16ME102 ENGINEERING MECHANICS

Hours Per Week :

L	T	P	C
3	1	-	4

Total Hours :

L	T	P
45	15	-

WA/RA	SSH/HSH	CS	SA	S	BS
20	30	-	5	-	5

Course Description and Objectives:

Engineering Mechanics applies principles of mechanics to solve common engineering problems. The goal of this course is to expose students to problems in mechanics as applied to real-world scenarios.

The course uses the Laws of Mechanics to predict forces in machines and structures. This course is prerequisite for courses like Mechanics of Machines, Stress Analysis, Design of Mechanical Systems and others.

Course Outcomes:

The student will be able to:

- use scalar and vector analytical techniques for analyzing forces in statically determinate structures.
- apply basic knowledge of mathematics and physics to solve real-world problems such as dams, bridges, fly overs, buildings, large structures etc.

SKILLS:

- ✓ *Solving classical mechanics problems involving system of forces.*
- ✓ *In-depth understanding of rigid bodies.*
- ✓ *Applying principles of center of gravity and moment of inertia.*

UNIT-1 **L-10; T-3**

GENERAL PRINCIPLES: Introduction to engineering mechanics, Idealization in mechanic's basic concepts, Vectors and scalar quantity, Laws of mechanics.

FORCE SYSTEM AND RESULTANT: Concept of force, Representation of force, System of forces, Resolution of forces using rectangular components.

MOMENTS AND COUPLES: Introduction, Moment of force, Varignon's theorem, Resultant of parallel forces, Couple and moment of couple, Characteristic of couple.

UNIT -2 **L-8; T-3**

EQUILIBRIUM OF BODIES: Conditions of equilibrium for a coplanar force system and coplanar non parallel non concurrent force system, Principle of equilibrium (two, three, force principle), Lami's theorem.

TRUSS: Introduction, Classification of truss, Fundamental of truss, Analysis of truss (method of joints and method of section).

UNIT-3 **L-10; T-3**

FRICTION: Introduction, Classification of friction, Coefficient of friction, Laws of friction, Angle of friction, Angle of repose, Cone of friction, Ladder friction, Wedge friction.

UNIT-4 **L-10; T-3**

CENTROID: Introduction, Centroid of lines, Centroid of surfaces, Determine centroid of simple figures, Centroid of composite figures, Centroid of a parabolic spandrel.

CENTER OF GRAVITY: Introduction, Center of gravity, Location of center of gravity - right circular cone and solid hemisphere, Center of mass, Theorem of Pappus.

UNIT-5 **L-10; T-3**

MOMENT OF INERTIA: Moment of inertia of plane areas, Polar moment of an area, Radius of gyration of area, Parallel axis theorem, Perpendicular axis theorem, Moment of inertia of composite areas, Mass moment of inertia- introduction, Radius of gyration of mass, Mass moment of inertia of rod, Rectangular plate, Right circular cylinder, Circular ring, Circular plate.

TEXT BOOKS:

1. A. K. Dhiman, P. Dhiman and D. C. Kulshreshtha, "Engineering Mechanics: Statics and Dynamics", Mc Graw Hill, 2015
2. Basudeb Bhattacharyya, "Engineering Mechanics", 2nd Edition, Oxford University Press 2014.

REFERENCE BOOKS:

1. N. H. Dubey, "Engineering Mechanics : Statics and Dynamics",1st Edition, Mc Graw Hill, 2015.
2. S. S. Bhavikatti, "Engineering Mechanics", 1st edition, New Age International, 2015.
3. J. L. Meriam and L. G. Kraige, "Engineering Mechanics: Statics", 8th Edition, John Wiley and sons, 2015.

WEB LINKS:

1. https://www.youtube.com/user/mySeriesEM
2. https://www.youtube.com/channel/UCSeYfmhG5Z25uvm9C7gdrWw
3. http://ocw.mit.edu/courses/civil-and-environmental-engineering/1-050-engineering-mechanics-i-fall-2007/index.htm