

ENGINEERING MECHANICS (19CV17/27)

Engineering Mechanics	2 Hrs lecture + 2 Hrs Tutorial	28 Hrs	3 credits
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The objective of this Course is to provide an introductory treatment of Engineering Mechanics to all the students of engineering, with a view to prepare a good foundation for taking up advanced courses in the area in the subsequent semesters. A working knowledge of statics with emphasis on force equilibrium and free body diagrams.

Course objectives

- 1) Understanding and solving the problems involving forces, loads and reactions, Moments and its applications of concurrent force system.
- 2) Solving the problems of couples and equilibrium of bodies.
- 3) To study the method of computing support reactions and friction of rigid bodies on horizontal and inclined planes.
- 4) To determine the centre of gravity and moment of inertia of planar sections.
- 5) To study the concept of work, power & energy.

Module 1

Introduction to Engineering Mechanics covering, force Systems, Basic concepts, Particle equilibrium; Rigid Body equilibrium; System of Forces; Coplanar Concurrent Forces, Composition and resolution of force systems, Resultant force, Moment of Forces and its Application; law of transmissibility of forces, Varignon's theorem of moments. Numerical examples on above related topics. 6 hrs.

Module 2

Couple system, equivalent force couple system, composition of coplanar non concurrent force system, Resultants of Force System, Equilibrium of System of Forces, Free body diagrams, Equations of Equilibrium of Coplanar Systems and conditions of equilibrium, law of superposition of forces. Numerical examples on above related topics. 5 hrs

Module 3

Types of supports, types of loads, statically determinate and indeterminate beams, support reactions for statically determinate beams.

Friction, Types of friction, Limiting friction, Laws of Friction, Static and Dynamic Friction; Impending motion on horizontal and inclined planes, wedge friction, ladder friction. Numerical examples on above related topics. 6 hrs

Module 4

Centroid of plane figures, Centroid of simple figures from first principle, centroid of composite sections; Centre of Gravity and its implications; locating the centroid of triangle, semicircle, quadrant of a circle and sector of a circle, centroid of the simple built sections & composite sections,

Moment of inertia Definition, Moment of inertia of plane sections from first principles, Theorems of moment of inertia, Moment of inertia of standard sections and composite sections. Numerical examples on above related topics. 06 hrs

Module 5

Work, Power & Energy, Introduction, Work of a force, Energy of a particle, principle of work & energy for a system of particles, Potential energy and conservative forces, principles of conservation of energy, Power. 05 hrs

Text books:

1. S.S. Bhavikatti, "Elements of civil engineering", Vikas publishing house Pvt. Ltd., New Delhi.
2. Jagadeesh T.R. and Jayaram, "Elements of civil engineering", Sapna Book House, Bangalore.
3. A.K. Tayal, "Engineering mechanics (Statics & Dynamics)", Ninth edition, Umesh publications, New Delhi.

Reference Books:

1. Timoshenko and Young, "Engineering Mechanics", McGraw Book Company, New Delhi.
2. Ferdinand P. Beer and E. Russel Johnston Jr., "Mechanics for Engineers: Statics" McGraw Book Company, New Delhi.
3. K.L. Kumar, "Engineering Mechanics", Tata-McGraw-Hill Publishing company, New Delhi

Course Outcomes.

1. Explain the resultant of coplanar concurrent and non-concurrent force system and moments C2
2. Explain the couple and equilibrium of forces C2
3. Application of laws of friction C3
4. Determine the centre of gravity and moment of inertia of plane figures C2
5. Explain the law of conservation of energy, work done by a force. C2