIT III -Graph Theory

Elements of graph theory, cut vertices and edges, covering, matching, Euler graph, Hamiltonian path, trees traversals, spanning trees Independent sets, Isomorphism, planarity.

UNIT IV - Functions

Mappings; injection and surjection; composition of functions; inverse functions; special functions; Peono postulates; pigeonhole principle; recursive function theory;

UNIT V -Group Theory& Elementary Combinatorics

Definition and elementary properties of groups, semigroups, monoids, rings, fields, vector spaces and lattices; Elementary combinatorics; counting techniques; recurrence relation; generating functions;

TEXT BOOKS:

1. K.H.Rosen, Discrete Mathematics and applications, TataMcGraw Hill, fifth edition, 2003.

2. C.L.Liu, Elements of Discrete Mathematics, McGraw-Hill Book, Second

Edition, 2006.

REFERENCE BOOKS:

1. J .L.Mott, A.Kandel, T.P .Baker, Discrete Mathematics for Computer Scientists and Mathematicians, Prentice Hall of India, second edition, 1986.

2. W.K.Grassmann and J.P.Trembnlay, Logic and Discrete Mathematics, A Computer Science Perspective, Prentice Hall, First edition, 1996.

MC123-Accounting and Financial Management

Objective: To Demonstrate an appropriate mastery of the knowledge, skills and tools of financial accounting principles, managerial accounting principles and cost accounting principles. To demonstrate competency in applying course knowledge to analyze and successfully solve course specific problems.

Learning outcome: Upon completion of this program, The student will be able to:

- Demonstrate an understanding of the functional areas of accounting and finance.
- Demonstrate an understanding of the global environment and responsibilities of business.
- Demonstrate the ability to use business tools.
- Demonstrate the ability to communicate effectively.
- Demonstrate the ability to apply knowledge of business concepts and functions in an integrated manner.
- Demonstrate knowledge in applications of marginal costing concepts.

UNIT I:

Accounting: Generally Accepted Accounting Principles (GAAP), Characteristics and limitations of single entry system, double entry system of accounting, introduction of basic books of accounts ledgers. Preparation of trial balance - Final accounts (with simple Adjustments) -. Users of Accounting Information, Role of Accountant in modern Organization

UNIT II;

Ratio Analysis - Advantages - limitations – Types of ratio's –Liquidity ratio-Solvency ratio-Profitable ratio-Turnover ratio

UNIT III:

Financial Management - Meaning , scope, Role, objectives - Time value of money - Basics of Financial decisions -Investment decisions - basic concepts in capital budgeting- working capital Management.

UNIT-IV:

Costing - Nature and importance and basic principles. Elements of cost ,Absorption costing vs. marginal costing - Financial accounting vs. cost accounting vs. management accounting. Marginal costing and Break-even Analysis: nature, scope and importance - practical applications of marginal costing, limitations and importance of cost - volume profit analysis.

UNIT V:

Standard costing and budgeting: nature, scope and computation and analysis - materials variance, labor variance and sales variance –Types of Budgets.

TEXT BOOKS:

1. Accounting for Management, T. Vijay Kumar, TMH.

2. Financial Accounting,S.N. Maheswari and S.K. Maheswari, Vikas

REFERENCE BOOKS

1. Financial Accounting, A. Mukherjee and M. Haneef, TMH
2. Basic Financial Accounting for Management, Ambaresh Gupta, Pearson

3. Accounts and Finance for Non Accounts, Chatterjee. D.K, Himalaya
4. Financial Analysis and Accounting, P. Premchand Babu and M.Madan Mohan, Himalaya.
5. Essential of Financial Accounting, Ashish. K and Ballacharya, PHI.
6. Guide to Financial Management, John Tannent, Viva.

MC125-Computer Programming and Problem Solving Lab

Course Description and Objective*:*

The purpose of this course is to introduce to students to the field of programming using C language. The students will be able to enhance their analyzing and problem solving skills and use the same for writing programs in C.

Course Outcomes:

The student will be able to:

- Apply and practice logical ability to solve the problems.
- Understand C programming development environment, compiling, debugging, linking and executing a program using the development environment
- Analyzing the complexity of problems, Modularize the problems into small modules and then convert them into programs
- Understand and apply the in-built functions and customized functions for solving the problems.
- Understand and apply the pointers, memory allocation techniques and use of files for dealing with variety of problems.

1. Programs using Input, output and assignment statements

a) Write a program to print Name, Address and Birth Date.
b) Write a program to add, multiply and divide two integers and float numbers.
c) Write a program to convert meters to Feet.
d) Write a program to accept number of days and print year, month and remaining days.

2. Programs using Branching statements

a) Write a program to find the largest of three numbers.
b) Write a program to check whether the entered number is prime or not.
c) Write a program to check whether the entered number is even or odd.
d) Write a program to find the roots of an equation ax2 + bx + c = 0.

3. Programs using Looping statements
a) Write a program to print 1 2 3 4 5 …..10.

b) Write a program to print series 2, 4, 6, 8,…….n.
c) Write a program to print series 2, 4, 16,……n*n using shorthand operator and while loop
d) Write a program to generate fibonnacci series.
(A Fibonacci Sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence)

e) Write a program to print the multiplication table.
f) Write a program to find a factorial of the given number.
g) Write a program to check whether the given number is Armstrong or not.
h) Write a program to check whether the given number is Strong number or not.
i) Write a program to check whether the given number is Perfect number.
j) Write a program to print all the numbers and sum of all the integers that are greater than 100 and less than 200 and are divisible by 13.

4. Programs using Functions
a) Write a program to find Fibonacci series till given number.
b) Write a program to check whether a number is a palindrome.
c) Write a program to print upper and lower triangular matrix.
d) Write a program to calculate sum and average of numbers in an array.
e) Write a program to calculate maximum and minimum value in an array.

5. Programs using Arrays
a) Write a program to find maximum element from 1-Dimensional array.
b) Write a program to sort given array in ascending order.
c) Write a program to transpose a matrix.
d) Write a program to add, subtract and multiply two matrices.

6. Programs using Structures
a) Define a structure called book that will describe the following information:Title of the book, Subject , Cost. Write a program to read the information about the 10 books and print subject-wise list containing name of the book with its cost.
b) Declare a structure with members: name, code, age, weight and height. Read the information of 10 persons and print the list of persons details whose weight is in between 35 and 50 kgs.

7. Programs using strings

a) Write a program to find string length.
b) Write a program that will read a text and count all occurrences of a particular alphabet
c) Write a program that will read a string and rewrite it in the alphabetical order. i.e.the word HELLO should be written as EHLLO.
d) Write a program that appends the one string to another string.
e) Write a program that finds a given word in a string.
f) Write a program that checks a given string for palindrome.
g) Write a program to find the number of vowels, blank spaces and other characters in a string.

8. Programs using Pointers

a) Write a program using pointers to read an array of integers and print its elements in reverse order.

b) Write a function to calculate the roots of the quadratic equation. The function must use two pointer parameters, one to receive the coefficients a, b, and c, and the other to send the roots to the calling function.
c) Write a function using pointers to add two matrices and to return the resultant matrix to the calling function.
d) Write a function to swap two values using pointers

9. Programs using Recursion

   a) Write a recursive program to calculate the factorial of a given number
   b) Write a recursive program to print Fibonacci series using recurssion

10. Programs using Files

   a) Write a program to create a file.
   b) Write a program to copy one file into another file
   c) Write a program to merge two files

TEXT BOOK :

1. Yashwanth P. Kanethkar, “Let us C”, 8th ed., BPB Publisher, 2007.

REFERENCE BOOK :

1. B.A. Forouzan and R.F. Gilberg, “Computer science, A structured programming approach using C”, 3rd ed., Thomson, 2007.

MC127-Internet and Web Technologies Lab

Course Description and Objective*:*

The purpose of this course is to introduce to students to the basics of internet and web technologies like HTML, DHTML, CSS, XML, Javascript, VBScript.

Course Outcomes:

- Understand, analyze and apply the role of languages like HTML, DHTML, CSS, XML, Javascript, VBScript and
- protocols in the workings of the web and web applications
- Analyze a web page and identify its elements and attributes.
- Create web pages using HTML, DHTML and Cascading Styles sheets.
- Create web pages using JavaScript
- Create XML documents and XML Schema.
- Build and consume web services.

1. Create a table in HTML to the following details

Book Name	**Author**
Operating Systems	Godbole
Data Communications and Networks	Godbole
Computer Networks	Rajkumar
OOPs	R.Nageswara Rao

2. Create a form by using various attributes of the input tags.

3. Create a web page multiple types of style sheet used in a single page.

4. Write a CGI sample program to send output back to the user.

5. Write a Java Script program by using variables.

6. Write a java script program to multiply two numbers and display the result in separate text box.

7. Write a java script program on Form Validations.

8. Write a AJAX program checking the presence of XMLHttpRequest object.

9. Write a program to create sales report for our books by using AJAX.

10.Create an XML document template to describe the result of students in an examination. The description should include the student's roll number,name,three subject names and marks,total marks,percentage and results.

11. Write an XSLT code to only retrieve the book titles and their prices.

12. Design a basic elements of a home page.

MC129-Communication Skills Lab - I

Objective of the Course:

To introduce students to the specific use of language for the purposes of Communication which would be an essential prerequisite for success in the areas of writing and speech. The teaching efforts in this course will be directed towards making students develop their business and general writing abilities using the fundamental principles that apply to the correct use of the English language free of grammatical and other related errors

Expected Learning Outcome:

Students are made

- to know the various ways to communicate
- to appreciate the intelligent and innovative use of rules
- to be able to generate creative output in tune with the demands of industry.
- To improve their power of comprehension and the ability to express themselves with rigor through writing and speech.

UNIT-1: COMMUNICATION – NATURE AND SCOPE

Communication – Significance – Process – Types – Flow of Communication – Basic Communication Skills – LSRW – Verbal and Non-verbal Communication – Formal Vs Informal Communication – Oral and Written Communication – Barriers to effective communication – organizational communication – Strategic implications of modern communication.

UNIT-2: AURAL AND ORAL COMMUNICATION

Listening – Active and Passive Listening –Barriers to effective listening – Strategies for effective listening – Introduction to presentations – Conversations – Roleplay – JAM – Debate – Extempore – Individual and Group Presentations –Group Discussions – Procedure – participation – Interviews - Business presentations - Addressing large groups – Public Speaking.

UNIT-3: WRITTEN COMMUNICATION

Sentence Structure – Requisites of a good sentence – Writing paragraphs – Principles of writing a good paragraph – Development of paragraphs – Describing people, places, things and processes – Narrating events, incidents – Persuasive communication – Longer composition – Common errors in writing.

UNIT-4: BUSINESS CORRESPONDENCE

Internal Communication – External Communication – Writing a memo – Letter Vs memo – Form and Structure – Circular – Notice – Agenda – Proceedings of meetings – Minutes – Business Letters – Sales Letters – Enquiry – Quotations – Placing orders – Claims – Adjustments – Inviting – Appreciating – Thanking etc. – Writing Emails – Standard Email practices – Email etiquette – Sample Emails.

UNIT-5: REPORTS, PROPOSALS AND PRESENTATIONS

Purpose of writing Reports –Format and Style – Types of reports – Regular reports – Factual reports – Survey reports – Feasibility reports – Business presentations – Format – Key elements for winning business proposals – Business presentations – Planning – Preparing – Organizing – Rehearsing – Improving – Visual aids – Nuances of delivery.

Text Books:

- Koneru, A., "Professional Communication", 2008, Tata McGraw Hill.
- Bill Mascull, "Business Vocabulary in Use", 2010, Cambridge University Press.

Reference Books:

- Bovee, C. and Thill, J.V., "Business Communication Today", 11th edition, 2011, Prentice Hall.
- Francis Soundararaj, "Speaking and Writing for Effective Business Communiation", 2008, Macmillan.
- RK Madhukar, "Business Communication", 2010,Vikas Publishing House Pvt. Ltd.
- MallikaNawal, "Business Communication", 2012, Cengage Learning India.
- Meenakshi Raman & Prakash Singh, "Business Communication", 2012, Oxford University Press.

Year II Semester I

MC116-Data Structures

DATA STRUCTURES

Course Description and Objective*:*

The main objective of this course is to provide an introduction to basic data structures and manipulation by using C programming language. It enables the students to understand Abstract Data Types. It also enables the students to understand the behavior of data structures (lists, stacks, queues, trees (binary trees and tree traversals, height-balanced trees), graphs, hash tables). It improves his ability to analyze a problem and determine the appropriate data structure for the problem.

Course Outcome:

Having successfully completed this course, the student will be able to:

- Apply C programming techniques such as pointers, dynamic memory allocation, structures to developing solutions for particular problems.
- Design and implement abstract data types such as linked list, stack, queue and tree in C programming language using static or dynamic implementations.
- Evaluate and choose appropriate abstract data types to solve particular problems.

UNIT – I Introduction, Arrays and Linked Lists

Concept of Data Structures, Implementation of Data Structures Arrays: One-dimensional array, multidimensional arrays, pointer Arrays, linked lists: Types of linked list, applications of linked lists.

UNIT – II Stacks and Queues

Stack:- Introduction to stack, Representation of a stack, operations on stack, applications of stacks; Queue: Representation of Queues, Operations on Queue, various Queue structures, Applications of Queues.

UNIT-III Trees

Trees:- Definition and concepts of trees, Representation of Binary tree, types of Binary trees, Tree Traversals operations of Binary search tree, Introduction to AVL trees.

UNIT-IV Graphs

Graph Terminologies, Representation of Graphs, operations on graphs, Graph traversals, Applications of Graphs, minimum spanning trees.

UNIT-V Sorting and Searching

Sorting Techniques; Insertion sort, selection sort, merge sort, heap sort, searching Techniques : linear search, binary search and hashing.

Text Books:

1. Debasis Samanta, “Classic Data Structures”, PHI Learning Private Limited, 2nd edition, 2011.

2. E. Horowiz & S. Sahani, “Fundamentals of Data Structures”, Galgotia Book Source Pvt. Limited, 3rd edition, 2003.

Reference Books:

1. Mark Allen Weiss, “Data Structures and Algorithm Analysis in C”, Second Edition, Pearson Education.

2. Sartaj Sahni, Data Structures, Algorithms and Applications in C++ , Universities Press, Second Edition, 2005

3. Jean Paul Tremblay and Paul G. Sorenson, An Introduction to Data Structures with Applications,Tata Mc-Graw Hill, Second Edition, 26th Reprint 2004

MC118-Database Management Systems

Course Objectives:

The objective of the course is to present an introduction to database management systems, with an emphasis on how to organize, maintain and retrieve - efficiently, and effectively - information from a DBMS.

Learning Outcomes:

Upon successful completion of this course, students should be able to:

- Describe the fundamental elements of relational database management systems
- Explain the basic concepts of relational data model, entity-relationship model, relational database design, relational algebra and SQL.
- Design ER-models to represent simple database application scenarios
- Convert the ER-model to relational tables, populate relational database and formulate SQL queries on data.
- Improve the database design by normalization.
- Familiar with basic database storage structures and access techniques: file and page organizations, indexing methods including B tree, and hashing.

UNIT- I

Database System- concepts and architecture: Data modelling using the Entity Relationship (ER) modelling and Enhanced Entity Relationship (EER) modelling, Specialization and Generalization.

UNIT-II

The Relational Model: Relational database design using ER to relational mapping, Relational algebra and relational calculus, Tuple Relational Calculus, Domain Relational Calculus, SQL.

UNIT-III

Database design theory and methodology: Functional dependencies and normalization of relations, Normal Forms, Properties of relational decomposition, Algorithms for relational database schema design.

UNIT-IV

Transaction processing concepts: Schedules and serializability, Concurrency control, Two Phase Locking Techniques, Optimistic Concurrency Control, Database recovery concepts and techniques.

UNIT-V

Data Storage and indexing: Single level and multi level indexing, Dynamic Multi level indexing using B Trees and B+ Trees, Query processing and Query Optimization, Introduction to database security.

TEXT BOOK:

1. Ramez Elmasri and Shamkant B. Navathe, Fundamentals of Database Systems (5/e), Pearson Education, 2008

REFERENCE BOOKS:

1. Silberschatz, Korth, “Data base System Concepts”, 4th ed., McGraw hill, 2006.

2. Raghu Ramakrishnan and Johannes Gehrke, Database Management Systems (3/e), McGraw Hill, 2003.

3. Peter Rob and Carlos Coronel, Database Systesm- Design, Implementation and Management (7/e), Cengage Learning, 2007.

MC120-Software Engineering

Objective : This course will be helpful for the student to understand the concept of a software life cycle and the role of process maturity models and apply key elements and common methods for elicitation and analysis to produce a set of software requirements. To distinguish between the different types and levels of testing (unit,integration, systems, and acceptance)

.**Learning Outcomes:**

After completing the course attendees will be able to:

- appreciate the wider engineering issues that form the background to developing complex, evolving (software-intensive) systems;
- plan a software engineering process to account for quality issues and non-functional requirements;
- Employ a selection of concepts and techniques to complete a small-scale analysis and design project.
- Interact with a client to elicit input, and communicate progress.
- Employ group working skills - including general organization, planning and time management, inter-group negotiation, etc.
- Translate a specification into a design, and then realize that design practically, all using an appropriate software engineering methodology.
- Reflect on the appropriateness of different software engineering methodologies in different circumstances.
- Demonstrate knowledge of the wider software engineering context, software engineering processes and their applicability.

UNIT - I

Introduction to Software Engineering : Software engineering, The software process, Software myths**.** A generic process model, Process assessment and improvement, Descriptive process models.

UNIT - II

Requirement Engineering and Modelling: Requirement engineering, Building requirement models

Requirements analysis, Scenario based modeling, Data modeling concepts, Class based modeling, Flow oriented modeling, Creating a behavioral model

UNIT - III

Design concepts and Architectural design: The design process, design concepts, the design model. Software architecture, Architectural styles, architectural design.What is a component, Designing class based components, conducting component level design, Golden rules, user interface analysis and design.

UNIT - IV

Software Testing: A strategic approach to software testing, test strategies for conventional software, Validation Testing, System Testing.

White box testing, Basis Path Testing, Control Structure Testing, Black Box Testing.

UNIT - V

Product metrics and Quality : Metrics for requirement model, Metrics for design model, Metrics for source code model, Metrics for testing model, Metrics for maintenance model. Introduction to Software quality.

TEXT BOOKS:

1. Roger S. Pressman, "Software Engineering – A practitioner's Approach",Seventh Edition,McGraw-Hill International Edition

2. Ian Somerville,"Software Engineering", 7th Edition, International Computer Science Series.

REFERENCES BOOKS:

1. K.K. Agarwal & Yogesh Singh," Software Engineering" ,New Age InternationalPublishers

2. Waman S Jawadekar, "Software Engineering principles and practice", The McGraw-Hill

MC122-Probability and Statistics

Course description and Objectives:

Aim of this course is to introduce statistical techniques which are useful in every walk of life. It also introduces some probability which has many applications. By the end of the course, student would have learned regression,correlation techniques, probability, distributions, test of hypothesis and their applications.

Course outcomes:

The students will understand

- the use of statistical techniques in every walk of life.
- The statistical techniques like regressions, correlation can be used for finding qualitative and quantitative relation between two or more variables
- Probability , probability distributions can be used in many places like academics ,real life problems for decision making.
- Test of hypothesis will be useful for them in taking decisions .
- All these topics are useful in academics as well as in research work.
- They find applications at work places as well as in their real life.

UNIT I - Descriptive Statistics

Basic Definitions, Frequencies, Graphical Representation, Histogram, Ogive curves, Measures of Central tendency, Arithmetic mean, Median, Mode, mean deviation, standard deviation, Symmetry and Skewness, Karl Pearson's Coefficient of skewness.

UNIT II - Curve Fitting and Correlation, Regression

Least squares method, curve fitting (straight line and parabola only) Covariance, Correlation, Types, Pearson's Coefficient of correlation, Rank correlation, Spearman's rank correlation. Regression, Regression lines, multiple regression.

UNIT III - Probability

Introduction, Definition (Classical and Axiomatic approach), Addition theorem, Conditional probability, Multiplication theorem, Total probability, Bayes theorem.

UNIT IV - Distributions

Random variables, Discrete and Continuous variables, Introduction to Distributions.

Binomial distribution : Definition, Mean and Standard deviation, Recurrence relation, Applications, Fitting of binomial distribution.

Poisson Distribution : Definition, Mean and Standard deviation, Recurrence relation, Poisson Distribution is an approximation of Binomial distribution, Applications, Fitting of Poisson distribution.

Geometric Distribution : Definition, Properties.Normal Distribution : Definition, Normal curve, Mean and Standard deviation,

Median, Mode, Normal Distribution applications, Normal Distribution is an approximation to Binomial distribution.

Exponential Distribution : Definition, Properties.

UNIT V - Sampling Methods

Population and Sampling, Parameters and Statistics, Types of sampling, Sampling Distributions, Central limit theorem, Standard Error of mean from infinite population, Standard deviation of variance.Test of hypothesis and test

of significance, confidence limits, confidence interval, Test of significance of Large samples, T-distribution, Chi square test.

TEXTBOOKS :

1. H. K. Dass and Er. Rajnish Verma, Higher Engineering Mathematics, S. Chand & Co., New Delhi, 2011.

2. Miller and Fruinds, Fundamentals of Probability and Statistics, PHI publication, 2003.

REFERENCEBOOKS :

1. S.C. Gupta and V.K .Kapoor, “Fundamentals of Mathematical Statistics”, Sultan Chand & Co., New Delhi, 2005.

2. B.V. Ramana, “Higher Engineering Mathematics”, 3rd Edition, Tata McGraw-Hill Publishing Co, 2008.

MC124-Computer Based Optimization Techniques

Objectives: To well ground students in the mathematical, engineering, and modeling skills that are the basis for computer based optimization techniques, and they will be prepared to apply those skills to the efficient design, analysis, operation and control of complex systems.

Learning Outcomes:

- Proficiency with tools from optimization, probability, statistics, simulation, and engineering economic analysis, including fundamental applications of those tools in industry contexts involving uncertainty and scarce or expensive resources.
- Facility with mathematical and computational modeling of real decision-making problems, including the use of modeling tools and computational tools, as well as analytic skills to evaluate the problems.
- Facility with the design, implementation, and analysis of computational experiments.

UNIT - I (10 Hrs)

Introduction: History and Development of OR,Types of models ,General methods for solving Operations Research models, Charecteristics, Phases, scientific method .**Linear Programming And IT's Applications:** Introduction,Linear programming formulation, Graphical solution , Simplex method, Artificial variable technique and Duality principle.

Transportation Problem: Mathematical formulation, Optimal solution, Degeneracy and Un-balanced Transportation

problem. **Assignment Problem:** Mathematical formulation, Optimal solution,Un-balanced assignment problem and variations.

UNIT - II (13 Hrs)

Replacement: Introduction, replacement of items that deteriorate when money value is not constant and constant, replacement of items that fail completely.**Job Sequencing:** Introduction, Principal assumption, solution of sequencing problem, optimal solution for processing n-jobs through two, three machines.

UNIT – III (13 Hrs)

Inventory Control: Meaning of. Inventory Control, Types,Reasons for carrying Inventory, economic lot size, quantity discounts, Deterministic models.

UNIT - IV (12 Hrs)

Network Models : Definitions – CPM and PERT – Their Algorithms Integer Programming : Branch and Bound Algorithms cutting plan algorithm.

UNIT - V (12 Hrs)

Theory of Games: Introduction, Minimax (maximin) criterion and optimal strategy, solution of games with saddle points, rectangular games with out saddle points, 2 X 2 games, dominance principle, m X 2 & 2 X n games, graphical method.

Dynamic Programming: Introduction, Bellman's Principle of optimality, solution of problem with finite number of stages, shortest path problem, linear programming problem.

TEXT BOOKS :

1. S.D.SHARMA : Operations Research

2. P.K.GUPTA & D.S.HIRA : Operations Research

REFERENCE BOOKS :

1. R.D.ASRHEDKAR & R.V.KULKARNI : Operations Research.

2**.** KAPPOR V.K **:**Operations Research

MC126-Data Structures Lab

Course Description and Objectives:

The course is designed to develop skills to design and analyze simple linear and non linear data structures. It strengthen the ability to the students to identify and apply the suitable data structure for the given real world problem. It enables them to gain knowledge in practical applications of data structures .

Course Outcomes:

At the end of this lab session, the student will

- Be able to design and analyze the time and space efficiency of the data structure
- Be capable to identity the appropriate data structure for given problem
- Have practical knowledge on the applications of data structures

List of Experiments:

1. Design and Implement List data structure using i) array ii) singly linked list.
2. Design and Implement basic operations on doubly linked list.
3. Design and Implement stack using i) array ii) singly linked list
4. Design and Implement Queue using i) array ii) singly linked list
5. Design and Implement basic operations on Circular Queue
6. Design and Implement basic operations(insertion, deletion, search, findmin and findmax) on Binary Search trees.
7. Implementation of Breadth First Search Techniques.
8. Implementation of Depth First Search Techniques.
9. Implementation of Searching Techniques.
10. Implementation of Sorting Techniques.

References

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India.
2. E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill.
3. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill.
4. Seymour Lipschutz, Data Structures, Schaum's Outlines Series, Tata McGraw-Hill.
5. Ellis Horowitz, Satraj Sahni and Susan Anderson-Freed, Fundamentals of Data Structures in C, W. H. Freeman and Company.
6. R. G. Dromey, How to Solve it by Computer, Prentice-Hall of India.

MC128-Database Management Systems Lab

Learning Outcomes:

The student will be familiarized with

- Familiarization of Oracle RDBMS
- Data Definition, Table Creation, Constraints, Insert, Select Commands, Update and Delete Commands.
- Nested Queries and Join Queries
- Views
- Design and development of database using Oracle
- High level programming language extensions (Control structures, Procedures and Functions).
- Front end Tools
- Forms
- Triggers
- Menu Design
- Reports.
- Case Study/ Database application project.

1. Creation, altering and dropping of tables and inserting rows into a table (use constraints while creating tables) examples using SELECT command.

2. Queries (along with sub Queries) using ANY, ALL, IN, EXISTS, NOTEXISTS, UNION, INTERSET, EXCEPT and Constraints.

3. Queries using Aggregate functions (COUNT, SUM, AVG, MAX and MIN), GROUP BY, HAVING and Creation and dropping of Views.

4. i) Creation of simple PL/SQL program which includes declaration section, executable section and exception – Handling section (Ex. Student marks can be selected from the table and printed for those who secured first class and an exception can be raised if no records were found)

ii) Insert data into student table and use COMMIT, ROLLBACK and SAVEPOINT in PL/SQL block

5. Program development using WHILE LOOPS, numeric FOR LOOPS, nested loops using ERROR Handling, BUILT –IN Exceptions, User defined Exceptions, RAISE- APPLICATION ERROR.

6. Programs development using creation of procedures, passing parameters IN and OUT of PROCEDURES.

7. Program development using creation of stored functions, invoke functions in SQL Statements and write complex functions.

8. Program development using creation of package specification, package bodies, private objects, package variables and cursors and calling stored packages.

9. Develop programs using features parameters in a CURSOR, FOR UPDATE CURSOR, WHERE CURRENT of clause and CURSOR variables.

10. Develop Programs using BEFORE and AFTER Triggers, Row and Statement Triggers and INSTEAD OF Triggers

TEXT BOOKS:

1. ORACLE DATA BASE LOG PL/SQL Programming SCOTT URMAN, Tata Mc-Graw Hill.

2. SQL & PL/SQL for Oracle 10g, Black Book, Dr.P.S. Deshpande.

3. SQL and PL/SQL for oracle 9i, Ivan Byross.

4. Oracle certified associate Mysql beginner's guide.

5. Oracle certified associate Oracle 10g &11g SQL fundamentals.

MC130-Statistical Techniques Lab

Course Description & Objectives:

The course provides a basic knowledge of statistics and make the students familiar with the software for statistics. It enables the students learn to solve simple technique which helps them to make analysis and effective decision making.

Course Outcomes:

The student will be able

- to learn basics of statistics
- and familiar with the software for statistics.
- to interpret and analyse data

List of Experiments:

1. Tabulation of data
   a) One way Frequency
   b) Two way Frequency
2. Construction of Histogram
3. Construction of Pie Chart
4. Construction of Line Chart
5. Construction of Scatter Chart
6. Descriptive Statistics
7. Correlation Analysis
8. Simple Regression Analysis
9. Multiple Regression Analysis
10. Fitting a trend line to an observed data

11. Polynomial Trends
12. Logarithmic, power and exponential trends
13. Moving averages

REFERENCE BOOK

1. K.V.S Sharma, "Statistics Made Simple Do it yourself on PC" TMH, Second Edition (2002)

MC 217 - OBJECT ORIENTED PROGRAMMING

Course Objectives:

To make the student able to understand fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries. To make the student able to write computer program to solve specified problems, by using the Java SDK environment to create, debug and run simple Java programs.

Learning Outcomes:

The student is expected to have the

- Understanding of OOP concepts and basics of java programming (Console and GUI based)
- Skills to apply OOP and Java programming in problem solving
- Should have the ability to extend his knowledge of Java programming further on his/her own.

UNIT – I Introduction, Classes and Objects

Creation of Java, Importance of Java to Internet, Byte code, Java buzzwords, OOP Principles- Encapsulation, Inheritance and Polymorphism, Data types, Variables, Declaring variables, Dynamic initialization, Scope and life time of variables, Arrays, Operators, Control statements, Type conversion and casting, Compiling and running of simple Java program, Concepts of classes and objects Class fundamentals – Declaring objects, Assigning object reference variables, Introducing methods, Constructors, Usage of static with data and methods, Usage of final with data, Access control, this key word, Garbage collection, Overloading methods and constructors, Call by value, Recursion, Nested classes and Inner classes, Exploring the String class.

UNIT –II Inheritance, Packages and Interfaces

Basic concepts, Member access rules, Usage of super key word, Forms of inheritance, Method overriding, Abstract classes, Dynamic method dispatch, Using final with inheritance, the Object class. Defining, Creating and Accessing a Package, Understanding CLASSPATH, Importing packages, Differences between classes and interfaces, Defining an interface, Implementing interface, Applying interfaces, Variables in interface and Extending interfaces.

II Year MCA I Semester	L	T	P	To	C
	3	1	-	4	4

MC201 JAVA PROGRAMMING

Objective of the Course:

For a student who has a basic awareness in Object Oriented Programming, this course makes him/her to learn the Advanced OOP concepts through java frontend tool.

UNIT - I **(12 Hrs)**

Basics to Java: Introduction to Java, Features of Java, Object oriented concepts, Data types, Variables, Arrays, Operators, Control statements, Classes, Objects, Constructors, Overloading method, Access control, Static and final methods, Inner Classes, Inheritance, Overriding methods, Using super abstract class, String class, String objects, String buffer, Char Array.

UNIT - II **(12 Hrs)**

Packages, Interfaces & Threads: Packages - Access protection - Importing packages - Interfaces - Exception handling - Throw and throws - Thread - Synchronization - Messaging - Runnable interfaces - Inter thread communication - Deadlock - Suspending, Resuming and stopping threads – Multithreading.

UNIT - III **(12 Hrs)**

HTML & JAVA Script: HTML Common tags- List, Tables, images, forms, Frames; Cascading Style sheets; Introduction to Java Scripts, Objects in Java Script, Dynamic HTML with Java Script.

UNIT - IV **(12 Hrs)**

Applets & Swings: Java Utilities -Applets - Class, Event Handling, AWT Programming, Introduction to Swing: JApplet, Handling Swing Controls like Icons – Labels – Buttons – Text Boxes – Combo Boxes – Tabbed Panes – Scroll Panes – Trees – Table Differences between AWT Controls & Swing Controls Developing a Home page using Applet & Swing.

UNIT - V **(12 Hrs)**

Java Servlets: Lifecycle of a servlets,JSDK The Servlet API,The javax.servlet Package,Reading Servlet and Initialization parameters,javax.servlet HTTP Package,Handling HTTP Request and Responses,Using Cookies, Session Tracking,Introduction to JSP.

Text Books:

1. Naughton and H.Schildt - **"Java 2 - The complete reference"** - 7/e edition.-2002.
2. Internet and World Wide Web – How to program by Dietel and Nieto Pearson Education Asia.

Reference Books:

1. S.Horstmann, Gary Cornell - "**Core Java 2 Volume I - Fundamentals**" - Addison Wesley – 2001
2. Arnold and J.Gosling - "The java programming language" - Second edition
3. Art Gittleman – "Ultimate Java Programming" –Wiley Publications-2002.

II Year MCA II Semester

	L	T	P	To	C
	3	1	-	4	4

MC202 CRYPTOGRAPHY AND NETWORK SECURITY

Objectives of the Course:

On completion of this course

- *Students will be able to identify the need of security in computer and information.*
- *Students will have an understanding of a variety of cryptographic algorithms and protocols underlying network security applications*

UNIT - I **(10 Hrs)**

Introduction: Security Trends – Security attacks – Security services – Security Mechanisms – A Model for Network Security Model.

Classical Encryption Techniques: Symmetric Cipher Model – Substitution Techniques – Transposition Techniques – Rotor Machines – Steganography.

UNIT - II **(12 Hrs)**

Block Ciphers and Data Encryption Standards: Block Cipher Principles – Data Encryption Standard – Strength of DES – Differential and Linear Cryptanalysis - Block Cipher Design Principles.

Advanced Encryption Standard: Evaluation Criteria of AES – AES Cipher – More on Symmetric Ciphers – Multiple encryption and Triple DES – Block Cipher Modes of Operation – RC4.

UNIT - III **(15 Hrs)**

Public-Key Encryption And Hash Functions: Principles of Public –Key Cryptosystems – RSA Algorithm – Key Management – Diffie Hellman Key Exchange - Message Authentication and Hash Functions – Authentication Requirements – Authentication Functions – Message Authentication – Hash Functions – Security of Hash Functions and MACS- Digital Signatures - Authentication Protocols – Digital Signature Standard.

UNIT - IV **(10 Hrs)**

Authentication Applications and Email Security: Kerberos – X.509 Authentication Service – Public Key Infrastructure – Pretty Good Privacy – S/MIME.

UNIT - V **(13 Hrs)**

IP Security and System Security: IP Security Overview – IP Security architecture- Authentication Header – Introduction to Ethical Hacking, General Introduction to Hacking-Vulnerabilities-Functionality and Easy of Use Triangle-Maintaining access-Covering Tracks-Types of Hacker Attacks-Collecting Information on Old and New Vulnerabilities-Computer Crimes and Implications.

Text Books:

1. Cryptography and Network security by William Stallings, Pearson Education, Fourth Edition
2. Cryptography and Network security by Behrouz. A. Forouzan TMH.
3. Ethical Hacking by Ankit Fadia.

Reference Books:

1. Fundamentals of Network Security by Eric Malwald(Dreamtech press)
2. Network Security – Private Communication in a Public World by Charlie Kaufman,Radis Perlman and Mike Speciner,Pearson Education
3. Introduction to Cryptography Buchmann, Springer
4. Network Security Essentials (Applications and Standards) by William Stallings Pearson Education,Second Edition

II Year MCA I Semester	L	T	P	To	C
	3	1	-	4	4

MC203 UNIX PROGRAMMING

Objectives of the Course:

The course will enable students to

- *Effectively use Unix and C to write, test, debug, and maintain modest-sized programs,*
- *Design, build, and use the software tools that fit well into Unix, writing such tools both in the Bourne Shell and in C, using Unix arguments and standard input and output facilities,*
- *Design modest-sized program using independent modules (abstract data types Hrs), that offer some potential for reuse,*
- *Clearly explain the principles behind Unix concepts such as the file system structure, pipelines, file permissions, and environments,*
- *Use standard C libraries and their associated header files effectively in writing programs.*

UNIT - I **(12 Hrs)**

Unix Utilities: Introduction to UNIX file system, file handling utilities, security by file permissions,vi editor, process utilities, diskutilities, networkingcommands, cp, mv, ln, rm, unlink, mkdir, rmdir, du, df, mount, umount, find, umask, ulimit, ps, who, w, finger, arp, ftp, telnet, rlogin.

UNIT - II **(12 Hrs)**

Unix Utilities: Text processing utilities and backup utilities detailed commands to be covered are: cat, tail, head, sort, nl, uniq, grep, egrep, fgrep, cut, paste, join, tee, more, pg, comm., cmp, diff, tr, awk, tar. What is a shell, shell responsibilities, pipes and input redirection, output redirection, shell variables, conditions,history and control structures and shell programming.

UNIT - III **(12 Hrs)**

File I/O: File descriptor, open function, close function, creat function, lseek, read, write, Filesharing, dup and dup2 functions, fcntl, ioctl functions.

Files and Directories: File status,stat,fstat,lstat Functions, File types, Permission, ownership of new files and Directories, File system, Links, File times, Directory related functions.The System calls to be covered are access, umask, chmod, fchmod, chown, link, unlink, symlink, mkdir, rmdir, chdir, fchdir, getcwd, utime.

Standard I/O Library: Streams, Buffering, open, read & write on streams, Binary I/O, Formatted I/O TemporaryFiles (fopen, fread, fclose, fflush, fseek, fgetc, getc, getchar, fputc, putchar).

UNIT - IV **(12 Hrs)**

Environment of Unix Process: Process invocation and termination,Environment variables & List, Memory Layout of C program & memory management routines.

Process control: Process identifiers, fork, vfork, exit, wait, waitpid, wait3, exec F unctions. Race conditions, Zombie process.

Signals: Signal Concepts, Signal handling, Important signals: kill, raise, alarm, pause, and abort.

UNIT - V **(12 Hrs)**

Advanced I/O: Record Locking , Streams, I/O Multiplexing, Memory Mapped I/O, various Read and write

Inter Process Communication: Pipes, FIFO, System V IPC (Message Queue,Semaphore, Shared Memory Hrs).

Text Books:

1. Unix and shell Programming Behrouz A. Forouzan, Richard F. Gilberg.Thomson
2. Sumitabha Das - Unix: Concepts & Applications 4/e - TMH.
3. Advanced Programming in the UNIX environment W.R.Stevens

Reference Books:

1. Unix internals,the new frontiers Uresh vahalia.
2. The C Odyssey UNIX Meeta Gandhi

II Year MCA II Semester

L	T	P	To	C
3	1	-	4	4

MC204 DATA WAREHOUSING AND MINING

Objectives of the Course:

The course aims to help students

- *To understand and implement classical algorithms in data mining and data warehousing.*
- *To assess the strengths and weaknesses of the algorithms.*
- *To identify the application area of algorithms, and to apply them.*

UNIT - I **(15 Hrs)**

Data Warehouse: Introduction, A Multi-dimensional data model, Data Warehouse Architecture, Data Warehouse Implementation, From Data Warehouse to Data Mining.

Data Mining – Introduction, Data Mining, Kinds of Data, Data Mining Functionalities, Classification of Data Mining Systems, Major issues in Data Mining.

UNIT - II **(12 Hrs)**

Data Preprocessing: Data cleaning, Data Integration & Transformation, Data Reduction, Discritization & Concept Hierarchy Generation, Data Mining Primitives.

Mining Association rules in large databases – Association rule mining, mining single-dimensional Boolean Association rules from Transactional Databases, Mining Multi-dimensional Association rules from relational databases & Data Warehouses.

UNIT - III **(10 Hrs)**

Concept Description: Introduction, Data Generalization and Summarization-Based Characterization, Analytical Characterization, Mining Class Comparisons, Mining Descriptive Statistical Measures in Large Databases.

UNIT - IV **(12 Hrs)**

Classification & Prediction: Introduction, Classification by Decision tree induction, Bayesian Classification, , Classification by Back propagation, Other Classification Methods, Prediction, Classifier accuracy.

Mining Complex Type of Data – Multidimensional Analysis and Descriptive Mining of Complex Data Objects, Mining Spatial Databases, Mining Multimedia Databases, Mining Text Databases, Mining the World Wide Web.

UNIT - V **(10 Hrs)**

Cluster Analysis: Introduction, Types of data in Cluster analysis, A categorization of major clustering methods, partitioning methods, Hierarchical methods, Density-Based Methods: DBSCAN, Grid-based Method: STING; Model-based Clustering Method: Statistical approach, Outlier analysis.

Text Books:

1. Data Mining Concepts & Techniques – Jiawei Han Micheline Kamber – Morgan Kaufmann Publishers.
2. Paulraj Ponnaiah, “Data Warehousing Fundamentals”, Wiley Publishers, 2001.

Reference Books:

1. Usama M.Fayyad, Gregory Piatetsky Shapiro, Padhrai Smyth, RamasamyUthurusamy, “Advances in Knowledge Discover and Data Mining”, The M.I.T. Press, 1996.
2. Ralph Kimball, Margy Ross, “The Data Warehouse Toolkit”, John Wiley and Sons Inc., 2002.
3. Alex Berson, Stephen Smith, Kurt Thearling, “Building Data Mining Applications for CRM”, Tata McGraw Hill, 2000.
4. Margaret Dunham, “Data Mining: Introductory and Advanced Topics”, Prentice Hall, 2002.

II Year MCA I Semester

	L	T	P	To	C
	3	1	-	4	4

MC205 COMPUTER NETWORKS

Objectives of the Course:

- *To focus on imparting knowledge about the aspects of data communication and computer network systems with the required basic principles behind them.*
- *To provide enough knowledge about the OSI model and TCP/IP model.*
- *To give students a good foundation covering the physical layer, data link layer, network layer and the transport layer.*

UNIT - I **(14 Hrs)**

Introduction to Computer Networks: Introduction to Data Communication System, Basic Concepts, Network Advantages and Applications, Network Hardware, Network Software, Types of Networks – LAN, MAN, WAN.

Layers : OSI Model, TCP/IP Model, Examples of Networks- Arpanet, Internet.

UNIT - II **(12 Hrs)**

Physical Layer: Introduction to Telecommunications, Functions of Physical Layer- Signals, Encoding, Transmission of Digital data – Interfaces and Modems, Transmission Media- Guided Media, Unguided Media, Introduction to ISDN, ATM, SONET.

UNIT - III **(15 Hrs)**

Data link layer: Design Issues, Framing, Error Detection and Correction Techniques, Elementary Protocols- Stop and Wait, Sliding Window, Example of Data link layer Protocols.

Medium Access Sub Layer : Channel Allocation Problem, Multiple Access Protocols-ALOHA,IEEE 802 project – 802.1, 802.2,802.3, 802.4,802.5, Wireless LANS, Bridges.

UNIT - IV **(12 Hrs)**

Network Layer: Network Layer Design Issues**,** Virtual circuit and Datagram subnets, Routing algorithms- , Congestion Control algorithms-, Internetworking, The Network layer in the Internet – IP, IP Addresses, IP Subnet masking, ICMP, ARP,RARP.

