

MEC107:BASIC ENGINEERING MECHANICS

L:3 T:1 P:0 Credits:4

Course Outcomes: Through this course students should be able to

CO1 :: recall the concept of forces, resultant forces, moments, and couples and their effect on a static rigid body.

CO2 :: discuss free body diagrams, equilibrium of particles, and equilibrium of rigid bodies

CO3 :: examine stability of rigid bodies subjected to friction

CO4 :: explore the moment of inertia and various theorems associated with it in context to the plane sections and thin plates.

CO5 :: assess the internal forces in simple trusses with the application of the method of joints and method of sections.

CO6 :: apply the fundamental concepts of kinematics and kinetics of particles to the analysis of practical problems.

Unit I

Introduction to Mechanics : Basic concepts, System of forces, Coplanar Concurrent Forces, Components in 2-D Plane-Resultant-Moment of Forces and its Applications, Couples and Resultant of Force System, Equilibrium of System of forces, Free body diagrams, Equations of Equilibrium of Coplanar Systems

Unit II

Friction : Introduction to friction, Types of friction, Limiting friction, Angle of friction, Laws of Friction, Static and Dynamic friction, Motion of bodies

Unit III

Centroid and Moment of Inertia : Centroids of areas and lines, Centroids of composite plates and wires, First moments of areas and lines, Moment of inertia of plane sections, Theorems of moment of inertia, Center of gravity, Moment of inertia of standard and composite sections, Mass moment of inertia of thin plates

Unit IV

Analysis of structures : Introduction to trusses, Definition of trusses, Simple trusses, Analysis of truss by method of joint, Analysis of truss by method of section.

Unit V

Introduction to Dynamics : Basic terms, general principles in dynamics, Types of motion, General Plane motion, Rectilinear motion, Plane curvilinear motion

Unit VI

Plane Kinematics and Kinetics of Rigid bodies : D' Alembert's principle and its applications in plane motion and connected bodies, Work energy principle and its application in plane motion of connected bodies, Kinetics of rigid body rotation

Text Books:

1. VECTOR MECHANICS FOR ENGINEERS, STATICS AND DYNAMICS by BEER AND JOHNSTON, MCGRAW HILL EDUCATION

References:

1. ENGINEERING MECHANICS: STATICS by ANDREW PYTEL | JAAN KIUSALAAS, CENGAGE LEARNING

2. ENGINEERING MECHANICS by BASUDEB BHATTACHARYYA, OXFORD UNIVERSITY PRESS

3. ENGINEERING MECHANICS - STATICS AND DYNAMICS by R. C. HIBBELER, A. GUPTA, PEARSON

4. ENGINEERING MECHANICS - STATICS AND DYNAMICS by S K SINHA, PEARSON

