ELECTRICAL SCIENCE

(For all branches except EEE)

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Objective of the Course :

It is necessary for an engineer of any branch to know the basics of Electrical Engineering. This subject provides the required basic knowledge of Electrical Circuits, Generators, Motors and Electronic devices.

UNIT - I

Electric & Magnetic Circuits : Representation of sources and network elements - Ohm's Law – series, parallel circuits - Kirchhoff's Laws – mesh and nodal analysis of simple resistive circuits.

Magneto motive force, reluctance, flux and flux density ,concept of Self Inductance and Mutual Inductance, Coefficient of coupling-only elementary treatment.

UNIT - II

A.C. Circuits : Generation of A.C. voltage - frequency, average value, R.M.S. value, form factor, peak factor of standard alternating wave forms - phasor representation of alternating quantities. Analysis of simple series and parallel A.C. circuits-Problems-Resonance.

Three phase systems – Relation between phase and line quantities of voltages and currents in star and delta connected systems – analysis of balanced three phase circuits – power consumed in a three phase balanced load.

UNIT - III

D.C. Machines & Transformers : Constructional details of a D.C. Machine.

D.C. Generator – Principle of operation – EMF equation – types of D.C. generators and simple problems

D.C. Motor – Principle of operation – Torque equation – types of D.C. motors and simple problems

Principle of operation of single phase transformer – constructional features – EMF equation –ratings- simple problems.

UNIT - IV

A.C. Machines : Principle of operation of three phase induction motors – slip ring and squirrel cage motors – Torque equation derivation – Torque slip characteristics – Principle of operation of single phase induction motors – Capacitors start, capacitor run, split phase and shade pole motors. 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. Del Toro, “Electrical Engineering Fundamentals”, 2nd ed., Prentice Hall of India Pvt. Ltd., New Delhi.
2. Millman & Halkias, “Integrated Electronics”, McGraw Hill, 1979.
3. A.K. Thereja & B.L. Thereja, “Electrical Technology”, Vol. – II, S.Chand Publications, 2007.
4. U.Bakshi & A.Bakshi, “Basic Electrical Engineering”, 1st ed., Technical Publications, Pune, 2005.