UNIT - V **(15 Hrs)**

Transport Layer and Application Layer: Elements of Transport Layer, Connection management, TCP and UDP protocols;

Application Layer – Network Security, Domain name system, SNMP, Electronic Mail; the World WEB, Multi Media.

Text Books:

1. Data Communications and Networking – Behrouz A. Forouzan. 4/e Edition TMH.
2. Computer Networks — Andrew S Tanenbaum,4th Edition. Pearson Education/PHI

Reference Books:

1. An Engineering Approach to Computer Networks-S.Keshav, 2nd Edition, Pearson Education.
2. Understanding communications and Networks, 3rd Edition, W.A. Shay, Thomson.

II Year MCA II Semester

	L	T	P	To	C
	3	1	-	4	4

MC206 ENTERPRISE RESOURCE PLANNING

Objective of the Course:

The objective of the course is to enable students in learning basic concepts of Enterprise Resource Planning so that they can understand how to use the organizational resources effectively.

UNIT - I **(08 Hrs)**

Introduction to ERP: Overview of ERP, MRP, MRPII and Evolution of ERP, Integrated Management Systems, Reasons for the growth of ERP, Business Modeling, Integrated Data Model, ERP Market.

UNIT - II **(18 Hrs)**

ERP Technologies: Business Process Re-engineering (BPR)– BPR Process, Clean Slate Re-engineering, Technology Enabled Re-engineering, Myths regarding BPR, Business Intelligence Systems-Data Mining, Data Warehousing, On-Line Analytical Processing (OLAP), Supply Chain Management, Best Practices in ERP.

UNIT - III **(12 Hrs)**

ERP Modules: Finance, Accounting Systems, Manufacturing and Production Systems, Sales and Distribution Systems, Human Resource Systems, Plant Maintenance System, Materials Management System, Quality Management System, ERP System Options and Selection, ERP proposal Evaluation.

UNIT - IV **(14 Hrs)**

ERP Implementation, Maintenance and Benefits of ERP: Implementation Strategy Options, Features of Successful ERP Implementation, Strategies to Attain Success, User Training, Maintaining.

UNIT - V **(10 Hrs)**

ERP & IS. Benefits of ERP: Reduction of Lead Time, On-Time Shipment, Reduction in Cycle Time, Improved Resource Utilisation, Better Customer Satisfaction, Improved Supplier Performance, Increased Flexibility, Reduced Quality Costs, Improved Information Accuracy and Decision Making Capabilities.

Text Books:

1. Alexis Leon, ERP (Demystified Hrs), 5/E, Tata McGraw-Hill, 2006.
2. David L Olson, Managerial Issues of Enterprise Resource Planning Systems, McGraw Hill, International Edition-2006.

Reference Books:

1. *Sinha; Enterprise Resource Planning, Cengage Learning, New Delhi, India, 2008*
2. Vaman, ERP in Practice, Tata McGraw-Hill , 2007

II Year MCA I Semester

	L	T	P	To	C
	3	1	-	4	4

MC207 SOFTWARE ENGINEERING

Objectives of the Course:

The course aims

- *To explain the concept of a software life cycle and the role of process maturity models.*
- *To apply key elements and common methods for elicitation and analysis to produce a set of software requirements.*
- *To explain the importance of Architecture in software design.*
- *To distinguish between the different types and levels of testing (unit, integration, systems, and acceptance).*

UNIT - I **(10 Hrs)**

Software Product and Process: Introduction to Software Engineering, Generic view of process- Capability Maturity Model Integration (CMMI),

Process models: The Waterfall Model, Incremental Process Models, Evolutionary Process Model, An Agile view of process.

UNIT - II **(12 Hrs)**

Software Requirements Engineering: Requirement Engineering Task, Initiating the Requirements Engineering Process, Requirements Analysis, Data Modeling, and Scenario based modeling, Flow Oriented Modeling.

UNIT - III **(12 Hrs)**

Software Design Engineering: Design Process And Concepts, Pattern Based Software Design.

Creating Architectural Design: Software architecture, Data design, Architectural styles and patterns, Performing User Interface Design.

UNIT - IV **(14 Hrs)**

Software Testing: A strategic approach to software testing, test strategies for conventional software, Validation Testing, System Testing, The Art of Debugging.

Testing tactics: White box testing, Basis Path Testing, Control Structure Testing, Black Box Testing.

UNIT - V **(12 Hrs)**

Software Metrics: Software Quality, Metrics for Analysis Model, Metrics for Design Model, Metrics for source code, Metrics for testing, Metrics for maintenance.

Text Books:

1. Roger S. Pressman, “Software Engineering – A practitioner’s Approach”,Sixth Edition,McGraw-Hill International Edition
2. Ian Somerville,”Software Engineering”, 7th Edition, International Computer Science Series.

References Books:

1. K.K. Agarwal & Yogesh Singh," Software Engineering" ,New Age InternationalPublishers
2. Waman S Jawadekar, "Software Engineering principles and practice", The McGraw-Hill Companies.

II Year MCA II Semester

	L	T	P	To	C
	3	1	-	4	4

MC208 STRATEGIC MANAGEMENT

ELECTIVE– I

Objective of the Course:

The course is designed to enhance analytical skills among students for carrying out effective stategic management of an organisation.

UNIT - I **(10 Hrs)**

Introduction to Strategic Management: Concepts in Strategic Management, Strategic Management as a process – Developing a strategic vision, Mission, Objectives, Policies – Factors that shape a company's strategy – Concepts of Core Competence, Crafting a strategy.

UNIT - II **(14 Hrs)**

Environmental Scanning and Strategic Analysis: Industry and Competitive Analysis – Methods. Evaluating company resources and competitive capabilities – SWOT Analysis – Strategy and Competitive advantage. Strategic Analysis and Choice: Tools and techniques – Porter's five Force Model, BCG Matrix, GE Model, TOWS Matrix, SPACE Matrix, IE Matrix, The Grand Strategy Matrix. Market Life Cycle Model- and Organisational Learning, Impact Matrix and the Experience Curve, Generic Strategies.

UNIT - III **(14 Hrs)**

A. Strategy Formulation: Strategy Framework For Analysing Competition, Porter's Value chain Analysis, Competitive Advantage of Firm, Exit and Entry Barriers – Formulation of strategy at corporate, business and functional levels, Types of Strategies: Offensive strategy, Defensive strategy, vertical integration, horizontal strategy; Tailoring strategy to fit specific industry and company situations.

B. Strategy Implementation: Strategy and Structure, Strategy and Leadership, Strategy and culture connection – Operationalising and institutionalizing strategy – Strategies for competing in Globalising markets and internet economy – Organisational Values and Their Impact on Strategy – Resource Allocation as a vital part of Strategy – Planning systems for implementation.

UNIT - IV **(10 Hrs)**

Turnaround and Diversification Strategies: Turnaround Strategy, management of Strategic Change, Strategies for Mergers, Acquisitions, Takeovers and Joint Ventures. Diversification Strategy, Why firms diversify, different types of diversification strategies, the concept of core competence, strategies and competitive advantage in diversified companies and its evaluation.

UNIT - V **(10 Hrs)**

Strategy Evaluation and Control: Establishing strategic controls – Measuring performance – appropriate measures – Role of the strategist – using qualitative and quantitative benchmarking to evaluate performance – strategic information systems – problems in measuring performance – Guidelines for proper control – Strategic surveillance – strategic audit – Strategy and Corporate Evaluation and feedback in the Indian and International context.

Text Books:

1. Ranjan Das, Crafting the Strategy: Concepts and Cases in Strategic Management, TMH, New Delhi, 2006.
2. Azhar Kazmi, Business Policy and strategic Mgt. TMH, New Delhi

Reference Books:

1. Lawrence R Jauch, R. Gupta & William F. Glueck: Business Policy and Strategic Management, Frank Bros. Delhi, 2006.
2. Thomposn & Strickland: Strategic Management, Concepts and Cases. Tata McGraw-Hill, 12/e, New Delhi, 2007.
3. Gregory Dess and G.T. Lumpkin, Strategic Management – Creating Competitive Advantage, McGraw Hill International, 2006.

II Year MCA I Semester

	L	T	P	To	C
	3	1	-	4	4

MC209 ORGANIZATION BEHAVIOR

Objective of the Course:

The course provides a basic knowledge of various dimensions of human behavior. This will form the foundation to study and to understand the behavior of the human beings working in organizations.

UNIT - I **(12 Hrs)**

Introduction to OB: Definition, Nature and Scope Environmental Organisational context Impact of IT, globalisation, Divessiky, Ethics, eulture.

UNIT - II **(12 Hrs)**

Coqnitive Process: Individual and Organistional and organizational factors that infencnce perceptional process. Role of perception in managerial activities and organizational processes.

UNIT - III **(10 Hrs)**

Personality and Attitudes: Personality as continues – Meaning of Personality – Johari window and Transactional Analysis Nature and Dimension of Attitudes.

UNIT - IV **(10 Hrs)**

Motivation Processed and Techniques: Nature of human motivation – Work Motivation – Theories of Motivation – Emotional Intelligence.

UNIT - V **(16 Hrs)**

Group Dynamics: The Nature of groups. Kinds of groups – Functional groups, Task groups and Informal groups. Stages of Group Development – Factors Contributing to Groups Cohesiveness – Role and functions of groups stress: Meaning & types of stress – Effect of Stress – Strategies of cope with stress, Leadership Dynamics in Organisation, Leadership Theories – Styles, Activities and Skills of Great Leaders.

Text Books:

1. Luthans, Fred: Organisational Behaviour 10/e, THM, 2007.
2. Robbins, P Stephen, Timotny A judge: Organisation Behaviour, 12/e, PHI, New Delhi, 2007.

Reference Books:

1. Organisation Behaviour by Nelson
2. Schermerhorn: Organisation Behaviour, 9ed wicey 2005.
3. Organisational Behaviour by Aswatappa

II Year MCA II Semester

	L	T	P	To	C
	3	1	-	4	4

MC216 E-COMMERCE

ELECTIVE– II

Objective of the Course:

This course explores the basics of working with internet including WWW, Email, Browsing, Chatting etc., and understand the potential of secured electronic transactions, E-mail security and electronic publishing.

UNIT - I **(12 Hrs)**

Electronic Commerce Environment and Opportunities: Background, The Electronic Commerce Environment, Electronic Marketplace Technologies. Modes of Electronic Commerce: Electronic Data Interchange, Migration to Open EDI, Electronic Commerce with www/Internet, Commerce Net Advocacy, web Commerce Going Forward.

UNIT - II **(12 Hrs)**

Approaches to Safe Electronic Commerce: Secure Transport Protocols, Secure Transactions, Secure Electronic Payment Protocol (SEPP), Secure Electronic Transaction (SET), Certificates for authentication Security on web Servers and Enterprise Networks.

Electronic Cash and Electronic Payment Schemes: Internet Monetary Payment & Security Requirements. Payment and Purchase Order Process, On-line Electronic cash.

UNIT - III **(12 Hrs)**

Internet/Intranet Security Issues and Solutions: The need for Computer Security, Specific Intruder Approaches, Security Strategies, Security Tools, Encryption, Enterprise Networking and Access to the Internet, Antivirus Programs, Security Teams.

UNIT - IV **(12 Hrs)**

Master Card/Visa Secure Electronic Transaction: Introduction, Business Requirements, Concepts, payment Processing. E-Mail and Secure E-mail Technologies for Electronic Commerce: Introduction, The Means of Distribution, A model for Message Handling, E-mail working, Multipurpose Internet Mail Extensions, Message Object Security Services, Comparisons of Security Methods, MIME and Related Facilities for EDI over the Internet.

UNIT - V **(12 Hrs)**

Internet Resources for Commerce: Introduction, Technologies for web Servers, Internet Tools Relevant to Commerce, Internet Applications for Commerce, Internet Charges, Internet Access and Architecture, Searching the Internet. Advertising on Internet: Issues and Technologies. Introduction, Advertising on the Web, Marketing creating web site, Electronic Publishing Issues, Approaches and Technologies: EP and web based EP.

Text Books:

1. WebCommerceTechnologyHandbook, byDanielMinoli, EmmaMinoli, McGraw-Hill
2. Frontiers of electroni commerece by Galgotia.

Reference Books:

1. E-Commerce fundamentals and applications Hendry Chan, Raymond Lee, Tharam Dillon, Ellizabeth Chang, John Wiley.
2. E-Commerce, S.Jaiswal – Galgotia.
3. E-Commerce, Efrain Turbon, Jae Lee, David King, H.Michael Chang.
4. Electronic Commerce – Gary P.Schneider – Thomson.
5. E-Commerce – Business, Technology, Society, Kenneth C.Taudon, Carol Guyerico Traver.

II Year MCA II Semester

	L	T	P	To	C
	3	1	-	4	4

MC212 PROFESSIONAL ETHICS
ELECTIVE– I

Objective of the Course:

This course makes an engineering professional aware of human, moral and ethical implications of technology.

UNIT - I **(12 Hrs)**

Engineering Ethics: Scenses of 'Engineering Ethics' – variety of moral issues – types of inquiry – moral dilemmas – moral autonomy – kohlberg's theory – giligan's theory – consensus and controversy – professions and professionalism – professional ideals and virtues – theories about right action – self –interest – customs and religion – uses of ethical theories.

UNIT - II **(12 Hrs)**

Engineering As social Experimentation: Engineering as experimentation – engineers as responsible experimenters – codes of eiths – a balanced outlook on law – the challenger case study.

UNIT - III **(12 Hrs)**

Engineer's Responsibility for Safety: Safety and risk – assessment of safety and risk – risk benefit analysis – reducing risk – the three mile island and Chernobyl case studies.

UNIT - IV **(12 Hrs)**

Responsibilities and Rights: Collegiality and loyalty – respect for authority – collective bargaining – confidentiality – conflicts of interest – occupational crime – professional rights – employee rights – intellectual property rights (IPR) – discrimination.

UNIT - V **(12 Hrs)**

Global Issues: Multinational corporations – environmental ethics– computer ethics– weapons development – engineers as managers – consulting engineers – engineers as expert witnesses and advisors – moral leadership – sample code of conduct.

Text Books:

1. Engineering Ethics – Charles D. Fleddermann – Prentice Hall
2. Engineering Ethics – Charles E Harris, Michael S. Partchard Concepts & Cases and Michael J Rabins

Reference Books:

1. "Ethics and the conduct of Business" – Pearson Education,
2. Fundamentals of Ethics for Scientists and Engineers – Edmund G Seebauer and Roert L Barry.

II Year MCA II Semester

	L	T	P	To	C
	3	1	-	4	4

MC214 MICROPROCESSORS & INTERFACING
ELECTIVE– II

Objective of the Course:

The course discusses the evolution of microprocessors; It is a 16-bit microprocessor. Its hardware, instructions, addressing modes, assembly language programming, interfacing memory and I/O devices, also A/D and D/A converter interfacing, data acquisition and analysis, serial data communication aspects are covered in this course.

UNIT - I **(12 Hrs)**

Introduction to microprocessors, 8086 microprocessor, architecture, register model, main units, 20-bit address generation, instruction classification, addressing modes, I/O addressing.

Assembly language programming, structure of .EXE and .COM files, writing assembly language source files, converting them into executable files, INT 21h services of MSDOS for programming, Debugger, writing simple programs and executing.

UNIT - II **(12 Hrs)**

Assembly language programs for arithmetic operations, logic operations, CALL-RETurn operations, intra and inter segment calls, sorting and string operations. Interrupts of 8086, Interrupt vector table, explanation of interrupts.

Hardware features of 8086, pin diagram of 8086, multiplexed ADD/DATA and ADD/STATUS buses, control bus, minimum and maximum modes, Memory READ/WRITE and I/O READ/WRITE machine cycles, machine cycle with WAIT states.

UNIT - III **(12 Hrs)**

Interfacing memory to 8086 using simple NAND gate for address decoding, multiple chip interfacing using 74LS138 decoder, Word organized memory interfacing.

8255 PPI, mode set and bit set control word formats, Interfacing to 8086, Key board and display interfacing, A/D and D/A converter interfacing, digitization of signals using assembly language programmes, storage in the memory and reconstruction, synthesized wave form generation.

UNIT - IV **(12 Hrs)**

8254 Timer, Control word format for the timer, Interfacing 8254 with 8086, Generation of a set time delay.

8259 Programmable interrupt controller, interfacing 8259 with 8086, Interrupt driven data acquisition.

UNIT - V **(12 Hrs)**

Direct memory access, Features of 8257 DMA chip, Interfacing 8257 with 8086 and bulk data transfer using DMA.

Serial data communication, 8251 USART, Interfacing 8251 with 8086, Serial data transfer, High speed serial communication and USB.

Text books:

1. Microprocessors & Interfacing by Douglas V.Hall, Second edition TMH,2003.
2. Advanced Microprocessors & Peripherals by AK Ray and KM Bhurchandi, Second edition, TMH, 2006
3. Assembly language techniques for the IBM PC by Alan R. Miller ,Sybex 1986

Reference Books:

1. The Intel Microprocessors by Barry B. Brey , Pearson Education, 2004.
2. 8086 Microprocessor Programming and Interfacing by Kenneth J. Ayala, Cengage Learning, 2008.

II Year MCA II Semester

L	T	P	To	C
3	1	-	4	4

MC216 E-COMMERCE
ELECTIVE– II

Objective of the Course:

This course explores the basics of working with internet including WWW, Email, Browsing, Chatting etc., and understand the potential of secured electronic transactions, E-mail security and electronic publishing.

UNIT - I **(12 Hrs)**

Electronic Commerce Environment and Opportunities: Background, The Electronic Commerce Environment, Electronic Marketplace Technologies. Modes of Electronic Commerce: Electronic Data Interchange, Migration to Open EDI, Electronic Commerce with www/Internet, Commerce Net Advocacy, web Commerce Going Forward.

UNIT - II **(12 Hrs)**

Approaches to Safe Electronic Commerce: Secure Transport Protocols, Secure Transactions, Secure Electronic Payment Protocol (SEPP), Secure Electronic Transaction (SET), Certificates for authentication Security on web Servers and Enterprise Networks.

Electronic Cash and Electronic Payment Schemes: Internet Monetary Payment & Security Requirements. Payment and Purchase Order Process, On-line Electronic cash.

UNIT - III **(12 Hrs)**

Internet/Intranet Security Issues and Solutions: The need for Computer Security, Specific Intruder Approaches, Security Strategies, Security Tools, Encryption, Enterprise Networking and Access to the Internet, Antivirus Programs, Security Teams.

UNIT - IV **(12 Hrs)**

Master Card/Visa Secure Electronic Transaction: Introduction, Business Requirements, Concepts, payment Processing. E-Mail and Secure E-mail Technologies for Electronic Commerce: Introduction, The Means of Distribution, A model for Message Handling, E-mail working, Multipurpose Internet Mail Extensions, Message Object Security Services, Comparisons of Security Methods, MIME and Related Facilities for EDI over the Internet.

UNIT - V **(12 Hrs)**

Internet Resources for Commerce: Introduction, Technologies for web Servers, Internet Tools Relevant to Commerce, Internet Applications for Commerce, Internet Charges, Internet Access and Architecture, Searching the Internet. Advertising on Internet: Issues and Technologies. Introduction, Advertising on the Web, Marketing creating web site, Electronic Publishing Issues, Approaches and Technologies: EP and web based EP.

Text Books:

1. WebCommerceTechnologyHandbook, byDanielMinoli, EmmaMinoli, McGraw-Hill
2. Frontiers of electroni commerece by Galgotia.

Reference Books:

1. E-Commerce fundamentals and applications Hendry Chan, Raymond Lee, Tharam Dillon, Ellizabeth Chang, John Wiley.
2. E-Commerce, S.Jaiswal – Galgotia.
3. E-Commerce, Efrain Turbon, Jae Lee, David King, H.Michael Chang.
4. Electronic Commerce – Gary P.Schneider – Thomson.
5. E-Commerce – Business, Technology, Society, Kenneth C.Taudon, Carol Guyerico Traver.

MC 217 - OBJECT ORIENTED PROGRAMMING

Course Objectives: To make the student able to understand fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries. To make the student able to write computer program to solve specified problems, by using the Java SDK environment to create, debug and run simple Java programs.

Learning Outcomes:

The student is expected to have the

- Understanding of OOP concepts and basics of java programming (Console and GUI based)
- Skills to apply OOP and Java programming in problem solving
- Should have the ability to extend his knowledge of Java programming further on his/her own.

UNIT – I Introduction, Classes and Objects

Creation of Java, Importance of Java to Internet, Byte code, Java buzzwords, OOP Principles- Encapsulation, Inheritance and Polymorphism, Data types, Variables, Declaring variables, Dynamic initialization, Scope and life time of variables, Arrays, Operators, Control statements, Type conversion and casting, Compiling and running of simple Java program, Concepts of classes and objects Class fundamentals – Declaring objects, Assigning object reference variables, Introducing methods, Constructors, Usage of static with data and methods, Usage of final with data, Access control, this key word, Garbage collection, Overloading methods and constructors, Call by value, Recursion, Nested classes and Inner classes, Exploring the String class.

UNIT –II Inheritance, Packages and Interfaces

Basic concepts, Member access rules, Usage of super key word, Forms of inheritance, Method overriding, Abstract classes, Dynamic method dispatch, Using final with inheritance, the Object class. Defining, Creating and Accessing a Package, Understanding CLASSPATH, Importing packages, Differences between classes and interfaces, Defining an interface, Implementing interface, Applying interfaces, Variables in interface and Extending interfaces.

UNIT – III Exception Handling, Multithreading

Concepts of Exception handling, Types of exceptions, Usage of try, Catch, Throw, Throws and Finally keywords, Built-in exceptions, Creating own exception Sub classes, Concepts of Multithreading, Differences between process and thread, Thread life cycle, Creating multiple threads using Thread class, Runnable interface, Synchronization, Thread priorities, Inter thread communication, Daemon threads, deadlocks, Thread groups.

UNIT – IVApplets and Event Handling & AWT Controls

Applet Class, Applet Architecture, Applet Skeleton - Applet Initialization and Termination, Overriding update(), Simple Applet, Display Methods, Requesting Repainting - A simple banner Applet, Using The Status Window, The HTML APPLET Tag, Passing parameters to Applets, Applet Context and show Document.

Event sources, Event classes – ActionEvent, AdjustmentEvent, ComponentEvent, Container Event, Focus Event, InputEvent, ItemEvent, KeyEvent and MouseEvent, Delegation event model, Event Listeners, Handling mouse and Keyboard events, Adapter classes.

UNIT – VAWT&Swing

Concepts of components, Container, Panel, Window, Frame, Canvas, Font class, Color class and Graphics. AWT Controls : Buttons, Labels, Text fields, Text area, Check boxes, Check box groups, Lists, Choice, Scrollbars, Menus, Layout Managers - Flow, Border, Grid, Card and Grid bag.

JApplet, JFrame and JComponent, Icons and Labels, Handling threading issues, Text fields, Buttons – The JButton class, Check boxes, Radio buttons, Combo boxes, Tabbed Panes, Scroll Panes, Trees, and Tables.

TEXT BOOKS

1. Herbert Schildt, “The Complete Reference Java J2SE”, 7th ed., TMH Publishing Company Ltd, New Delhi, 2008.

2. Joe Wiggles worth and Paula McMillan, “Java Programming Advanced Topics”, 3rd ed., TMH, 2009.

REFERENCE BOOKS

1. Cay Horstmann, “Big Java”, 2nd ed., John Wiley and Sons, 2006.

II Year MCA II Semester

	L	T	P	To	C
	3	1	-	4	4

MC218 COMPUTER GRAPHICS
ELECTIVE– II

Objective of the Course:

Computer graphics is the art and science of communicating information using images that are generated and presented through computation. This requires (a) the design and construction of models that represent information in ways that support the creation and viewing of images,(b) the design of devices and techniques through which the person may interact with the model or the view, and (c) the creation of techniques for rendering the model.The goal of this course in computer graphics is to engage the person's visual centers alongside other cognitive centers in understanding.

UNIT - I **(10 Hrs)**

Introduction: Application areas of Computer Graphics, overview of graphics systems, video-display devices,raster-scan systems, random scan systems, graphics monitors and work stations and input devices.

UNIT - II **(14 Hrs)**

Output primitives: Points and lines, line drawing algorithms, mid-point circle and ellipse algorithms.

Filled area primitives: Scan line polygon fill algorithm, boundary-fill and flood-fill algorithms

Attributes of output primitives: Line attributes, character attributes and antialiasing.

UNIT - III **(12 Hrs)**

2-D geometrical transforms: Translation, scaling, rotation, reflection and shear transformations, matrix representations and homogeneous coordinates, composite transforms, transformations between coordinate systems.

2-D viewing: The viewing pipeline, viewing coordinate reference frame, window to view-port coordinate transformation, viewing functions, Cohen-Sutherland and Cyrus-beck line clipping algorithms, Sutherland –Hodgeman polygon clipping algorithm.

UNIT - IV **(12 Hrs)**

3-D Geometric transformations: Translation, rotation, scaling, reflection and shear transformations, composite transformations.

3-D viewing: Viewing pipeline, viewing coordinates, view volume and general projection transforms and clipping.

UNIT - V **(12 Hrs)**

3-D object representation: Polygon surfaces, quadric surfaces, spline representation, Hermite curve, Bezier curve and B-Spline curves, Bezier and B-Spline surfaces. Classification, back-face detection, depth-buffer, scan-line, depth sorting, BSP-tree methods, area sub-division and octree methods.

Text Books :

1. Donald Hearn and M.Pauline Baker “Computer Graphics *version*”,, Pearson Education.
2. Amerendra , N Sinha , and Arun D Udai, “ Computer Graphics” , Tata McGraw Hill

Reference Books :

1. C, Foley, VanDam, Feiner and Hughes “Computer Graphics Principles & practice”, second edition in C, Pearson Education.
2. Zhigand xiang, Roy Plastock, Schaum’s outlines “Computer Graphics Second edition”, , Tata Mc- Graw hill edition.
3. David F Rogers ,Procedural elements for Computer Graphics, Tata Mc Graw hill, 2nd edition.
4. Neuman and Sproul, “Principles of Interactive Computer Graphics”, Neuman and Sproul, TMH.
5. Shalini Govil, Pai, Principles of Computer Graphics, 2005, Springer.
6. Steven Harrington ,Computer Graphics, TMH.

MC 219-OPERATING SYSTEMS

Course Objectives:

To make the student understand how the operating system effectively manages system resources.

Course Outcomes:

The student will

· Understand the types of Operating systems and analyze the process scheduling Algorithms and Case study on processing Scheduling.

· Understand the resource sharing among the processes in the system.

· Understand how to manage the memory during the process execution (Memory Management) and File Management system.

UNIT I - Introduction

What Operating System do, Operating System structure. Process Concept:Overview, Process scheduling, Operations on process, Inter processcommunication. Process Scheduling: Scheduling Criteria, SchedulingAlgorithms, Multiple-Processor Scheduling, Case Study: Process scheduling

in Linux.

UNIT II - Process Synchronization

The Critical-Section Problem, Peterson's Solution, Synchronization Hardware,Semaphores, Monitors, Classical problems of synchronization, Case Study :Process Synchronization in Linux.

UNIT III - Deadlocks

Deadlock Characterization, Methods of Handling Deadlocks, Deadlockprevention, Deadlock avoidance, Deadlock Detection and Recovery.

UNIT IV - Memory Management

Continuous memory allocation, paging, structure of the page table,segmentation, demand paging, page replacement algorithms.

UNIT V - File System

File Concept, Access Methods, Directory Structure, File System Mounting,File Sharing, Protection, File-System Structure, File System Implementation,Directory Implementation, Allocation Methods, Free Space Management.

Secondary-Storage Structure: Overview of Mass-Storage Structure, DiskStructure, Disk Scheduling, RAID Structure.

TEXTBOOK:

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, "OperatingSystem Principles", 7th edition, John Wiley & Sons Inc, 2006.

REFERENCEBOOKS:

1. William Stallings, “Operating Systems – Operating System: Internals andDesign Principles”, 6th edition, , Prentice Hall, 2005.

2. Andrew S Tanenbaum ,”Modern Operating Systems”, 3rd edition, , PrenticeHall, 2007.

II Year MCA II Semester

	L	T	P	To	C
	-	-	3	3	2

MC220 CRYPTOGRAPHY AND NETWORK SECURITY LAB

Objective of the Course:

After the successfull completion of this course the student is enable towards learning and create security in networks as well as information and database. Also protect e-mail messages and instant messaging from common security threats and have basic ideas of routing algorithms.

1. Implement the data link layer framing method of bit stuffing & Character Stuffing.
2. Implement CRC polynomial for error checking.
3. Write a program to transfer file using TCP.
4. Write a program to transfer file using UDP.
5. Implement the following algorithms
   a. Implement Caesar substitution technique with a shift of ‘k’ positions.
   b. Implement Hill cipher. Encrypt the Message “PAYMOREMONEY” with a key.
   c. Implement Mono-alphabetic substitution. Generate the mapping using random number 0 to 26.
6. Write a program to encrypt and decrypt using row and column transposition cipher.
7. Implementation of DES algorithm using 64-bit text and encrypt the same.
8. Implementation of RSA algorithm for encryption and decryption.
9. a. Program to print the content of the file given in URL.
   b. To write a program to find multiple IP Address of multi-named host.
10. Implementation of Security Services.

Text Books:

1. Cryptography and Network security by William Stallings, Pearson Education, Fourth Edition
2. Network Security Essentials (Applications and Standards) by William Stallings Pearson Education, Second Edition

Reference Books:

1. Fundamentals of Network Security by Eric Malwald(Dreamtech press)
2. Network Security – Private Communication in a Public World by Charlie Kaufman, Radis Perlman and Mike Speciner,Pearson Education
3. Introduction to Cryptography Buchmann, Springer
4. Problem solving with C++, The OOP, Fourth edition, W.Savitch, Pearson education.
5. C Programming with problem solving, J.A. Jones & K. Harrow, Dreamtech Press.
6. Java How to Program, Sixth Edition, H.M.Dietel and P.J.Dietel, Pearson Education/PHI

MC227 - Object Oriented Programming Lab

Course Objectives:

This course is introduced to understand the basic concepts of Java,Classsyntax, data types, flow of control, classes, methods, objects, arrays, exceptionhandling, recursion, and graphical user interfaces (GUIs). Writing and testing applets for potential inclusion in web pages. Understanding how to accessenterprise data bases from the application programs.

Course outcomes:

The student is expected to have hands on experience with the following:

1. Basics of Java programming, multi-threaded programs andException handling

2. The skills to apply OOP in Java programming in problem solving

3. Use of GUI components (Console and GUI based)

List of Experiments:

1. Write a Java program that prompts the user for an integer and thenprints out all prime numbers up to that. Integer.

2. Write a Java program that checks whether a given string is a palindromeor not.

Ex: MADAM is a palindrome.

3. Write a Java program for sorting a given list of names in ascendingorder.

4. Write a Java Program that reads a line of integers, and then displayseach integer, and the sum of all the integers (use StringTokenizer class)

5. Write a Java program that reads a file and displays a file and displaysthe file on the screen, with a line number before each line.

6. Write a Java program that displays the number of characters, lines andwords in a text file.

7. Write a Java program for creating multiple threads

a) Using Thread class.

b) Using Runnable interface.

8. Write a Java program that illustrates how run time polymorphismisachieved.

9. Write a java program that illustrates the following

a) Creation of simple package.

b) Accessing a package.

c) Implementing interfaces.

10. Write a java program that illustrates the following

a) Handling predefined exceptions.

b) Handling user defined exceptions

11. APPLETS

a) Working with Frames and various controls.

b) Working with Dialogs and Menus.

c) Working with Panel and Layout.

d) Incorporating Graphics.

e) Working with colors and fonts

12. SWINGS

Jpanel- Jframe – Jtoolbar—JwindowFramework

REFERENCEBOOKS:

1. Dietel&Dietel, Java How to Program, 5th Edition, Pearson Education,2009.

2. P.J.Deitel and H.M.Deitel, Java for Programmers, Pearson education,PHI, 2008.

3. P.Radha Krishna, Object Oriented Programming through Java,Universities Press, 2010.

4. Bruce Eckel, Thinking in Java, Pearson Education, 2010.

5. S.Malhotra and S.Choudhary, Programming in Java, Oxford Univ. Press,2009.

MC229 - Advanced Data Structures Lab

Course Objectives:

The fundamental design, and implementation of data structures. Principles for good program design, especially the uses of data abstraction.

Course Outcomes:

At end of this laboratory the student will be able to

· Write well-structured object-oriented programs of medium size of

code.

· Write programs and class libraries given a specification.

· Students will collaboratively design and then individually implement

a robust set of tools to efficiently and elegantly organize data, with

optimized access methods.

List of Programs:

1. Write Java programs that use recursive and non-recursive functions to traverse the given binary tree in

a) Preorder b) Inorder c) Postorder.

2. Write a Java program to perform the following operations:

a) Construct a binary search tree with given elements.

b) Search for a key element in the above binary search tree.

c) Delete an element from the above binary search tree.

3. Write Java programs that use both recursive and non-recursive functions for implementing the following searching methods:

a) Linear search b) Binary search

4. Write a Java program to implement priority queue ADT.

5. Write Java programs for implementing the following sorting methods:

a) Bubble sort b) Insertion sort c) Radix sort

6. Write Java programs for implementing the following sorting methods:

a) Quick sort b) Merge sort

7. Write a Java program to implement all the functions of a dictionary (ADT) using Hashing.

8. Write a Java program to perform the following operations:

a) Insertion into a B-tree b) Searching in a B-tree

9. Write a Java program that implements KMP algorithm for pattern matching.

REFERENCEBOOKS:

1. A.Drozdek, Data Structures and Algorithms in Java, 3rd edition, Cengage Learning, 2008

2. J.R.Hubbard, Data Structures with Java, 2nd edition, Schaum's Outlines, TMH, 2013.

3. S.Sahani Data structures, Algorithms and Applications in java, 2nd Edition, Universities Press, 2009.

MC236 - Open Systems For Web Technologies

Course Objectives:

It makes familiar of Open Source technologies like LINUX, MySQL, CGI, PHP, Webserver and various tools which are used to develop web programming.

Course Outcomes:

- Students can develop web pages using HTML
- Can write dynamic web pages
- Can write server programs handling database connection
- Can generate responses accordingly

UNIT I - Introduction

Nature of Open sources –Maturity Model- Design Strategy-Support Models-Advantages – Application of Open Sources.

General Overview - Case Study: Linux - Files and Directories - Intermediate File Management - Process Management-Memory Addressing - Process Scheduling - Signals – Virtual File System- Page Cache- Program Execution.

UNIT II - Open source Database

General Overview- Case Study: MySQL -Introduction – MySQL Basic- Directory Structure-Creating Users and Super Users- Designing a Relational Database-Managing Databases, Tables and Indexes-Operators-functions-Transaction Management

UNIT III - Open source programming languages

General Overview - Case Study: PHP -Introduction – Basics of PHP- functions-Error Handling-Interaction between PHP and MySQL Database using Forms-Using PHP to manipulate and Retrieve Data in MySQL.

UNIT IV - Open source web server

General Overview of Web Server - Case Study: Apache Web server – Working with Web Server – Configuring and using Apache Web services-Case Study Apache Tomcat.

UNIT V - Open source tools and technologies

Open Source IDE-Modeling Tools- Mozilla Firefox- Wikipedia- Eclipse

TEXT BOOKS:

1. Dan Woods and GautamGuliani,"Open Source for the Enterprise: Managing Risks, Reaping Rewards", O'Reilly, Shroff Publishers and Distributors, 2005.

2. Daniel.P.Bovet and Marco Cesati," Understanding the Linux Kernel ", O, Reilly, 2007.

REFERENCE BOOKS:

1. Ivan Bayross and SharanamShah,"MySQL 5 for Professionals", Shroff Publishers and Distributors, 2007
2. Ivan Bayross and Sharanam Shah," PHP 5.1 for Beginners", Shroff Publishers and Distributors, 2006
3. Vivek Chopra, Sing Li, Jeff genender, "Professional Apache Tomcat 6", Wiley India, 2007

III Year MCA I Semester

	L	T	P	To	C
	3	1	-	4	4

MC301 OBJECT ORIENTED ANALYSIS AND DESIGN

Objectives of the Course:

Students through the course will:

- gain enough competence in object-oriented analysis and design (OOAD) to tackle a complete OO project
- acquire UML, a common language for talking about requirements, designs, and component interfaces
- understand the main principles of good OO design
- understand what major tasks are appropriate to developing OO models and software
- understand the issues and options in reuse and component based development

UNIT - I **(08 Hrs)**

Introduction to UML: Importance of modeling, principles of modeling, object oriented modeling, conceptual model of the UML, Architecture, Software Development Life Cycle.

UNIT - II **(18 Hrs)**

Basic Structural Modeling: Classes, Relationships, common Mechanisms, and diagrams.

Advanced Structural Modeling: Advanced classes, advanced relationships, Interfaces, Types and Roles, Packages.

UNIT - III **(08 Hrs)**

Class & Object Diagrams: Terms, concepts, modeling techniques for Class & Object Diagrams.

UNIT - IV **(18 Hrs)**

Basic Behavioral Modeling: Interactions, Interaction diagrams, Use cases, Use case Diagrams, Activity diagrams

Advanced Behavioral Modeling: Events and signals, state machines, processes and Threads, time and space, state chart diagrams.

UNIT - V **(04 Hrs)**

Architectural Modeling: Component, Deployment, Component diagrams and Deployment diagrams.

Text Books:

1. Grady Booch, James Rumbaugh, Ivar Jacobson : The Unified Modeling Language User Guide, Pearson Education.
2. Hans-Erik Eriksson, Magnus Penker, Brian Lyons, David Fado: UML 2 Toolkit, WILEY-Dreamtech India Pvt. Ltd.

Reference Books:

1. Meilir Page-Jones: Fundamentals of Object Oriented Design in UML, Pearson Education.
2. Pascal Roques: Modeling Software Systems Using UML2, WILEY- Dreamtech India Pvt. Ltd.
3. Atul Kahate: Object Oriented Analysis & Design, The McGraw-Hill Companies.

III Year MCA I Semester

	L	T	P	To	C
	3	1	-	4	4

MC303 MIDDLEWARE TECHNOLOGIES

Objective of the Course:

The main objective of this course is to get on awareness of a the various technologies which can help in the implementation of the various live project

UNIT - I **(12 Hrs)**

CORBA with Java: Remote Method Invocation-RMI API-JDBC-Client/Server CORBA-style, The Object web: CORBA with Java**.**

UNIT - II **(12 Hrs)**

Fundamentals of C# and .NET Platform: Comprehensive .NET Assemblies; OOP with C#-Callback Interfaces, Delegates and events.

Implementing C# Applications: Type Reflection, Late Binding, and Attribute-Based programming; Object Serialization and the .NET Remoting Layer; Data Access with ADO.NET; XML Web Services.

UNIT - III **(12 Hrs)**

Core CORBA/JAVA: Two types of Client/Server invocations-static, dynamic. The static CORBA, first CORBA program, OR Blets with Applets, Dynamic CORBA-The portable count, the dynamic count multicount**.**

Existential CORBA: CORBA initialization protocol, CORBA activation services.

UNIT - IV **(12 Hrs)**

Java Bean Component Model: Events, Properties, Persistency, Interspection of beans, CORBA Beans.

UNIT - V **(12 Hrs)**

EJB and CORBA: Object Transaction monitors CORBA OTM's, EJB and CORBA OTM's, EJB container frame work, Session and Entity Beans, The EJB client/server development Process The EJB container protocol, support for transaction EJB packaging EJB design Guidelines**.**

Text Books:

1. Client/Server programming with Java and CORBA Robert Orfali and DanHarkey, John Wiley & Sons, SPD 2nd Edition.
2. Java Programming with CORBA 3rd Edition, G.Brose, A Vogel and K.Duddy, Wiley-dreamtech, India John wiley and sons.

Reference Books:

1. C# and the .NET Platform Andrew Troelsen, Apress Wiley-dreamtech, India Pvt.Ltd.;
2. Distributed Computing, Principles and Applications, M.L.Liu,Pearson Education
3. Client/server survival Guide 3rd edition Robert Orfali Dan Harkey and Jeri Edwards, John Wiley & Sons
4. Client/Server Computing D T Dewire, TMH**.**

III Year MCA I Semester

L	T	P	To	C
3	1	-	4	4

MC305 SYSTEMS AUDITING

Objective of the Course:

The Objective of this course is to evaluate the systems efficiency and security protocols, in particular to evaluate the organizations ability to protect its information assets and properly dispense information to authorised parties. It focus on determining risks that are relevant to information assests, and a asscssing controls in order to reduce or mitigate these risks. By implementing controls, the effects of risks can be minimized.

UNIT - I **(12 Hrs)**

Introduction: Overview Of Information Systems Auditing - Conduction an Information Systems Audit - The Management Control Framework - Top Management Controls - System Development Management Concepts.

UNIT - II **(12 Hrs)**

Programming Management Controls - Data Resources Management Controls - Security Management Controls - Operations Management Controls - Quality Assurance Management Control.

UNIT - III **(12 Hrs)**

The Application Control Frame work: boundary controls - input controls - cooperation controls - processing controls - database controls - output controls.

UNIT - IV **(12 Hrs)**

Evidence Collection: Audit Software - Code Review, Test Data And Code Comparison - Concurrent Auditing Techniques - Interviews, Questionnaires And Control Flowcharts - Performance Measurement Tools.

UNIT - V **(12 Hrs)**

Evidence Evaluation: evaluating asset safeguarding and data integrity - evaluating systems effectiveness - evaluating system efficiency

Text Book:

1. Weber R: Information Systems Control and Audit, Pearson Education.
2. James A. Hall: Information Technology Auditing and Assurance, 2/e Thomson, 2006.

Reference Books:

1. David Ricchiute: Auditing and Assurance Services, 7/e, Thomson, 2003.
2. Davis, IT Auditing, Tata McGraw - Hill, 2007.
3. Cannon, Bergmann, Pamlin, CICA- certified Information Systems Auditor, Study Guide, 1/e, Sybex, WILEY-India, 2006.
4. Ronald, Russel, The CISSP prep Guide, 2/e, WILEY- Dreamtech India Pvt. Ltd, 2006.

III Year MCA I Semester

	L	T	P	To	C
	3	1	-	4	4

MC309 MANAGEMENT OF TECHNOLOGY

ELECTIVE– III

Objective of the Course:

The Objective of this course is to expose students to the importance of technology in conducting of business and its skillful management for optimum results.

UNIT - I **(12 Hrs)**

Technology and Society – Definition of Technology – knowledge and Technology – Technology and Business – Classification of Technology – Management of Technology – MOT at the Firm Level – MOT at the National / Government Level.

UNIT - II **(12 Hrs)**

Critical Factors in Managing Technology – The Creativity Factor – Invention – Innovation – The link between Science and Technology – Types of innovation – creativity and innovation – Bringing innovation to market.

