

# MEC107:BASIC ENGINEERING MECHANICS

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

**Course Outcomes:** Through this course students should be able to

- Discuss and Understand and analyze forces, moments and their applications in real life situations.
- Describe and Understand the basic concepts of the laws of friction
- Analyze the concepts of moment of inertia and its application in real life situations
- Deduce and Formulate equations of motion for rigid body using different principles of motion

## 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 Co-planar 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