UNIT - III **(12 Hrs)**

Technology life Cycle – The S-Curve of technological progress – the Technology life cycle and market Growth – multiple – Generation Technology – Technology and Market Interaction – Science – Technology Push – Market Pull – The Product life Cycle – Competition at different phases of the Technology life cycle.

UNIT - IV **(12 Hrs)**

Business strategy and technology strategy: What is meant by strategy? – Formulation of a strategy – Technology and the concept of core competence – Integration – Linking technology and business strategies – creating the product – Technology – business connection.

UNIT - V **(12 Hrs)**

Management of Technology and Global competitiveness – The case of Japan – The case of Singapore – a comparison of international competitiveness: Economic indicators.

Text Books:

1. Tarek Khalil, Management of Technology—The Key to Competitiveness and Wealth Creation, McGraw Hill, Boston, 2006.
2. V.K.Narayanan, Managing Technology and Innovation for Competitive Advantage, Pearson Education, 2006.

Reference Books:

1. Norma Harrison & Danny Samson, Technology Management—Text and International Cases, McGraw-Hill International, 2005.
2. P.N.Rastogi, Managing Creativity, Macmillan India Ltd, 2003.
3. William L Miller and Longdon, Morris, Fourth Generation R & D, John Wiley & Sons Inc.
4. Pradip N Khandwalla: Lifelong Creativity—An Unending Fest, TMH, 2004.
5. Pradip N Khandwalla: Corporate Creativity, TMH, 2006.
6. White: The Management of Technology & Innovation Thomson,20.

III Year MCA I Semester

	L	T	P	To	C
	3	1	-	4	4

MC313 EMBEDDED SYSTEMS

ELECTIVE– IV

Objectives of the Course:

The course lays

- *Emphasis on Comprehensive treatment of Embedded Hardware and Real Time Operating systems along with case studies in tune with the requirements of Industry. Will put students.*
- *The example-driven approach puts you on a fast track to understand embedded-system programming and applying what they learn to their projects.*

UNIT - I **(12 Hrs)**

Introduction to Embedded Systems: Applications of ES, Embedded Hardware Units and Devices , Embedded Software, Examples of Embedded Systems, Design Metrics in ES, Challenges in ES Design.

UNIT - II **(14 Hrs)**

Introduction, 8051 Micro controller Hardware, Input/Output Ports and Circuits, External Memory, Counter and Timers, Serial data Input/Output, Interrupts.

UNIT - III **(10 Hrs)**

Data Transfer and Logical Instructions: Arithmetic Operations, Decimal Arithmetic. Jump and Call Instructions, Further Details on Interrupts.

UNIT - IV **(14 Hrs)**

Introduction to Real Time Operating Systems: Time Operating Systems, Tasks and Task States, Tasks and Data, Semaphores, and Shared Data; Message Queues, Mailboxes and Pipes, Timer Functions, Events, Memory Management,Interrupt Routines in an RTOS Environment.

UNIT - V **(10 Hrs)**

Principles Basic Design Using a Real-Time Operating System: Embedded Software Development Tools: Host and Target machines, Linker/Locators for Embedded Software, Getting Embedded Software into the Target System.

Text Books:

1. Embedded Systems, Raj Kamal, 2/e, TMH.
2. The 8051 Microcontroller, Third Edition, Kenneth J. Ayala, Thomson.
3. An Embedded Software Primer, David E. Simon, Pearson Education.

Reference Books:

1. Computers as Components-principles of Embedded computer system design, Wayne Wolf, Elseveir
2. Embedding system building blocks, Labrosse, via CMP publishers.
3. Micro Controllers, Ajay V Deshmukhi, TMH.
4. Embedded System Design, Frank Vahid, Tony Givargis, John Wiley.
5. Microcontrollers, Raj kamal, Pearson Education.

2015 - 2016

Doctor of Philosophy

BIOTECHNOLOGY

Course	Code	L	T	P	Cr
ADVANCED BIOPROCESS ENGINEERING	PH008	4	-	-	4
MACHINE LEARNING FOR BIOTECHNOLOGISTS	PH036	4	-	-	4
PLANT GENOMICS & BIOTECHNOLOGY	PH037	4	-	-	4
PLANT MOLECULAR BREEDING	PH041	4	-	-	4
BIOANALYTICAL TECHNIQUES	PH061	4	-	-	4
PHARMACEUTICAL SCIENCES	PH062	4	-	-	4
EXPERIMENTAL STUDIES ON CERTAIN SELECTED MAN GROVES SPECIES OF NIZAMPATNAM SANITARY	PH063	4	-	-	4
CLINICAL BIOTECHNOLOGY	PH064	4	-	-	4
MEDICAL BIOTECHNOLOGY	PH065	4	-	-	4
MOLECULAR GENETICS	PH066	4	-	-	4
METHOD DEVELOPMENT & VALIDATION FOR QUANTITATIVE ESTIMATION OF BIOACTIVE MOLECULES IN PHARMACETICAL DOSAGE FORMS & BIOLOGICAL SAMPLES	PH067	4	-	-	4
PHARMACOLOGICAL SCREENING OF INDIAN MEDICAL PLANTS FOR ANTI-MICROBIAL, ANTI-OXIDANT & ANTI-CANCER BIOLOGY	PH071	4	-	-	4
GENES, GENOMICS AND PROTEOMICS	PH266	4	-	-	4

ELECTRONICS & COMMUNICATION ENGINEERING

Course	Code	L	T	P	Cr
DIGITAL IMAGE PROCESSING	PH059	4	-	-	4
TRANSFORMS TECHNIQUES	PH081	4	-	-	4

ELECTRICAL & ELECTRONICS ENGINEERING

Course	Code	L	T	P	Cr
ADVANCED POWER SYSTEM PROTECTION	PH002	4	-	-	4
POWER SYSTEM AUTOMATION	PH028	4	-	-	4
POWER SYSTEM PLANNING AND RELIABILITY	PH029	4	-	-	4
SMART GRID	PH030	4	-	-	4
SOFT COMPUTING	PH031	4	-	-	4
ENERGY AUDITING AND MANAGEMENT SYSTEM	PH264	4	-	-	4

MECHANICAL ENGINEERING

Course	Code	L	T	P	Cr
COMPOSITE MATERIALS	PH033	4	-	-	4
POLYMER CHARACTERIZATION	PH048	4	-	-	4

MANAGEMENT SCIENCES

Course	Code	L	T	P	Cr
FINANCIAL MANAGEMENT	PH006	4	-	-	4
HUMAN RESOURCE MANAGEMENT	PH013	4	-	-	4
SECURITY ANALYSIS & PORTFOLIO MANAGEMENT	PH055	4	-	-	4

CHEMISTRY

Course	Code	L	T	P	Cr
INSTRUMENTAL METHODS OF CHEMICAL ANALYSIS	PH038	4	-	-	4
SEPARATION METHODS & ANALYTICAL TECHNIQUES	PH039	4	-	-	4
RECENT ADVANCES IN MATERIAL CHEMISTRY	PH060	4	-	-	4
MANUFACTURING PROCESSES OF FIBER REINFORCED POLYMER COMPOSITES	PH068	4	-	-	4
CHARACTERIZATION OF FIBER REINFORCED POLYMER COMPOSITES	PH069	4	-	-	4
ADVANCED ORGANIC SYNTHESIS	PH072	4	-	-	4

FLAVANOIDS	PH076	4	-	-	4
PHARMACEUTICAL WASTE WARER TREATMENT TECHNIQUES	PH079	4	-	-	4
QUINONE ISOXAZOLE THIOPHENE HYBRIDS	PH080	4	-	-	4
HETERO CYCLES	PH268	4	-	-	4

CHEMICAL ENGINEERING

Course	Code	L	T	P	Cr
Advanced Chemical Process Equipment Design and Drawing	PH001	4	-	-	4
Advanced Process Dynamics and Control	PH003	4	-	-	4
Advanced Separation Processes	PH004	4	-	-	4
Advanced Transport Phenomena	PH005	4	-	-	4
Applied Numerical Methods	PH007	4	-	-	4
Chemical Process Equipment Design	PH009	4	-	-	4
Chemical Process Safety	PH010	4	-	-	4
Computational Methods	PH011	4	-	-	4
Energy Management	PH012	4	-	-	4
Enzyme and Microbial Technology	PH015	4	-	-	4
Fermentation Technology	PH016	4	-	-	4
Interfacial Science and Engineering	PH017	4	-	-	4
Mathematical Methods in Chemical Engineering	PH018	4	-	-	4
Membrane Technology	PH019	4	-	-	4
Modeling and Simulation of Chemical Processes	PH020	4	-	-	4
Optimization Techniques	PH021	4	-	-	4
Particulate Technology	PH022	4	-	-	4
Petroleum Refinery Processes	PH023	4	-	-	4
Polymer Engineering	PH024	4	-	-	4
Reaction Engineering and Reactor Design	PH025	4	-	-	4
MULTI VARIETY STATISTICS	PH073	4	-	-	4

Statistical Methods	PH263	4	-	-	4

MATHEMATICS

Course	Code	L	T	P	Cr
MULTI VARIATE STATISTICS	PH073	4	-	-	4
STATISTICAL METHODS	PH263	4	-	-	4

PHYSICS

Course	Code	L	T	P	Cr
VACUUM & THIN FILM TECHNOLOGY	PH040	4	-	-	4
CONDENSED MATTER PHYSICS & CHARACTERIZATION TECHNIQUES	PH074	4	-	-	4

BIOTECHNOLOGY

PH008- ADVANCED BIOPROCESS ENGINEERING

UNIT - I

KINETICS OF MICROBIAL GROWTH, STERILISATION AND PRODUCT FORMATION: Different modes of operation - batch, fed batch and continuous cultivation. Simple unstructured kinetic models for microbial growth- Monod model, Growth of filamentous organisms, Substrate and product inhibition on cell growth and product formation. Different types of industrial sterilization, Thermal death kinetics of microorganisms, Batch and continuous heat sterilization of liquid media, Filter sterilization of liquidmedia, Air sterilization and design of depth filters.

UNIT - II

METABOLIC STOICHIOMETRY AND ENERGETICS: Stoichiometry of cell growth and product formation, Elemental balances, degrees of reduction of substrate and biomass, Available electron balances, Yield coefficients of biomass and product formation, Maintenance coefficients energetic analysis of microbial growth and product formation, Oxygen consumption and heat evolution in aerobic cultures.

UNIT - III

BIOREACTOR OPERATION: Choosing the cultivationmethod, design and operation of a typical aseptic, aerobic fermentation process, Environmental requirements for animal cell cultivations, Reactors for large scale production using animal cell, plant cell cultivation, Active and Passive Immobilization of cells, Diffusional limitations in Immobilized cells, Bioreactorconsiderations in Immobilized cell.

UNIT - IV

TRANSPORT PHENOMENA IN BIOPROCESS SYSTEM: Gas – Liquid mass transfer in cellular systems, Determination of oxygen rates, Mass transfer for freely rising or falling bodies, Correlations formass transfer coefficient and interfacial area, Mass transfer across free surface, Other factors affecting K_La, Heat transfer correlations.

UNIT - V

MIXED CULTURE AND SOLID STATE FERMENTATION: Introduction, Major classes of interactions inmixed cultures, simple models describing mixed cultures interactions, Mixed cultures in nature and industrial utilization of mixed cultures, Solid-state fermentation.

TEXT BOOKS:

1. Shuler, M.L. and Kargi, F. "*Bioprocess Engineering – Basic concepts* – 2nd Ed., Prentice Hall of India Pvt. Ltd., 2005
2. Peter F. Stanbury, Stephen J. Hall & A. Whitaker, *Principles of Fermentation Technology,* 2nd ed., Butterworth – Heinemann anImprint of Elsevier India Pvt. Ltd., 2005.

REFERENCEBOOKS:

1. Bailey and Ollis, "Biochemical Engineering Fundamentals", 2nd Ed., McGrawHill, 1986.
2. Pauline M. Doran, "Bioprocess Engineering Calculation", Blackwell Scientific Publications.

PH036 – MACHINE LEARNING FOR BIOTECHNOLOGISTS

Unit-I : Introduction to the world of machine learning: What is ML; Problems, data, and tools; Visualization; Matlab

Unit – II : **Regression:** Linear regression; SSE; gradient descent; closed form; normal equations; features Overfitting and complexity; training, validation, test data

Unit – III: Unsupervised learning: clustering, k-means, hierarchical agglomeration, discussion on clustering and EM

Unit – IV : **Supervised learning:** Regression, Classification, Support vector machines and large-margin classifiers, Markov models; autoregressive models

Unit – IV: **Clustering:** k-means, adaptive hierarchical clustering, Gaussian mixture model.

TEXT BOOK:

1. Ethem Alpaydin, Introduction to Machine Learning, Second Edition, http://mitpress.mit.edu/catalog/item/default.asp?ttype=2&tid=12012. This book will cover all the material in the course.

REFERENCE BOOK:

- ✓ Stephen Marsland, Machine Learning: An Algorithmic Perspective. http://www.amazon.com/Machine-Learning-AlgorithmicPerspective%20Recognition/dp/1420067184%20.
- ✓ Christopher M. Bishop, Pattern Recognition and Machine Learning. http://research.microsoft.com/en-us/um/people/cmbishop/prml/.
- ✓ Tom Mitchell, Machine Learning http://www.cs.cmu.edu/~tom/mlbook.html.

PH037 - PLANT GENOMICS & BIOTECHNOLOGY

UNIT 1 Plant Genomics

1.1 Plant nuclear genome- genome organization in plant nucleus, Plant organellar genomes - plastid and mitochondrial genomes

1.2 Plant epigenome –epigenomic reprogramming in gametogenesis and seed development in plants, endosperm imprinting, histone modifications in response to light, natural epigenome variation in plants, heterosis

1.3 Plant genome sequencing strategies- high-throughput sequencing technologies, single molecule and real time sequencing, assembly & alignment programs, genome browsers

1.4 Plant proteomics- high throughput approaches–mass spectrometry based proteomics

1.5 Plant metabolomics- analytical platforms–GC-MS, NMR, MALDI

UNIT 2 Plant Metabolic Engineering

2.1 Secondary metabolites-transport storage and turnover, ecological functions & uses of secondary metabolites in biotechnology

2.2 Terpenoids- synthesis of IPP, phenyltransferase and terpene synthase reactions, modification of terpenoid skeletons

2.3 Alkaloid biosynthesis– nicotine and tropane alkaloids, benzyl isoquinoline alkaloids, moneterpene indole alklaoids

2.4 Phenolic compounds – phenyl propanoid, phenyl propanoid-acetate pathways, Lignin& flavonoid biosynthesis

2.5 Coumarins – classification, simple coumarins and Furanocoumarins, stilbenes, styrylpyrones and arylpyrones

UNIT 3 Plant Cell Biotechnology

3.1 Introduction to plant cell culture – different plant tissue culture media, role of plant growth regulators in tissue culture

3.2 Plant cell culture technique- callus and cell suspension cultures; applications of plant cell cultures

3.3 Somatic embryogenesis – induction of somatic embryos, production and applications of synthetic seeds

3.4 Cryo-preservation- theoretical basis, methods and applications of cryo-preservation.

3.5 Plant secondary metabolites produced by cell cultures, strategies to improve secondary metabolite production in plant cell cultures –cell line selection, medium optimizations, permeabilization, elicitation, cell immobilization, biotransformation

UNIT 4

Transgenic Plants

4.1 Co-integrated vectors, binary vectors, novel and specialized vectors for transformation

4.2 Selectable markers (positive & negative selection), novel selection methods and restriction enzymes to control T-DNA integration; marker free transgenic technology; analysis of transgenic plants

4.3 Chloroplast transformation – advantages of chloroplast transformation; transplastomic plants -applications

4.4 Molecular farming- advantages of transgenic plants as bioreactors, expression systems, sub-cellular targeting, plant expression hosts, downstream processing & purification

4.5 Molecular farming for biopharmaceuticals – (plantibodies, plantigens, therapeutic proteins & edible vaccines)

Activities:

1. To isolate commercially important secondary metabolites.

2. To develop transgenic plants for stress tolerance.

PH041 - PLANT MOLECULAR BREEDING

UNIT 1Principles of Plant Breeding

1.1 Introduction to plant breeding: Domestication of crop plants – Centers of origin and diversity

1.2 Basic features of plant breeding, Objectives of plant breeding

1.3 Plant genetic resources and conservation strategies: Sources of plant genetics resources; Methods of germplasm conservation; Evaluation and utilization of plant genetic resources

1.4 Reproductive systems in plants: Sexual reproduction – self and cross fertilization – Autogamy, Allogamy and often cross pollinated plants; Asexual reproduction and Apomixis

1.5 Genetic basis of breeding: Mating systems of plants

UNIT 2 Plant Breeding Methodologies

2.1 Breeding Methods in self-pollinating crops: Pure line selection; Pedigree method; Bulk population methods; Single seed descent method; Back cross method and Multilines

2.2 Breeding methods in cross pollinating crops: Mass selection; Ear-torow selection; Progeny selection and Recurrent selection methods

2.3 Hybrid Breeding – Development and evaluation of inbred lines, A, B and R lines, Development of hybrids, male sterility systems

2.4 Mutation breeding: types of mutations – mutagenic agents: physical and chemical mutagens; Mutation breeding in seed crops and vegetative propagated crops – TILLING and EcoTILLING

2.5 Cultivar release - Seed certification and multiplication

UNIT 3 Specific Breeding Methods

3.1 Breeding for disease resistance: Genetics of pathogenicity, Genetics of disease resistance; Methods of breeding for disease resistance

3.2 Breeding for insect resistance: Mechanisms of insect resistance; Breeding methods for pest resistance

3.3 Breeding for abiotic stress tolerance - drought, salinity

3.4 Breeding for abiotic stress tolerance - cold stress tolerance, heat stress tolerance and flooding tolerance

3.5 Breeding for yield and morphological traits – ideotype concept, lodging and shattering resistance, photoperiod response, early maturity

UNIT 4 Biotechnological Approaches for Crop Improvement

4.1Introduction to plant cell-tissue culture: Cellular totipotency, factors affecting shoot bud differentiation; Plant tissue culture techniques in crop improvement - Micropropagation

4.2 Tissue culture applications; Haploids and di-haploids in breeding, Somaclonal variations and their role in crop improvement, Protoplast fusion in crop improvement and breeding, germplasm preservation

4.3 Transgenics in crop improvement: Gene transfer methods in plants, Production of transgenics for biotic and abiotic stress tolerance; Cisgenic approaches

4.4 Transgenic male-sterility systems and development of hybrids

4.5 Gene silencing: RNAi mechanism & its applications for crop improvement

PH061- BIO ANALYTICAL TECHNIQUES

UNIT - I

SPECTROSCOPY: Principle, instrumentation and application of Colorimeter, UV – Visible Spectrophotometer, IR spectrophotometer, Flourimeter, Flame photometer, x-ray spectroscopy, NMR spectroscopy.

UNIT - II

MICROSCOPY AND ELECTROPHORESIS: Basics of phase contrast, confocal and fluorescent microscopy; electron microscopy – SEM and TEM; Flow cytometry; Electrophoresis – principles, supporting materials-paper, starch, agarose, polyacrylamide types – gel and capillary electrophoresis; disc; Isoelectric focussing; immuno-electrophoresis; isotachophoresis.

UNIT – III

CHROMATOGRAPHY: Chromatography – principles; types - paper, thin layer, adsorption, ion-exchange, affinity, gel filtration, gas liquid and HPLC; GC-MS; Simulation moving bed.

UNIT - IV

RADIOACTIVE TECHNIQUES: Radioactive isotopes, radioactive decay and their types; principles of scintillation counting; isotope dilution technique; radioactive techniques-RIA; GM counter; Scintillation counter; Autoradiography; Applications in Medicine & Diagnosis; Radiation hazards and methods for containment and prevention.

UNIT – V

THERMO ANALYTICAL TECHNIQUES: Theory of thermal analysis; thermo gravimetric; Basic theory, construction and working of Differential Thermal Analysis (DTA); Differential Scanning Calorimeter (DSC).

TEXT BOOKS:

1. Willard and Merrit, “Instrumental Methods and Analysis” . 6th ed, CBS Publishers & Distributors.
2. Keith Wilson, Kenneth H. Goulding, “A Biologist Guide to Principles and Techniques of Practical Biochemistry”, 3rd ed., ELBS series.
3. Skoog and West, “Fundamentals of Analytical Chemistry”, 1982.

REFERENCE BOOKS:

1. Ewing GW, “Instrumental Methods of Chemical Analysis”, McGraw Hill Book Company, 1989.

Braun. H, “Introduction to Chemical Analysis”, McGrawHill, 1987.

PH062-PHARMACEUTICAL SCIENCES

UNIT-I

INTRODUCTION TO PHARMACEUTICALS: History & Definition of Drugs. Sources of Drugs - Plant, Animals, Microbes and Minerals, Routes of drug administration. Different dosage forms.

UNIT-II

BIO PHARMACEUTICS: Introduction, their role in formulation development & clinical settings, fate of drugs after administration. Drug absorption: drug absorption mechanisms, factors affecting drug absorption (physiochemical, biological, metabolic, formulations and dosage form considerations).

UNIT-III

DRUG DISTRIBUTION & PROTEIN BINDING OF DRUGS: Distribution of drug through organ /tissue - factors affecting distribution (Physicochemical properties of drugs, organ/tissue size, blood flow to the organ, physiological barriers to the distribution of drugs, drug binding blood / tissue / macromolecules). Protein /tissue binding of drugs- factors affecting protein binding of drugs, significance and kinetics, tissue binding of drugs.

UNIT-IV

DRUG METABOLISM & EXCRETION OF DRUGS: Biotransformation of drugs- drug metabolizing enzymes & organs, phase I & phase II reactions, factors affecting biotransformation, drug metabolism significance, Excretion of drugs - renal excretion of drug, factors affecting renal excretion of drugs, nonrenal routes of excretion of drug & factors affecting them, enterohepatic circulation.

UNIT-V

PHARMACOKINETICS: Introduction, basic concepts- rate processes in biological systems, Pharmacokinetics drug interaction and their significance in combination therapy. Clinical pharmacokinetics: dosage adjustment in patient with and without renal and hepatic failure.

TEXT BOOKS:

1. Brahmankar DM, Jaiswal SB Biopharmaceutics and pharmacokinetics. VallabhPrakashan Publishers 2015.
2. Ram I Mahato, Ajit S. Narang Pharmaceutical Dosage Forms and Drug Delivery, Second Edition CRC press 2011.
3. Katzung, Basic and clinical pharmacology 11th edition, Tata McGraw Hill edition, 2009.

REFERENCE BOOKS:

1. Sabine Globig and William Hunter Jr.Current Research in Pharmaceutical Technology 1st Edition Apple Academic Press 1st edition. 2011.
2. Rang and Dales, Pharmacology 6th edition, Churchhill living stone Elsevier Publiction, 2008.
3. KD Tripathi, Essentials of medical pharmacology 6th edition, Jaypee brothers Medical Publishers (P) Ltd, 2008.

PH063-EXPERIMENTAL STUDIES ON CERTAIN SELECTED MANGROVE SPECIES OF NIZAMPATNAM SANCTUARY

UNIT-1

Mangrove vegetation and niches of Indian sub-continent special emphasis of peninsular India.

UNIT-2

Estuaries and influence of mangrove vegetation with concern to the climate changes and its impacts.

UNIT-3

Research articles and literature sources of mangrove plant wealth.

UNIT-4

Ex-situ and *in-situ* conservation practices for mangrove restoration programmes.

UNIT-5

Govt. and non Govt.agencies and N.G.Os role to conservation and sustainable utilization of mangrove plant wealth.

TEXT BOOKS /REFERENCE BOOKS:

1. T. Ravi Shankar, L. Gnanappazham R. Ramasubramanian D. Sridhar M. NavamuniyammalV.SelvamAtlas of Mangrove Wetlands of India Part-2, Andhra Pradesh.(2002)

2. Forest Survey of India. 1999. Status of Forest Report, Ministry of Environment and Forest, Government of India, New Delhi.

3. Blasco, F. and Aizpura, M. 2002. Mangroves along the coastal stratch of the Bay of Bengal: Present status, IndianJournal of Marine Sciences, 9 - 20.

4. Mittal, R. 1993. Management plan for Coringa Wildlife Sanctuary, Forest Department, Government of Andhra Pradesh, Hyderabad.

5. Rangarao, V., Reddy, B. S. R., Raman, A. V.andRamana Murthy, M. V.2003. Oceanographic features of the Bay _ Mangrove water ways of Coringa, East coast of India, Proceedings of AP Akademy Sci., 135-142.

6. Reddy, B.S.R. and Prasad, K.V.S.R.1982. The sand spit near Kakinada - Further studies, Indian J Ear Sci., 9: 167 -173.

PH064-CLINICAL BIOTECHNOLOGY

UNIT-I

FUNDAMENTALS OF CARDIOVASCULAR DISEASE: Global burden of cardiovascular disease, cardiovascular disease in India, functional anatomy of heart, physiology of cardiovascular system, cardiac pathology

UNIT-II

CORONARY ARTERY DISEASES: Valvular Diseases, Dilated cardiomyopathy, restrictive & infiltrative cardiomyopathy, hypertrophic cardiomyopathy, Myocarditits and specific cardiomyopathies, Anti-platelet therapy.

UNIT-III

PHYSIOLOGY OF CARDIAC FUNCTION: Cardiac rate and rhythm, disturbances of cardiac rhythm, cardiac contraction, factors affecting cardiac function, drugs affecting cardiac function, cardiac hypertrophy and chronic heart failure in mice. Recording the effects of acetyl choline and non-adrenaline on the B.P and ECG of an anesthetized rat.

UNIT-IV

MOLECULAR TECHNIQUES: Purification of genomic DNA from living cells, Manipulation of purified DNA; Introduction of DNA into living cells - methods of Gene transfer, DNA methylation, DNA hybridization, DNA sequencing, DNA fingerprinting;

UNIT-V

EXPRESSION AND DETECTION OF CLONES: Cloning strategies, sequencing, DNA fingerprinting; Blot analysis- Southern, Northern, Western blot; dot and slot blot; PCR- Principles, designing of primers, methodology. Applications of PCR.

TEXT BOOKS :

1. T.A.Brown, "Gene Cloning & DNA analysis", 5th Ed., Blackwell, 2006.
2. Primrose SB, "Principles of Gene manipulation and Genomics", 5th edition, Blackwell Scientific Publications, 2006.
3. S.K.Kulkarni (2011), Hand book of experimental pharmacology, VallabhPrakashan publishers, 2011.

REFERENCE BOOKS:

1. David Friefelder, "Essentials of Molecular Biology", 7th ed., Narosa Publishing house, 2006.
2. Rang and Dales, Pharmacology 6th edition, Churchhill living stone Elsevier Publication, 2008.

PH065-MEDICAL BIOTECHNOLOGY

UNIT-I

INTRODUCTION TO THYROIDISM: Thyroid gland; Thyroid disorders-Hypothyroidism, Hyperthyroidism, TreatmentCongenital hypothyroidism; Hypothyroidism in infants; Hypothyroidism in children and teens; Complications of untreated hypothyroidism

UNIT-II

CONGENITAL HYPOTHYROIDISM: Screening for congenital hypothyroidism, Initial diagnosis, Interpreting results and starting treatment, Long term care of congenital hypothyroidism patients.

UNIT-III

GENE STRUCTURE AND MUTATIONS: Spontaneous and induced mutations; Selection of mutants-Ames test; Chromosomal aberrations; Fine structure of genes in prokaryotes and Eukaryotes; Genetic control of development in Drosophila.

UNIT-IV

MOLECULAR TECHNIQUES: Purification of genomic DNA from living cells, Manipulation of purified DNA; Introduction of DNA into living cells - methods of Gene transfer, DNA methylation, DNA hybridization

UNIT-V

EXPRESSION AND DETECTION OF CLONES: PCR- Principles, designing of primers, methodology, Applications of PCR. Cloning strategies, Sequencing, DNA fingerprinting; Blot analysis-Southern, Northern, Western blot; dot and slot blot.

TEXT BOOKS:

1. Werner and Ingbar Thyroid-A fundamental and clinical text. Tenth Edition 2012.
2. T.A.Brown, "Gene Cloning & DNA analysis", 5th Ed., Blackwell, 2006.
3. Primrose SB, "Principles of Gene manipulation and Genomics", 5th edition, Blackwell Scientific Publications, 2006.
4. P.K. Gupta, "Genetics", 3rd ed., Rastogi Publications, 2005.

REFERENCE BOOKS:

1. David Friefelder, "Essentials of Molecular Biology", 7th ed., Narosa Publishing house, 2006.
2. William H. Elliott and D.C. Ellioit, "Biochemistry & Molecular Biology", 3rd ed., Oxford University Press, 2007.

PH066-MOLECULAR GENETICS

UNIT-I

GENERAL MICROBIOLOGY: Physical and chemical methods of sterilization techniques - Basic techniques for isolation, cultivation and enumeration of microorganisms – Staining of microorganisms – Microscopy-Collection, preservation and transportation of specimens for microbiological analysis – Structure, composition and functions of bacterial cell and its different components.

Unit-II

SYSTEMIC BACTERIOLOGY: Systematic study of taxonomic position, distribution, morphology and staining characters, growth requirements and characteristics, antigenic structure, virulence factors, pathogenecity, diagnosis, immunity and control of with respect to the gram positive and gram negative anaerobic organisms.

UNIT-III

BACTERIAL GENETICS: Bacterial growth; measurement of bacterial growth, bacterial growth curve-Maintenance and preservation of bacteria. Stock culture collections; Preservation methods; Short and long term preservation at low temperatures Cryopreservation and freeze drying. Gene transfer mechanisms – conjugation, transformation, transduction, Plasmids, transposons, cosmids, insertion sequences, and Recombinant DNA technology -Antimicrobial agents: Classes of antimicrobials and mechanism of action.

UNIT-IV

MOLECULAR BIOLOGY: DNA replication in prokaryotic and eukaryotic cells — Isolation and purification of DNA/RNA from prokaryote Types and function of DNA polymerases Principle and applications of molecular diagnostic tests: PCR and its types, application of PCR-Gel electrophoresis: Agarose and PAGE –native PAGE, SDS-PAGE –genomic DNA Preparation – DNA Sequencing techniques.

UNIT-V

GENETIC ENGINEERING/RECOMBINANT DNA TECHNOLOGY: Restriction endonucleases-cloning and expression vectors, plasmids, cosmids, phages – shuttle vectors – cloning and expression in prokaryotic and eukaryotic hosts –screening and characterization of DNA clones, transformation of bacterial and animal cells- oligonucleotide synthesis-DNA markers and their applications. Biotechnological approaches for disease diagnosis - safety aspects of genetic engineering – ethical issues related to use of biotechnology products – patenting and intellectual property rights.

TEXT BOOKS/REFERENCE BOOKS:-

1. S.Ram Reddy et al, "A Text book of Molecular bio-technology", Himalaya Publishing House, 1st ed. New Delhi, India, Himalaya pub. House, 2007.

2. Keith Wilson and John Walker, “Essentials of bio-chemistry”, Cambridge University press, 5^{th}ed, UK.

3. Joanne Willey et al, “A text Book of Prescott Microbiology”, McGraw Hill, 9^{th}ed, 2014, PP.1 to 1014.

4. Mark.L.Wheelis, Principles of Modern Microbiology,1^{st} ed,2008.

5. Jeffrey C.Pammerville, Alcamo’s Fundamentals of Microbiology, Jones and Bartlett publishers, Sudbury, 7^{th}ed, 2008.

6. B.K.khontia, Basic Microbiology- An illustrated lab manual, Daya publishing Housing, Delhi, 1^{st}ed, 2011.

7. Jacquelyn.G.Black, Microbiology-Principles and explorations, Jhon Wiles & Sons, Inc9van Hoffmann press0, USA, 6^{th}ed, 2013.

8. Stuart Hogg, essential Microbiology, Wiley and Blackwell, 2^{nd}ed, 2013.

9. Sambrook and Russell, Molecular cloning-A Laboratory manual, cold spring harbor laboratory press, 3^{rd}ed, NewYork,Vol.1,2 & 3,2001 PP.1.1-18.136.

PH067-METHOD DEVELOPMENT & VALIDATION FOR QUANTITATIVE ESTIMATION OF BIOACTIVE MOLECULES IN PHARMACETICAL DOSAGE FORMS & BIOLOGICAL SAMPLES

UNIT I

MEDICINAL & AROMATIC PLANTS

Indian System of Medicine, Medicinal & Aromatic Plants in India, Basic principles of plant taxonomy, Agronomic features, Description of at least 10 plants species. Database on medicinal plants. Traditional knowledge and digital library.

UNIT II

PHYTOCHEMICAL SCREENING AND ISOLATION

Phytochemicals- Classification and types: Alkaloid, Flavonoid, Polyphenol, Tannin, Terpenoid and Saponin. Preparation of crude extracts and essential oils. Plant Tissue Culture techniques to enhance secondary metabolite production.

UNIT III

PHYTOCHEMICALS CHARACTERIZATION

Qualitative and quantitative identification and characterization methods for crude drugs and active phyto compounds: TLC, HPTLC, Column Chromatography, UV-Vis, FTIR, GCMS, LCMS, and NMR, QSAR and molecular docking.

UNIT IV

APPLICATIONS OF PHYTOCHEMICALS AND NATURAL PRODUCTS

Antimicrobial,antioxidant, anti-inflammatory, antiulcer, antidiabetic, anti-cancer, antihypertensive, hepatoprotective, wound healing and immunomodulatory phytochemicals. Biocides, biofungicides and biopesticides. Nutraceuticals. Cosmetic products.

UNIT V

IPR AND TYPICAL EXAMPLES OF PHYTODRUGS

Definition of the terms: Patent, IPR, Breeder's right, Bioprospecting and Bio piracy. A few examples of phytodrugs and their mode of action: Andrographolide, Vinblastine, Vincristine, Curcumin, Asiaticoside, Cinnamaldehyde, Anthocyanins, Ferulic acid, Kaempferol, Morindin.

Books:

1) P.C. Trivedi (2009) Indian Medicinal Plants, Vedic Books, New Delhi, ISBN: ISBN:9788179102787.

2) Dr. Biren Shah (2019) Pharmacognosy and Phytochemistry, free ebooks publisher.

PHBT032-PHARMACOLOGICAL SCREENING OF INDIAN MEDICAL PLANTS FOR ANTI-MICROBIAL,ANTI-OXIDANT & AMP; ANTI-CANCER BIOLOGY

UNIT I

MEDICINAL & AROMATIC PLANTS -

Indian System of Medicine, Medicinal & Aromatic Plants in India, Basic principles of plant taxonomy, Agronomic features, Description of at least 10 plants species. Database on medicinal plants. Traditional knowledge and digital library.

UNIT II

PHYTOCHEMICAL SCREENING AND ISOLATION -

Phytochemicals- Classification and types: Alkaloid, Flavonoid, Polyphenol, Tannin, Terpenoid and Saponin. Preparation of crude extracts and essential oils. Plant Tissue Culture techniques to enhance secondary metabolite production.

UNIT III

PHYTOCHEMICALS CHARACTERIZATION

Qualitative and quantitative identification and characterization methods for crude drugs and active phyto compounds: TLC, HPTLC, Column Chromatography, UV-Vis, FTIR, GCMS, LCMS, and NMR, QSAR and molecular docking.

UNIT IV

APPLICATIONS OF PHYTOCHEMICALS AND NATURAL PRODUCTS

Antimicrobial, antioxidant, anti-inflammatory, antiulcer, antidiabetic, anti-cancer, antihypertensive, hepatoprotective, wound healing and immunomodulatory phytochemicals. Biocides, biofungicides and biopesticides. Nutraceuticals. Cosmetic products.

UNIT V

IPR AND TYPICAL EXAMPLES OF PHYTODRUGS

Definition of the terms: Patent, IPR, Breeder’s right, Bioprospecting and Bio piracy. A few examples of phytodrugs and their mode of action: Andrographolide, Vinblastine, Vincristine, Curcumin, Asiaticoside, Cinnamaldehyde, Anthocyanins, Ferulic acid, Kaempferol, Morindin.

Books:

1) P.C. Trivedi (2009) Indian Medicinal Plants, Vedic Books, New Delhi, ISBN: ISBN:9788179102787.

2)Dr. Biren Shah (2019) Pharmacognosy and Phytochemistry, free ebooks publisher.

PH266 - GENES, GENOMICS & PROTEOMICS

UNIT I

Introduction to Genes and Genomics: Definition of gene, genome, trancriptome and proteome; Organization and structure of genomes; Genome size; Sequence complexity; Introns and Exons; Isolation of Chromosomes; chromosome micro dissection and its applications.

UNIT II

Gene Identification and Expression: Genome annotation; Traditional routes of gene identification; Open-reading Frame definition and it's detection; Identifying the function of a new gene; Gene ontology; Global expression profiling; Traditional approaches to expression profiling.

UNIT III

Analysis of Proteomics: Introduction to Proteomics; Mining proteomes; Bridging Genomics and Proteomics; Analysis of proteomes – SDS-PAGE; Detecting proteins in Polyacrylamide gels; Two-dimensional polyacrylamide gel electrophoresis- Procedure, Image analysis of 2-DE gels; Mass spectrometry.

UNIT IV

Analysis of Genomics: Micro array techniques- Types of micro arrays, Designing a microarray experiment, Applications of Microarray Technology, Chip array, Shotgun method**.**

UNIT V

Applications of Genomics and Proteomics: Insights from genome sequencing of various species; Applications of proteome analysis; Applications of Proteomics.

TEXT BOOKS:

1. S. B. Primrose and R.M. Twyman "Principles of Genome Analysis and Genomics", 7th Edition, Blackwell Publishing, 2006.
2. S. Sahai, "Genomics and Proteomics, Functional and Computational Aspects" Plenum Publication, 1999.

REFERENCE BOOKS:

1. Andrezej K Konopka and James C. Crabbe, "Compact Hand Book – Computational Biology", Marcel Dekker, USA, 2004.
2. Pennington & Dunn, "Proteomics from Protein Sequence to Function", 1 st edition, Academic Press, San Diego, 1996.

ELECTRONICS & COMMUNICATION ENGINEERING

PH059 - DIGITAL IMAGE PROCESSING

UNIT-I

FUNDAMENTALS STEPS OF IMAGE PROCESSING: Components of an Image processing system, Image sampling and quantization, relationship between the pixels. Gray level transformation, Histo-gram processing, Smoothing and sharpening spatial filters, Smoothing and sharpening fre-quency domain filters.

UNIT-II

IMAGE COMPRESSION AND SEGMENTATION: Compression models, Error free coding, lossy coding, compression standards. Image segmentation: Edge linking and boundary detection, Thresholding, Region based segmentation.

UNIT-III

VIDEO REPRESENTATION: Video formation, perception and representation: Color perception and specification, Video capture and display, Analog video raster, Analog color TV systems, Digital Video Sampling: Basics of lattice theory, sampling over lattice, Sampling of video signals, filtering operations, Conversion of signals sampled on different lattices, Sampling rate conver-sion of video signals.

UNIT-IV

VIDEO MODELING: Camera model, illumination model, object model. Scene model, Two dimen-sional motion models 2-D motion estimation: Optical flow, General methodologies, Pixel based motion estimation, Block matching algorithm, Mesh-based motion estimation, Global motion estimation. Application of motion estimation in video coding.

UNIT-V

VIDEO CODING: Information theory, binary encoding, Scalar quantization, Vector quantization, Wave- form based video coding: Block based transform coding, Predictive coding, Object based scalability, and Wavelet Transform based coding.

TEXTBOOKS:

1. Digital Image Processing 3e by Rafael C. Gonzalez Richard E. Woods Pearson Education India; Third edition (23 June 2016).

2. Video Processing and Communications (Prentice-Hall Signal Processing Series) by Yao Wang JornOstermannYa-Qin Zhang Pearson (27 September 2001).

REFERENCEBOOKS:

1. Digital Video Processing (Prentice-Hall Signal Processing Series) by A. Murat Tekalp Prentice Hall; 2 edition (18 June 2015).

2. Handbook of Image and Video Processing (Communications, Networking and Multimedia) 2nd ,Kindle Edition by Alan C. Bovik Academic Press; 2 edition (21 July 2010).

PH081 – TRANSFORM TECHNIQUES

UNIT -I : Fourier Analysis:Vector space, Hilbert spaces, Fourier basis, FT- Limitations of Fourier Analysis, Need for time-frequency analysis, DFT, 2D-DFT: Definition, Properties and Applications, IDFT, Hilbert Transform, STFT.

UNIT -II : Transforms:Walsh, Hadamard, Haar and Slant Transforms, DCT, DST, KLT,– definition, properties and applications

UNIT -III : Continuous Wavelet Transform (CWT):Short comings of STFT, Need for wavelets, Wavelet Basis Concept of Scale and its relation with frequency, Continuous time wavelet Transform Equation-Series Expansion using Wavelets- CWT- Tiling of time scale plane for CWT. Important Wavelets: Haar, Mexican Hat, Meyer, Shannon, Daubechies.

UNIT -IV : Multi Rate Analysis and DWT:Need for Scaling function – Multi Resolution Analysis, Two-Channel Filter Banks, Perfect Reconstruction Condition, Relationship between Filter Banks and Wavelet Basis, DWT, Structure of DWT Filter Banks, Daubechies Wavelet Function, Applications of DWT.

UNIT -V : Special Topics: Wavelet Packet Transform, Multidimensional Wavelets, Biorthogonal basis-BSplines, Lifting Scheme of Wavelet Generation, Multi Wavelets

TEXT BOOKS: 1. Raghuveer M.Rao and Ajit S. Bopardikar, “Wavelet Transforms-Introduction theory and applications” Pearson Edu, Asia, New Delhi, 2003. 2. Soman. K. P, Ramachandran. K.I, “Insight into Wavelets from Theory to Practice” Printice Hall India, 1st Edition, 2004. REFERENCE BOOKS: 1. Jaideva C Goswami, Andrew K Chan, “Fundamentals of Wavelets- Theory, Algorithms and Applications” John Wiley & Sons, Inc, Singapore, 1999. 2. Vetterli M. Kovacevic, “Wavelets and Sub-band Coding”, PJI, 1995. 3. C. Sydney Burrus, “Introduction to Wavelets and Wavelet Transforms”, PHI, 1st Edition, 1997. 4. Stephen G. Mallat,v, ”A Wavelet Tour of Signal Processing” , Academic Press, 2nd Edition 5. S.Jayaraman, S.Esakkirajan, T.Veera Kumar, “Digital Image Processing” , TMH, 2009.

ELECTRICAL & ELECTRONIC ENGINEERING

PH002- ADVANCED POWER SYSTEM PROTECTION

UNIT-1

Static Relays classification and Tools

Comparison of Static with Electromagnetic Relays, Basic classification, Level detectors and Amplitude and phase Comparators – Duality – Basic Tools – Schmitt Trigger Circuit,Multivibrators, Square wave Generation – Polarity detector – Zero crossing detector – Thyristor and UJT Triggering Circuits. Phase sequence Filters – Speed and reliability of static relays.

UNIT-2

Amplitude and Phase Comparators (2 Input)

Generalized equationsfor Amplitude and Phase comparison – Derivation of different characteristicsof relays – Rectifier Bridge circulating and opposed voltage type amplitude

Comparators – Averaging & phase splitting type amplitude comparators –Principle of sampling comparators.

UNIT-3

Static over current (OC) relays

Instantaneous, Definite time, Inversetime OC Relays, static distance relays, static directional relays, static differentialrelays, measurement of sequence impedances in distance relays, multi inputcomparators, elliptic & hyperbolic characteristics, switched distance schemes,

Impedance characteristics during Faults and Power Swings

UNIT-4

Carrier plot protection scheme

Carrier current protection schemes,relative merits & demerits, carrier aided distance protection schemes, transferschemes, blocking scheme and acceleration schemes.

Differential relay Principle and characteristics, mal-operation of differential relay,protection of transformers, protection of generators.

UNIT-5

Numerical Protection

Introduction, numerical relay, numerical relayingalgorithms, mann-morrison technique, Differential equation technique, discretefourier transform technique, odeling zed harr transform technique, wavelettransform technique, numerical overcurrent protection , numerical distanceprotection , numerical differential protection.

TEXT BOOKS

1. W. A. Almore, “Protective Relaying Theory and Applications,” Marcel Dekker Inc; New York, 1994.
2. J. L. Blackburn, “Applied Protective Relaying,” Westinghouse Electric Corporation, New York, 1982.
3. Van C. Warrington A. R. “Protective Relays: Their Theory and Practice,”, Vol 1, Chapman & Hall Ltd, London, 1962

REFERENCEBOOKS

1.Bhavesh Bhalja, R. P. Maheshwari and N. G. Chothani, “Protection and Switchgear,” Oxford University Press, New Delhi, India, 2011.

2. P. M. Anderson, Power System Protection, IEEE Press, New York, 1999.
3. A. T. Johns and S. K. Salman, “Digital Protection for Power Systems,” Peter Peregrinus Ltd, UK, 1995.
4. S. H. Horowitz and A. G. Phadke, “Power System Relaying,” John Wiley & Sons, New York, 1996.
4. A. G. Phadke and J. S. Thorp, “Computer Relaying for Power Systems,” Research study press Ltd, John Wiley & Sons, Taunton, UK, 1988.

PH028 - POWER SYSTME AUTOMATION

UNIT-1
INTRODUCTION TO SCADA

Evolution of Automation systems, History of Power system Automation, Supervisory Control and Data Acquisition (SCADA) Systems, Components of SCADA systems, SCADA applications, SCADA in power systems, SCADA basic functions, SCADA application functions in Generation, Transmission and Distribution.

UNIT-2
SCADA SYSTEM COMPONENTS

Advantages of SCADA in Power Systems, The Power system 'Field', Types of data &signals in the Power system, Flow of Data from the field to the SCADA Control center. Building blocks of SCADA systems, Classification of SCADA systems.

UNIT- 3
FEATURES OF RTU

Remote Terminal Unit (RTU), Evolution of RTUs, Components of RTU, Communication, Logic, Termination and Test/HMI Subsystems, Power supplies, Advanced RTU Functionalities.

UNIT-4
COMMUNICATION SYSTEM STANDARDS FOR SCADA

Intelligent Electronic Devices (IEDs), Evolution of IEDs, IED functional block diagram, The hardware and software architecture of IED, IED Communication subsystem, IED advanced functionalities, Typical IEDs, Data Concentrators and Merging Units, SCADA Communication Systems.

UNIT-5
FEATURES OF HMI

Master Station, Master station software and hardware configurations, Server systems in the master station, Small, medium and large master station configurations, Global Positioning Systems, Master station performance, Human Machine Interface (HMI), HMI components, Software functionalities, Situational awareness, Case studies in SCADA.

TEXT BOOKS

1. Mini S. Thomas, John D McDonald, Power Systems SCADA and Smart Grid, CRC Press, Taylor and Francis, 2015.
2. Electric Power Substation Engineering John D. Mc Donald CRC Press, Taylor and Francis, 2012.

REFERENCE BOOKS

1.Control and Automation of Electrical Power Distribution systems, James North cote- Green, R Wilson, CRC Press, Taylor and Francis, 2006.
2.Electric Power Distribution, Automation, Protection and Control, James Momoh, CRC press, Taylor and Francis, 2008.
3. Biswarup Das, Power Distribution Automation, IET, 2016.

PH029 – POWER SYSTEM PLANNING AND RELIABILITY

UNIT-1
PLANNING AND FORECASTING
Objectives of planning – Long and short term planning - Load forecasting – characteristics of loads – methodology of forecasting – energy forecasting – peak demand forecasting – total forecasting – annual and monthly peak demand forecasting.

UNIT-2
CONCEPTS OF RELIABILITY AND RELIABILITY IN GENERATION
Reliability concepts – exponential distributions – meantime to failure – series and parallel system – MARKOV process – recursive technique. Generator system reliability analysis – probability models for generators unit and loads – reliability analysis of isolated and interconnected system – generator system cost analysis.

UNIT-3
TRANSMISSION SYSTEM AND RELIABILITY ANALYSIS
Transmission system reliability model analysis – average interruption rate - LOLP method - frequency and duration method - Sub transmission lines and distribution substations- -Design primary and secondary systems .

UNIT- 4
INTERCONNECTED SYSTEMS
Two plant single load system - two plant two load system - load forecasting uncertainty - Interconnections benefits- Introduction to system modes of failure – the loss of load approach – frequency & duration approach.

UNIT- 5
EXPANSION PLANNING
Basic concepts on expansion planning-procedure followed for integrate transmission system planning, current practice in India-Capacitor placer problem in transmission system and radial distributions system

TEXT BOOKS
1.Sullivan, R.L., ‘Power System Planning’, Heber Hill, 1987.Digitized 5 August 2011
2.Roy Billington,Ronald L Allan, ‘Reliability Evaluation of Power System’, Springer USA , 1996
3.*Eodrenyi, J., ‘Reliability Modeling in Electric Power System’ John Wiley, 1980.*

REFERENCE BOOKS

1. X. Wang & J.R. McDonald, “Modern Power System Planning”, McGraw Hill Book Company,1994.
2. Pabla, A.S., Electric Power Distribution, Tata McGraw−Hill (2008)
3. Roy Billington, ‘Power System Reliability Evaluation’, Gordan& Breach Scain Publishers,1990

PH030- SMAR GRIDS

UNIT- 1
INTRODUCTION TO SMART GRID
Introduction - Evolution of Electric Grid, Smart Grid Concept - Definitions and Need for Smart Grid – Functions – Opportunities – Benefits and challenges, Difference between conventional & Smart Grid, Technology Drivers

UNIT-2
ENERGY MANAGEMENT SYSTEM
Energy Management System (EMS) - Smart substations - Substation Automation - Feeder Automation, SCADA – Remote Terminal Unit – Intelligent Electronic Devices – Protocols, Phasor Measurement Unit – Wide area monitoring protection and control, Smart integration of energy resources – Renewable, intermittent power sources – Energy Storage.

UNIT- 3
DISTRIBUTION MANAGEMENT SYSTEM
Distribution Management System (DMS) – Volt / VAR control – Fault Detection, Isolation and Service Restoration, Network Reconfiguration, Outage management System, Customer Information System, Geographical Information System, Effect of Plug in Hybrid Electric Vehicles

UNIT-4
SMART METERS
Introduction to Smart Meters – Advanced Metering infrastructure (AMI), AMI protocols – Standards and initiatives, Demand side management and demand response programs, Demand pricing and Time of Use, Real Time Pricing, Peak Time Pricing.

UNIT-5
COMMUNICATION NETWORKS & IOT
Elements of communication and networking – architectures, standards, PLC, Zigbee, GSM, BPL, Local Area Network (LAN) - House Area Network (HAN) - Wide Area Network (WAN) - Broadband over Power line (BPL) - IP based Protocols - Basics of Web Service and CLOUD Computing, Cyber Security for Smart Grid.

TEXT BOOKS
1.JanakaEkanayake, Nick Jenkins, KithsiriLiyanage, Jianzhong Wu, Akihiko Yokoyama, ‘Smart Grid: Technology and Applications’, Wiley, 2012
2.StuartBorlase ‘Smart Grid: Infrastructure, Technology and Solutions’, CRC Press 2012.

REFERENCE BOOKS
1. Mini S. Thomas, John D McDonald, ‘Power System SCADA and Smart Grids’, CRC Press, 2015
2. Kenneth C.Budka, Jayant G. Deshpande, Marina Thottan, ‘Communication Networks for Smart Grids’, Springer, 2014.

PH031 – SOFT COMPUTING

UNIT-1

Fundamentals of optimization techniques

Definition-Classification of optimization problems-Unconstrained and Constrained optimization-Optimality conditions-Classical Optimization techniques (Lamda Iteration method, linear programming, Quadratic programming). Brief introduction to lamda iteration method, formulate the Lagrange function, Lamda iteration method to solve Optimal dispatch problem. Introduction to quadratic programming, Working principle, sequential programming, linear constrained optimization problem.

UNIT- 2

Linear programming

Examples of linear programming problem, The Simplex Method I, Fundamental theorem of linear programming, Weak and strong duality theorems, Integer programming, Network flow, develop a linear programming model from problem description.

UNIT-3

Genetic Algorithm

Introduction to genetic Algorithm, working principle, Principles of Genetic Algorithm- Evolutionary Strategy and Evolutionary Programming-Genetic Operators-Selection, Crossover and Mutation fitness function. GA operators; Similarities and differences between GA and traditional methods; Unconstrained and constrained optimization using Genetic Algorithm.

UNIT-4

Particle Swarm Optimization

Fundamental principle-Velocity Updating-Advanced operators-Parameter selection- Hybrid approaches (Hybrid of GA and PSO, Hybrid of EP and PSO) -Binary, discrete and combinatorial

UNIT-5

Differential Evolution

Fundamental principle, developing DE based solution techniques for OPF problems with single and multiple objectives and comparing the performance and computational effectiveness of DE with other evolutionary and conventional techniques.

REFERENCE BOOKS

1. S.S.Rao, Engineering Optimization, 3rd Edition, New Age International (P) Ltd.
2. Soft computing Technique and its application in electrical Engineering by Chaturvedi,
3. An Introduction to Optimization, 3rd Edition by K.P. Chong, Stanislaw H. Zak.

PH264 – ENERGY AUDITING AND MANAGEMENT SYSTEM

UNIT-1
INTRODUCTION
Need for energy management - energy basics- designing and starting an energy management program – energy accounting -energy monitoring, targeting and reporting-energy audit process.

UNIT-2
ENERGY COST AND LOAD MANAGEMENT
Important concepts in an economic analysis - Economic models-Time value of money- Utility rate structures- cost of electricity-Loss evaluation- Load management: Demand control techniques-Utility monitoring and control system-HVAC and energy management-Economic justification.

UNIT-3
ENERGY MANAGEMENT FOR MOTORS, SYSTEMS, AND ELECTRICAL EQUIPMENT
Energy efficient motors , factors affecting efficiency, loss distribution , constructional details , characteristics - variable speed , variable duty cycle systems, RMS hp- voltage variation-voltage unbalance- over motoring- motor energy audit. Transformer Loading/Efficiency analysis, Feeder/cable loss evaluation, case study. Reactive Power management-Capacitor Sizing-Degree of Compensation-Capacitor losses-Location-Placement-Maintenance

UNIT- 4
METERING FOR ENERGY MANAGEMENT
Relationships between parameters-Units of measure-Typical cost factors- Utility meters - Timing of meter disc for kilowatt measurement - Demand meters - Paralleling of current transformers - Instrument transformer burdens-Multitasking solid-state meters – Metering location vs. requirements

UNIT-5
LIGHTING SYSTEMS & COGENERATION
Concept of lighting systems - The task and the working space -Light sources - Ballasts –Luminaries - Lighting controls-Optimizing lighting energy - Power factor and effect of harmonics on power quality - Cost analysis techniques-Lighting and energy standards
Cogeneration: Forms of cogeneration - feasibility of cogeneration- Electrical interconnection.

TEXT BOOKS
1. Amit K. Tyagi, Handbook on Energy Audits and Management, TERI, 2003.
2. Energy management by W.R. Murphy & G. Mckay Butter worth, Heinemann publications. 2016

REFERENCE BOOKS
1. Energy efficient electric motors by John .C. Andreas, Marcel Dekker Inc Ltd-2nd edition, 1995
2. Energy management by Paul o’ Callaghan, Mc-graw Hill Book company-1st edition, 1998.

MECHANICAL ENGINEERING

PH033 – COMPOSITE MATERIALS

Unit — I: Basic concepts and characteristics: Geometric and Physical definitions, natural and man-made composites. Acrospace and structural applications, types and classification of composites,

Reinforcements: Fibres- Glass, Silica, Kevlar, carbon, boron, silicon carbide, and born carbide fibres. **Particulate composites, Polymer** composites, Thermoplastics, Therrnosetts, Metal matrix and ceramic composites.

Unit—II

Manufacturing methods: Autoclave, tape production, molding methods, filament winding, man layup. pultrusion. **RTM,**

Micromechanics: Unidirectional composites, constituent materials and properties, elastic properties of a lamina, properties of typical composite materials, laminate characteristics and configurations. Characterization of composite properties_

Unit — III Coordinate transformations: Hooke's law for different types of materials, Hooke's law for two dimensional unidirectional lamina, Transformation of stress and strain, Numerical **examples of** stress strain transformation, Graphic interpretation of stress strain relations. Off -axis, stiffness modulus, off - axis compliance,

Elastic behavior of unidirectional composites: Elastic constants of lamina, relationship between engineering constants and reduced stiffness and compliances, analysis of laminated composites, constitutive relations.

Unit **IV Strength of unidirectional lamina:** Micro mechanics of failure. Failure mechanisms, Strength of an orthotropic lamina, Strength of a lamina tinder tension and shear maximum stress and strain criteria, application to design.

Unit — V Analysis of laminated composite plates: Introduction, thin plate theory, specially orthotropic plate, cross and angle pLy laminated plates, problems using thin plate theory.

Reference Books:

1, Mechanics of Composite Materials/ R.. M. Jones/ Mc Draw **Hill** Company, New **York, 1975,**

2. Engineering Mechanics of Composite Materials by Isaac and M Daniel, Oxford University Press, 1994.

3, Analysis and performance of fibre Composites/ B. D. Agarvcial and L, **J.** Broutman/ Wiley -Interscience, New York, 1980.

4. Mechanics of Composite Materials/ Second Edition (Mechanical Engineering)/ Autar K. Kaw Publisher: CRC

. Analysis of Laminated Composite Structures/ L. R. Calcote/ Van NostrandRainfold, New York, 1969.

6+ Advanced Mechanics of Composite Materials/ Vasiliev&MorozoviElsevier/Second Edition

PH048-POLYMER CHARACTERIZATION

UNIT I : STANDARDS AND SPECIMEN PREPARATION
Standards - BIS, ASTM, ISO, specifications and their importance with reference to polymer Preparation of test specimen by various techniques for thermoplastics, thermo sets, and elastomers conditioning and test atmospheres- Analytical tests: determination of specific gravity, density by density gradient method, bulk density, moisture absorption, particle size analysis.

UNIT II : MECHANICAL PROPERTIES
Tensile, compression, flexural, shear, tear, impact, abrasion, hardness, Creep and stress relaxation, fatigue. Friction and wear-abrasion testfatigue-burst strength-and folding endurance.

UNIT III : THERMAL AND RHEOLOGICAL PROPERTIES
Transition temperatures, Vicat softening temperature, heat distortion temperature, coefficient of expansion, specific heat, thermal conductivity, shrinkage, brittleness temperature, thermal stability, and flammability, melt flow index, Viscosity (Rotational viscometer, MDR, capillary rheometer, and torque rheometer) , DSC, TGA, DTG, etc

UNIT –IV : MORPHOLOGICAL PROPERTIES
Microscopy techniques. Electron microscopy: scanning electron microscopy (SEM), transmission electron microscopy (TEM). Scanning probe microscopy: atomic force microscopy (AFM),scanning tunneling microscopy (STM). Optical spectroscopy: UVVisible spectroscopy, Fourier Transform infrared (FTIR) spectroscopy, Raman
spectroscopy.

UNIT –VOPTICAL&ELECTRICAL PROPERTIES
Optical Properties– Refractive index – light transmission – haze – clarity – gloss –colour guard and microscope.
Electrical properties- Effect of polymer structure , Insulation resistance-power factorpermittivitydielectric
strength-tracking resistance-arc resistance and antistatic test.

TEXT BOOKS:
1. Vishu Shah, "Handbook of Plastics Testing Technology", John Wiley, NY, 1998.
2. ASTM: 8.01 & 8.04; 9.01 & 9.02,2000
REFERENCES: 1. Testing of Polymers, interscience, New York, 1965.
2. G. C. Ives & J. A. Mead, and N. M. Riley "Handbook of Plastics Test Methods", ILIFEE, London, 1971
3. Roger P. Brown, "Physical Testing of Rubber", interscience, New York, 1966.
4. Nicholas P.Cheremisinoff, "Product Design and Testing of Polymeric Materials", Marcel Dekker, inc, New York, 1990

MANGEMENT SCIENCES

PH006 - FINANCIAL MANAGEMENT

UNIT - I

Perspectives on Financial Management: Finance Function & Inter linkages with other functions. Objective of the finance Function, Investment, Financing and dividend, firm value maximization, Agency Problems, Time value of Money.

UNIT - II

Capital Budgeting Decisions: Investment Appraisal Methods- NPV and other techniques.
Fundamentals of Capital Budgeting- Forecasting earnings, Risk Analysis in capital Budgeting.

UNIT - III

Working capital management: Cash cycle, operating cycle, estimation, Factors affecting working capital, Types of working capital- Inventory management, Cash Management.

UNIT - IV

Capital Structure: Cost of Capital- Component cost of capital and WACC. Capital structure and impact on firm value- MM Hypothesis with and without taxes, traditional models.

UNIT - V

Dividend Policy: Forms of dividend, Theories of dividend, Dividend payout theories and comparison of dividends versus buy backs.

TEXT BOOK:

1. Ross, Westerfield and Jaffe and Kakani (RWJK) Corporate Finance, 10/e, 2014,Tata Mc Graw Hill.

REFERENCE BOOKS:

1. Michael C Ehrhardt and Eugene F Brigham, Corporate Finance- A Focused Approach, Cengae Learning, 5/e, 2013.
2. Rajiv Srivastava and Anil Misra, Financial Management, Oxford University Press, 2/e, 2011
3. I.M.Pandey, Financial Management (10th edition), Vikas Publishing 2011.
4. Anthony, Hawkins and Merchant, Accounting: Text & Cases, 13/e, 2010.

PH013- HUMAN RESOURCE MANAGEMENT

UNIT - I

Introduction, HRM at work - The Changing Environment and Changing Role of HRM - The HR Manger's Proficiencies - Labor Legislations in India - Equal Employment Opportunity, HR Process Outsourcing - Disruptive HRM - Business HR - Employee Engagement.

UNIT - II

Job Analysis: Basics, Methods - Writing Job Descriptions and Job Specifications - The Recruitment and Selection Process: Planning and Forecasting - Effective Recruiting, Internal and External Sources of Candidates, Developing and Using Application Forms - e-Recruitment: Use of social media - Recruitment Process Outsourcing.

UNIT - III

Selection: Importance, Assessment Centre, Types of Testing, Work Samples and Simulations - Background Investigation and other Selection Methods - Basic Features of Interviews - What can Undermine and Interview's Usefulness, Designing and Conducting an Effective Interview - Orientation: Purpose, Process - Training: Process - Training Methods - Management Development, Evaluating the Training Effort.

UNIT - IV

Basic Concepts in Performance Management, Introduction to Appraising Performance – Steps and Methods in Performance Appraisal – Appraising Performance: Problems and Solutions, The Appraisal Interview – Career Management, Career Planning and Career Development – Managing Promotions and Transfers.

UNIT - V

Factors Determining Pay, Establishing Pay Rates- Payroll Management – Competency Based Pay and other Compensation Trends – Incentives: Individual, Group and Organizationwide Plans – Employee Benefits – Employee Relations – Collective Bargaining Process - Handling Grievances – Trends in HR: HR Metrics, HR Analytics.

TEXT BOOK:

1. Dessler, Varkkey: Human Resource Management, 12/e, Pearson Education India, 2014.

REFERENCE BOOKS:

1. Armstrong, Taylor: Armstrong's Handbook of Human Resource Management Practice, 13/e, Kogan Page, 2014.
2. Decenzo, Robbins: Fundamentals of Human Resource Management, 11/e Wiley, 2013.

PH055- SECURITY ANALYSIS AND PORTFOLIO MANAGEMENT

UNIT - I

The Investment Environment, Financial Instruments, Markets for investments and Trading.

UNIT - II

Risk and Return calculation, Efficient markets: concepts and forms of market efficiency, testing market efficiency. Economic analysis, Industry Analysis, company Analysis, Technical Analysis.

UNIT - III

Introduction to portfolio management, Portfolio selection and Markowitz portfolio theory, Index models, capital Asset pricing Model.

UNIT - IV

Equity Analysis and valuations, introduction to Bond Analysis, Bond pricing and yield, Bond pricing theories.

UNIT - V

Portfolio performance evaluation-Forecasting portfolio performance.

TEXT BOOKS:

1. Investments by Bodie, Kane, Marcus and Mohanty,8th edition (BKMM), Mcgraw Hill, 2012.
2. Investment Analysis and Portfolio Management by Prasanna Chandra, Tata McGraw Hill, 2013.

REFERENCE BOOKS:

1. Business Analysis and Valuation using financial statements by Palepu, Healy and Bernard (PHB), 3rd edition, Cengage Learning, 2013.
2. Chapters of book: Corporate Finance by Ross, Westerfield, Jaffe and Kakani, 8th Edition, Tata Mcgraw Hill, 2014.
3. Security Analysis and Portfolio Management by Fisher and Jordan, Prentice Hall India, 2014.
4. Damodaran on Valuation(AD)-Security Analysis for Investment and Corporate Finance, 2nd edition, Wiley, 2013.
5. Investment Analysis and Portfolio Management by Railley and Brown, Cengage, 2012.

CHEMISTRY

PH038 - INSTRUMENTAL METHODS OF CHEMICAL ANALYSIS

UNIT-I ' SPECTROSCOPY Basic concepts operational principles and applications of UV-VIS' FT-IR and Raman Spectroscopy.

UNIT-II RESONANCE SPECTROSCOPY FundamentWsr operational principles, type5 and applications of Nuclear magi tic Resonance (NM H), 'Electron Spin 1e5onance (EST), FerrOrnagnetic Rescrnance (FM Ft), Mossbauer Spectroscopy.

UNIT-Ill THERMAL ANALY51$ AND SPECTROSCOPY Therirriogravirnetylc Analysis (T 'I - Differential Scanning Calorimetry (DS) - Therrnomechanical. Anal ysis (TMA).

UNIT-IV X-Ray Differentiation of X. ray diffraction - Deb Schemer formula - powder diffraction - dislocation density strain and stre55-partide Sine Dnaly5i$ by schemer formula -Weber- Frenchmen method of p2irtIcle size determination-H RX.R.Dana lysis and imaging,

UNIT-IV MICROSCOPY Atomic manipulations - AFM - different met d5 of 0 peratiOn- 5Canning Tunneii4 Electron MicrOstopy (STEM) - Scanning Probe Microscopy (5PM). Field Erin issicl n Scanning Electron Microscopy - FESEM TrariSrrirSSOn electron microscopy-11 RTEM — Energy dispersive x-ray Spectroscopy (E CAS) and Quantitative microanalysis using ' E DS, H5

1. William 'N. Parson., Modern Optical Spectroscopy, Springer, (2007). 2. Collin Illarom.11, Mc Ca chi, Fundamentals. of Molecular Spectroscopy, McCraw Hill (19 910. 3. Harvey Elliot White, Introduction to Atomk Spectra, McCraw 1-11111, 0934). 41, Guoz Fong C.acio Nancistructures et Na no ma Nrial & Synthesis, Properlie5, Applications, World Scientific Publishing Private, Ltd., Singapore (2o04). REFERIENICE. B _ _ _ OOKS •..____. t Fri ri c I s 11. ci-Li essac and Amick Rouessac, Chemical Apia lysi s. WI oclern Imtrurneritatkin iviOlialls and Techniques (000) 2. C. N. R. Rae, A. ?kJ Iler, A. K. Cheetham, The Chemistry of NanomaiteriallE: Synthesis, Properties and Applkations., 'Volume t, Wiley-Val, Verlag Gm 1:13-1, Germany (2004).

PH039- SEPARATION METHODS AND ANALYTICAL TECHNIQUES

UNIT I

PRODUCT RECOVERY METHODS:

Extraction (liquid-liquid extraction, aqueous two-phase extraction and leaching) Membrane-based separations (micro, ultra filtration, reverse osmosis, dialysis) – theory, design and configuration of membrane separation equipment applications.

UNIT II

PRODUCT PURIFICATION:

Adsorption, Ion exchange, Gel filtration, Affinity chromatographic separation processes.

UNIT III

PRODUCT FINISHING AND EMERGING TECHNOLOGIES:

Pervaporation, super liquid extraction, foam based separation and Crystallization.

UNIT IV

CHROMATOGRAPHIC AND ELECTROPHORETIC ANALYSIS:

GC, HPLC, FPLC, Electrophoretic separations and analysis (Agarose gel, SDS – PAGE and Capillary Electrophoresis).

UNIT-V

VALIDATION OF ANALYTICAL PROCEDURES:

Methodology for validation of analytical procedures. ICH guideline for Specificity, Linearity, Range, Accuracy, Precision, Limit of detection (LOD), Limit of quantification (LOQ) and Robustness.

TEXT BOOKS:

1. BIOTOL.' Series - Product Recovery in Bioprocess Technology (2004), 1st edition, Butterworth Publications.
2. Instrumental Methods of Analysis, B.K. Sharma (2001), 20th Edition, Goel Publishing House.
3. Bioseparations, B.Shivasankar (2006), Third Edition, PHI publications.

REFERENCES:

1. HPLC for Pharmaceutical Scientists, Yuri Kazakevich, Rosario LoBrutto, (2007).
2. Practical HPLC Method Development, Lloyd R. Snyder, Joseph L. Glajch, and Joseph J. Kirkland. (1997).
3. Instrumental methods of analysis, seventh edition, Hobart H.Willard, Lynne L. Marritt, John A. Dean, Frank A.Settle.
4. ICH guideline Q2 (R1) Validation of analytical procedures: Text and methodology.

PH060- RECENT ADVANCES IN MATERIALS CHEMISTRY (RAMC)

Unit-1

Introduction to solids:

Solids – types of solids –Crystal Structure-Crystalline solids, crystal systems point groups.

Unit II

Synthesis of Materials:

Preparative methods–Solid state reaction, precipitate reactions, sol-gel route, hydrothermal, salvo thermal methods, ion exchange reactions, intercalation / deintercalation reactions.

Unit-III

Properties of Materials:

Properties of solids-electrical properties, magnetic properties and optical properties etc.

Unit IV

Metal Organic Frame works:

Introduction, Preparation methods, properties and applications of few MOFs

Unit V

Characterization Techniques:

Methods of characterizing - Powder and single crystal x-ray diffraction, BET surface analysis, Adsorption by various gases.

Text Books:

1. A. R. West, Solid State Chemistry and its Applications, 2nd Edition, wily Publishers 2014.
2. David Farrusseng, *Metal-Organic Frameworks Applications from Catalysis to Gas Storage*. Wiley Publisher 2011.

Reference books:

1. Emil Zolotoyabko, Basic Concepts of X-Ray Diffraction, Wiley Publisher 2014.

PH068 – MANUFACTURING PROCESS OF FIBER REINFORCED POLYMER COMPOSITES

Unit – I: Manufacturing of Natural Fibre-Reinforced Polymer Composites
The Relationship Between Manufacturing and Design for Manufacturing in Product Development of Natural Fibre Composites; Green Composite Manufacturing via Compression Molding and Thermoforming. Compaction, Permeability and Flow Simulation for Liquid Composite Moulding of Natural Fibre Composites.

Unit – II: Manufacturing and Processing
Kenaf Fibre-Reinforced Epoxy Composites via Different Methods; Critical Concerns on Manufacturing Processes of Natural Fibre Reinforced Polymer Composites; Challenges in Machining of Natural Fibre Composites and The Manufacturing of Natural Fibre-Reinforced Composites by Resin-Transfer Molding Process.

Unit – III: Manufacturing and Techniques
Manufacturing and Properties, Manufacturing of Natural Fibre-Reinforced Polymer Composites by Solvent Casting Method, Manufacturing of Coir Fibre-Reinforced Polymer Composites by Hot Compression Technique,

Unit – IV: Bio-Nanocomposites
Bio-nanocomposites from Natural Fibre Derivatives: Manufacturing and Properties and Processability of Wood Fibre-Filled Thermoplastic Composite Thin-Walled Parts Using Injection Molding.

Text Book:
1. Manufacturing of Natural Fibre Reinforced Polymer Composites by Editors: Salit, M.S., Jawaid, M., Yusoff, N.B., Hoque, M.E, Springer International Publishing, 2015.

PH069 - CHARACTERIZATION OF FIBER REINFORCED POLYMER COMPOSITES.

Unit – I: Fiber Reinforced Polymers

Introduction, Properties of Fiber Reinforced Polymers, Classification and synthesis of Fiber Reinforced polymers, Compaction, Permeability and Flow Simulation for Liquid Composite Moulding of Natural Fibre Composites.

Unit – II: Characterization of FRPs

Chemical Characterization: Paper chromatography (PC), Thin layer chromatography (TLC), Gas chromatography (GC), Liquid column chromatography (LCC)

Unit – III: Spectroscopic Techniques for FPRs

Chemical Characterization: FT-IR, Raman spectroscopy, Mass spectrometry, NMR, , , X-Ray Powder Diffraction (XRPD),

Unit – IV: Physical Characterization

Microscopic Characterization: Optical microscopy, Scanning Electron Microscopy (SEM), Scanning Electron Microscopy with Energy Dispersive spectroscopy (SEM/EDS) and Transmission Electron Microscopy (TEM)

Unit – V: Mechanical Characterization

Aspect ratio of reinforcement, reinforcement orientation, volume fraction, thickness, and number of layers of reinforcement (in case of composite laminates). Tensile test, Compression Test, Flexural Test, Impact Test, Shear Test; Durability Characterization: Creep Testing, Fatigue Testing, Wear Testing, Fire Testing, Environmental Testing.

Text Book:

1. Characterization Techniques of Reinforced Polymer Composites, Manish K. Lila Ujendra K. Komal Inderdeep Singh, Wiley-VCH Verlag GmbH & Co. KGaA. 2014.

2. Manufacturing of Natural Fibre Reinforced Polymer Composites by Editors: Salit, M.S., Jawaid, M., Yusoff, N.B., Hoque, M.E, Springer International Publishing, 2015.

PH072- ADVANCED ORGANIC SYNTHESIS

UNIT-I
REACTIVE INTERMEDIATES
Generation, Structure, Stability and reactivity of Carbo cations, Carbo anions, free radicals, Carbenes, nitrenes and Benzyne.

UNIT-II
HETEROCYCLIC CHEMISTRY
Synthesis and Reactions of furan, thiophene, pyrrole, pyridine, quinoline, isoquinoline and indole; Skraup synthesis, Fisher indole synthesis.

UNIT-III
STEREOCHEMISTRY & CONFORMATIONAL ANALYSIS
a)Recognition of symmetry elements and chiral structures (one and more than one chiral centers); R – S nomenciature Optical activity in the absence of chiral carbon. Stereochemistry of compounds containing nitrogen, sulphur and phosphorous.
b)Geometrical isomerism – E, Z- nomenclature – physical and chemical methods of determining the configuration of geometrical isomers.
c) Conformations of monocyclic compounds – cyclohexane- chair, boat and twist boat cyclohexanes, energy profile diagram – Mono and di- substituted cyclohexanes –conformations and physical properties.

UNIT-IV
SYNTHESIS IN ORGANIC CHEMISTRY
Oxidation and reduction of functional groups, Protecting groups, Reagents for modern organic synthesis, Named Organic Reactions and rearrangements – applications in organic synthesis, common catalysts and reagents (organic, inorganic, organometallic and enzymatic), Retrosynthesis, synthons, umpolung of reactivity

UNIT-V
ORGANOCATALYSIS
Basic concepts, enamine-, dienamine-, trienamine- catalysis, Iminium catalysis, HOMO-, LUMO-, SOMO-activation, Recent trends in organo catalysis.

TEXTBOOKS
1.Stereo Chemistry of carbon compounds – E.L. Eliel.
2.Modern organic Reactions, H.O.House, Benjamin.

REFERENCE BOOKS
1.Advanced organic chemistry – reaction, mechanism and structure, Jerry March, John Wiley.
2. Advanced organic chemistry, F.A.Carey and R.J.Sundberg,Plenum.

PH076 - FLAVONOIDS

Unit – I: The Stereochemistry of Flavonoids Introduction, Nomenclature of 2-Phenylbenzopyrans, Isoflavonoids, Neoflavonoids; Synthesis of flavonoids: Chalcones, Dihydrochalcones and Racemic Flavonoids; Asymmetric Epoxidation of Chalcones and chiral dioxiranes;

Unit – II: Isolation and Identification of Flavonoids Isolation of Flavonoids and their conjugates from biological materials; Structural characterization of Flavonoids and their conjugates by using NMR and Mass spectrometry; Identification of Flavonoid conjugate mixtures from various chromatographic techniques.

Unit – III: The Biosynthesis of Flavonoids History of Flavonoids biosynthesis, Proanthocyanidin biosynthesis, Dihydroflavonol Reductase, The 2-ODD Enzymes, Flavonoid Glycosyltransferases and Acetyltransferases, Peroxidases and Frontiers in the study of flavonoid metabolism.

Unit – IV: Transport of Flavonoids Entrance of Flavonoids into membrane-bound compartments: Proton-dependent transporters, ABC-type Transporters, MATE-type transporters; Factors involved in Flavonoid transport: GST proteins, Acylation of Flavonoids and Cytological aspects of Flavonoid transport.

Unit – V: Flavonoids as Nutraceuticals Introduction, Antioxidant activity, Anticarcinogenesis, Suppression of cancer growth and Molecular mechanisms of cancer chemoprevention by Flavonoids.

Text Books: 1. The Science of Flavonoids by Erich Grotewold, Springer publishers, 2006. 2. The Flavonoids by Jeffrey B. Harborne, Helga Marby and T. J. Marby, Springer US, 1975. 3. The Handbook of Natural Flavonoids, Volume 2, Jeffrey B. Harborne and Herbert Baxter, Wiley publishers, 1999.

PH079 – PHARMACEUTICAL WASTE WATER TREATMENT

Unit – I: Categorization of the Pharmaceutical Industry Fermentation plants; Synthesized organic chemicals plants; Fermentation/synthesized organic chemicals plants (generally moderate to large plants); Biological production plants (production of vaccines–antitoxins); Drug mixing, formulation, and preparation plants (tablets, capsules, solutions, etc.).

Unit – II: Pharmaceutical Manufacturing Processes. Challenges for Pharmaceutical Manufacturing, Technologies for Continuous Drug Product Manufacturing: Feeding, Blending, Granulation, Wet granulation, Dry granulation, Particle size reduction, Compression, Coating; Emerging technologies for continuous drug product production; Process integration and Process monitoring and control

Unit – III: Significant Parameters in PWT pH-Fecal coliform; Temperature-Manganese; BOD5, BODUlt-Phenolics; COD-Chromium; Dissolved oxygen-Aluminum; TOC-Cyanides; Solids (suspended and dissolved)-Zinc; Oil and Grease-Lead Nitrogen, (NH4 and organic-N)-Copper Sulfides-Mercury; Toxicity-Iron.

Unit – IV: Advanced treatment Methods of Pharmaceutical Wastewater Coagulation and sedimentation, Flotation, Activated carbon adsorption, Advanced oxidation processes, Wet air oxidation(WAO), Supercritical water oxidation(SCWO), Photocatalytic oxidation, Ultrasound oxidation, Electrochemical oxidation, Ozonation, Membrane separation, Microfiltration(MF), Ultrafiltration(UF), Reverse osmosis(RO), Electrodialysis(ED) and Biological treatment.

Unit – V: Hybrid Technologies for Pharmaceutical Wastewater Treatment Combination among advanced oxidation processes, Ozonation at high pH environments, Peroxone process (O3/H2O2), O3/catalyst, UV/H2O2, UV/O3, UV/SO4 2− , UV/Cl2, Electrochemical AOPs, Catalytic AOPs: Fenton process, Catalytic AOPs: Photocatalytic AOPs, Physical AOPs: Electrohydraulic discharge (plasma) oxidation, Physical AOPs: Ultrasound, Physical AOPs: Microwave, Physical AOPs: Electron beam, Combination: AOPs and other physicochemical processes, Combined AOPs and biotreatment technology, Adsorption-based combinations, Membrane-based combinations, Biological treatment-based combination,

Text Books: 1. The Science and Technology of Industrial Water Treatment by Zahid Amjad, Springer US, 2002. 2. Wastewater treatment in the pharmaceutical industry by R. Chen and K. Crowell, Springer publishers, 2012.

PH080 – QUINONE ISOXAZOLE THIOPHENE HYBRIDS

Unit I: Heterocycles: Synthesis and reactivity of Azepines, Oxepines and Thiapines. Synthesis and rearrangements of Diizipines. Synthesis of Benzoazepines, Benzodiazepines, Benzooxepines, Benzothiapines, Azocines and Azonines, synthesis of selenophenes, TGellerophenes, phospholes and Boroles.

Unit II: Synthesis of Novel Isoxazole fused Heterocycles Vilsmeir–Haack Reaction of 3-Aryl-isoxazol-2-ene-5-ones; Synthesis of 3-aryl-5-chloro-4- formyl-isoxazoles and 2,4-dichloro-3-formyl-6 unsubstituted quinolines, Synthesis of 5-chloro-4- formyl-3-phenyl-isoxazole and 2,4-dichloro-3-formyl quinoline.

Unit III: Novel thiophene derivatives Design and Synthesis of novel thiophene derivatives with sulfonamide, isoxazole, benzothiazole, quinoline and anthracene moieties; Biological evaluation and anti-cancer agent studies.

Unit IV: Diaziridinyl Quinone Isoxazole Hybrids Design, synthesis and biological evaluation of diaziridinyl quinone isoxazole hybrids: Confirmation of regioselectivity for diaziridinyl compounds; Biological evaluation: Antibacterial activity, Minimum bactericidal concentration (MBC), Biofilm inhibition assay, Antifungal activity, Minimum fungicidal concentration (MFC) and Cytotoxic activity

Unit V: Isoxazole Platform for Polyketide Assembly: Cycloaddition of Stable Benzonitrile Oxides to Stable ortho-Quinone Mono-acetals and Dehydro -genation; Claisen isoxazole synthesis TEXT AND REFERENCE BOOKS: 1. Heterocyclic Chemistry by T. Gilchrist. 2. An Introduction to the Chemistry of Heterocyclic Compounds by R M Acheson. 3. Heterocyclic Chemistry by J A Joule and K. Mills. 4. Principles of Modern Heterocyclic Chemistrry by A Paquette. 5. Handbook of Heterocylic Chemistry by A R Katritzky.

PH268- HETEROCYCLES

UNIT-I INTRODUCTION TO HETEROCYCLES:

1. Defination, 2. Classification 3. Uses of heterocyclic compounds

UNIT-II SYNTHESIS OF HETEROCYCLIC COMPOUNDS:

1. Pyridine, 2. Quinoline 3. Isoquinoline 4. Furan 5. Thiophene 6. Indole

UNIT-III PROTECTION AND DEPORTATION IN ORGANIC CHEMISTRY:

3.1) Protection and deportation of the following functional groups

1. Hydroxyl 2. Carbonyl 3. Amino and 4. carboxyl with 5. Applications

UNIT-IV STEREO CHEMISTRY:

1 Classification of isomers into structural and stereo types-Optical isomerisation-Elementary of symmetry and chirality – Configuration of optically active molecules – DL and RS notations – Resolution of recemic mixtures. Cis and Trans isomerism; E-Z configuration. Conformational analysis of acyclic systems like Ethane and cyclic systems like cyclohexane

UNIT-V

STRUCTURAL ELUCIDATION OF ORGANIC COMPOUNDS BY USING INSTRUMENTATION:

1. Spectroscopy: a) Basic concepts, operational principles and applications of UV-VIS, and
FT-IR spectroscopy. 2. Resonance spectroscopy: a) Fundamentals, b) Operational principles, types and C) Applications of Nuclear magnetic resonance (NMR) spectroscopy.

TEXT BOOK:

1. March's Advanced Organic Chemistry: Reactions, Mechanisms, and Structure, 7th Edition, ISBN: 978-0-470-46259-1, March 2013

REFERENCE BOOK:

1. Advanced Organic Chemistry, Francis A. Carey, Richard A. Sundberg, 5th Edition, 2007, ISBN-13: 978-0-387-68350-8, Springer.

CHEMICAL ENGINEERING

PH001 - ADVANCED CHEMICAL PROCESS EQUIPMENT DESIGN AND DRAWING

UNIT - I

Shell and Tube Heat Exchanger Design: 1-2 parallel – counter flow: Shell and Tube Exchanger, Flow arrangements for increased heat recovery, Calculations for process conditions.

UNIT - II

Vessel Supports: Introduction and classification support, design of skirt support, considering stresses due to dead weight, wind load, seismic load and period of vibration, design of basic plates, skirt bearing plate, anchor bolt and bolting chair.

UNIT - III

Storage Vessels: Study of various types of storage vessels and application. Atmospheric vessels, vessels for storing volatile and non-volatile liquids. Storage of gases, Losses in storage vessel. Various types of roofs used for sotrage vessels. Manholes, Nozzles and mounting. Design of cylindrical storage vessels as per IS:803 should include base plates, shell plate, roof plate and wind griders.

UNIT - IV

Sieve Tray Design: Introduction, Sieve Trays: Tower Diameter, Plate Spacing, Entrainment, Weepage, Tray Layout, Hydraulic Parameters, Worksheet for Sieve Tray Design, Design of a Sieve tray Tower for Distillation.

UNIT - V

Mechanical Design: Introduction, The Mechanical Design of Heat Exchangers: General Thicknesses of various components, The Mechanical Design of Columns: Vessel Design, Vessel Supports, Manholes and Flanges,Materials of Construction.

Text Books:

1. M.V.Joshi, "Process Equipment Design", 3rd ed., McMillan India.,2000D.
2. Backhurst and Harker, "Process Plant Design", 1st ed.,Heinmann Educational Books,1973

Reference Books :

1. Q.Kern, "Process Heat Transfer", 2ne ed.,Mc Graw Hill Co.,1983.
2. Coulson and Richardson, "Chemical Engineering", Volume 6, 2nd ed., Butterworth-Heinemann Ltd,1996

PH003 - ADVANCED PROCESS DYNAMICS AND CONTROL

Unit - I

Frequency Response: Polar plots, Nyquist stability criterion, Gain margin and Phase margin, effect of addition of poles and zeros. Inverse polar plots, stability criteria in the inverse plane. Closed loop frequency response: M and á circles, correlation between transient and frequency responses.

Unit - II

Introduction to Advanced Control Systems: Cascade control, Feed forward control, Adaptive Control, Inferential control, Internal model Control, Model predictive control, Dynamic matrix control, Ratio control, Selective and split range control, Plant wide control.

Unit - III

State Space Methods: State Space representation of Physical systems: State variables, State space description, Selection of state variables, Transfer function matrix, Transition matrix, Solution of state space models.

Unit - IV

Controllability and Observability. Multivariable control: control of interacting systems, Primary and Cross controllers, Relative Gain Analysis (RGA).

Unit - V

Response of multi loop control system, Non interacting control, Decouplers. Stability of multivariable control systems.

Text Books:

1. I.J.Nagrth and M.Gopal, “Control Systems Engineering”, New Age International Publishers, 1999.
2. Donald R Coughnowr, “Process Systems Analysis and Control, Mc Graw-Hill Inc.,1991.

PH004 - ADVANCED SEPARATION PROCESSES

Objective of the Course :

Objective: The course will · Promote the application of membrane science and technology to improve processing technologies, reduce energy utilization and waste treatment techniques. This course will offer scope of research and development that can lead to next generation of products.

Unit-I

Introduction to SeparationProcesses:

Classification of separation processes; Equilibrium-based separations: General properties, operation, and complexities of Separations that involve Mass separating agents and Energy separating agents; Review of Vapor- Liquid Equilibria and other equlibria; Thermodynamic consistency test for vapor-liquid equilibrium data; Phase rule and Degrees of freedom estimations; Equlibrium ratio concept and its estimation from Depriester's charts; Bubble-point and Dew-point Calculations; Flash Calculations, Estimation of state of the mixture.

Unit-II

Binary Separation Processes:

Common approach for process design (estimation of feed locations, product qualities and theoretical stages) of Equilibrium based separations: Single Stage- Single component and Multi Stage- Single component Separation Processes involving absorption, stripping, liquid-liquid immiscible extraction, adsorption and distillation; Kremser- Brown equation and its limitations; Process design (estimation of feed locations, product qualities and theoretical stages) of Multi stage Multiple Feeds and Side Streams processes.

Unit-III

Multicomponent Separation Processes: Multicomponent Distillation: Introduction to Multicomponent Distillation, Key Components; Estimation of Minimum Theoretical Stages (Fenske's equation); Distribution of non key components in overhead and bottom products at total reflux; Determination of minimum Reflux ratio (Underwood's Method);

Approximate calculation shortcut methods for multicomponent, multistage distillation (estimation of actual reflux ratio and theoretical stages): Fenske-Underwood-Gilliland method; Feed- Stage Location (Kirke-Bride's equation); Distribution of non-key component at actual reflux; Batch Multicomponent Distillation with Reflux: Shortcut method for multicomponent Batch Distillation with constant reflux, Stage-by-stage method for Multicomponent Distillation

Unit-IV

Rate Based Separations: Membrane Separation Processes: Principles, characteristic, and classification of membrane separation processes; Membrane materials, structures, and preparation techniques; Membrane modules; Membrane characterization: Pore size and pore distribution; Bubble point test; Challenge test; Factors affecting retentivity, concentration polarization, gel polarization, fouling, cleaning and regeneration of membranes.

Unit-V

Mechanisms of Separation: Porous membranes, dense membranes, and liquid membranes. Membrane separation models: Irreversible thermodynamics; Capillary flow theory; Solution diffusion model; Viscous flow models; Models for separation of gas (vapour) mixtures; Science and technology of microfiltration, reverse osmosis, ultrafiltration, nanofiltration, dialysis and electrodialysis, pervaporation, liquid membrane permeation, gas permeation. Membrane reactors: Polymeric, ceramic, metal and bio-membrane.

Text Books:

1. R.E. Treybal, "Mass Transfer Operations", 3rd ed., McGraw-Hill, 1980.
2. G.J. Geankoplis, "Transport Processes and Unit Operations", 3rd ed., Prentice Hall, NJ, 1993.

Reference Books :

1. P.H. Wankat, "Equilibrium Staged Separations", Elsevier, 1988.
2. J.D. Seader, E.J. Henley, "Separation Process Principles", John Wiley, 1998.
3. W.L. McCabe, J.C. Smith, P. Harriott, "Unit Operations of Chemical Engineering", 6th ed., McGraw-Hill, 2001.
4. King, C J, "Design of Equilibrium Stage Processes", Mc Graw-Hill Book Co. Inc., New York, 1980.

7. Coulson, J.M., and Richardson, J.F, “Chemical Engineering”, Volume 2, 4 and 6th ed’s., (SI Units). Pergamon Press Ltd., 1991.
8. Kohl, A. and Riesenfeld, F., “Gas Purification” 4th and 5th ed’s., Gulf Publishers Co, Houston, Texas. 1985.
9. Schoem, H.M, “New Chemical Engineering Separation Techniques”, Inter Science Publishers, 1972.
10. Lacey, R.E. and S.Loaeb “Industrial Processing with Membranes”, Wiley-Inter Science, NY, 1972.
11. Ronald W.Roussel “Handbook of Separation Process Technology”, John Wiley, New York, 1987.
12. Kestory, R.E., “ Synthetic Polymeric Membranes”, Wiley, New York, 1987.
13. Osadar, Varid Nakagawa I, “Membrane Science and Technology”, Marcel Dekkar, 1992.
14. Mulder M, “Basic Membrane Technology”, Kluwer Publishers, 1996.

PH005 - ADVANCED TRANSPORT PHENOMENA

UNIT - I

Basic Concepts and Review of Classical Flow Problems Using Shell Balances: Review of mathematics, Scalar, Vectors, Tensors, divergence, relation between rectangular coordinates and cylindrical coordinates, relation between rectangular coordinates and spherical coordinates, partial derivative, substantial derivative, total derivative, line integral, surface integral, integral theorems, frame of reference (Eularian and Lagrangian).

UNIT - II

The Equations of Change for Isothermal Flow: Equations of continuity, equation of motion, the equation of mechanical energy, application of Navier-Stokes equation to solve problems, the equations of change for incompressible non-Newtonian fluids.

The Equations of Change for Non-Isothermal Flow: Equations of energy, the energy equation in curvilinear coordinates, use of equations of change to set up steady state heat transfer for problems.

UNIT - III

The Equations of Change for Multi Component Systems: The equations of continuity for a binary mixture, the equation of continuity of A in curvilinear coordinates, the multicomponent equations of change in terms of the flows, the multi component fluxes in terms of the transport properties, use of equations of change to setup diffusion problems.

UNIT - IV

Velocity, temperature and concentration distributions with more than one independent variables, unsteady flow, stream function, potential flow, boundary layer theory, steady state two dimensional flow for momentum, heat and mass.

UNIT - V

Turbulent Flow: Introduction, fluctuations and time smoothened equations for velocity, temperature and concentration, time smoothing of equation of change, equation of energy, equation of continuity of A, Reynolds stresses.

Dimensional Analysis: Introduction, momentum, heat and mass transfer.

Text Books:

1. R. B. Bird, W. E. Stewart and E. N. Light foot, “Transport Phenomena”, Wiley International Edition, New York, 2002.
2. G.K. Batchelor, “An Introduction to Fluid Dynamics”, Cambridge University Press, Cambridge, 1967.

Reference Books :

1. J.C. Salterry, “Momentum Energy and Mass Transfer in Continua”, Robert e. Kridger Publishing Company, New York 1981.
2. James R. Welty, Chrles E. W icks and Robert E. Wilson, “Fundamentals of Momentum, Heat and Mass Transfer”, John Wiley & Sons, Inc New York.

PH007 - APPLIED NUMERICAL METHODS

UNIT - I

Solution of Simultaneous Linear Algebraic Equations: Introduction, Engineering Applications, Basic Concepts of Solution, Linearly Independent Equations and conditioned equations, Matrix Inversion, Equation with special form of coefficient matrix, Over – determined, Undetermined, and Homogeneous Equations.

UNIT - II

System of Equations: Simultaneous equations in matrix form, consistency of equations, types of solutions, methods of solving simultaneous equations: Giraff'S root square method, determinant method, Tri - Diagonal Matrices, Inverse Matrix, LU Factorization, Cholesky, Jacobi, Pivoting Methods, Iterative Refinement, Linear Programming-Simplex Method.

UNIT - III

Interpolation and Polynomial Approximation: Lagrange polynomial Interpolation and Approximation, Newton Interpolation Polynomial, Hermite Polynomial Interpolation, Legendre Polynomials.

UNIT - IV

Curve Fitting: Least Squares Lines, Least Squares Polynomials, Nonlinear Curve Fitting, Logistic Curve, FFT and Trigonometric Polynomials, Conic Fit, Circle of Curvature.

UNIT - V

Numerical Integration: Midpoint Rule, Newton-Cotes Integration, Trapezoidal Rule for Numerical Integration, Simpson's Rule for Numerical Integration, Simpson's 3/8 Rule for Numerical Integration, Adaptive Simpson's Rule, Gauss-Legendre Quadrature, Cubic Spline Quadrature, Monte Carlo Pi, Monte Carlo Integration, 2D Trapezoidal and Simpson Rules.

Text Books:

1. Dr.B.S.Grewal, "Higher Engineering Mathematics", Khanna Publishers, 37th ed.
2. Erwin Kreyszig, "Advanced Engineering Mathematics", John Wiley & Sons,7th ed., 2001.
3. S.S.Sastry, "Introductory Methods of Numerical Analysis", PHI Publishers, 4th ed.,
4. Singeresu S.Rao, "Applied Numerical Methods", Pearson Education Inc., Illustrated, 2001.

Reference Books:

1. Santosh K Gupta, “Numerical Methods for Engineering”, New Age International Publishers, 1st ed.,
2. M.K.Jain, S.R.K.Iyengar and R.K.Jain, “Numerical Methods for Scientific and Engineering Computation”, 5th ed.,New Age International Publication, 2007.

PH009 - CHEMICAL PROCESS EQUIPMENT DESIGN

UNIT - I

Shell and Tube Heat Exchanger Design: 1-2 parallel – counter flow: Shell and Tube Exchanger, Flow arrangements for increased heat recovery, Calculations for process conditions.

UNIT - II

Vessel Supports: Introduction and classification support, design of skirt support, considering stresses due to dead weight, wind load, seismic load and period of vibration, design of basic plates, skirt bearing plate, anchor bolt and bolting chair.

UNIT - III

Storage Vessels: Study of various types of storage vessels and application. Atmospheric vessels, vessels for storing volatile and non-volatile liquids. Storage of gases, Losses in storage vessel. Various types of roofs used for sotrage vessels. Manholes, Nozzles and mounting. Design of cylindrical storage vessels as per IS:803 should include base plates, shell plate, roof plate and wind griders.

UNIT - IV

Sieve Tray Design: Introduction, Sieve Trays: Tower Diameter, Plate Spacing, Entrainment, Weepage, Tray Layout, Hydraulic Parameters, Worksheet for Sieve Tray Design, Design of a Sieve tray Tower for Distillation.

UNIT - V

Mechanical Design: Introduction, The Mechanical Design of Heat Exchangers: General Thicknesses of various components, The Mechanical Design of Columns: Vessel Design, Vessel Supports, Manholes and Flanges,Materials of Construction.

Text Books:

1. D.Q.Kern, “Process Heat Transfer”, Mc Graw Hill Co.
2. Backhurst and Harker, “Process Plant Design”, Heinmann Educational Books.

Reference Books :

1. M.V.Joshi, “Process Equipment Design”, McMillan India.
2. Coulson and Richardson, “Chemical Engineering”, Volume 6 Pergamon Press.

PH010 - CHEMICAL PROCESS SAFETY

UNIT - I

Introduction: Importance of process safety with examples of major accidents; which might cover chemical, petroleum & petroleum chemical Industrial.

Material Hazards: Flammability, toxicity, Reaction Hazards, Burning Characteristics, Material Properties and Hazards.

UNIT - II

Process Hazards: Temperature & Pressure effects and deviations, flow, level and other process deviations.

Ignition Sources: Flames, Hot surfaces, static electricity, and the like Explosions: Confined & Unconfined explosions, BLEVES, Dust Explosions.

UNIT - III

Hazard Analysis: Check – lists, fault trees, cause consequence diagrams, HAZOP and other methods of study. Dow procedures for safety assessment.

UNIT - IV

Safety Devices: Relief valves and Rupture disks Explosive relief, flare systems.

Safety in Plant Design & Lay-out: Electrical area classification, control of entry to confined spaces.

UNIT - V

Emergency preparedness & handling analysis of major accidents & preventive measures.

Text Books:

1. Daniel A. Crowe, Joseph F Louvar "Chemical Process Safety Fundamentals with Applications", 2nd ed., Prentice Hall International Series, 1990.
2. Roy and Sanders, "Chemical Process Safety", 3rd ed., Prentice Hall International Series, 2000.

Reference Book :

1. S.N.Saha, "Fundamentals of Chemical Engineering", 1st ed., Dhanpatrai Publishers, 2002.

PH011 - COMPUTATIONAL METHODS

UNIT - I

Variables, Operations and Plotting:

Introduction to process modeling and simulation, Examples of chemical, Biochemical and environmental engineering problems arising in fluid mechanics, thermodynamics, heat and mass transfer, separation processes, reaction engineering, process dynamics, and transport phenomena. Introduction to MATLAB, introducing the theory of variable and matrices, basic operations and plotting.

UNIT - II
Visualization & Programming:

Introducing advanced visualizations commands in MATLAB. Introduction to basic built-in MATLAB functions. Getting familiar with building user- defined functions, and understanding the importance of them for solving advanced chemical engineering models. Practicing basic flow-control in MATLAB by applying if, else, elseif, for, while loops in various problems.

UNIT - III
Solving Equations, Fitting:

Case study problems in chemical processes involving algebra, polynomials, integral functions, differentiation and integration. Applications and importance of parameter estimation in process models, linear, multiple linear and non-linear least square methods, Statistical analysis of fitted equation, Importance and applications of statistical experimental design in engineering, Sensitivity analysis, Case studies.

UNIT - IV
Differential Equations in ChemicalEnvironmental Processes: Modeling of batch and continuous processes involving heat, mass & momentum transfer, dynamic operation of chemical processes and reaction engineering that give rise to linear or nonlinear, first or higher order, ordinary or partial differentialequations.

UNIT - V
Numerical solution techniques for solving the initial and boundary value problems; Introduction to the main differental equations solvers in MATLAB. Case studies.

Text Books:

1. Curtis F. Gerald and Patrick O. Wheatly, "Applied Numerical Analysis", Addison-Wesley, 1999.
2. Holly Moore, "MATLAB for Engineers", Pearson Prentice Hall, 2007.

Reference Books :

1. Laurene V. Fausett, “Numerical Methods: Algorithms and Applications”, Pearson Prentice Hall, 2003.
2. Gerald Recktenwald, “Numerical Methods with MATLAB: Implementation and Application”, Prentice Hall, 2000.
3. Michael B. Cutlip and Mordechai Shacham, “Problem Solving in Chemical Engineering with Numerical Methods”, Prentice-Hall, 1999.
4. Steven C. Chapra and Raymond P. Canale, “Numerical Methods for Engineers”, McGraw Hill, 1998.
5. A. Constantinides and N. Mostoufi, “Numerical Methods for Chemical Engineers with Matlab Applications”, Prentice Hall International, 1999.
6. Timothy Sauer, “Numerical Analysis”, Addision Wesley, 2006.
7. Ajay K. Ray and Santosh K. Gupta, “Mathematical Methods in Chemical and Environmental Engineering”, Thomson Learning, 2nd ed., Revised, 2005.

PH012 - ENERGY MANAGEMENT

UNIT - I

Energy Scenario: Introduction, Primary and Secondary Energy, Commercial Energy and Non commercial Energy, Renewable and Non Renewable Energy, Global Primary Energy Reserves, Indian Energy Scenario, Energy Needs of Growing Economy, Long Term Energy Scenario for India, Energy Pricing in India, Energy Sector Reforms, Energy and Environment, Energy Security, Energy Conservation and its Importance, Energy Strategy for the Future, The Energy Conservation Act, 2001 and its Features.

UNIT - II

Basics of Energy and its Various Forms: Definition, Various Forms of Energy, Electrical Energy Basics, Thermal Energy Basics, Units and Conversions. Energy action planning: Introduction, Energy Management System.

Project Management: Introduction, Steps in Project Management.

UNIT - III

Energy Management and Audit: Definition & Objectives of Energy Management,Energy Audit: Types and Methodology, Energy Audit Reporting Format, Understanding Energy Costs, Benchmarking and Energy Performance, Matching Energy Usage to Requirement, Maximizing System Efficiency, Fuel and Energy Substitution, Energy Audit Instruments.

UNIT - IV

Material and Energy Balance: Basic Principles, The Sankey Diagram and its Use, Material Balances, Energy Balances, Method for Preparing Process Flow Chart, Facility as an Energy System, How to Carryout Material and Energy (M & E) Balance.

UNIT - V

Financial Management: Introduction, Investment Need, Appraisal and Criteria, Financial Analysis, Financial Analysis Techniques, Sensitivity and Risk Analysis, Financing Options.

Energy monitoring and targeting: Definition, Elements of Monitoring & Targeting System, A Rationale for Monitoring, Targeting and Reporting, Data and Information Analysis, Relating Energy Consumption and Production, CUSUM, Case Study.

Text Books:

1. General Aspects of Energy Management and Energy audit by Beuro of Energy studies.
2. Encyclopedia of Energy - McGraw Hill Publication.
3. Basics of Energy, Energy action planning and Project Management.

Reference Books :

1. Handbook of Energy Engineering , The Fairmont Press Inc - Albert Thumann.
2. Energy Handbook, Von Nostrand Reinhold Company - Robert L. Loftness.
3. BP Statistical Review of World Energy.
4. Financial Management, Energy monitoring and Targeting.
5. The Energy and Resources Institute (TERI).
6. Energy Dictionary, Van Nostrand Reinhold Company, New York - V Daniel Hunt.
7. Energy Management Handbook, John Wiley and Sons - Wayne C. Turner.
8. Guide to Energy Management, Cape Hart, Turner and Kennedy.

PH015 - ENZYME AND MICROBIAL TECHNOLOGY

UNIT - I

Introduction to Microbiology: Discovery of microorganisms, Theory of spontaneous generation, Germ theory of diseases, Major contribution and events in the field of Microbiology, Development of pure culture methods, Enrichment culture methods.

UNIT - II

Major Groups of Microorganisms: Micro diversity, Diversity classification of Woese et al. Three domains of life. Five - kingdom system of Whittaker. Classification systems - Phylogenetic, Phenetic, Taxonomic ranks, Major characteristics used in Taxonomy, Molecular approaches to microbial taxonomy.

UNIT - III

Introduction to Enzymes: Methods used for investigating the kinetics of enzyme catalysed reactions, Kinetics of single substrate reactions; Estimation of Michaelis – Menten parameters,Types of inhibition & models for substrate and product.

UNIT - IV

Multi-substrate and Allosteric Enzyme Catalysed Reactions: Multisubstrate reactions mechanisms, steady state kinetics, Allosteric regulation of enzymes, Monod - Changeux -Wyman model, Koshland- Nemethy-Filmer (KNF) model.Deactivation kinetics- pH and temperature effect on enzymes.

UNIT - V

Enzyme Immobilization and Purification of Enzymes from Natural Sources: Physical and chemical techniques for enzyme immobilization

– advantages, disadvantages and applications. Effects of external mass transfer resistance, analysis of intraparticle diffusion and reaction, simultaneous film and intraparticle mass transfer resistances, immobilised enzyme bioreactors. Production and purification of crude enzyme extracts from plant,animal and microbial sources.

Text Books:

1. Prescott LM, Harley JP, Klein DA, “Microbiology”, 6th ed., Wm. C. Brown, McGrawel, 2005.
2. Roger Y Stanier, “General Microbiology”, Macmillan, 5th ed., 2005.

Reference Books :

1. Palmer T., “Enzymes: Biochemistry, Biotechnology and Clinical Chemistry”, First East -West Press Edition, 2004
2. James E Bailey, David F., “Ollis Biochemical Engineering Fundamentals”, 2nd ed., Mc GrawHill Intl. Edition.

PH016 - FERMENTATION TECHNOLOGY

UNIT - I

Fermentation Processes and Parameters: Over view on fermentation technology, history & development of fermentation industry. General requirements of fermentation processes and an overview, configuration of fermentor and ancillaries, main parameters to be monitored and controlled in fermentation processes.

UNIT - II

Media Design for Fermentation Process: Criteria for good medium, medium requirements for fermentation processes, points to be considered in the selection of different nutrients including oxygen, formulation of optimal growth and product formation, examples of simple and complex media, design of various commercial media for industrial fermentations– medium optimization methods.

UNIT - III

Sterilisation of Media: Introduction, design of batch sterilization processes – calculation of Del factor, holding time, Richard's rapid method for sterilization cycles, design of continuous sterilization processes, Sterilisation of fermenter, feeds, liquid wastes, filter sterilization of media, air, exhaust air, theory and design of depth filters.

UNIT - IV

Instrumentation for Measurement and Control of Variables: Introduction to process variables, instruments used for measurement and control of temperature, flow measurement and control, measurement and control of pressure, rate of stirring, control of foam, oxygen and pH.

UNIT - V

Production of Value Added Compounds from Renewal Sources: Production of primary and secondary metabolites: Biopolymers, Biodeseal, Bioethanol, aminoacids, antibiotics.

Text Books:

1. Peter F. Stanbury, Stephen J. Hall & A. Whitaker, "Principles of Fermentation Technology", 2nd ed., Butterworth – Heinemann An Imprint of Elsevier India Pvt. Ltd., 2005.
2. Shuler, M.L. and Kargi,F. "Bioprocess Engineering - Basic Concepts", 2nd ed., Prentice Hall of India Pvt. Ltd., 2005.

Reference Books :

1. Mukhopadhyay S.N., "Process Biotechnology Fundamentals", 2nd ed., Viva Books Private Limited, Chennai 2004.

2. Wang D.I.C., Cooney C.L., Demain A.L., Dunnil.P., Humphery A.E., Lilly M.D., " Fermentation And Enzyme Technology ", John Wiley and Sons, 1980.
3. Bailey and Ollis, "Biochemical Engineering Fundamentals", McGraw Hill, 2nd ed., 1986.
4. Pauline M. Doran, "Bioprocess Engineering Calculation", Blackwell Scientific Publications, 1st ed., 2005.

PH017 - INTERFACIAL SCIENCE & ENGINEERING

UNIT- I

Introduction: General introduction of colloids, interfaces, surfactants, and micellization. Intermolecular forces, Van der Waals forces, Brownian motion and Brownian flocculation.

UNIT- II

Surface and interfacial tension, surface free energy, Surface tension for curved interfaces, Surface excess and Gibbs equation.

UNIT- III

Thermodynamics of interfaces, Thermodynamics of micelle formation, Electrical phenomena at interfaces (Electrokinetic phenomena, Electrical double layer), Colloidal systems and colloidal stability, Emulsion and micro-emulsion.

UNIT- IV

Applications: General applications, Enhanced petroleum recovery, Novel fabrication of nanostructured particles, Engineering surfaces and interfaces, Self-assembled & nanostructured biomimeticinterfaces.

UNIT- V

Measurement techniques of surface tension, zetapotential, particle size, dynamic surface tension.

Text Books:

1. Hiemenz, P. C. and Rajagopalan, R., "Principles of Colloid and Surface Chemistry", 3rd ed., Marcel Dekker, N.Y., 1997.
2. M. J. Rosen, "Surfactants and Interfacial Phenomena", Wiley - Interscience Publication, NewYork, 1978.

Reference Books :

1. Adamson, A. W. Gast, A. P., "Physical Chemistry of Surfaces", Wiley-Interscience, New York,1997.
2. Russel, W. B., Saville, D. and Schowalter, W.R., "Colloidal Dispersions", Cambridge University Press, Cambridge, 1989.
3. "Foundation of Colloid Science", Vol. I and II, Oxford University Press, Oxford, 1992.

4. Jacob Israelachvili, “Intermolecular and Surface Forces”, Academic Press, New York, 1992.
5. D. J. Shaw, “Colloid & Surface Chemistry”, Butterworth Heinemann, Oxford, 1991.

PH018 - MATHEMATICAL METHODS IN CHEMICAL ENGINEERING

UNIT – I

Ordinary Differential Equations:

Introduction, Order and degree, First order differential equations: Batch Chemical Reactor Analysis, Variation of Tank Temperature with time, Second order differential equations: Heat Transfer through electrode, Linear differential equations: Simultaneous diffusion and chemical reaction in a tubular reactor, Continuous hydrolysis of tallow in a spray column, Simultaneous differential equations: Sulphuric acid cooling system.

UNIT – II
Partial Differentiation and Partial Differential Equations: Introduction, Interpretation of partial derivatives, Formulating partial differential equations: Unsteady state heat conduction in one dimension, Mass Tranfer with axial symmetry, The continuity equation, Boundary conditions: Cylindrical furnace, Particular solutions of partial differential equations: One dimensional heatconduction.

UNIT – III
Finite Differences:

Introduction, The difference operator, Δ, other difference operators, Interpolation, Finite difference equations, Linear finite difference equations: Plate absorption column, Stirred tank reactors in series, Spray column, Non - linear finite difference equations: CSTRs in series, Distillation column, Differential - difference equations: Stirred tank reactors in cascade, Counter current extractor.

UNIT – IV
Treatment of Experimental Results:

Introduction, Graph Paper, Theoretical properties, Contour plots, Propagation of errors, Curve fitting, Numerical Integration.

UNIT – V
Numerical Methods:

Introduction, First – order ordinary differential equations, Higher order differential equations (Initial value type), Higher order differential equations (Boundary value type), Algebraic equations, Difference – differential equations: Absorption column, Partial differential equations: Tubular catalytic reactor.

Text Books:

1. V.G.Jenson & G.V.Jeffreys, “Mathematical Methods in Chemical Engineering”, 2nd ed., Academic Press, London, 2000.
2. T.S.Sherwood & C. Reed, “Applied Mathematics in Chemical Engineering”, 2nd ed., Tata McGraw Hill Publishers, 1998.

Reference Books :

1. Steve Chopra, “ Numerical Methods for Chemical Engineering”, 5th ed., Tata McGraw Hill Publishers, 2009.
2. Pushpavanam ,Kondaswamy, “Numerical Methods for Chemical Engineering”, 1st ed., PHI Publishers, 2005.

PH019 - MEMBRANE TECHNOLOGY

UNIT - I

Introduction: Separation processes, introduction to membrane processes, history, definition of a membrane, membrane processes.

UNIT - II

Materials and Material Properties: Introduction, polymers, stereoisomerism, chain flexibility, molecular weight, chain interactions, state of the polymer, effect of polymeric structure on Tg, glass transition temperature depression.

Preparation of Synthetic Membranes: Introduction, preparation of synthetic membranes, phase inversion membranes, preparation technique for immersion precipitation, preparation technique for composite membranes.

UNIT - III

Characterization of Membranes: Introduction, membrane characterization, characterization of porous membranes, characterization of ionic membranes, characterization of non porous membranes.

Transport in Membranes: Introduction, driving forces, non equilibrium thermodynamics, transport through porous, non porous, and ion exchange membranes.

UNIT - IV

Membrane Processes: Introduction, osmosis, Pressure driven membrane processes, concentration driven membranane electrically driven processes, membrane reactors.

Polarization Phenomenon and Fouling: introduction, concentration polarization, turbulence promoters, pressure drop, gel layer model, osmotic pressure model, boundary layer resistance model, concentration polarization in diffusive membrane separations and electro dialysis, membrane fouling, methods to reduce fouling, compaction.

UNIT - V

Module and Process Design: Introduction, plate and frame model, spiral wound module, tubular module, capillary module, hollow fiber model, comparison of module configurations.

Text Book:

1. M.H.V. Mulder, “Membrane Separations”, Kluwer Publications.

PH020 - MODELING AND SIMULATION OF CHEMICAL PROCESS

UNIT - I

Mathematical Models for Chemical Engineering Systems: Principles of Modeling, fundamentals, introduction to fundamental laws: Total Continuity Equation, Equation of Energy, Equation of Motion, Transport laws.

Examples of mathematical models of chemical engineering systems: Constant hold up CSTRs, Variable Hold up CSTRs, Gas pressurized CSTR, non-isothermal CSTR, Two heated Tanks.

UNIT - II

Examples of Mathematical Models of Chemical Engineering Systems: Single component vaporizer, Batch reactor, reactor with mass transfer, ideal binary distillation column, batch distillation with hold up. **Classification of mathematical modeling**: static and dynamic models, the complete mathematical model, Boundary conditions, the black box principle.

Artificial Neural Networks: Network training, Models of training, Network architecture, Back-propagation algorithm, ANN applications.

UNIT - III

Computer Simulation: Simulation examples of Three CSTRs in series, Gravity Flow tank, Binary distillation column, Non-isothermal CSTR. **Models in Reaction Engineering:** Chemical reaction with diffusion in a tubular reactor, chemical reaction with heat transfer in a packed bed reactor, gas absorption accompanied by chemical reaction.

UNIT - IV

Models in Heat Transfer Operations: Steady state heat conduction through a hollow cylindrical pipe, Unsteady state steam heating of a liquid, heat transfer in a thermometer system, Unsteady state heat transfer by conduction.

UNIT - V

Modular Approaches and Equation Solving Approach: Modular approaches to process simulation. Analysis versus design mode.

The Equation Solving Apporach: Procedence - Ordering of equations sets, Disjointing, Tearing of system of equations.The SWS algorithm, maintaining sparsity.

Text Books:

1. Luyben, William, "Process Modelling, Simulation and Control for Chemical Engineers", McGraw Hill, New York,1990.

2. B.V.Babu, "Process Plant Simulation", Oxford University.

Reference Books :

1. Crowe, C.M., Hamielec, A.E., Hoffman, T.W., Johnson, A.I. Woods, D.R.and Shannon, P.T., "Chemical Plant Simulation", Prentice Hall, inc., Englewood Cliff, New Jersey, 1971.
2. Westerberg, A.W., Hutchison, H.P., Motard, R.L. and Winter, "Process Flow Sheeting", Cambridge University Press, Cambridge, 1979.
3. Hussain, Asghar, "Chemical Process Simulation", Wiley Eastern Limited, NewDelhi, 1986.

PH021 - OPTIMIZATION TECHNIQUES

UNIT - I

Introduction to Process Optimization: formulation of various process optimization problems and their classification.

Basic Concepts of Optimization: convex and concave functions, necessary and sufficient conditions for stationary points.

UNIT - II

Optimization of Unconstrained Functions: one-dimensional search: Numerical methods for optimizing a function of one variable, scanning and bracketing procedures, Newton's, Quasi-Newton's and Secant methods of uni-dimensional search, region elimination methods, polynomial approximation methods.

UNIT - III

Unconstrained Multivariable Optimization: Direct methods, random search, grid search, uni-variate search, simplex method, conjugate search directions, Powell's method, indirect methods- first order, gradient method, conjugate method, indirect method-second order: Newton's method.

UNIT - IV

Constrained Optimization Algorithms: Kuhn-Tucker conditions, Transformation methods: Penalty function method, method of multipliers, Sensitivity analysis, Liberalized search techniques: Frank-Wolfe method, Cutting plane method.

UNIT - V

Specialized Algorithms: Integer Programming: Penalty function method, Branch and bound method. **Nontraditional Optimization Algorithms**: Genetic Algorithms: Working principles, differences between GAs and traditional methods, similarities between GAs and traditional methods, GAs for constrained optimization, other GA operators, Real-coded GAs, Advanced GAs.

Text Books:

1. T.F.Edgar and D.M.Himmelblau, "Optimization of Chemical Processes", Mc Graw Hill, International Editions, Chemical Engineering Series, 1989.
2. Kalyanmoy Deb, "Optimization for Engineering Design", Prentice Hall of India.

Reference Books :

1. G. S. Beveridge and R. S. Schechter, "Optimization Theory and

Practice", Mc Graw Hill, New York, 1970.
2. Rekllitis, G.V., Ravindran, A., and Ragdell, K. M., "Engineering Optimization Methods and Applications", John Wiley, New York, 1983.
3. S.S Rao, "Optimization Theory and Applications".

PH022 - PARTICULATE TECHNOLOGY

UNIT- I

Introduction: Processes involving contact between solid particles and a Fluid, Packed Beds, Fluidized Beds advantages and disadvantages of fluidized beds for industrial applications. Fundamental fluidized bed behaviour, Fast fluidization circulating fluidized beds.

Particles and Fluidization: Physical properties of solid particles, size, sharp, size range, surface area of particles in a bed, Bed voidage, classification of particles according to fluidization characteristics, pressure drop across packed beds, minimum fluidization velocity and its determination.

UNIT -II

Two – Phase Theory of Fluidization: Bubbles and Fluidization Regimes, Bubble rise velocity, Bed expansion, Bubble growth and slugging, Mixing, Elutriation and Transport of solids, General mechanism of mixing of particles, mixing and segregation of particles, Terminal velocity of particles, Elutriation, transport disengaging height, solids transport. Davidson's Medal, Diffusion model, Bubbling bed model, ideal mixing stage model, two resign models.

UNIT- III

Fluidized Bed Heat Transfer : Heat Transfer in Beds of Particles, Gas

– to – particle heat transfer, Bed – to surface heat transfer, particle convection component, interphase gas connective component, Radioactive component, Estimation of Bed – to surface Heat Transfer coefficient, Heat Transfer between the Bed-Distributor, side walls, immersed tubes or components, Heat Transfer to surfaces located above the Bed, Free surface, Design for physical operation, Batch and continuous operation for Mass & Heat Transfer and Drying of solids.

UNIT- IV

Design of Simple Fluidized Beds: Introduction, Estimation of Bed Dimensions and Fluidizing velocity, Transport disengaging Height, Distributors, Heat removal from fluidized beds, staging of the beds counter flow staging, cross flow staging, cooling tubes in the bed, optimum size of a fluidized bed reactor, power consumption.

UNIT -V

Fluidized Bed Combustion: Introduction, combustion systems for solid fuels combustors and the first law of thermodynamics, fluidized Bed combustion of solid fuels, pressurized fluidized bed combustion, size of fluidized bed combustion system. Heat removal requirements, size of inert particles in the bed, velocity of fluidizing gas, turndown efficiency of fluidized bed combustion, Equipment, combustion of fuel particles in a fluidized bed, distinction between boiler and furnaces, methods of starting up, circulating or ‘fast’ fluidized bed combustion systems, control of emission.

Text Books:

1. J.R. Howard Adam Hilger, “Fluidized Bed Technology (Principles & Applications)”, IOP, Publishing Ltd., NY,1989.
2. Diazo Kunll & Octave Levenspiel, “Fluidization Engineering”, Wiley – International Edition, John Wiley & Sons, 2002.

PH023 - PETROLEUM REFINERY PROCESSES

UNIT- I

Sources of Petroleum:

Past, present and future of petroleum refining, Characterization of petroleum & Petroleum products, Chemical Composition of Crude Petroleum.
Various processes and techniques involved in thermal cracking, Catalytic cracking, Fluidized catalytic cracking, Steam reforming and partial Oxidation.

UNIT- II
Thermal Cracking:

Mechanism involved during thermal cracking reaction, Fundamentals of initiation, propagation, disproportionation and termination steps during free radical reactions.
Recent trends in the production of LDPE and HDPE, Details of thermal cracking to produce light olefins from various feed stocks.

UNIT- III
Petroleum Feed Stocks:

Effect of various parameters i.e temperature, residence time and C/H ratio on yields of important products from various feed stocks during thermal cracking.

UNIT- IV
Catalytic Cracking:

Coke formation during thermal cracking and catalytic cracking reactions from Various petrochemical feed stocks, Simple models of coke formation during thermal cracking reactions to produce maximum light olefins.

UNIT- V
Petrochemical Industry Scenario:

Various structures of deposited coke during pyrolysis, Various ways to inhibit coke formation.
Global economic scenario, Environmental aspects in general, Present Indian Scenario of Petroleumindustry,

Text Books:

1. Dr B.K. Baskara Rao, “Petroleum Refining”, 3rd ed., Oxford – IBH, 1998.
2. Dr B.K. Baskara Rao, “Petrochemicals”, 2nd ed., Kanna Publishers, 1998.
3. Nelson, W.L. “Petroleum Refinery Engineering”, 1st ed., McGraw Hill, New

York1961.

Reference Books :

1. Hengstebeck R.J., "Petroleum Refining", 1st ed., McGraw Hill, New York1959.
2. Steiner H, "Introduction to Petroleum Chemical Industry", 1st ed., Pergamon, London, 1961.
3. V.Y.Sern, "Gas Phase Oxidation", 2nd ed., Pergamon, London, 1964.
4. A.L. Waddams "Chemicals from Petroleum", 1st ed., Chemical Publishing co, 1969.

PH024 - POLYMER ENGINEERING

UNIT - I

Polymer Fundamentals: Defining polymers, classification of polymers and fundamentals concepts, chemical classification of polymers based on polymerization Mechanisms. Molecular weight distributions, configuration and crystallinity of polymeric materials.

Step Growth Polymerization: introduction, esterification of homologous series and the equal reactivity hypothesis, kinetics of A-R-B polymerization using the equal reactivity hypothesis, average molecular weight in step growth polymerization, molecular weight distribution in step growth polymerization.

UNIT - II

Chain Growth Polymerization: Introduction, Radical Polymerization, Kinetic model of radical polymerization, average molecular weight in radical polymerization, verification of the kinetic model and the gel effect in radical polymerization, temperature effect in radical polymerization.

Ionic and anionic polymerization, Zigler-Natta catalyst in stereo regular polymerization, kinetic mechanism in heterogeneous stereo regular polymerization, stereo regulation by Zigler – Natta catalyst, rates of Ziegler – Natta polymerization. Diffusional effect in Ziegular- Natta polymerization

UNIT - III

Emulsion polymerization, Introduction, aqueous emulsifier solutions, Smith and Ewart theory for state II of the emulsion polymerization Estimation of the total number of particles, Nt determination of molecular weight in emulsion polymerization, emulsion polymerization in homogeneous continuous flow stirred tank reactors (HCSTRs), time dependent emulsion polymerization.

UNIT - IV

Measurement of molecular Weight and its distribution: Introduction, End group analysis colligative properties, light scattering Ultracentrifugation, Intrinsic viscosity, gel permeation chromatography.

Thermodynamics of polymer mixtures: Introduction, criteria for polymer solubility, the Flora- Huggins theory, free volume theory, the solubility parameter, Polymer blends.

UNIT - V

Theory of Rubber Elasticity: Introduction, probability distribution for the freely jointed chain, elastic force between chain ends, stress- strain behavior, the stress tensor (matrix) measurement of finite strain, the stress constitution equation, vulcanization of rubber and swelling equilibrium.

Text Book:

1. Anil Kumar, Rakesh K. Gupta, “Fundamentals of Polymers”, McGraw Hill International Edition, 1998.

PH025 - REACTION ENGINEERING & REACTOR DESIGN

UNIT - I

Non-Ideal Flow: Two- parameter models- Modeling real reactors with combination of ideal reactors, testing a model and determining its parameters.
Mixing of Fluids: Zero parameter models, segregation model, and maximum mixedness.

UNIT – II
Fluid-Particle Reactions: Application to design of various types of contacting in gas- solid operations, Development of performance equation for frequently met contacting pattern assuming uniform gas composition, application to a fluidized bed with entrainment of solid fines.

UNIT - III
Fluid-Fluid Reactions: Applications to design- Towers for fast reaction; Towers for slow reaction, Mixer- settlers (Mixed flow of both phases), semi-batch contacting patterns, Reactive distillation and extractive reactions.

UNIT - IV
External Diffusion Effects on Heterogeneous Reactions: External resistance to mass transfer.

Diffusion and reaction in porous catalysts- Diffusion and reaction in spherical / cylindrical Catalyst pellets, Internal effectiveness factor, Falsified kinetics, Overall effectiveness factor, Estimation of diffusion and reaction limited regines.
Catalysis and Catalytic Reactors: Design of reactors for gas- solid reactions. Heterogeneous data analysis for reactor design, moving bed reactors, fluidized bed reactors.

UNIT - V
Non- Isothermal Reactor Design: energy balance, non- isothermal continuous Flow, reactors at steady state, equilibrium conversion; multiple steady states-heat removed term, heat of generation, ignition- extinction curve.

Text Books:

1. Fogler, H.S., “Elements of Chemical Reaction Engineering”, Prentice

Hall, New Jersey,1986.

2. Octave Levenspiel, “Chemical Reaction Engineering”, Wiley Eastern university, 3rd ed., New Delhi, 2001.

MATHEMATICS
PH073 – MULTI VARIATE STATISTICS

UNIT-I

ReviewsofMultivariateDistributions,MultipleandPartialCorrelation and Regression,

Multivariate Normal Distribution, Marginaland ConditionalDistributions-Maximum likelihood Estimators ofsampleMean and dispersion Matrix.

UNIT-II

DistributionofmeanvectorandSampleDispersion Matrix- James-SteinEstimator for the

MeanVector,Wishart Distribution and its Properties (withoutderivation)-Distribution of Total, Partial and Multiple correlationundernullcase–Maximumlikelihoodestimatorsof total, partial and multiple correlation– Test basedon total, partial and multiple correlations.

UNIT-III

Tests basedon Mean Vectors for oneandtwo Multivariate NormalDistributions- Hotelling'sT2 andMahalanobisD2 teststatisticswiththeirnullandnon-nulldistributions- Related ConfidenceRegions-TestingandIllustration usinglikelihood Ratio Criterion.

UNIT-IV

Principal Component Analysis, Factor Analysis Underlying Models and Illustrations-

Identification Problem, Estimation -Maximum likelihood Method Centroid Method, Canonical Correlation–Extraction -Properties.

UNIT-V

Classification Analysis using Discriminant functions- Clustering techniques-

Hierarchical Clustering-Agglomerative techniques, Single Linkage Method, Complete average linkagemethod–Non-hierarchicalmethod–K-Meanconceptofmultidimensional scaling and correspondence analysis.

Books forStudy:

1. Anderson, T.W.(1980):An Introduction Multivariate Statistical Analysis,

Second Edition, WileyEastern.

2. Applied Multivariate Statistical, 5thEdition, Richard A.JohnsonDean.W.Wichern.

3. M.JambuandLebeaux,M.O.(1983):Cluster Analysis andDataAnalysis,North- Holland PublishingCompany.

Books forReference:

1. Kshirsagar, A.M.(1972):MultivariateAnalysis, Marcel Decker.

2. Morrison, D.F.(1976): MultivariateStatistical Methods, Second Edition, McGrawHill.

3. Afifi,A.A.andAzen,S.P.(1979):StatisticalAnalysis- A Computer Oriented Approach, Academic Press.

4. N.Giri, Multivariate StatisticalInference, Academic Press.

5. Reucher, MultivariateAnalysis, AcademicPress.

PH263 - STATISTICAL METHODS

UNIT I ESTIMATION THEORY

Estimators :Unbiasedness, Consistency, Efficiency and sufficiency – Maximum likelihood estimation – Method of moments.

UNIT II TESTING OF HYPOTHESIS

Sampling distributions - Small and large samples -Tests based on Normal, t, Chi square, and F distributions for testing of means, variance and proportions – Analysis of r x c tables – Goodness of fit.

UNIT III CORRELATION AND REGRESSION

Multiple and partial correlation – Method of least squares – Plane of regression – Properties of residuals – Coefficient of multiple correlation – Coefficient of partial correlation – Multiple correlation with total and partial correlations – Regression and partial correlations in terms of lower order co - efficient.

UNIT IV DESIGN OF EXPERIMENTS

Analysis of variance – One way and two-way classifications – Completely randomized design – Randomized block design – Latin square design - 2 2 Factorial design.

UNIT V MULTIVARIATE ANALYSIS

Random vectors and matrices – Mean vectors and covariance matrices – Multivariate normal density and its properties – Principal components : Population principal components – Principal components from standardized variables.

REFERENCES:

1. Gupta. S.C., and Kapoor, V.K., "Fundamentals of Mathematical Statistics", Sultan Chand and Sons, Eleventh Edition, 2002
2.J.E. Freund, Mathematical Statistical", 5th Edition, Prentice Hall of India, 2001.
3. Jay L. Devore, "Probability and statistics for Engineering and the Sciences", 5th Edition, Thomson and Duxbury, Singapore, 2002
4. Murray. R. Spiegeland Larry J. Stephens, "Schaum's Outlines- Statistics", Third Edition, Tata McGraw-Hill, 2000
5. R.A. Johnson and C.B. Gupta, "Miller & Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 7th Edition, 2007
6. Richard A. Johnson and Dean W. Wichern, "Applied Multivariate Statistical Analysis",

Pearson Education, Asia, 6th Edition, 2007.

PHYSICS

PH040 - VACUUM & THIN FILM TECHNOLOGY

Unit – I Production of vacuum:

Vacuum pumps: Principles of pumping , Mechanical oil sealed rotary pumps, Roots pump, Diffusion pump, Cryogenic pumps, ion pumps.

Unit – II Measurement of Low Pressure:

Manometer, Mac Leod gauge, radiometer gauge, Thermal conductivity gauges - Pirani gauge, Thermocouple gauge, Semiconductor gauge, Ionization gauges - Hot-Cathode ionization gauge , Cold – cathode ionization gauge (Penning gauge).

Unit- III Nucleation and Film growth:

Thermodynamics of nucleation, nucleation theories: Capillarity model, Atomistic or statistical model, Comparison of two models of Nucleation, Film growth

***Thickness measurement*:** Microbalance technique, crystal oscillator technique, Optical methods - Photometric method, Ellipsometry and Interferometry

Unit – IV Thin film deposition methods:

Introduction to thin film – Basic principle-

Physical methods: Ball milling, Thermal evaporation, Flash evaporation, Activated Reactive Evaporation (ARE), Electron beam (EB) evaporation, DC Magnetron sputtering, RF Magnetron sputtering, Pulsed laser deposition, Molecular Beam Epitaxy, Lithography, Electron Beam Lithography, Nanoimprint Lithography, Dip Pen Nanolithography.

Chemical methods: Chemical vapour deposition, Vapour Phase Epitaxy, spray pyrolysis, Spin coating, Sol-gel process, electrochemical deposition.

Unit – V Applications of thin film technology:

Thin film resistors, Thin film capacitors, Thin film solar cells, Gas sensors, Thin film solid state micro batteries, Micro and opto electronic devices, Chromogenic devices.

Text Books:

1. Vacuum Technology by Roth,(North-Holland publishing company,USA)
2. Vacuum Technology by Wadd and Bunn,
3. Thin Film Phenomena, K. L. Chopra(1969,McGraw-Hill,New York)
4. Thin Film Fundamentals by Goswami (2007,New Age International (P) Ltd.,New Delhi)
5. Hand book of thin Film by L. I. Maissel & R. Glang (1970, McGraw-Hill, New York)
6. Preparation of Thin Film by Joy George, (Marcel Dekker, Inc., New York)

References:

1. The Materials Science and Thin Films by Milton Ohring, Academic Press

1992.
2. Thin Film Deposition: Principles and Practice by Donald L. Smith, McGraw Hill 1995.
3. Ludminla Eckertova, ‘Physics of thin films’, Plenum press, New York 1977.

PH074 - CONDENSED MATTER PHYSICS AND CHARACTERIZATION TECHNIQUES

Unit: I Solids and Crystal Structure:

Formation of solids- Interatomic forces, Types of Bonding, Crystal lattice and Unit cell, Planes and Miller Indices, Crystal System and Symmetry, Inter-planar Spacing, Polymorphism, Single crystal and Poly crystalline material, Amorphous and Liquid state, Liquid Crystal-Solid state imperfections.

Unit – II Band theory of Solids

Remarks in free electron theory, The Bloch Theorem, The Kronig-Penney model, The motion of electrons in one dimension according to the Band theory, The distinction between metals, insulators and intrinsic semiconductors, Brillouin Zones: density of states and overlapping of energy bands.

Unit - III Spectroscopy:

Properties of Light, Optical Constants – Methods for determining optical constants: reflection & transmission methods, UV-Visible Spectrophotometry, FTIR, RAMAN (Quantitative Analysis).

Unit – IV Crystal Growth and Structural Analysis*:*

Methods of crystal growth- Hydrothermal growth, Gel growth, Growth from melt , Electrocrystallisation, Growth from vapour, Low temperature solution growth.

Bragg's law, Bragg's Spectrometer, X-ray diffraction, Laue method, Powder Crystal method, Rotating Crystal method, GIXRD.

Unit – V Texture and Morphological Studies:

Atomic Force Microscopy (AFM), Scanning Electron Microscopy (SEM), Transmission Electron Microscopy (TEM), Scanning Tunneling Electron Microscopy (STM), Energy Dispersive X-ray analysis (EDXA), X-ray Photo Electron Spectroscopy (XPS), Field Emission Scanning Electron Microscopy (FESEM), High Resolution Transmission Electron Microscopy (HRTEM).

Text books:

1. Solid state Physics by A.J.Dekkar, MacMillon Co LTD
2.Introduction to Solid state Physics by Charles Kittel, 8th edition, WSE series
3. Nano Science and Nano Technology by M.S. Ramachandra Rao and Shubra Singh, Wiley pub, 2013
4. Instrumental methods and analysis-Willards Merrit et.al (CBS)2011
5. Introduction to crystal growth methods by M.L. Caroline, 2010
6.Solid State Physics by S.O. Pillai, 7 th edition 2012
7. Elementary solid state Physics by M.AliOmer, Lpe pearson

Reference books:

1. Nano technology by M.A.Shah and K.A.Shah, Wiley Pub 2013

2. Modern optical spectroscopy by William W. Parson, Springer

3. Enclopedia of characterization-C.Richard Brundle et.al(2006)

4. Solid State Chemistry and its applications, Anthony R.West,2 nd edition

Bachelor of Computer Applications (BCA) (2015-18)

Course Structure

I Semester

S.No	Name of the subject	L	P	To	C	Internal	External	Total
1	BC101- Digital Computer Fundamentals	4		4	4	40	60	100
2	BC103- Computer Programming	4		4	4	40	60	100
3	BC105- Principles and practice of Management	4		4	4	40	60	100
4	BC107- Mathematics - I	4		4	4	40	60	100
5	BC109- Technical communication Skills Lab		3	3	2	50	50	100
6	BC111- Office Automation Lab - I		3	3	2	50	50	100
7	BC113- Computer Programming Lab		3	3	2	50	50	100
		16	9	25	22	310	390	700

II Semester

S.No	Name of the subject	L	P		To	C	Internal	External	Total
1	BC102- Data Structures	4			4	4	40	60	100
2.	BC104- Internet and Web Technologies	4			4	4	40	60	100
3	BC106- Accounting and Financial Management	4			4	4	40	60	100
4	BC108- Mathematics – II	4			4	4	40	60	100
5	BC110- Soft Skills Lab		3		3	2	50	50	100
6	BC112- Data Structures Lab		3		3	2	50	50	100
7	BC114- Internet and Web Technologies Lab		3		3	2	50	50	100
		16	9		25	22	310	390	700

III Semester

S.No	Name of the subject	L	P	To	C	Internal	External	Total
1	BC201- Object Oriented	4		4	4	40	60	100

	Programming with Java							
2	**BC203**- Database Management Systems	4		4	4	40	60	100
3	**BC205**- Software Engineering	4		4	4	40	60	100
4	**BC207**- Organization Behavior	4		4	4	40	60	100
5	**BC209**- Statistical Techniques Lab		3	3	2	50	50	100
6	**BC211**- Object Oriented Programming through Java lab		3	3	2	50	50	100
7	**BC213**- Database Management Systems Lab		3	3	2	50	50	100
		16	9	25	22	310	390	700

IV Semester

S.No	Name of the subject	L	P	To	C	Internal	External	Total
1	**BC202**- Multimedia Systems	4		4	4	40	60	100
2	**BC204**- Computer Networks	4		4	4	40	60	100
3	**BC206**- Operating Systems	4		4	4	40	60	100
4	**BC208**- E- Commerce	4		4	4	40	60	100
5	**BC210**- Multimedia Systems Lab		3	3	2	50	50	100
6	**BC212**- Computer Networks Lab		3	3	2	50	50	100
7	**BC214**- Linux basics and shell programming lab		3	3	2	50	50	100
		16	9	25	22	310	390	700

V Semester

S.No	Name of the subject	L	P	To	C	Internal	External	Total
1	**BC301**- Open source Systems	4		4	4	40	60	100

2	**BC303**- Data warehousing and Mining	4		4	4	40	60	100
3	**BC305**- Software Testing Methodologies	4		4	4	40	60	100
4	**BC307**- Embedded Systems	4		4	4	40	60	100
5	**BC309**- Open source systems Lab		3	3	2	50	50	100
6	**BC311**- Data warehousing & Mining Lab		3	3	2	50	50	100
7	**BC313**- Professional Communications Lab		3	3	2	50	50	100
		16	9	25	22	310	390	700

VI Semester

S.No	Name of the subject	L	P	To	C	Internal	External	Total
1	**BC302**- Information Security	4		4	4	40	60	100
2	**BC304**- Big data Analytics	4		4	4	40	60	100
3	**BC306**- Seminar	2		2	1	50	50	100
4	**BC308**- Project				15	40	60	100

BC101-DIGITAL COMPUTER FUNDAMENTALS

Course Description and Objective: The student should learn the Fundamental components used in a Digital Computer which is essential for the programme.

Course Outcomes: After Completion of the subject student should able to

- Identify the logic gates and their functionality

- Perform Number Conversions from one System to another System
- Design basic electronic Circuits(combinational circuits)
- Understand the Construction of Memory

Unit 1- Introduction to Number System and Codes

Decimal Numbers, Binary Numbers, Decimal to binary Conversions, Binary Arithmetic, 1's and 2's complements of Binary Numbers, Signed Numbers, Arithmetic Operations with Signed numbers, Hexadecimal Numbers, Octal Numbers, Digital Codes, Error Detection Codes.

Unit 2- Logic gates

The Inverter, The AND gate, The OR gate, The NAND gate, NOR gate, The Exclusive – OR gate and Exclusive NOR gate. Boolean Algebra and Logic Simplification: Boolean Operations and Expressions, Laws and Rules, DeMorgan's Theorems, Boolean Expressions and Truth tables, The karnaugh Map, SOP minimizations.

Unit 3- Combinational Logic Analysis

Basic combinational Logic Circuits, Implementing Combinational Logic, The Universal Property of NAND and NOR Gates. Functions of Combinational Logic: Basic Adder, Parallel Binary Adders, Comparators, Decoders, Encoders, Code Converters, Multiplexers, Parity Generator/Checkers.

Unit 4- Latches and Flip-flops

Latches, Edge Triggered Flip-Flops, Flip-Flop Operating characteristics, Flip-Flop Applications. Counters: Asynchronous Counters, Synchronous counters.

Unit 5- Memory and Storage

Memory Basics, The RAM, The ROM, Programmable ROMs, The Flash Memory, Memory Expansion, Special Types of Memories, Magnetic and Optical Storage.

TEXT BOOK(s): 1. Floyd, Thomas L: "Digital Computer Fundamentals", 10th Edition, 1997. University Book Stall.

REFERENCE BOOK(S):

1. Malvino, Paul Albert and Leach, Donald P: "Digital Principles and Applications" 4th Edition, 2000. TMH.
2. Malvino, Paul Albert and Leach, Donald P: "Digital Computer Fundamentals" 3rd Edition, 1995. TMH. 3. Bartee, Thomas C: "Digital Computer Fundamentals" 6th Edition, 1995. TMH.

BC103- COMPUTER PROGRAMMING

Course Description and Objective:

The purpose of this course is introduce to students to the field of programming using C language. The students will be able to enhance their analyzing and problem solving skills and use the same for writing programs in C.

Course Outcomes: After Completion of the course student should able to

- Know the basics of computer science
- Know concepts in problem solving
- To do programming in C language

UNIT – 1 Computer and Data

Introduction - Computer Hardware, Data, Computer Software, History, Classification of computers- Workstations, Mainframe, Super computers, client and server, Data Inside the computer, Representing Data.

Algorithm - Concept, Algorithm representation, Sub algorithms. Evolution of Programming languages, Building a program, Program execution, categories of languages. CPU, Main memory, Input or Output, Interconnection of subsystems Operating systems- Definition, Evolution, Components.

UNIT –2 Introduction to C

Desirable Program Characteristics. Data types, Constants, Variables and Arrays, Declarations, Expressions Statements, Symbolic Constants, Operators and Expressions, Data Input and Output. Preparing and Running A Complete C Program.

Control Statements: Preliminaries, Branching, looping, The Switch Statement, The break Statement, The continue Statement, The comma Statement, The go to Statement.

UNIT –3 Functions

A Brief Overview, Defining a Function, Accessing a Function, Function Prototypes, Passing Arguments to a Function, Recursion.

Program Structure: Storage Classes, Automatic Variables, External (Global) Variables, Static Variables.

Arrays: Defining an Array, Processing an Array, Passing Arrays to Functions, Multidimensional Arrays, Arrays and Strings.

UNIT - 4Structures and Unions:

Defining a Structure, Processing a Structure, User-defined Data Types (Typedef), Structure and Pointers, Passing Structures to Functions, Self-referential Structures, Unions.

Pointers: Fundamentals, Pointer Declarations, Passing Pointers to a Function, Pointers and One-dimensional Arrays, Dynamic Memory Allocation, Operations on Pointers, Pointers and Multidimensional Arrays, Arrays of Pointers, Passing Functions to Other Functions

UNIT - 5Data Files:

Why Files, Opening and Closing a Data File, Reading and Writing a Data File, Processing a Data File, Unformatted Data Files, Concept of Binary Files

TEXT BOOK(S):

1. Foundations of computer science, Behrouz A. Forouzan, 2nd edition.
2. Introduction to computers, 6/e, Peter Norton TMH.
3. Byron S Gottfriend, “Programming with C”, Second Edition, Schaum Out Lines, TATA Mc Graw Hill (2007)

REFERENCE BOOK(S):

1. Sinha P., “Foundation of Computing”, BPB Publication, 1st Edition, 2003
2. Rajaraman V, "Fundamental of Computers" (2nd edition), Prentice Hall of India, New Delhi. 1996.

3. Behrouy A. Foreuzan& Richard F. Gilberg, “Computer Science A structured programming Approach using C”, Third Edition, Cengage Learning (2008).
4. Herbert Schildt, “The Complete Reference C”, Fourth Edition, TMH (2008)

BC105- PRINCIPLES AND PRACTICE OF MANAGEMENT

Course Description and Objective*:*

Objective of the course is to provide basic perspectives of Management theories and practices. This will form foundation for further study of functional areas of management and give a conceptual framework for understanding.

Course Outcomes: After Completion of the course student should able to

- Know the basics concepts of management
- Know about various theories of Management
- Know about various functions of Management

UNIT -1 Introduction to Management

Concept of management – evaluation of management - nature ofmanagement – scope of management – functions of management – theories of management – scientific management theory – Henry fayol's theory – classification theory – human relations theory – behavioral theory – management Vs administration – universality of management

UNIT-2 Planning

Importance – advantages – disadvantages – types of plans – process of planning – steps involved in planning- Decision – Decision Making – Process and Techniques

UNIT-3 Organizing:

Principles of organization – types of organization structures, merits, demerits and suitability – Departmentation, Delegation and decentralization

UNIT-4 Directing:

Meaning and Nature of Directing - types of leaders – leadership qualities – leadership theories – motivation theories, Maslow's need hierarchy theory – Herzberg's two factor theory – theory X and theory Y – equity theory – expectations theory – communications – importance – formal and informal communication.

UNIT-5 Controlling:

Importance of controlling – need for controlling – steps involved in controlling – process of controlling – techniques in controlling.

Text Book(s):

1. Weirich& Koontz, "Essential of Management", TMH.
2. Massie, "Essentials of Management",

Reference Book(s):

1. Jonus A. F. Stoner, "Management", Thomson.
2. Heinz Weihrich, Harold Koontz, "Management A Global Perspective", TMH, 10/e, 2002.
3. Stephen P. Robbins Mary Coulter, "Management", PHI, 8/e, 2006

BC107- MATHEMATICS – I

Course Description and Objective*:*

Objective of the course is to provide basic knowledge in mathematics which is used in several branches of science and engineering. This will form foundation for further study of computer science.

Course Outcomes: After completion of the course student should able to

- Know the basics of matrices and its applications, solving system of equations
- Know about differential equations and its applications
- Know about number theory used in computer science applications

Unit -1 Matrices

Matrix, Types of matrices, Algebraic operations on matrics, Determinants, Elementary row (column) operations, Rank of a Matrix by reducing it to echelon from, Rank of a matrix by normal form, Finding the inverse of a matrix.

Unit -2Matrices – 2

Homogeneous and non-Homogeneous system of equations, Consistency criterion, Characteristic equations, Eigen values, Eigen vectors and properties, Cayley Hamilton theorem (Statement only)

Unit-3 Differential Equations – 1

Definition and examples, Order and Degree, Solutions of first order first degree differential equations, Variable separable, Equations reducible to variable separable, Homogeneous equations, non homogeneous equations

Unit -4 Differential Equations – 2

Exact differential equations, non exact equations, linear differential equations – Bernoulli's differential equations

Unit 5 Number Theory

Divisibility, Division Algorithm, Greatest Common Divisor, Euclid's algorithm to find the G.C.D. of two non-zero integers, Prime and Composite numbers, Unique Factorization theorem, Division of a given number, Euler's Ø Function

Text Books:

1. Vasishta A R : "Matrices", Krishna PrakashanMandir
2. Frank Ayres J R : "Matrices",Schaum series, TMH.

Reference Books

1. Frank Ayres J R : "Differential Equations", Schaum series, TMH.
2. S. Narayana & T. K ManicavachogamPillay : " Differential Equations" , SV Publishers
3. Remedial Mathematics, P. Seshagiri Rao
4. Apostol T M : "Introduction to Analytic Number Theory", Narosa Publishing House
5. Herstein I N : "Modern Algebra".

BC109- TECHNICAL COMMUNICATION SKILLS LAB (BUSINESS ENGLISH COMMUNICATION)

Course Description and Objective:

To introduce students to the specific use of language for the purposes of Business Communication which would be an essential prerequisite for success in the areas of writing and speech. The teaching efforts in this course will be directed towards making students develop their business and general writing abilities using the fundamental principles that apply to the correct use of the English language free of grammatical and other related errors

Course Outcomes:

By observing the rules of grammar, vocabulary and composition that are learnt during the course, students are made

- to appreciate the intelligent and innovative use of rules
- able to generate creative output in tune with the demands of industry and the corporate world
- The course improves their power of comprehension and the ability to express themselves with rigor through writing and speech.

UNIT-1:

Text : GLOBAL ISSUES

(Child Labour – Food Crisis – Genetic Modification – E-waste – Assistive Technology)

Grammar : Articles – Prepositions-

Vocabulary : Root–Prefixes-Suffixes - Synonyms – Antonyms

Composition : Paragraph Writing (Descriptive & Narrative) , Letter Writing (Formal - Application - Business)

UNIT-2:

Text : MEDIA MATTERS

(History of Media – Language and Media – Milestones in Media – Manipulation by Media – Entertainment Media - Interviews)

Grammar : Time and Tense (Present-Past-Future; Helping Verbs; Modals)

Vocabulary : Use of Adjectives

Composition : E-mail - Report-Writing – Writing Advertisements

UNIT-3:

Text : LESSONS FROM THE PAST

(Importance of History – Differing perspectives – Modern Corporatism – Lessons from the Past)

Grammar : Subject-Verb Agreement - If Conditional

Vocabulary : Idioms & Phrases – One-word Substitutes

Composition : Summarizing and Note-making

UNIT-4:

Text : TRAVEL AND TOURSIM

(Advantages and disadvantages of Travel – Tourism – Atithidevobhava – Tourism in India)

Grammar : Sentence Transformation (Degrees, Voice, Speech & Synthesis)

Vocabulary : Phrasal Verbs

Composition : Letter Writing (Formal - Application - Business)

Practice : Situational Conversations – Role-Plays

(Introducing; Greeting; Enquiring; Informing; Requesting; Inviting -Emotions; Directions; Descriptions; Agreements; Refusals; Suggestions)

UNIT-5:

Text : GETTING JOB-READY

(SWOT-Analysis – Companies and Ways of Powering Growth – Preparing for Interviews)

Grammar : Common Errors

Vocabulary : Connectives – Discourse Markers

Composition : Profile - Curriculum Vitae – Problem Solving (Case Studies)

Practice : Group Discussions

Textbook(s):

1. Mindscapes - Orient Black Swan, 2012.

Reference Book(s):

1. V. R. Narayana Swamy, "Strengthen Your Writing", 1st edition, Orient Longman, 2003.
2. Thomas Elliott Berry, "The Most Common Mistakes in English Usage", 1st edition, Tata McGraw Hill, 2004.
3. T. Balasubramanyam, A Textbook of English Phonetics for Indian Students, Macmillan Ltd., 2000.
4. Sasikumar.V and P.V. Dhamija,. Spoken English: A Self-Learning Guide to Conversation Practice, 34th Reprint, Tata McGraw Hill, New Delhi, 1993.
5. Margaret M Maison, "Examine your English", 1st edition, Orient Longman, 1999.
6. Meenakshi Raman and Prakash Singh, "Business Communication", 2nd edition, Oxford University Press, 2012

BC111- OFFICE AUTOMATION LAB

Course Description and Objective*:*

0ffice tools course would enable the students in crafting professional word documents, excel spread sheets, power point presentations using the Microsoft suite of office tools.To familiarize the students in preparation of documents and presentations with office automation tools.

Course Outcomes:

By learning the course, the students will be able

- to perform documentation
- to perform accounting operations
- to perform presentation skills

Word

Word Orientation : The instructor needs to give an overview of Microsoft word & Importance of MS Word as word Processor, Details of the four tasks and features that would be covered Using word – Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter.

Task 1 : Using word to create project certificate. Features to be covered:-Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in Word.

Task 2 : Creating project abstract Features to be covered:-Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check , Track Changes.

Task 3 : Creating a Newsletter : Features to be covered:- Table of Content, Newspaper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes and Paragraphs

Task 4 : Creating a Feedback form - Features to be covered- Forms, Text Fields, Inserting objects, Mail Merge in Word.

Excel

Excel Orientation :The instructor needs to tell the importance of MS Excel as a Spreadsheet tool, give the details of the four tasks and features that would be covered Excel – Accessing, overview of toolbars, saving excel files, Using help and resources

{Comdex Information Technology course tool kit Vikas }

Task1: Creating a Scheduler - Features to be covered: Gridlines, Format Cells, Summation, auto fill, Formatting Text

Task 2 : Calculations - Features to be covered:- Cell Referencing, Formulae in excel – average, std.deviation, Charts, Renaming and Inserting worksheets, Hyper linking, Count function, LOOKUP/VLOOKUP

Task 3 : Performance Analysis - Features to be covered:- Split cells, freeze panes, group and outline, Sorting, Boolean and logical operators, Conditional formatting

Task 4 : Cricket Score Card - Features to be covered:-Pivot Tables, Interactive Buttons, Importing Data, Data Protection, Data Validation

MS Power Point

Task1 : Students will be working on basic power point utilities and tools which help them create basic power point presentation. Topic covered includes :- PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows

Task 2 : This session helps students in making their presentations interactive. Topics covered includes : Hyperlinks, Inserting –Images, Clip Art, Audio, Video, Objects, Tables and Charts

Task 3 : Concentrating on the in and out of Microsoft power point. Helps them learn best practices in designing and preparing power point presentation. Topics covered includes :- Master Layouts (slide, template, and notes), Types of views (basic, presentation, slide slotter, notes etc), Inserting – Background, textures, Design Templates, Hidden slides.Auto content wizard, Slide Transition, Custom Animation, Auto Rehearsing

Task 4 : Power point test would be conducted. Students will be given model power point presentation which needs to be replicated (exactly how it's asked).

Text Book(s) :

1. Comdex Information Technology course tool kit Vikas Gupta, WILEY Dreamtech
2. The Complete Computer upgrade and repair book,3rd edition Cheryl A Schmidt, WILEY Dreamtech
3. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.

4.PC Hardware and A + Handbook – Kate J. Chase PHI

BC113- COMPUTER PROGRAMMING LAB

Course Outcomes:

A comprehensive problem solving skills through C language is offered to enable the students to write diversified solutions using this language.

l.a) Write a C program to find the sum of individual digits of a positive integer.

b) A Fibonacci Sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequence.

c) Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.

2.Write a C program to find whether :

a) The given number is Armstrong or not.
b) The given number is Strong number or not.
c) The given number is Perfect number.

3. a) Write a C program to calculate the following Sum:

Sum=1-x^2/2! +x^4/4!-x^6/6!+x^8/8!-x^{10}/10!

b) Write a C program toe find the roots of a quadratic equation.

4.a) Write C programs that use both recursive and non-recursive functions

i) To find the factorial of a given integer.
ii) To find the GCD (greatest common divisor) of two given integers.
iii) To solve Towers of Hanoi problem.

5.a) The total distance travelled by vehicle in 't' seconds is given by distance = ut+1/2at^2 where 'u' and 'a' are the initial velocity (m/sec.) and acceleration (m/sec^2). Write C program to find the distance travelled at regular intervals of time given the values of 'u' and 'a'. The program should provide the flexibility to the user to select his own time intervals and repeat the calculations for different values of 'u' and 'a'.

b) Write a C program, which takes two integer operands and one operator form the user, performs the operation and then prints the result. (Consider the operators +,-,*, /, % and use Switch Statement)

6.a) Write a C program to find both the larges and smallest number in a list of integers.

b) Write a C program that uses functions to perform the following:

i) Addition of Two Matrices
ii) Multiplication of Two Matrices

7.a) Write a C program that uses functions to perform the following operations:

i) To insert a sub-string in to given main string from a given position.
ii) To delete n Characters from a given position in a given string.

b) Write a C program to determine if the given string is a palindrome or not

8.a) Write a C program that displays the position or index in the string S where the string T begins, or – 1 if S doesn't contain T.

b) Write a C program to count the lines, words and characters in a given text.

9.a) Write a C program to generate Pascal's triangle.

b) Write a C program to construct a pyramid of numbers.

10.Write a C program to read in two numbers, x and n, and then compute the sum of this geometric progression:

$1+x+x^2+x^3+\ldots\ldots\ldots\ldots+x^n$

For example: if n is 3 and x is 5, then the program computes 1+5+25+125.

Print x, n, the sum

Perform error checking. For example, the formula does not make sense for negative exponents – if n is less than 0. Have your program print an error message if n<0, then go back and read in the next pair of numbers of without computing the sum. Are any values of x also illegal ? If so, test for them too.

11.Write a C program that uses functions to perform the following operations:

i) Reading a complex number

ii) Writing a complex number

iii) Addition of two complex numbers

iv) Multiplication of two complex numbers

(Note: represent complex number using a structure.)

12.a) Write a C program which copies one file to another.

b) Write a C program to reverse the first n characters in a file.

(Note: The file name and n are specified on the command line.)

BC102- DATA STRUCTURES

Course Description and Objective:

The main objective of this course is to provide an introduction to basic data structures and manipulation by using C programming language. It enables the students to understand Abstract Data Types. It also enables the students to understand the behavior of data structures (lists, stacks, queues, trees (binary trees and tree traversals, height-balanced trees), graphs, hash tables). It improves his ability to analyze a problem and determine the appropriate data structure for the problem.

Course Outcome:

Having successfully completed this course, the student will be able to:

- Apply C programming techniques such as pointers, dynamic memory allocation, structures to developing solutions for particular problems.
- Design and implement abstract data types such as linked list, stack, queue and tree in C programming language using static or dynamic implementations.
- Evaluate and choose appropriate abstract data types to solve particular problems.

UNIT – 1Concept of Data Structures

Implementation of Data Structures Arrays: One-dimensional array, multidimensional arrays, pointer Arrays, linked lists: Types of linked list, applications of linked lists.

UNIT – 2Stack

Introduction to stack, Representation of a stack, operations on stack, applications of stacks; Queue: Representation of Queues, Operations on Queue, various Queue structures, Applications of Queues.

UNIT-3Trees

Definition and concepts of trees, Representation of Binary tree, types of Binary trees, Tree Traversals operations of Binary search tree, Introduction to AVL trees.

UNIT-4Graph

Terminologies, Representation of Graphs, operations on graphs, Graph traversals, Applications of Graphs, minimum spanning trees.

UNIT-5Sorting Techniques

Insertion sort, selection sort, merge sort, heap sort, searching Techniques : linear search, binary search and hashing.

Text Book(s):

1. DebasisSamanta, “Classic Data Structures”, PHI Learning Private Limited, 2nd edition, 2011.
2. E. Horowiz& S. Sahani, “Fundamentals of Data Structures”, Galgotia Book Source Pvt. Limited, 3rd edition, 2003.

Reference Book(s):

1. Mark Allen Weiss, “Data Structures and Algorithm Analysis in C”, Second Edition, Pearson Education.
2. SartajSahni, Data Structures, Algorithms and Applications in C++ , Universities Press, Second Edition, 2005
3. Jean Paul Tremblay and Paul G. Sorenson, An Introduction to Data Structures with Applications,Tata Mc-Graw Hill, Second Edition, 26th Reprint 2004

BC104-INTERNET AND WEB TECHNOLOGIES

Course Description and Objective*:*

This course is intended to teach the basics involved in publishing content on the World Wide Web. This includes the 'language of the Web' – HTML, the fundamentals of how the Internet and the Web function, a basic understanding of graphic production with a specific stress on creating graphics for the Web, and a general grounding introduction to more advanced topics such as programming and scripting. This will also expose students to the basic tools and applications used in Web publishing.

Course Outcomes:

- Analyze a web page and identify its elements and attributes.
- Create web pages using XHTML and Cascading Style Sheets.
- Build dynamic web pages using JavaScript (Client side programming).
- Create XML documents and Schemas.

UNIT-1 Networking Protocols and OSI Model

Introduction, Protocols in Computer Communications, the OSI Model, OSI Layer Functions.
Internet Working Concepts, Devices, Internet Basics, History and Architecture: Introduction, Why Internet Working?, Problems in Internet Working, Dealing with Incompatibility Issues, A Virtual Network, Internet Working Devices, Repeaters, Bridges, Routers, Gateways, A Brief History of the Internet, Growth of the Internet.

UNIT-2 WWW, HTTP, TELNET

Introduction, Brief History of WWW, the Basics of WWW and Browsing, Hyper Text Markup Language, Common Gateway Interface, Remote Login.

UNIT-3 JavaScript and AJAX

Introduction, JavaScript, Basic Concepts, Controlling JavaScript Execution, Miscellaneous Features, JavaScript and Form Processing, Pop-up Boxes.
AJAX:
Introduction, How AJAX Works? , Life without AJAX, AJAX Coding, Life with AJAX.

UNIT-4 Introduction to XML

What is XML?, XML versus HTML, Electronic Data Interchange, XML Terminology, Introduction to DTD,Document-Type Declaration,Element-Type Declaration,AttributeDeclaration,Limitations of DTDs, Introduction to Schema, Complex Types, Extensible Stylesheet Language Transformations, Basics of Parsing, JAXP

UNIT-5 Creating Good Web Pages

Introduction, Top Level Navigation, Creating Sample Layouts, Metaphor, Theme, and Storyboard, Screen Resolution,3-Column Layout, Using Frameworks, Using Graphics, Usability for the Handheld Devices, Creating Multilingual Web sites, XHTML and Web Browser Compatibility Issues, Designing the Basic Elements of a Home Page.

TEXT BOOKS:

1. AchyutGodbole,AtulKahate"WebTechnologies:TCP/IP,Web/Java Programming, and Cloud Computing”,ThirdEdition,McGraw Hill Education.

Reference Books:

1. Deitel, Deitel, Goldberg, "Internet & World Wide Web How to Program", Third Edition, Pearson Education, 2006.
2. Raj Kamal, “Internet and Web Technologies”, Tata McGraw-Hill.

BC106- ACCOUNTING AND FINANCIAL MANAGEMENT

Course Description and Objective:

This course is intended to provide knowledge on accounting practices to equip students with concepts, process and reporting of financial statements in modern organizations.

Course Outcomes: The student will be able to

- understand the basic concepts of accounting
- analyze and perform Financial Accounting and statements

.

UNIT-2Accounting

Introduction, Double entry system of Accounting and book keeping, Rules of debit & credit and their application, Meaning of terms like debtor, creditor, assets, liabilities, goods, journal, ledger, vouchers, insolvency, invoice/credit verification, etc.,

UNIT-2Accounting Cycle

Systems of Accounting, Process of accounting transactions, Classification of Accounts, Journal-Ledgers, Trial balance.

UNIT-3Final Accounts

Trading - Profit & Loss Account - Balance sheet. – Problems with Simple Adjustments

UNIT-4 Ratio Analysis

Meaning – Advantages and Disadvantages, Types of Ratio's- Liquidity, Solvency, Turnover, Profitability

UNIT-5 Cost Accounting and decision-making

Meaning of key terms, objectives of cost accounting- Elements of cost- Preparation of cost sheet- CVP-Analysis (Break-even point Analysis).

TEXT BOOK(S):

1. R K Sharma and S K Gupta "Accounting Management”,
2. Maheshwari, S.N., &Maheshwari, S.K. (2012). *Advanced Accountancy* (10th edi), New Dehli:Jain Book Agency.

Reference Book(s):

1. Jain S.P., &Narang K L. (nd). *Basic Financial Accounting*, *I*, New Dehli:Kalyani publishers.

2. Shukla, M. (nd). *Advanced Accounts*, New Delhi:S Chand Group

3. Radhaswamy, M & Gupta, R.L. (2008). *Advanced Accountancy. 2*, New Delhi:Sultan Chand & Sons.

BC108- MATHEMATICS – II

Course Description and Objective:

Objective of the course is to provide basic knowledge in mathematics which is used in several branches of science and engineering. This will form foundation for further study of computer science.

Course Outcomes: After completion of the course student should able to

- Know about the derivativesof functions of two and several variables partial differential equations and its applications
- Know about Coordinate geometry which is required for computer graphics etc
- Know about Group theory, Group Homomorphisms and graph theory used in computer science applications

Unit-1 Partial Differentiation

Functions of two variables, Partial derivatives, Second and higher order derivatives, Maxima and minima, Simple applications, Jacobian.

Unit -2 Coordinate Geometry

Coordinate System (2 dimensional), Distance between two points, mid point formula, division in a given ratio, Geometrical representation of rectangle, rhombus, parallelogram, Equation of straight line in different forms, equations of parabola, circle, ellipse.

Unit-3 Theory of Groups

Definition of Group, Semigroup, Subgroup, Results on subgroups, Order of an element, Properties, Cyclic groups and related properties, Coset decomposition, Lagrange's theorem and its consequences.

Unit -4 Group Homomorphism and Rings

Normal subgroups and related results, Quotient group, Group homomorphism, Elementary properties, Kernel of homomorphism, Isomorphism and related results, Rings, Examples, Types of Rings, Fields Examples of Fields.

Unit -5 Introduction to Graph Theory

Graph definition, Types of graphs, Subgraph, Handshake theorem, Path, walk, circuit, cycle, Euler cycle, Hamiltonian path etc., Tree, Spanning tree.

Text Books:

- Vasishta A R : "Modern Algebra", Krishna PrakashanMandir
- T. K Manicavachogam : "Algebra", S V Publishers
- Chandrasekhar, Mathematical Foundation for Computer Science (For Graph Theory)
- Remedial Mathematics, P. Seshagiri Rao

BC110- SOFT SKILLS LAB

Course Description and Objective:

The Soft Skills Laboratory course is aimed at training undergraduate students and enabling them to acquire employability skills. Designed to impart work related skills, the course will help trainees develop interpersonal communication, leadership and team skills. It will give them the required competence and confidence to handle professional tasks.

Course Outcomes:

The Soft Skills course will help students

- develop professional and non-personal ways of approaching people and work through the correct use of language and speech in a workplace environment
- the ability to think critically on issues demanding attention
- enhancing self-awareness and a sense of self-worth in the students in order to improve their productivity and performance at the workplace.

UNIT-1

a) Role of language in Personality – How language reflects, impacts personality – Using gender-neutral language in MNCs – being culturally sensitive.

Activity – Appraising each other – Worksheets related to the above

b) Career Planning- job vs. career- goal setting- SWOT analysis- planning and prioritization - four quadrant time management system - time management – self-management – stress-management.

Activity: Setting a SMART goal - SWOT analysis of the self – Writing a Statement of Purpose (SOP).

c) Effective Resume-Writing: structure and presentation - planning and defining the career objective - projecting one's strengths and skill-sets – summarizing - formats and styles - covering letter.

Activity: Resume preparation –writing a covering letter.

UNIT-2

A) Functional English - Formal/informal context – purpose - interpersonal dynamics - ideation –content organization - initiating a conversation –responding appropriately - right body language.

Activity - Role play in different situations, - self-introduction - social background (family, home town etc.,) - role model - my future - likes/dislikes (movies, persons, places, food, music etc.,) - a mini project on functional English.

b) Vocabulary-Building: Etymology of words - word roots - prefixes & suffixes - synonyms & antonyms- collocations - one-word substitutes – analogies - idioms and phrases - contextual guessing of unfamiliar words – task-oriented learning (100 words).

Activity: Flash cards (200 words) – vocabulary exercises with hand-outs.

UNIT-3

a) Group Discussion: Articulation and flow of oral presentation - dynamics of group discussion – intervention – summarizing - voice modulation – content generation – Key Word Approach (KWA) – Social, Political, Economic, Legal and Technical Approach (SPELT) – View Point of Affected Part (VAP) - language relevance - fluency and coherence.

Activity: Mock sessions on four types of GD topics.

b) Facing Interviews: Interview process - understanding employer expectations - pre-interview planning - opening strategies - answering strategies – stress-based interviews - tele-interviews, video interviews- frequently asked questions (FAQs).

Activity: Writing responses to FAQs - mock interviews.

UNIT-4

a) Reading Comprehension: Reading as a skill- techniques for speed reading- skimming-scanning- appreciating stylistics - impediments for speed reading - eye fixation - sub-vocalisation - critical reading - reading based on purpose - reading for information - reading for inference -understanding tone.

Activity: Reading comprehension exercises with texts drawn from subject areas. (Hand-outs)

b) Listening Comprehension: Listening as skill - different types of listening - hidden data of communication - active listening - top-down approach - bottom-up approach.

Activity: Following different accents (Indian, British, American) listening comprehension exercises with audio and video excerpts.

UNIT-5

a) Data Commentary: Deductive & inductive reasoning - data interpretation - tables & charts - bar charts - pie charts - line graphs - ratios & proportions – percentages - coding and decoding - reasoning by analogy - artificial language etc.,

b) Analytical Thinking: Statement and Conclusion - Data Sufficiency - Statement and Argument - Statement and Assumption - Logical Deduction - Logical Problems.

Activity: Exercises with handouts.

Reference Books:

1. Edward Holffman, Ace the Corporate Personality, McGraw Hill,2001
2. Adrian Furnham, Personality and Intelligence at Work, Psychology Press, 2008.
3. John Adair Kegan Page, “Leadership for Innovation” 1st edition, Kogan, 2007.
4. M.Ashraf Rizvi, “Effective Technical Communication”, 1st edition, Tata McGraw Hill, 2005.
5. Krishna Mohan & NP Singh , “Speaking English Effectively” 1st edition, Macmillan, 2008.
6. Soft Skills Material of Infosys Under the Academic Initiative of Campus Connect
7. K.R. Lakshminarayana& T. Murugavel, “Managing Soft Skills”, Scitech Publications. 2009
8. Dr. S.P. Dhanvel, English and Soft Skills, Orient Blackswan, 2011
9. Rajiv K. Mishra, Personality Development-, Rupa& Co. 2004.

10. R.S.Agarwal, Verbal & Non-verbal Reasoning, S. Chand& Co. Latest edition.

BC112- DATA STRUCTURES LAB

Course Description and Objectives:

The course is designed todevelop skills to design and analyze simple linear and non linear data structures. It strengthen the ability to the students to identify and apply the suitable data structure for the given real world problem. It enables them to gain knowledge in practical applications of data structures .

Course Outcomes:

At the end of this lab session, the student will

- Be able to design and analyze the time and space efficiency of the data structure
- Be capable to identity the appropriate data structure for given problem
- Have practical knowledge on the applications of data structures

List of Experiments:

1. Design and Implement List data structure using i) array ii) singly linked list.
2. Design and Implement basic operations on doubly linked list.
3. Design and Implement stack using i) array ii) singly linked list
4. Design and Implement Queue using i) array ii) singly linked list
5. Design and Implement basic operations on Circular Queue
6. Design and Implement basic operations(insertion, deletion, search, findmin and findmax) on Binary Search trees.
7. Implementation of Breadth First Search Techniques.
8. Implementation of Depth First Search Techniques.
9. Implementation of Dijkstra's Algorithm.
10. Implementation of Kruskal's Algorithm.
11. Implementation of MergeSort.
12. Implementation of Binary Search using arrays.

References Book(S):

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India.
2. E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill.
3. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill.
4. Seymour Lipschutz, Data Structures, Schaum's Outlines Series, Tata McGraw-Hill.
5. Ellis Horowitz, SatrajSahni and Susan Anderson-Freed, Fundamentals of Data Structures in C, W. H. Freeman and Company.
6. R. G. Dromey, How to Solve it by Computer, Prentice-Hall of India.

BC114- INTERNET AND WEB TECHNOLOGIES LAB

Course Description and Objective:

This course is intended to teach the basics involved in publishing content on the World Wide Web. This includes the 'language of the Web' – HTML, the fundamentals of how the Internet and the Web function, a basic understanding of graphic production with a specific stress on creating graphics for the Web, and a general grounding introduction to more advanced topics such as programming and scripting. This will also expose students to the basic tools and applications used in Web publishing.

Course Outcomes:

- Analyze a web page and identify its elements and attributes.
- Create web pages using XHTML and Cascading Style Sheets.
- Build dynamic web pages using JavaScript (Client side programming).
- Create XML documents and Schemas.

List of Experiments:

1. Create a table in HTML to the following details

Book Name	Author
Operating Systems	Godbole
Data Communications and Networks	Godbole
Computer Networks	Rajkumar
OOPs	R.Nageswara Rao

2. Create a form by using various attributes of the input tags.
3. Create a web page multiple types of style sheet used in a single page.
4.Write a CGI sample program to send output back to the user.
5.Write a Java Script program by using variables.
6.Write a java script program to multiply two numbers and display the result in separate text box.
7.Write a java script program on Form Validations.
8.Write a AJAX program checking the presence of XMLHttpRequest object.
9.Write a program to create sales report for our books by using AJAX.
10.Create an XML document template to describe the result of students in an examination.The description should include the student's roll number,name,three subject names and marks,totalmarks,percentage and results.
11.Write an XSLT code to only retrieve the book titles and their prices.
12.Design a basic elements of a home page.

Course Code: BB101

BUSINESS ENGLISH COMMUNICATION

Course Description and Objective:

To introduce students to the specific use of language for the purposes of Business Communication which would be an essential pre-requisite for success in the areas of writing and speech. The teaching efforts in this course will be directed towards making students develop their business and general writing abilities using the fundamental principles that apply to the correct use of the English language free of grammatical and other related errors.

Expected Learning Outcome:

By observing the rules of grammar, vocabulary and composition that are learnt during the course, students are made to appreciate the intelligent and innovative use of rules in order to be able to generate creative output in tune with the demands of industry and the corporate world. The course improves their power of comprehension and the ability to express themselves with rigor through writing and speech.

UNIT-I: **- 12 Hrs**

- Text : GLOBAL ISSUES
  (Child Labour – Food Crisis – Genetic Modification – E-waste – Assistive Technology)
- Grammar : Articles – Prepositions
- Vocabulary : Root–Prefixes-Suffixes - Synonyms – Antonyms
- Composition : Paragraph Writing (Descriptive & Narrative)
  Letter Writing (Formal - Application - Business)

UNIT-II: **- 12 Hrs**

- Text : MEDIA MATTERS
  (History of Media – Language and Media – Milestones in Media –
  Manipulation by Media – Entertainment Media - Interviews)
- Grammar : Time and Tense (Present-Past-Future; Helping Verbs; Modals)
- Vocabulary : Use of Adjectives
- Composition : E-mail - Report-Writing – Writing Advertisements

UNIT-III: **- 12 Hrs**

- Text : LESSONS FROM THE PAST
  (Importance of History – Differing perspectives – Modern Corporatism –
  Lessons from the Past)

- Grammar : Subject-Verb Agreement - If Conditional
- Vocabulary : Idioms & Phrases – One-word Substitutes
- Composition : Summarizing and Note-making

UNIT-IV: - 12 Hrs

- Text : TRAVEL AND TOURSIM
  (Advantages and disadvantages of Travel – Tourism – Atithi devobhava – Tourism in India)
- Grammar : Sentence Transformation (Degrees, Voice, Speech & Synthesis)
- Vocabulary : Phrasal Verbs
- Composition : Letter Writing (Formal - Application - Business)
- Practice : Situational Conversations – Role-Plays
  (Introducing; Greeting; Enquiring; Informing; Requesting; Inviting -Emotions; Directions; Descriptions; Agreements; Refusals; Suggestions)

UNIT-V: - 12 Hrs

- Text : GETTING JOB-READY
  (SWOT-Analysis – Companies and Ways of Powering Growth – Preparing for Interviews)
- Grammar : Common Errors
- Vocabulary : Connectives – Discourse Markers
- Composition : Profile - Curriculum Vitae – Problem Solving (Case Studies)
- Practice : Group Discussions

Textbook:

1. Mindscapes - Orient Black Swan, 2012.

Reference Books:

1. V. R. Narayana Swamy, “Strengthen Your Writing”, 1st edition, Orient Longman, 2003.
2. Thomas Elliott Berry, “The Most Common Mistakes in English Usage”, 1st edition, Tata McGraw Hill, 2004.
3. T. Balasubramanyam, A Textbook of English Phonetics for Indian Students, Macmillan Ltd., 2000.
4. Sasikumar.V and P.V. Dhamija,. Spoken English: A Self-Learning Guide to Conversation Practice, 34th Reprint, Tata McGraw Hill, New Delhi, 1993.
5. Margaret M Maison, “Examine your English”, 1st edition, Orient Longman, 1999.
6. Meenakshi Raman and Prakash Singh, “Business Communication”, 2nd edition, Oxford University Press, 2012

Course Code: BB103

FUNDAMENTALS OF MATHEMATICS

Course Description and Objective:

The objective of this course is to familiarize the students with mathematical tools useful for decision making. Students will learn set theories, types of matrices, binomial theorem, derivatives of standard function and knowledge of integrals. (Proofs and derivations are excluded).

Learning outcome

After reading this course student can able to understand

1. Set, elements of set, methods of describing a set, types of sets, Venn diagrams, Operations on sets, Algebra of sets, Cartesian product of sets, Set relations and its properties.

2. Types of matrices, scalar multiplication of matrix, equality of matrices, addition, subtraction, multiplication of matrices, determinants, Cramer's rule, solution of linear equations, inverse of a matrix, solution of equations by matrix method and rank of a matrix.

3. Binomial theorem, position of terms, binomial coefficients and its applications.

4. The derivative and the derivatives of standard functions, additive, multiplicative and quotient rules of derivatives, maxima and minima of a function.

5. To find the indefinite integral of a given function, the standard definite integrals, to evaluate the definite integral.

UNIT-I: - 12 Hrs

Set Theory: Definition of Set ,Presentation of Sets, Different types of Sets- Null Set, Finite and Infinite Sets , Universal Set , Subset , Power Set etc, Set operations : Laws of algebra of Sets and problems., Cartesion product of sets .

UNIT-II - 12 Hrs

Matrix Algebra: Introduction operations on matrices**:** Addition, subtraction and multiplication of matrices –ad-joint of matrix, inverse of a matrix - solution of simultaneous equations(Cramer's rule and matrix inverse method) ,rank of matrix

UNIT-III - 12 Hrs

Binomial Theorem: Statement of the theorem for positive integral index - General term - Middle term - Equidistant terms- Simple properties of binomial coefficient.

UNIT-IV - 12 Hrs

Differentiation: Interdiction basic laws of derivatives- product rule – quotient rule - higher order Derivatives - maxima and minima of functions.

UNIT-V - 12 Hrs

Integration: Interdiction, definite integral, rules of integration, some standard results, Integration by substitution, Integration by parts.

Text Books:

1. Sancheti and Kapoor V.K ., Business mathematics Sultan Chand & sons ,new Delhi, 6th ed., 1998.

2. SIVAYYA K.V AND SATYA RAO ,Business Mathematics, Saradhi publications

Reference Books:

1. Business Mathematics, Sancheti. D.C., Sultan Chand, 1979, New Delhi, 6th ed.

2. Kappor V.K., Introductory Business Mathematics", 14th revised, New Delhi, Sultan Chand, 2005.

Course Code: BB105

FINANCIAL ACCOUNTING

Course Description and Objective:

This course is intended to provide knowledge on accounting practices to equip students with concepts, process and reporting of financial statements in modern organizations. Students will learn accounting principles, accounting process, preparation of final accounts for sole trading firms and companies and bank reconciliation statement.

Learning Outcomes

By the end of this course it is expected that the student will be able to:

1. Understand Accounting concepts, conventions and principles

2. Accounting system and process- journal and ledger

3. Preparation of final accounts

4. Preparation of Bank Reconciliation statement

5. Preparation company accounts

UNIT-I: **- 12 Hrs**

Introduction to Accounting: Meaning, Need for Accounting, Objectives of Accounting, Advantages Book-Keeping, , Accounting Terminology, Internal and External users of accounting information, Accounting Cycle, limitations of accounting, Accounting Concepts and Conventions, (GAAP)

UNIT-II: **- 12 Hrs**

Accounting systems & process: Systems of Accounting, Process of accounting transactions, Classification of Accounts, Double Entry Book-Keeping System, Accounting Standards in India and International Financial Reporting Standards(IFRS) -Journals-Ledgers-,Subsidiary Books–Cash Books, Trial balance.

UNIT-III: **- 12 Hrs**

Preparation of Final Accounts: Concept of Capital and Revenue**.** Manufacturing - Trading - Profit & Loss Account - Balance sheet. – Problems with Adjustments

UNIT-IV **- 12 Hrs**

Bank Reconciliation statement: Need for reconciliation and preparation of Bank Reconciliation Statement., Depreciation: Meaning, need & importance of depreciation, methods of charging depreciation. Valuation of Inventory – Methods of Valuation of Closing Stock.

UNIT-V **- 12 Hrs**

Company Accounts: Preparation of Final Accounts- Meaning-Importance-Types of Shares &Debentures- Issue-Forfeiture- Re-Issue-Redemption of Debentures-Methods of Redemption.

Reference Books:

1. Jain S.P., & Narang K L. (nd). *Basic Financial Accounting*, *I*, New Dehli:Kalyani publishers.
2. Maheshwari, S.N., & Maheshwari, S.K. (2012). *Advanced Accountancy* (10th edi), *1,*New Dehli:Jain Book Agency.
3. Shukla, M. (nd). *Advanced Accounts*, New Delhi:S Chand Group
4. Radhaswamy, M & Gupta, R.L. (2008). *Advanced Accountancy. 2*, New Delhi:Sultan Chand & Sons.
5. Reddy, A. (2011). *Fundamentals of Accounting*. New Delhi: Himalaya Publishing House

Course Code: BB107

BUSINESS ECONOMICS

Course Description and Objective:

To make the students familiar with the basic concepts and principles of Business Economics. Students will learn nature and scope of managerial economics, demand analysis, theory of production, cost analysis and different markets and pricing methods.

Learning Outcomes

By the end of this course it is expected that the student will be able to:

1. Understand and apply supply and demand analysis to relevant economic issues;

2. Apply marginal analysis to the "firm" under different market conditions;

3. Understand the causes and consequences of different market structures

4. Apply economic models to examine current economic issues and evaluate policy options for addressing these issues

5. Analyse the causes and effects of changes in real GDP;

6. Understand the concept of macroeconomic equilibrium and implications for the management of the business cycle

UNIT-I **- 12 Hrs**

Nature & Scope of Business Economics, Basic tools and techniques of Business Economics, Macro Economic Environment and Managerial decisions.

UNIT-II **- 12 Hrs**

Demand Analysis: Types of Demand, Demand determination Concept of Elasticity and measurement, Demand forecasting, Survey & Statistical methods.

UNIT-III **- 14 Hrs**

Theory of Production: Production function, Marginal rate of technical substitution, Iso-quants and Iso-costs, production function with one/two variable factors, Law of Variable Proportions, and Returns to Scale, internal and external economies.

UNIT-IV **- 10 Hrs**

Cost Analysis: Cost concepts, cost determinants, cost output relationship in the short and long run, Break-Even analysis.

UNIT-V **- 12 Hrs**

Features and types of different competitive situations – Perfect competition, Monopoly, Monopolistic competition and Oligopoly, pricing methods in practice.

Text Books:

1. Gupta: Managerial Economics, 1/e TMH, 2005
2. A.R.Arya Sri, Managerial Economics and Financial Analysis, TMH, 2/e, 2010

Reference Books:

1. Dominic Salvatore, Managerial Economics, Thomson, 2/e, 2006
2. Mote Paull, Managerial Economics, 1/e, TMH, 2004

Course Code: BB109

COMPUTERS AND INFORMATION TECHNOLOGY IN BUSINESS

Course Description and Objective:

The primary objective of this course is to familiarize the student with basic concepts of computers and information technology and their applications to business processes. Students will learn fundamentals of computers, MS office, MS Excel, some important softwares and their application in business decision making.

Learning outcomes

By the end of this course it is expected that the student will be able to:

1. Understand the computer fundamentals
2. Computer softwares, internet and its applications
3. MS Office and Excel
4. Computer and IT applications in business decision making

UNIT-I **- 12 Hrs**

Computer Fundamentals: Block Structure of a Computer, Characteristics of Computers, Generations of Computers, Classification of Computers, Computer Memory and Mass Storage Devices, Input-Output Devices.

UNIT-II **- 12 Hrs**

Computer Software: application and system software, programming languages and their classification, assemblers, compilers and interpreters, process of software development, operating systems: functions of operating systems. **Computer Network & Communication**: Network types, network topologies, network communication devices, physical communication media, network protocol (TCP/ IP), internet and its applications:

UNIT-III **- 12 Hrs**

MS Office- Text processing using word- Functions. MS Excel-Graphs, Basic statistical formulae using MS Excel, MS-Power Point –Creating Effective Presentations.

UNIT-IV **- 12 Hrs**

Computers and IT in business applications

Introduction, Business and Computer, E-Mail, E-Commerce, Project management, Computers in personnel Administration, Accounting, Computers in Cost and Budget Control, Marketing, Manufacturing, Materials management, Banking, Insurance And Stock-broking, Purchasing activities

UNIT-V **- 12 Hrs**

World Wide Web and Business Community, Internet, E- Mail with TCP/IP.

Suggested Readings / Books:

1. ITL Education Solutions, Introduction to Information Technology, Pearson Education.
2. Turban, Rainer and Potter, Introduction to information technology, John Wiley and Sons.
3. Information Technology for Managers, Sudalaimuthu & Hariharan, HPH.
4. Understanding Computers Today & Tomorrow, D.Monley & CS Parker, Cengage/Thomson.

Course Code: BB111

English Proficiency Course-I

Course Description and Objective:

To equip the learners with Functional English by experiencing wide range of language usage in different Situations**.** To instill among the learners the significance of developing LSRW skills and to create a scaffolding to the learners to speak in real life situations. To help learners acquire adequate vocabulary which enable them communicate in day to day situations

Learning Outcomes:

- By the end of 100 hours programme, the learners will be proficient in English and ready to take an Intermediate Level English Proficiency Test by an external certifying agency viz. Preliminary English Test by Cambridge English Language Assessment.

UNIT-I: - 12 Hrs

Activity-1 : Introducing Self

Activity-2 : Introducing Others

Activity-3 : Expressing Needs and Necessities

UNIT-II: - 12 Hrs

Activity-4 : Expressing Likes and Dislikes

Activity-5 : Describing People and Places

Activity-6 : Describing Things and Processes

UNIT-III: - 12 Hrs

Activity-7 : Describing Spacial and Temporal Relations

Activity-8 : Giving Instructions and Directions

Activity-9 : Talking about Routine or Habits

UNIT-IV: - 12 Hrs

Activity-10 : Narrating Events

Activity-11 : Commenting on Happenings

Activity-12 : Making Predictions

UNIT-V: - 12 Hrs

Activity-13 : Retelling and Relating Events

Activity-14 : Asking for information, Clarification and Confirmation

Activity-15 : Discussing and Debating

Course Code: BB102

BUSINESS COMMUNICATION

Course Description and Objective:

The purpose of the course is to develop the students' competence and confidence to communicate at an advanced level. Students will learn how to improve LSRW skills and developing strategies for LSRW skills. They also learn business letter writing and correspondence skills.

Learning Outcomes

By the end of this course it is expected that the student will be able to:

1. Understand the essentials of an effective communication

2. How to improve LSRW skills

3. Understand strategies for developing LSRW skills

4. Understand elements of business letter writing

5. Knowledge of business correspondence and professional correspondence

UNIT-I - 7 Hrs

Basics of Communication: Communication Process & Elements, Need of Communication Skills in Management, Channels of Communication, Types of Communication, Barriers to Communication, How to overcome the Barriers, Principles of effective communication.

UNIT-II - 8 Hrs

Language and Communication: Language as a tool of communication, Importance of LSRW skills, Strategies for developing LSRW skills.

UNIT-III - 10 Hrs

Business Letter Writing: Purpose of format of a business letter, Elements of a business letter, Types of business letters, Enquiry, Sales, Quotations, Claims, Adjustment, and other social correspondence.

UNIT-IV - 10 Hrs

Business Correspondence: Reports, Memos, Notice/Circular, Agenda, Minutes, e-mail.

UNIT-V - 10 Hrs

Professional Correspondence: Interview skills, Leadership qualities, Business etiquette, Telephone etiquette, Group Discussion, Group Dynamics, Presentation skills.

Text Books:

1. Success with Grammar & Composition by K.R.Narayana Swamy.
2. Communication Skills for Technical Students by T.M.Farhatullah

Reference Books:

1. Basic Communication Skills for Technology by Andse J.Rutherford. Pearson Education Asia.
2. Advanced Communication Skills by V.Prasad, Atma Ram.
3. Business Communication by Raymond V. Lesikar.
4. Writing Remedies by University Press.

Course Code: BB104

BUSINESS STATISTICS

Course Description and Objective:

The objective of this course is to provide the basic knowledge of the various statistical techniques useful to managers in their decision-making. Students will learn statistical tools like measures of central tendency, dispersion, Regression and Correlation analysis, sample tests and Hypothesis testing.

Learning outcomes:

The focus is the use of statistical techniques to describe the data, thereby enabling you to

1. Define statistics, become aware of wide range of applications in statistics, types of data, tabulation of data, construct a histogram, frequency polygon, an ogive, pie chart,

2. Apply various measures of central tendency –mean, median, mode, GM and H.M for grouped and ungrouped data. Apply various measures of variability-range, MD,QD, standard deviation, and to know percentiles, Deciles.

3. Understand and importance of correlation, types and measures of correlation. Useof simple regression analysis and applications.

4. Explain why hypothesis testing is important, know how to establish null and alternative hypothesis, for population parameters, develop hypothesis testing methodology for accepting and rejecting the hypothesis, and understand the concepts of large sample tests –single proportion, two proportions, single mean, two means ,two standard deviations.

5. To know the differences between small sample tests and large sample tests. Understand the concepts of t-test for single mean, two means, F-test for equality of variances, and understand the concept of ANOVA one-way and two-way classification.

UNIT-I - 12 Hrs

Definition of Statistics: Importance and scope of statistics and Statistics in business decisions; and Limitations. Methods of data collection; Primary and Secondary data; classification, Tabulation of data; Graphs and charts; Diagrammatic presentation of frequency distributions

UNIT-II - 14 Hrs

Measures of Central Tendency: Common measures of central tendency – mean, median and mode; Partition values – quartiles, deciles, percentiles.

Measures of Dispersion: Common measures of dispersion – range, quartile deviation, mean deviation and standard deviation; Measures of relative dispersion.

UNIT-III - 12 Hrs

Correlation and Regression: Types of correlation and measures-Scatter diagram-karl pearsons coefficient of correlation-spearmen’s rank correlation and simple regression analysis.

UNIT-IV - 12 Hrs

Hypothesis Testing: types of hypothesis, null hypothesis alternative hypothesis, two types of errors - Level of significance, procedure for testing of hypothesis, Large sample tests – single mean and proportions, difference of means and proportions. Test for difference of standard deviations.

UNIT-V - 10 Hrs

Small sample tests: students t- test and F-test and ANOVA one-way and two-way classification

Text Books:

1. Gupta, S.P. Statistical Methods, Sultan Chand & Sons.2009.
2. G.C.Beri, Business Statistics, 3rd ed., McGraw Hill, 2009.

Reference Books:

1. Srivastava, U.K.;Shenoy,G.V. and Sharma, S.C.; Quantitative Techniques for Managerial Decisions; New Age International Pvt. Ltd.,(2002) 2nd edition.
2. Sancheti , D.C. & Kapoor, V.K.; Statistics-Theory, Methods and Applications, Sultan Chand & Sons, 2004.

Course Code: BB106

PRINCIPLES AND PRACTICE OF MANAGEMENT

Course Description and Objective:

Objective of the course is to provide basic perspectives of Management theories and practices. This will form foundation for further study of functional areas of management and give a conceptual framework for understanding.

Learning Outcomes:

The student will:

1. Analyze management as both an art and a science.
2. Compare and contrast different types, roles, and styles of managers.
3. Explain the evolution of management theories, values, and ethics.
4. Research about the functions of managers and the importance of communications.
5. Define internal and external factors that affect organizational design and production
6. Understand realistic and practical applications of management concepts.

UNIT-I - 14 Hrs

Introduction to Management: Concept of management – evaluation of management - nature of management – scope of management – functions of management – theories of management – scientific management theory – Henry fayol's theory – classification theory – human relations theory – behaviorism theory – management Vs administration – universality of management

UNIT-II - 12 Hrs

Planning: Importance – advantages – disadvantages – types of plans – process of planning – steps involved in planning- Decision – Decision Making – Process and Techniques

UNIT-III - 10 Hrs

Organizing: Principles of organization – types of organization structures, merits, demerits and suitability –Departmentation, Delegation and decentralization

UNIT-IV **- 14 Hrs**

Directing – Meaning and Nature of Directing - types of leaders – leadership qualities – leadership theories – motivation theories, Maslow's need hierarchy theory – Herzberg's two factor theory – theory X and theory Y – equity theory – expectations theory – communications – importance – formal and informal communication.

UNIT-V **- 10 Hrs**

Controlling: Importance of controlling – need for controlling – steps involved in controlling – process of controlling – techniques in controlling.

Text Books:

1. Weirich & Koontz, "Essential of Management", TMH.
2. Massie, "Essentials of Management",

Reference Books:

1. Jonus A. F. Stoner, "Management", Thomson.
2. Heinz Weihrich, Harold Koontz, "Management A Global Perspective", TMH, 10/e, 2002.
3. Stephen P. Robbins Mary Coulter, "Management", PHI, 8/e, 2006

Course Code: BB108

BUSINESS PSYCHOLOGY

Course Description and Objective:

The objective of this course is to gain a basic understanding of major topics in Business psychology. Emphasis is placed on what common practice entails and how it affects the individual in the organization. Students will learn elements of motivation, job satisfaction and positive psychology.

Learning Outcomes:

The student will:

1. Understand fundamentals of business psychology
2. Learn factors influence motivation and job satisfaction
3. Learn performance management process, elements of training and HRD
4. Understand elements of positive psychology

UNIT-I **- 12 Hrs**

Introduction to Business Psychology –Concept, Definitions & Scope Major influences on Business Psychology- Scientific management and human relations schools Hawthorne Experiments

UNIT-II **- 12 Hrs**

Individual in Workplace Motivation and Job satisfaction, stress management. Organizational culture, Leadership & group dynamics.

UNIT-III **- 12 Hrs**

Work Environment & Engineering Psychology-fatigue. Boredom, accidents and safety. Job Analysis, Recruitment and Selection – Reliability & Validity of recruitment tests. Working conditions: Physical – Temporal- Psychological condition at work.

UNIT-IV **- 12 Hrs**

Performance Management: Recruitment selection, reliability validity tests -Training & Human Resource Development.

UNIT-V **- 12 Hrs**

Positive Psychology: Assumptions, Goals and Definitions - Western and Eastern View of Positive Psychology- Classifications and Measures of Human Strengths and Positive outcomes-Developing Strengths and Living well.

References:

1. Miner J.B. (1992) Industrial/Organizational Psychology. N Y : McGraw Hill.
2. Blum & Naylor (1982) Industrial Psychology. Its Theoretical & Social Foundations CBS Publication.

Course Code: BB110

GEOGRAPHY AND ENVIRONMENTAL STUDIES

Course Description and Objective:

To sensitize the students on the environmental aspects of development and give basic exposure to geography. Students will learn fundamentals of geography, Sources of energy and importance of Bio-Diversity. They also learn environmental issues and their implications.

Learning Outcomes

By the end of this course it is expected that the student will be able to:

1. Understand fundamentals of geography
2. Learn milestones in India's scientific and technological progress
3. Sources of energy and their importance
4. Importance of Bio-Diversity
5. Environmental issues and their implications

UNIT-I: **- 12 Hrs**

Geography: Fundamental concepts of Geography-Physical Geography of India – River systems, climate, soils, minerals, geological Strata, climatic regions, natural vegetation, Races and Physical Types of People.

UNIT-II: - 12 Hrs

Scientific and Technological Development: Milestones in India's scientific and technological progress in diverse fields – space, Nuclear, IT, Defense, Agriculture and Rural technologies- Prominent scientists of India and their contribution -Recent initiatives to spread scientific temper and S & T practices.

UNIT-III: - 12 Hrs

Energy Sources: Sources of Energy-availability and consumption pattern, Energy policy and pricing Issues relating to hydel power (Big Dams), Thermal Plants and Nuclear power Green Energy technologies and their importance

UNIT-IV: - 12 Hrs

Biodiversity: Meaning and importance of Bio-diversity, Sustainable Development-Ecosystems and their management -Bio-Diversity of India, Bio- spheres and Biodiversity hot spots of India Initiatives to preserve bio-diversity

UNIT-V: - 12 Hrs

Environmental issues: Magnitude, causes and consequences of environmental pollution in India - Factors that led to global warming and climate change -Recent international protocols to tackle climate change, Carbon trading and its implications -Concerns of Developing Countries

Reference Books:

1. Bio & Environmental Geog. Biosphere A Geography of Life By Dr. Thomas and K. Siddhartha.
2. Environmental Geology –By Valdiya.

Course Code: BB112

English Proficiency Course-II

Course Description and Objective:

To equip the learners with Functional English by experiencing wide range of language usage in different Situations**.** To instill among the learners the significance of developing LSRW skills and to create a scaffolding to the learners to speak in real life situations. To help learners acquire adequate vocabulary which enable them communicate in day to day situations.

Learning Outcomes:

- By the end of 100 hours programme, the learners will be proficient in English and ready to take an Intermediate Level English Proficiency Test by an external certifying agency viz. Preliminary English Test by Cambridge English Language Assessment.

UNIT-I: **- 12 Hrs**

Activity-1 : Making Requests – Accepting/Refusing Requests.

Activity-2 : Inviting people – Accepting/Declining Invitations.

Activity-3 : Making Complaints – Responding to Complaints.

UNIT-II: **- 12 Hrs**

Activity-4 : Congratulating/Praising.

Activity-5 : Expressing Sympathy/condolence.

Activity-6 : Offering help Accept/Refuse.

UNIT-III: **- 12 Hrs**

Activity-7 : Conversing over phone.

Activity-8 : Advising/Suggesting.

Activity-9 : Comparing/Contrasting.

UNIT-IV: **- 12 Hrs**

Activity-10 : Convincing/Persuading.

Activity-11 : Negotiating.

Activity-12 : Making Decisions.

UNIT-V: **- 12 Hrs**

Activity-13 : Cause and Effect

Activity-14 : Stating and Concluding

Activity-15 : Drawing Conclusions

Course Code: BB201

INDIAN ECONOMY

Objective of the Course:

To give a broader perspective of the working of Indian economy. Students will learn concepts of national income, sources of revenue and classification of expenditures, LPG policies, WTO,TRIPS, TRIMS and GATT, agrarian structure and Indian economy. They also learn Industrial strategy and its impact on development, causes and measures of poverty.

Learning Outcomes

By the end of this course it is expected that the student will be able to:

1. Understand concepts of national income, sources of revenue and classification of expenditures

2. LPG policies, WTO,TRIPS, TRIMS and GATT

UNIT-I: **- 12 Hrs**

Activity-1 : Making Requests – Accepting/Refusing Requests.

Activity-2 : Inviting people – Accepting/Declining Invitations.

Activity-3 : Making Complaints – Responding to Complaints.

UNIT-II: **- 12 Hrs**

Activity-4 : Congratulating/Praising.

Activity-5 : Expressing Sympathy/condolence.

Activity-6 : Offering help Accept/Refuse.

UNIT-III: **- 12 Hrs**

Activity-7 : Conversing over phone.

Activity-8 : Advising/Suggesting.

Activity-9 : Comparing/Contrasting.

UNIT-IV: **- 12 Hrs**

Activity-10 : Convincing/Persuading.

Activity-11 : Negotiating.

Activity-12 : Making Decisions.

UNIT-V: **- 12 Hrs**

Activity-13 : Cause and Effect

Activity-14 : Stating and Concluding

Activity-15 : Drawing Conclusions

Course Code: BB201

INDIAN ECONOMY

Objective of the Course:

To give a broader perspective of the working of Indian economy. Students will learn concepts of national income, sources of revenue and classification of expenditures, LPG policies, WTO,TRIPS, TRIMS and GATT, agrarian structure and Indian economy. They also learn Industrial strategy and its impact on development, causes and measures of poverty.

Learning Outcomes

By the end of this course it is expected that the student will be able to:

1. Understand concepts of national income, sources of revenue and classification of expenditures

2. LPG policies, WTO,TRIPS, TRIMS and GATT

3. Agrarian structure and Indian economy

4. Industrial strategy and its impact on development

5. Causes and measures of poverty

UNIT-I: - 12 Hrs

National Income: Basic Concepts of National Income -Sect oral composition of National Income of India and changes there in Performance on the social front -Union Government- sources of Revenue and classification of expenditures, Fiscal indicators

UNIT-II: - 12 Hrs

LPG Policies: Transition from Centralized Planning to Indicative Planning -LPG policies, Relative roles of state and markets in pre-liberalization and post- liberalization periods -Globalisation and its discontents -WTO, TRIPS, TRIMS,GATS

UNIT-III: - 12 Hrs

Agrarian Structure: Agrarian Structure , land Reforms, Farm subsidies, Support prices and Procurement policies, Food Security, Agrarian Crisis and Farmer suicides, WTO and Indian Agriculture

UNIT-IV: - 12 Hrs

Industrial Strategy: Strategy of Industralisation, Special Economic Zones, FDI Policy- Multi-National Companies and their importance -Rise of Corporate power in India -Privatization and Dis-investment policies -Infrastructure policies

UNIT-V: - 12 Hrs

Poverty: Measures of Poverty and inequality and trends therein - Anti poverty programmmes - Public Distribution System - Wage employment programmes - Concepts of Social justice and Inclusive growth and their Components

Reference Books:

1. Dutt and Sundaram, “Indian Economy”, Sultan Chand, 2014.

2. Misra and Puri, “Indian Economy”, Himalaya Publication, 2014.

Course Code: BB203

COST ACCOUNTING

Course Description and Objective:

The objective of this subject is to familiarize students with the various concepts and elements of cost. Students will learn cost concepts and elements of cost sheet, methods of costing, cost reduction and cost control process-methods and techniques.

Learning Outcomes

By the end of this course it is expected that the student will be able to:

1. Understand cost concepts and elements of cost sheet

2. Methods of costing

3. Cost reduction and cost control process- methods and techniques

UNIT-I **- 15 Hours**

Introduction to Cost Accounting: Introduction – Meaning & Definition of Cost, Cost concepts-Classification of cost-Methods and systems of cost Accounting. Preparation of cost sheet

UNIT-II **- 15 Hours**

Methods of Costing: Unit Costing, Job Costing and Contract costing

UNIT-III **- 12 Hours**

Process Costing: Meaning, Features, Objectives –Cost Accounting Procedure and its application in Process Industry

UNIT-IV **- 10 Hours**

Standard Costing and Variance Analysis: Meaning –Importance of Standard Costing-Variance Analysis-Advantages- Limitations of Standard Costing

UNIT-V **- 15 Hours**

Cost Reduction and Cost Control Process: Introduction—Cost reduction and Cost Control Process-Short and long range cost control-cost reduction strategies-Methods and Techniques- Value Engineering Programme.

Reference Books:

1. Principles & Practice of cost accounting by N.K.Prasad.
2. Cost Accounting Principles and Practice by M.N. Arora.

Course Code: BB205

MANAGEMENT INFORMATION SYSTEMS

Course Description and Objective:

To enable the students to understand management information systems to integrate for the purposes of information requirements, the accounting, financial, and operations management functions of an organization. And how MIS facilitates managerial decision making.

Learning Outcomes:

By the end of this course it is expected that the student will be able to:

1. Understand concepts of MIS

2. Types of MIS and its application in enterprises

3. MIS development and acquisition of information

4. MIS- Software development cycle

5. Research report preparation using MIS

UNIT-I **- 12 Hrs**

Management information systems-What is MIS-Concept of MIS- MIS in business functions- major components and technologies of an information systems infrastructure.

UNIT-II **- 12 Hrs**

MIS-Types of MIS- Application of MIS in enterprises- Information gathering-business blue print-Realization-Configuration-Documentation of business process- Final preparation for implementation of software packages.

UNIT-III **- 12 Hrs**

MIS- development and acquisition of information systems and technologies, assess the value of information systems investments, and formulate a business case for a new information system with estimation of both costs and benefits—to gain business intelligence, support decision making, create competitive advantages, or meet a competitive necessity.

UNIT-IV **- 12 Hrs**

MIS- Software Development Life Cycle (SDLC) -Accounting techniques and reports- Design and analyze business processing by utilizing advanced spreadsheet functionality including formulas, bar graphs, pie charts, and pivot tables.

UNIT-V **- 12 Hrs**

Prepare a research report on a current topic involving an information systems industry, strategy, or technology and synthesize this research with information presented in class.

Text Books:

1. C.S.V.Murthy, 2011, Management Information System, Himalaya Publications.
2. Goyal, D.P. “Management Information Systems”, MC Millan India.

Reference Books:

1. Murdic Rass, e.elagett, “Information System for Management”, Tata McGraw Hill, India.
2. W S Tawadekar, “Management Information System”, 2nd ed., TMH, Newdelhi, 2002.
3. James o’Brien, 2011, Management Information System, Golgotha Publications.
4. Davis and Olson, 2011, Management Information System, Tata Mc GrawHill.

Course Code: BB207

BUSINESS LAW

Course Description and Objective:

The main objective of the course is to make the students know the legal framework for carrying out a business. Issues related to drafting contracts, partnerships, company management & consumer protection laws will be discussed.

Learning Outcomes

By the end of this course it is expected that the student will be able to:

1. Learn essential elements of a valid contract
2. Partnership Act-1932 and Negotiable instrument Act
3. Company law and company management
4. Consumer protection Act and its importance in the present context

UNIT-I **- 10 Hrs**

Contract Law: The Indian Contract Act, 1872 - Nature of contract - Essential elements of valid contract – Performance of contract – Discharge of contracts - Remedies for breach of contract.

UNIT-II **- 10 Hrs**

Partnership Act & NI Act: The Indian Partnership Act–1932: Constitution of partnership - Rights of Partners – Duties of Partners - Dissolution of partnership.

The Negotiable Instruments Act – 1881: Characteristics of Negotiable Instruments – Promissory Note, Bills of Exchange, & Cheque, and their definitions and characteristics – Discharge of Parties.

UNIT-III **- 10 Hrs**

Company Law: The Companies Act, 1956 - Definition & its Characteristics – Company distinguished from partnership – Kinds of companies - Steps and procedure for incorporation of the company – Directors: Appointment, Duties, Powers, Liabilities.

UNIT-IV **- 10 Hrs**

Company Management: Meetings: Kinds of Meetings – Requisites of valid meeting, Proxies - Resolutions - Winding-up of a Company: By Tribunal – Duties of Liquidator - Powers of Liquidator – Voluntary winding up: By Members – By Creditors.

UNIT-V **- 10 Hrs**

Special Acts: The Consumer Protection Act, 1986: Consumer Protection councils – Redressal Machinery – The Air (Prevention and Control of Pollution) Act, 1981 - The Water (Prevention and Control of Pollution) Act, 1974 - The Environment (Protection) Act, 1986.

NOTE: Few case studies be discussed in the class

Text Books:

1. N.D.Kapoor, Mercantile Law, Sultan Chand & Sons, 2006.
2. C.L.Bansal, Business and Corporate Laws, 1/e, Excel Books, 2006.

Reference Books:

1. S.S. Gulshan, Mercantile Law, 2/e, Excel Books, 2004.
2. Akhileshwar Pathak, Legal Aspects of Business, 3/e, Tata McGraw-Hill, 2007.

Course Code: BB209

ORGANIZATIONAL BEHAVIOUR

Course Description and Objective:

The course provides a basic knowledge of various dimensions of human behavior. This will form the foundation to study and to understand the behavior of the human beings working in organizations. Students will learn nature and scope of OB, Perceptual process, important aspects of personality and attitude, group dynamics and effects of stress and issues of conflict management.

Learning Outcomes

By the end of this course it is expected that the student will be able to:

1. Understand nature and scope of OB
2. Perceptual process
3. Important aspects of personality and attitude
4. Group dynamics and effects of stress
5. Issues of conflict management

UNIT-I - 12 Hrs

Nature of OB: Nature and scope of OB - contributing disciplines to OB - Environmental and Organizational context of Organizational Behaviour.

UNIT-II - 12 Hrs

Perception - Process: Individual and Organizational factors that influence perceptional process. Role of perception in managerial activities and organizational processes.

UNIT-III - 12 Hrs

Personality and Attitudes: Personality as continuum – Meaning of Personality – Johari window and Transactional Analysis Nature and Dimension of Attitudes.

UNIT-IV - 12 Hrs

Group Dynamics: The Nature of groups. Kinds of groups – Stages of Group Development – Factors Contributing to Groups Cohesiveness - Meaning & types of stress – Effect of Stress – Strategies of cope with stress

UNIT-V **- 12 Hrs**

Conflict Management: Nature of conflict – Dynamics of Conflict – Conflict resolution modes – approaches to conflict management – sources of conflict in organization.

Text Books:

1. Luthans, Fred," Organizational Behaviour", 10/e, THM, 2007.
2. Robbins, P Stephen, Timotny A judge, "Organization Behaviour", 12/e, PHI, New Delhi, 2007.

Reference Books:

1. Organisation Behaviour by Nelson
2. Schermerhorn: Organisation Behaviour, Wiley, 9/e, 2005.
3. Organisational Behaviour by Aswathappa

Course Code: BB211

Soft Skills Laboratory

Course Description and Objective:

The Soft Skills Laboratory course is aimed at training undergraduate students and enabling them to acquire employability skills. Designed to impart work related skills, the course will help trainees develop interpersonal communication, leadership and team skills. It will give them the required competence and confidence to handle professional tasks.

Training Methodology:

The training methodology is designed to bring about changes in attitudes through experience-based learning. Activities in simulated environments such as role plays, group discussions, micro-presentations, audio-video clippings, case studies, psychometric tests etc., will provide students insights into their strengths and weaknesses.

Learning Outcome:

The Soft Skills course will help students develop professional and non-personal ways of approaching people and work through the correct use of language and speech in a workplace environment along with the ability to think critically on issues demanding attention. This includes enhancing self-awareness and a sense of self-worth in the students in order to improve their productivity and performance at the workplace.

Course Contents:

UNIT-I: **- 12 Hrs**

a) Role of language in Personality – How language reflects, impacts personality – Using gender-neutral language in MNCs – being culturally sensitive.

Activity – Appraising each other – Worksheets related to the above

b) Career Planning- job vs. career- goal setting- SWOT analysis- planning and prioritization - four quadrant time management system - time management – self-management – stress-management.

Activity: Setting a SMART goal - SWOT analysis of the self – Writing a Statement of Purpose (SOP).

c) Effective Resume-Writing: structure and presentation - planning and defining the career objective - projecting one's strengths and skill-sets – summarizing - formats and styles - covering letter.

Activity: Resume preparation –writing a covering letter.

UNIT-II: - 12 Hrs

A) Functional English - Formal/informal context – purpose - interpersonal dynamics - ideation –content organization - initiating a conversation –responding appropriately - right body language.

Activity - Role play in different situations, - self-introduction - social background (family, home town etc.,) - role model - my future - likes/dislikes (movies, persons, places, food, music etc.,) - a mini project on functional English.

b) Vocabulary-Building: Etymology of words - word roots - prefixes & suffixes - synonyms & antonyms- collocations - one-word substitutes – analogies - idioms and phrases - contextual guessing of unfamiliar words – task-oriented learning (100 words).

Activity: Flash cards (200 words) – vocabulary exercises with hand-outs.

UNIT-III: - 12 Hrs

a) Group Discussion: Articulation and flow of oral presentation - dynamics of group discussion – intervention – summarizing - voice modulation – content generation – Key Word Approach (KWA) – Social, Political, Economic, Legal and Technical Approach (SPELT) – View Point of Affected Part (VAP) - language relevance - fluency and coherence.

Activity: Mock sessions on four types of GD topics.

b) Facing Interviews: Interview process - understanding employer expectations - pre-interview planning - opening strategies - answering strategies – stress-based interviews - tele-interviews, video interviews- frequently asked questions (FAQs).

Activity: Writing responses to FAQs - mock interviews.

UNIT-IV: - 12 Hrs

a) Reading Comprehension: Reading as a skill- techniques for speed reading- skimming- scanning- appreciating stylistics - impediments for speed reading - eye fixation - sub-vocalisation - critical reading - reading based on purpose - reading for information - reading for inference -understanding tone.

Activity: Reading comprehension exercises with texts drawn from subject areas. (Hand-outs)

b) Listening Comprehension: Listening as skill - different types of listening - hidden data of communication - active listening - top-down approach - bottom-up approach.

Activity: Following different accents (Indian, British, American) listening comprehension exercises with audio and video excerpts.

UNIT-V: - 12 Hrs

a) Data Commentary: Deductive & inductive reasoning - data interpretation - tables & charts - bar charts - pie charts - line graphs - ratios & proportions – percentages - coding and decoding - reasoning by analogy - artificial language etc.,

b) Analytical Thinking: Statement and Conclusion - Data Sufficiency - Statement and Argument - Statement and Assumption - Logical Deduction - Logical Problems.

Activity: Exercises with handouts.

Reference Books:

1. Edward Holffman, Ace the Corporate Personality, McGraw Hill,2001
2. Adrian Furnham, Personality and Intelligence at Work, Psychology Press, 2008.
3. John Adair Kegan Page, "Leadership for Innovation" 1st edition, Kogan, 2007.
4. M.Ashraf Rizvi, "Effective Technical Communication", 1st edition, Tata McGraw Hill, 2005.
5. Krishna Mohan & NP Singh , "Speaking English Effectively" 1st edition, Macmillan, 2008.
6. Soft Skills Material of Infosys Under the Academic Initiative of Campus Connect
7. K.R. Lakshminarayana & T. Murugavel, "Managing Soft Skills", Scitech Publications. 2009
8. Dr. S.P. Dhanvel, English and Soft Skills, Orient Blackswan, 2011
9. Rajiv K. Mishra, Personality Development-, Rupa & Co. 2004.
10. R.S.Agarwal, Quantitative Aptitude, S. Chand& Co. Latest edition.
11. R.S.Agarwal, Verbal & Non-verbal Reasoning, S. Chand& Co. Latest edition.

Course Code: BB202

FINANCIAL MANAGEMENT

Course Description and Objective:

To enable the students understand the fundamental concepts of financial management and various financial decisions of a firm. Students will learn importance of Investment decisions in FM, issues of management of working capital, Financing decisions and Dividend decisions.

Learning Outcomes

By the end of this course it is expected that the student will be able to:

1. Understand fundamentals of Financial Management
2. Importance of Investment decisions in FM
3. Issues of management of working capital
4. Financing decisions

5. Dividend decisions

UNIT-I **- 12 Hrs**

Financial Management- Meaning, importance, scope and objectives- Conflicts in profit versus value maximization principle- Role of Chief Financial Officer.

Time Value of Money-Compounding and discounting techniques – concepts of annuity and perpetuity.

UNIT-II **- 12 Hrs**

Investment Decisions- Purpose, objective, process- Techniques of decision making: payback period method, accounting rate of return, net present value, internal rate of return, modified internal rate of return, discounted payback period and profitability index.

UNIT-III **- 12 Hrs**

Management of working capital-Working capital policies - Inventory management- Receivables management- Payables management- Management of cash and marketable securities- Financing of working capital.

UNIT-IV **- 12 Hrs**

Financing Decisions- Cost of Capital – weighted average cost of capital and marginal cost of capital - Capital Structure decisions – capital structure patterns, designing optimum capital structure, constraints, various capital structure theories- Business risk and financial risk – operating and financial leverage, trading on equity.

UNIT-V **- 12 Hrs**

Dividend decisions: Forms of dividend, Theories of dividend – Walter model, Gordon model, MM hypothesis, concept of cash and bonus shares.

Text Books:

1. I.M. Pandey, Financial Management.
2. V.K. Bhalla, Financial Management.

Reference Books:

1. Dr. S.N. Maheswari & Dr. C.B. Gupta, Financial Management.
2. Prasanna Chandra, Financial Management & Practice.
3. Preeti Singh, Investment Management Security Analysis and Portfolio Management.

Course Code: BB204

MARKETING MANAGEMENT

Course Description and Objective:

The course aims at making students understand concepts, philosophies, processes and techniques of managing the marketing operations of a firm. Students will learn importance of STP in Marketing management, marketing mix decisions, PLC and New product development process, important aspects of Service marketing.

Learning Outcomes

By the end of this course it is expected that the student will be able to:

1. Understand fundamentals of marketing
2. Understand importance of STP in Marketing management
3. Marketing mix decisions
4. PLC and New product development process
5. Important aspects of Service marketing

UNIT-I **- 10 Hrs**

Introduction: Definition, Importance and Scope of Marketing, Core marketing concepts, Elements of Marketing - Needs, Wants, Demands, Consumer, Markets and Marketers; Marketing Vs Selling, Consumer Markets and Industrial Markets. Concept of Marketing Management, developing marketing plans and strategies. Marketing Environment, Factors Affecting Marketing Environment, Marketing Information System and Marketing Research and demand forecasting ,Buyer behavior and influencing factors, Buying decision process

UNIT-II **- 10Hrs**

Market Segmentation: Segmenting the Market, Benefits, of Market Segmentations, Market Segmentation Procedure, Basis for Consumer/Industrial Market Segmentation. Market Targeting – Introduction, Procedure. Product Positioning - Introduction, Objectives, Usefulness, Differentiating the Product, Product Positioning Strategy.

UNIT-III **- 10 Hrs**

Marketing: Mix Decisions, Product Decisions, New Product Development-Concept and Necessity for Product Development, Failure of New Products, New Product Planning and Development Process, Product-Mix, Branding and Packaging Decisions, Product Life cycle - Stages and Strategies for Different Stages of PLC.

UNIT-IV **- 14 Hrs**

Pricing, Distribution, and Promotion Decision: Pricing Decisions, Pricing Objectives, Policies Methods of Setting Price, Pricing Strategies, Channels of Distribution for Consumer/ industrial Products, Factors Affecting Channel Distribution, Management of Channels, channel conflicts:. **Marketing Communication:** The communication process, Communication mix, Managing advertising sales promotion, Public relations and Direct Marketing. Sales force Objectives, Sales force structure and size, Sales force Compensation

UNIT-V **- 6 Hrs**

Service Marketing Aspect: A Brief Account of Marketing of Services, Social Marketing, Online Marketing.

Text Books:

1. Rajan Saxena: Marketing Management, 4/e, TMH, 2009.
2. V.S.Ramaswamy , S.Namakumari: Marketing Management, 4/e, Macmillan, 2009

Reference Books:

1. Phillip Kotler: Maketing Management, 11/e, Pearson Publishers, 2011.
2. Stanton William J., Fundamentals of Marketing, McGraw Hill, N. Delhi 10th Ed.
3. Czinkota and Kotabe: Marketing Management, 2/e, Thomson,2007

Course Code: BB206

HUMAN RESOURCE MANAGEMENT

Course Description and Objective:

The objective of the course is to provide basic knowledge of functional areas of Human Resource Management. This course will be a prerequisite for students to take any electives offered in the third and fourth semesters in any subject on HRM stream.

Learning Outcomes

By the end of this course it is expected that the student will be able to:

1. Understand nature, scope and importance of HRM
2. Elements of job analysis and design
3. Recruitment and selection process
4. Training and development process and methods
5. Performance appraisal methods and compensation

UNIT-I - 10 Hrs

Introduction to HRM: Meaning – nature and scope of HRM – functions – objectives of HRM – challenges of HRM – HR Planning process – HR information system.

UNIT-II - 12 Hrs

Job Analysis and Design: Basic prerequisites – job analysis – job description – job specification and job evaluation – job performance standards – elements of job design: job – restructuring – job rotation – job enlargement and job enrichment.

UNIT-III - 14 Hrs

Recruitment and Selection: The recruitment process – methods of recruiting – challenges of recruitment – the selection process – types of tests – basic features of interviews – types of interviews – designing and conducting the effective interview – induction and placement.

UNIT-IV **- 10 Hrs**

Training & Development: Introduction to training – the training process – training methods – management development – evaluation of training and development.

UNIT-V **- 14 Hrs**

Performance Appraisal and Compensation: The appraisal process, methods – the appraisal interviews – the feedback interview – career planning and development.

Compensation: Objectives of compensation – job evaluation system – benefits and services – safety and health.

Text Books:

1. Aswathappa.K, "Human Resource Management-Text & Cases", TMH, 2/e, 2008.
2. Gary Dessler, "Human Resource Management", PHI, 3/e, 2007.

Reference Books:

1. Mirza S.Saiyadain, "Human Resource Management", TMH, 3/e, 2001.
2. Decenza Robbins, "Human Resource Management", John Willey, 3/e, 1998.
3. Biswajeet Patnayak, "Human Resource Management", PHI, 2/e, 2002.
4. Jon M.Werner & Desmone, "Human Resource Development-Foundation Frame work and Application", Cengage Publishers, 2/e, 2008.

Course Code: BB208

OPERATIONS MANAGEMENT

Course Description and Objective:

The Objective of the course is to enable students to learn the Basics of Operations Management, which will help them in understanding actual business process. Students will learn concepts of production system, factors effecting productivity, issues of purchasing and inventory management.

Learning Outcomes

By the end of this course it is expected that the student will be able to:

1. Understand basic concepts of production systems
2. Elements of production management
3. Factors effecting productivity
4. Issues of purchasing and inventory management

5. Quality management and TQM

UNIT-I **- 12 Hrs**

Production systems: Systems concept of Production, Types of production Systems, Flow, Shop, Batch, Cellular, flexible Manufacturing. Group Technology. Computer Integrated manufacturing, Mass Production Vs Product variety. Maintainability.

UNIT-II **- 10 Hrs**

Production Management: Production Planning and control activities, Aggregate planning, MRP, MRP II, Simple problems. Supply Chain.

UNIT-III **- 14 Hrs**

Productivity Improvement: Factors affecting productivity and their measurement, Total productivity, tools and techniques for improving productivity. Facilities Layout – Types of layout – Process, product, Cellular, fixed position, mixed; Applicability, advantages and disadvantages. Work Study – Method Study, Micromotion Study, Stop watch Time Study, Work Sampling.

UNIT-IV **- 12 Hrs**

Purchasing and Inventory Management: Purchase function, Procedures. Economic Order quantity, Wilson's Lot size formula, assumptions in the equation, Ordering with lead time, safety stock and its effect on EOQ. Inventory analysis Methods – ABC, VED, XYZ methods – their utility. Inventory Valuation Methods: Periodic and perpetual systems; FIFO, LIFO, Average cost and Weighted Average Cost Methods.

UNIT-V **- 12 Hrs**

Quality Management: Inspection, Quality, Total Quality – Deming, Juran concepts. Quality as Cost and Quality as Profit. Total Quality Management. Statistical Quality Control – Control Charts – exercises. Concept of Quality Assurance. Principles of ISO and BIS. ISO standards and Certification process.

Text Books:

1. R.Paannerselvam, "Production and Operations Management", 2nd ed., PHI 2006.
2. K.Aswathappa, K.Sridhara Bhat, "Production and Operations Management", 2nd ed., HPH, 2010.

Reference Books:

1. S. N. Chary, "Production and Operations Management", 6th ed., TMH 2006.
2. Buffa, "Modern Production Operation Management", 6th ed., Willey 2008.
3. Joseph S Matrinich, "Production and Operations Management", 8th ed., Willey 2008.

Course Code: BB210

BUSINESS ENVIRONMENT

Course Description and Objective:

To familiarize the students with issues influencing business environment. Students also learn dimensions of business environment, policy framework- Industrial and trade policies, regulatory environment, role of regulatory institutions in Indian financial system, business ethics and corporate governance.

Learning Outcomes

By the end of this course it is expected that the student will be able to:

1. Understand dimensions of business environment
2. Policy framework- Industrial and trade policies
3. Regulatory environment
4. Role of regulatory institutions in Indian financial system
5. Business ethics and corporate governance

UNIT-I - 12 Hrs

Business Environment- Meaning- Different dimensions: Social, Cultural, Political, and Legal Environments and their Importance, Business Cycles and their impact

UNIT-II - 12 Hrs

Policy framework and business environment: Industrial policies, Trade Policies, Monetary and Fiscal policies – Liberalisation, Privatisation and Globalisation and business opportunities – Disinvestment Policies

UNIT-III - 12 Hrs

Regulatory Environment: Clearances and permissions for establishing industry and businesses – Environmental acts, Patents, IPRs, - Pollution and Waste management practices - Government Business Interface- Governance Reforms

UNIT-IV - 12 Hrs

Role of regulatory institutions in Indian financial system – RBI, SEBI, IRDA, AMFI – Prudential and Disclosure norms for accountability- Regulation of Foreign Trade – FDI Policy

UNIT V - 12 Hrs

Business Ethics, Corporate Governance, Corporate Social Responsibility of business enterprises,

Suggested Readings:

1. Dutt and Sundaram , Indian Economy, S. Chand, New Delhi, 2007.
2. K.Aswathappa, Essentials of Business Environment, 9/e Himalaya, 2007.

3. Justin Paul: Business Environment, 1e 2006, TMH
4. Misra and Puri: Indian Economy,, Himalaya, 2007.
5. Shaikh & Saleem - Business Environment (Pearson, 2nd Edition)
6. Francis Cherunilam – Business Environment, Text and Cases (Himalaya Publishing House, 8th Edition).

Course Code: BB212

Professional Communication Laboratory

Course Description and Objective:

The Professional Communication course is aimed at improving written communication skills of undergraduate students and preparing them to meet professional challenges in the work spheres. Writing and Personality are not two exclusive spheres of influence and this course will work on the relationship between professional writing and a personality that is able to meet the goals of an organization in creative and innovative ways. The course will expose students to conventions of corporate communication and documentation procedures involved in the day-to-day functioning of the business world.

Training Methodology:

The methodology is designed to give hands-on practice to students in formal and informal report writing, structure and format of letters as well as other organization related work.

Learning outcomes:

After going through the course, students will acquire competency to write logical sentences and paragraphs, use appropriate diction, grammar and punctuation. They will be able to compose clear and concise messages and produce business documents for mailing to external recipients or intra-organizational circulation.

UNIT-I: **- 12 Hrs**

- Elements of Technical Writing : Sentence structure - reducing verbosity - arranging ideas logically – building coherence - paragraph level and document level - topic sentence - cohesive devices – transitionals – paraphrasing – précis-writing.
- Mechanics of Writing: Stylistic elements – the rapporteur- the purpose- the reader (audience) - elementary rules of grammar- choice of diction - elementary principles of composition - matters of form – punctuation - conventions of business communication -language and tone - weak links in business correspondence - ethical concerns in business writing

UNIT-II: **- 12 Hrs**

- Parts of the Report: Writing an abstract - features of a good abstract – approach - compare and contrast - cause and effect.
- Types of Technical Reports : Drafting a technical proposal - formal and informal proposals - factual reports, feasibility reports, survey reports – parts of a report - title page –declaration –

acknowledgements – table of contents - abstract – introduction – conclusion – citations – references - appendices - oral reports and presentations

UNIT-III: **- 12 Hrs**

- Letter-Writing - Formal and informal letters - structure of formal letters - expressions of salutations, introductory and concluding paragraphs - different types of letters - sales letter - complaint letter - adjustment letter - letter to the editor - covering letter - claim letter – letter of condolence.

UNIT-IV: **- 12 Hrs**

- Business Correspondence : E-mail – nature and scope - e-mail etiquette – Common Errors in composing e-mails – Quotations - Inviting quotations - sending quotations –placing orders Office Communication - agenda - notice – circular
- Effective Resume-Writing: Structure and presentation - defining career objective - projecting one's strengths and skill-sets
- Summarizing - formats and styles - covering letter.

UNIT-V: **- 12 Hrs**

- Business Proposals: Drafting business proposals - calculating profit and loss-averages - ratios and proportions – partnership - simple interest - compound interest - calculating volumes and areas
- Course of action - cause and effect- theme detection - making judgments - logical deductions - analyzing arguments – syllogisms - Venn diagrams- 2 matching definitions -verbal reasoning - numerical reasoning - working out justifications.

Reference Books:

1. Strunk , William, Jr.The Elements of Style, Fourth Edition,
2. Rozakis, Laurie, Ph.D, (2003). English Grammar for the Utterly Confused, McGraw-Hill
3. Sharma. C. (1978) Business Correspondence & Report Writing, Tata McGraw-Hill
4. Kirkman, John. Good Style: Writing for science & technology, Routledge Study Guides, second edition.
5. Monippally, Matthukutty. M. 2001. Business Communication Strategies. 11th Reprint.Tata McGraw-Hill. New Delhi

Course Code: BB301

INDIAN BANKING AND INSURANCE

Course Description and Objective:

Course Code : MB614

CASE STUDY PRACTICE

Course Code : MB616

TAXATION PRACTICE-I

Objective:

To enable the student to understand the practical applications of Direct Taxes.

Practical problems and case studies under Direct Taxes

1.	Computation of Income from Salaries.	-	12 Hrs
2.	Computation of Income from House Property.	-	12 Hrs
3.	Computation of Income from Business and Profession.	-	12 Hrs
4.	Computation of Income from Other Sources.	-	12 Hrs
5.	Computation of Total Income and Assessment of individuals.	-	12 Hrs

Text Books:

6. Bhagawath Prasad, "Direct Taxes Law and Practice".
7. Dinakar, Pagre, "Direct Taxes".
8. Gowr & Narang, "Income Tax", 2011-12

Reference Books:

1. Dr.Vinod & K Singharia, "Direct Taxes, Law and Practice".
2. S.Bhattacharya, "Indian Income Tax Law and Practice".
9. Ahuja & Ravi Gupta, "Practical and Systematic approach to Income Tax".
10. Mahadevan, "Income TA".

Course Code : MB701
AUDITING

Objective:
To understand objective and concepts of auditing and gain working knowledge of auditing procedures and of techniques

UNIT-I **- 10 Hrs**
Auditing - Concepts – Significance – Types of Audit – Ethical Principles of Auditors

UNIT-II **- 12 Hrs**
Auditing engagement – Audit planning, Audit programme, Control of quality of audit work–Delegation and supervision of audit work - Documentation .

UNIT-III **- 14 Hrs**
Audit Evidence – Audit procedures for obtaining evidence, Sources of evidence, Reliability of audit evidence.
Internal Control – Elements of internal control, Review and documentation, Evaluation of internal control system.
Audit Sampling – Types of sampling, Test checking, Techniques of test checks.

UNIT-IV **- 12 Hrs**
Company Audit – Audit of Shares, Qualifications and Disqualifications of Auditors, Appointment of auditors, Removal of auditors, Powers and duties of auditors, Branch audit, Joint audit, Special audit, Reporting requirements under the Companies Act, 1956.

UNIT-V **- 12 Hrs**
Audit Report – Qualifications, Disclaimers, Adverse opinion, Disclosures, Reports and certificates.

Text Books:
1. Jagadish Prakash Auditing Principles, Practices and Problems, Kalyani Publishers, 2009.
2. S.D. Sharma, "Auditing Principles and Practice".

Reference Books:
1. Dolphy D.Souza, "Advance Auditing".
2. Kamal Gupta, "Auditing".

Course Code : MB703

TAXATION – II

Objective: To gain knowledge of various provisions of Central Excise, Service tax, VAT & Sales Tax.

UNIT-I **- 10 Hrs**

Indirect Taxes- Features of Indirect Tax. Constitutional validity. Indirect Tax Laws, administration and relevant procedures

UNIT-II **- 14 Hrs**

Central Excise - The Central Excise Law- Goods, Excisable goods, Manufacture and manufacturer, Classification, Valuation – CENVAT – Basic procedures – Export, SSI, Job work – Assessment – Demands – Refund – Exemptions – Central Excise Audit.

UNIT-III **- 12 Hrs**

Customs laws-Basic concepts of customs law- Territorial waters, high seas-Types of custom duties. Import and Export Procedures, Export Promotion Schemes. EOU-Duty Drawback- Special Economic Zones.

UNIT-IV **- 14 Hrs**

Service Tax - Introduction, Nature of Service Tax- Service Provider and Service Receiver- Registration procedure- Records to be maintained-Classification of taxable services- Valuation of taxable services- Exemptions and Abatements- Payment of service tax, Return-Cenvat Credit Rules-Export and import of services- Other aspects of Service Tax- Taxable Services- Special Audit under 14A and 14AA of Central Excise Act

UNIT-V **- 10 Hrs**

Central Sales Tax Act & VAT Act- Introduction, definition of sale under GST-Stock transfer, branch transfer under GST- Inter state sale,

Text Books:

1. V.S. Date, “Indirect Taxes”.
2. Sanjiv Kumar, “Indirect Taxes Law and Practice”.
3. R.K.Jain, “Excise Manual”.
4. Taxman, “Service Tax”.

Reference Books:

1. Satya Prasad TVR, “Service Tax”, Made easy Deccan Law House, 2011.
2. Veera Reddy P, “Guide to Service Tax”, Deccan Law House, 2011.
3. Income Tax Act, Bharat Publications.
4. Atul Kumar Gupta, “Introduction to Service Tax”, Indirect Tax Laws, Bharat Publications.

Course Code : MB705
OPERATIONS RESEARCH

Objective: The objective of the course is to introduce some of the tools that facilitate better understanding about the operations in a quantitative form and help them in taking right decision about the business through mathematical approach.

UNIT– I **- 12 Hrs**

Decision Theory: Steps In the Decision Making, the Different environments, In which Decisions Are Made, Criteria For Decision Making Under Uncertainty, Decision Making Under conditions of Risk - Decision Trees, Graphic Displays of the Decision Making Process, Decision Making With an Active Opponent.

UNIT – II **- 12 Hrs**

Linear Programming: Introduction to Linear programming – formulation of LPP – solution of LPP - Using Graphical Methods, the Simplex Method; Justification, interpretation of Significance of All Elements In the Simplex Tableau, the Simplex Solution to A Minimizing Problem - Two-Phase and Big-M method - Definition of the Dual Problem, Primal, Dual Relationships.

UNIT – III **- 12 Hrs**

Transportation, Assignment Problems & Game Theory: Definition and Application of the Transportation Model, Solution of the Transportation Problem, the Assignment Model, and Travelling Salesman Problem.

Game Theory: Introduction – Two Person Zero-Sum Games, Pure Strategies, Games with Saddle Point, Mixed strategies, Rules of Dominance, Solution Methods of Games without Saddle point – Algebraic, matrix and arithmetic methods.

UNIT – IV **- 12 Hrs**

Queuing Theory: Basic Elements of the Queuing Model, structure of the Queuing model - Poisson and Exponential Distributions. M/M/1 with infinite and finite capacity queuing model.

Simulation Theory: Nature and Scope, Applications, Types of simulation, Discrete and continuous Simulation Approaches, Role of Random Numbers, Gathering Observations In Simulation, Inventory Example, Queuing Examples.

UNIT – V **- 12 Hrs**

P.E.R.T. & C.P.M. And Replacement Model: Drawing networks – identifying critical path – probability of completing the project within given time. Replacement models comprising single replacement and group replacement.

Text Books:

1. J.K.Sharma, "Operations Research: Theory & Applications", Macmillan India, 2007.
2. S.D.Sharma, "Operations Research", 11th ed., Kendarnath, Ramanath & Co.

Reference Books:

1. Barry Render, Ralph M.Stair,Jr. Michael E.Hanna, "Quantitative Analysis for Management", 9/e, PHI Pvt. Ltd , New Delhi, 2007.
2. Hamdy, A.Taha, "Operations Research: An Introduction", Prentice-Hall of India, New Delhi, 2007.
3. Harvey M. Wagner, "Principles Of Operations Research", PHI, New Delhi, 2003.
4. Pannerselvam.R, "Operations Research", 2nd ed., PHI.
5. Operations Research, Kranthi Swaroop, P.K.Gupta and Manmohan, 4th ed., Sultan & Sons.

Course Code : MB707

STRATEGIC MANAGEMENT

Objective: To develop an understanding of strategic management concepts and techniques.

UNIT – I **- 12 Hrs**

Business Environment-General environment - demographic, socio-cultural, macro-economic, legal/political, technological, and global; competitive environment.

Business Policy and Strategic Management-Meaning and nature; strategic management imperative; vision, mission and objectives; strategic levels in organizations.

UNIT – II **- 12 Hrs**

Strategic Analysis: Situational analysis – SWOT analysis, TOWS matrix, portfolio analysis - BCG matrix.

UNIT – III **- 12 Hrs**

Strategic Planning - Meaning, stages, alternatives, strategy formulation.

Formulation of Functional Strategy: Marketing strategy, financial strategy, production strategy, logistics strategy, human resource strategy.

UNIT- IV **- 12 Hrs**

Strategy Implementation and Control: Organizational structures; establishing strategic business units; establishing profit centers by business,
product or service, market segment or customer; leadership and behavioural challenges.

UNIT – V **- 12 Hrs**

Reaching Strategic Edge: Business process re-engineering, benchmarking, total quality management, six sigma, contemporary strategic issues.

Text Books:

1. R. Nanjundaiah & Dr. S. Ramesh, Strategic Planning and Business Policy.
2. Azhar Kazmi, Business Policy and Strategic Management.
3. Ghosh P.K, Business policy and strategic Planning & Management.
4. Sharma & Gupta, Strategic Management.
5. P.Subba Rao, “Strategic Management”, Text & Cases.

Reference Books:

1. Lawrence, Business Policy and Strategic Management.
2. Sukul Lomesh, P.K. Mishra, Business Policy and Strategic Management.

Course Code : MB709

ORGANIZATIONAL BEHAVIOUR

Objective:

The course provides a basic knowledge of various dimensions of human behavior. This will form the foundation to study and to understand the behavior of the human beings working in organizations.

UNIT – I **- 12 Hrs**

Nature of OB: Nature and scope of OB - contributing disciplines to OB - Environmental and Organizational context of Organizational Behaviour.

UNIT – II **- 12 Hrs**

Perception - Process: Individual and Organizational factors that influence perceptional process. Role of perception in managerial activities and organizational processes.

UNIT – III **- 12 Hrs**

Personality and Attitudes: Personality as continuum – Meaning of Personality – Johari window and Transactional Analysis Nature and Dimension of Attitudes.

UNIT – IV **- 12 Hrs**

Group Dynamics: The Nature of groups. Kinds of groups – Stages of Group Development – Factors Contributing to Groups Cohesiveness - Meaning & types of stress – Effect of Stress – Strategies of cope with stress

UNIT – V **- 12 Hrs**

Conflict Management: Nature of conflict – Dynamics of Conflict – Conflict resolution modes – approaches to conflict management – sources of conflict in organization.

Text Books:

1. Luthans, Fred," Organizational Behaviour", 10/e, THM, 2007.
2. Robbins, P Stephen, Timotny A judge, "Organization Behaviour", 12/e, PHI, New Delhi, 2007.

Reference Books:

1. Organisation Behaviour by Nelson
2. Schermerhorn: Organisation Behaviour, Wiley, 9/e, 2005.
3. Organisational Behaviour by Aswathappa

Course Code : MB711
Operations Research LAB

Objective of the Lab:
The objective of this lab work will enhance skills in Operation Research Problems, Solving through the Operations Research Software TORA.

1. Optimal solution of simple method using TORA - 2 Labs – 6 Hrs
2. Optimal solution of two-phase method using TORA - 2 Labs – 6 Hrs
3. Optimal solution of transportation problem using TORA - 2 Labs – 6Hrs
4. Optimal solution of Assignment problem using TORA - 2 Labs – 6Hrs
5. Optimal solution of travelling salesmen problem using TORA - 2 Labs – 6Hrs
6. Optimal solution of dual simplex method using TORA - 2 Labs – 6Hrs
7. Optimal solution of inventory problems using TORA - 2 Labs – 6Hrs

Reference: H.A TAHA, Operations Research, 6th ed., PHI.

Course Code : MB713
TAXATION PRACTICE-II

Objective:
To enable the student to understand the practical application of Indirect Taxes

Practical problems and case studies under Indirect Taxes

1. Problems in Central Excise	-	15 Hrs
2. Problems in Customs	-	15 Hrs
3. Computation of Service Tax	-	15 Hrs
4. Computation of GST	-	15 Hrs

Text Books:
1. V.S. Date, "Indirect Taxes".
2. Sanjiv Kumar, "Indirect Taxes Law and Practice".
3. R.K.Jain, "Excise Manual".
4. Taxman, "Service Tax".

Reference Books:
1. Satya Prasad TVR, "Service Tax", Made easy Deccan Law House, 2011.
2. Veera Reddy P, "Guide to Service Tax", Deccan Law House, 2011.
3. Income Tax Act, Bharat Publications.
4. Atul Kumar Gupta, "Introduction to Service Tax", Indirect Tax Laws, Bharat Publications.

Course Code : MB715
MINI PROJECT

Course Code : MB702

BUSINESS AND INDUSTRIAL LAW

Objective: The main object of the course is to make the students know the legal framework for carrying out a business. Issues related to drafting contracts and other important laws will be discussed.

UNIT – I **- 12 Hrs**

Indian Contracts Act – 1872: Nature and types of contracts - Essential elements of valid contract - Discharge of contracts - Remedies for breach of contract

UNIT - II **- 12 Hrs**

Sale of Goods Act – 1930: Meaning of Sale and Goods – Conditions and Warranties – Transfer of Property – Performance of contract of sale.

UNIT – III **- 12 Hrs**

Negotiable Instrument Act – 1881: Essentials of NI – Kinds of NI – Holder and Holder in Due Course – Types of Endorsements – Crossing of Cheque – Dishonor of Cheque.

UNIT – IV **- 12 Hrs**

The Consumer Protection Act - 1986: Objectives of the Act, Consumer Protection councils – Consumer disputes redressal – Agencies, Forum, Commission – National consumer disputes redressal commission.

UNIT – V **- 12 Hrs**

Other Laws: The Industries Disputes Act – 1951 – The Factories Act-1948 – The Workman's Compensation Act-1923 - Essentials Commodities Act-1955.

Text Books:

1. N.D.Kapoor, "Mercantile Law, Sultan Chand & Sons, 2006.
2. VK.Agwaral, Consumer Protection in India, Deep & Deep Publications, 1988.

Reference Books:

1. S.S. Gulshan, Mercantile Law, 2/e, Excel Books, 2004
2. Akhileshwar Pathak, Legal Aspects of Business, 3/e, Tata McGraw-Hill, 2007
3. C.L.Bansal, Business and Corporate Laws, 1/e, Excel Books, 2006
4. S.N.Maheshwari & Maheshwari, Business Regulatory Framework, Himalaya Publishing House.2006.
5. Kuchhal M.C – Business Law, Vikas Publications, New Delhi.

Course Code : MB704
ORGANIZATIONAL DEVELOPMENT

Objective:
The objective of the course is to enable managers to cope with the changes that take place constantly in business. The prerequisite for the course is knowledge of HRM and Organizational Behaviour subjects.

UNIT - I **- 12 Hrs**
Introduction: Concept of OD; Definitions & its distinguishing characteristics Historical background: various stages, second-generation OD and extent of application, values, assumptions and beliefs in OD.

UNIT – II **- 12 Hrs**
Action Research And OD: Action research: a process and an approach Managing OD Process: Diagnosis, Diagnosis Models, Nature of OD intervention, Analysis of discrepancies, Phases of OD program, Model of Managing change, Creating parallel learning structures.

UNIT - III **- 12 Hrs**
OD Interventions: Definition – factors to be considered choosing and sequencing intervention activities – classification of OD interventions An overview of Interventions,

UNIT - IV **- 12 Hrs**
OD Implementation: Issues in Consultant-Client Relations: Entry and contracting, defining the client system, trust, the nature of the consultant's expertise, diagnosis and appropriate interventions, Implications of OD for the client. Power, politics and OD, Research on OD

UNIT – V **- 12 Hrs**
Future of OD: Fundamental strengths of OD, OD's future" leadership & value, knowledge about OD, OD training, inter-disciplinary nature of OD,

Text Books:

1. Nendees L.French, Cecil M.Bell, Veena, Jr.Pearson "OD, behavioural Science Intervention for Organization Improvement", PHI.
2. Dr.Bhupen Srivastava, Biztantra, "OD and Development-Concepts and Applications", PHI.

Reference Books:

1. Pradip M.Khadwalla, "Organizational Design for Excellence", TMH, 2/e, 2005.
2. Richard L Daft, "Organization Theory and Design", Cengage Learning, 8/e.
3. Wendese L.French, Cecil H. Bell, "Organizational Development and Transformation Managing Effective Change", TMH.
4. Gareth R.Jones, "Organizational, Design and Change", Pearson, 5/e.

Course Code : MB706
OPERATIONS MANAGEMENT

Objective:
The Objective of the course is to enable students to learn the Basics of Operations Management, which will help them in understanding actual business process.

UNIT – I **- 12 Hrs**
Production systems: Systems concept of Production, Types of production Systems, Flow, Shop, Batch, Cellular, flexible Manufacturing. Group Technology. Computer Integrated manufacturing, Mass Production Vs Product variety. Maintainability.

UNIT – II **- 10 Hrs**
Production Management: Production Planning and control activities, Aggregate planning, MRP, MRP II, Simple problems. Supply Chain.

UNIT – III **- 14 Hrs**
Productivity Improvement: Factors affecting productivity and their measurement, Total productivity, tools and techniques for improving productivity. Facilities Layout – Types of layout – Process, product, Cellular, fixed position, mixed; Applicability, advantages and disadvantages. Work Study – Method Study, Micromotion Study, Stop watch Time Study, Work Sampling.

UNIT – IV **- 12 Hrs**
Purchasing and Inventory Management: Purchase function, Procedures. Economic Order quantity, Wilson's Lot size formula, assumptions in the equation, Ordering with lead time, safety stock and its effect on EOQ. Inventory analysis Methods – ABC, VED, XYZ methods – their utility. Inventory Valuation Methods: Periodic and perpetual systems; FIFO, LIFO, Average cost and Weighted Average Cost Methods.

UNIT – V **- 12 Hrs**
Quality Management: Inspection, Quality, Total Quality – Deming, Juran concepts. Quality as Cost and Quality as Profit. Total Quality Management. Statistical Quality Control – Control Charts – exercises. Concept of Quality Assurance. Principles of ISO and BIS. ISO standards and Certification process.

Text Books:

1. R.Paannerselvam, "Production and Operations Management", 2nd ed., PHI 2006.
2. K.Aswathappa, K.Sridhara Bhat, "Production and Operations Management", 2nd ed., HPH, 2010.

Reference Books:

1. S. N. Chary, "Production and Operations Management", 6th ed., TMH 2006.
2. Buffa, "Modern Production Operation Management", 6th ed., Willey 2008.
3. Joseph S Matrinich, "Production and Operations Management", 8th ed., Willey 2008.

Course Code : MB708

Indian Banking System

Objective: To create the awareness among the students of Indian banking system and to understand the reforms and other developments in the Indian banking.

UNIT-I **- 12 Hrs**

Structure and Role of Indian Banking System: Structure of Indian Banking System Central bank - Commercial banks -Cooperative banks – Regional Rural Banks-Local Area Banks: Difference between scheduled and non-scheduled bank Role of banking system in the economic growth and development

UNIT –II **- 12 Hrs**

Public and Private sector banks: Public and Private sector banks in India their functions, progress and performance after 1969. Foreign banks in India: Their progress and performance, Regulation of Foreign banks in India

UNIT – III **- 12 Hrs**

Regional Rural Banks: Reasons for establishment of Regional Rural Banks (RRBs), Meaning of RRBs, Difference between RRBs and Commercial banks, Objectives of RRBs, Organization and Management of RRBs Functions of RRBs, Progress, performance and problems of RRBs.

UNIT – IV **- 12 Hrs**

Cooperative Credit System: Principles of cooperation, Evolution of cooperative credit system. Meaning, objectives, organization, functions, progress and problems of: 1. Primary Agricultural Cooperative Credit societies, 2. District Central Cooperative banks, 3. Sate Cooperative Banks. Urban Cooperative Banks, Urban Cooperative Credit Societies

UNIT –V **- 12 Hrs**

RBI–Evaluation, Functions, Organization and Management. Banking Sector Reforms: Rationale and objectives of reforms, Problems of nationalized banks. Recommendations of the Narasimham Committee (I), Income recognition, Asset classification, Capital adequacy norms Provisioning, Management of Non Performing Assets (NPAs), Recommendations of the Narasimham Committee (II)

Text Books:

1. Indian banking system - Dr. Rita Swami
2. Indian Banking System - Dr. B.R. Sangle, Dr. G.T. Sangle, Dr. Kayande Patil and Prof. N.C. Pawar
3. Inidan Banking System - Prof. S.V. Joshi, Dr. C.P. Rodrigues and Prof. Azhar Khan

Reference Books:

1. Functions and Working of the RBI: Reserve Bank of India Publications.
2. Financial Sector Reforms and India's Economic Development: N.A.Majumdar
3. Central Banking and Economic Development: Vasant Desai
4. Banking in India - S. Panandikar
5. Banking: S.N. Maheshwari
6. Report on Trends and Progress of Banking in India: Reserve Bank of India Publication.

Course Code : MB710
MARKETING MANAGEMENT-II

Objective:
The objective of the course is to make the students aware about the market segmentation, testing, positioning strategies and recent trends.

UNIT-I **- 12 Hrs**
Marketing Environment - Analyzing needs & trends in the Micro & Macro environment - Market Segmentation - Bases for Market segmentation, Requisites of sound marketing, segmentation.

UNIT –II **- 12 Hrs**
Market targeting strategies -Positioning strategies - Undifferentiated marketing - Concentrated marketing.
Case Studies
UNIT-III **- 12 Hrs**
Analyzing consumer markets - and buying behaviour - Factors influencing Buying behaviour - Cultural, Social, Personal, Psychological factors – The Buying decision process - stages of the buying decision process
Case Studies
UNIT-IV **- 12 Hrs**
Marketing Research Marketing Information System, components - market intelligence system - Marketing Research, Process, Types and techniques of organizing Marketing Research.

UNIT-V **- 12 Hrs**
Recent Trends in marketing, E-business, Tele-marketing, M-Business, Relationship Marketing, Retailing, Concept Marketing and Virtual Marketing, Mobile Marketing, Database Marketing, Viral Marketing, Ingredient Branding, and Hyper Markets.

Text Books:
1. Phillip Kotler: Maketing Management, 11/e, Pearson Publishers, 2007
2. Adrian Palmer , Introduction to Marketing theory and practice Oxford University Press 2007
3. Rajan Saxena: Marketing Management, 2/e, TMH, 2006.
4. Kerin, Hartley & Rudelius: Marketing—The Core, McGraw-Hill, Irwin, 2007.
5. Lamb, Hair ,Mac Daniel: Marketing, 7/e Thomson Publishers, 2006.
6. Boone& Kurtz, Principles of Marketing, 12/e, Thomson Publishers, 2007.

Reference Books:
1. V.S.Ramaswamy , S.Namakumari: Marketing Management, 3/e, Macmillan, 2003.
2. Michael J.Etzel, Bruce J. Walker, William J.Stanton, Ajay Pandit, Marketing Concepts 13th ed Tata McGraw Hill 2006
3. William D.Perreault, Jr.E.Jerome Mc Carthy, Basic marketing, 14/e, TMH.2007.
4. Czinkota and Kotabe: Marketing Management, 2/e, Thomson,2007.
5. Joel R. Evans, Borry Berman: Marketing in the 21st Century, 8/e, Biztantra, 2006.
6. Philip Kotler and Kelvin Lane Marketing Mangement 12th ed Pearson Education 2007

MASTER OF BUSINESS ADMINISTRATION

Course Structure

(Teaching Scheme: Hrs per week)

I Year Semester - I

Code	Subject	L	T	P	To	C
MS801	Indian Social Systems-Historical Perspective	3	-	-	3	4
MS803	Advanced Quantitative Methods	4	-	-	4	4
MS805	Political Economic History	3	-	-	3	4
MS807	Industrial Psychology	3	-	-	3	4
MS809	Modern Management	3	-	-	3	4
MS811	Research Methodology	3	-	-	3	4
	Labs:					
MS813	Advanced Communication Practice	-	-	2	2	2
MS815	Computer Aided Management Practice	-	-	2	2	2
MS817	Seminar	-	-	2	2	2
TOTAL		**19**	**-**	**6**	**25**	**30**

I Year Semester - II

Code	Subject	L	T	P	To	C
MS802	Strategic Financial Management	3	-	-	3	4
MS804	Supply Chain Management	3	-	-	3	4
MS806	Leadership and Decision Making	3	-	-	3	4
MS808	Strategic Marketing	3	-	-	3	4
MS810	Strategic Human Power Management	3	-	-	3	4
MS812	Competitive Strategy	3	-	-	3	4
	Labs:					
MS814	ERP Practice	1	-	2	3	2
MS816	Seminar	-	-	2	2	2
TOTAL		**19**	**-**	**4**	**23**	**28**

II Year Semester - III

Code	Subject	L	T	P	To	C
MS901	Elective 1	3	-	-	3	4
MS903	Elective 2	3	-	-	3	4
MS905	Elective 3	3	-	-	3	4
MS907	Elective 4	3	-	-	3	4
MS909	Elective 5	3	-	-	3	4
MS911	Elective 6	3	-	-	3	4
	Labs:					
MS913	Seminar	-	-	2	2	2
MS915	Advanced Communication Practice	-	-	2	2	2
TOTAL		**18**	**-**	**4**	**25**	**28**

L = Lecture ; **T =** Tutorial ; **P =** Practicals ; **To =** Total ; **C =** Credits

II Year Semester - IV

Industrial Practice
Project Work
Seminar

Electives – Six Streams: HRM, Marketing, Finance, Operations, IT, Pharma

HRM
HRM in MNC·
HRM Policy & Strategy·
Corporate Social Responsibility: Perspectives and Practices·
Entrepreneurship in NGOs·
Managerial Effectiveness and Human Values·
Advanced Corporate Strategy·
High Performing Organizations·
Personnel Competence and Capability Building·
Intellectual Capital Management

Marketing
Advanced Marketing Research·
B2B Marketing·
Consumer Behaviour·
International Marketing·
Rural and Social Marketing·
Sales and Distribution Management·
Services Marketing·
Strategic Brand Management·
Advertising Management·
Retail Management·
Competitive Marketing Strategy·
Logistics Management

Finance·
International Finance ·
Investment Analysis and Portfolio Management·
Management of Insurance Business·
Options, Futures and Derivates·
Risk Modelling & Management·
Integrated Treasury and Risk Management·
Management of Banks and Financial Institutions·
Cost and Management Control Systems·
Advanced Corporate Finance·
Venture Capital and Private Equity·
Carbon Finance·
Public Finance

Operations
Management Game·
Management of Technology·
Production and Inventory Control·
Business Forecasting·
Services Management·
Managing E-business·
Systems thinking for Decision Making·

Simulation for Management·
Purchasing and Stores Management·
Lean Manufacturing·
Total Quality Management·
Six Sigma·
Advanced Optimization Methods

IT
AI for Business Applications·
ANNFS: Applications to Finance & Strategy·
Business Data Mining·
Business Dynamics·
Business Intelligence·
Computational Intelligence in Finance & Business·
E-Commerce·
ISB-MPC: Information Security in Business – Multi – Party Computation·
ISB-PTC: Information Security in Business – Privacy, Trust & Control·
Networks and Internet·
Software Project Management·
Strategies for Information System Development

Pharma
Clinical Research·
Pharmacology & Psychology·
Pharma Sales Management·
Principles & Practices of Pharma Marketing Management·
Advertisement in Pharmaceutical Industry·
Rural and Social Marketing·
Pharma Industry·
Overview of Pharmaceutical Science & Technology·
Pharma Regulatory Affairs·
Pharma legislation in India·
Patent Management·
Pharma Distribution Management·
Pharma Product Management·
Pharma Quality Management

General Electives
Multi-Variate Analysis
Advanced Forecasting Methods
Business, Government and Society
Actuarial Mathematics and Statistics
Econometrics
Interpersonal and Group Process
Socio-cultural Environment of Business
Economic Environment & Policy
Organizational Diagnosis
Balanced Score Card
Business Chinese
Business Arabic
Business German
Business French
Game Theory and Applications
Business Perspectives on Film Industry
Media Management
Environmental Management
Mergers and Acquisitions