

## ENGINEERING MECHANICS – I

Lectures/Tutorials : 4/1 Periods / week  
Semester End Exam. : 3 hours

Sessional marks : 40  
Semester end Exam. marks : 60  
Credits : 4

### Course Objectives :

- To study Concurrent force systems in a plane
- To study Parallel force systems in a plane
- To study General case of force system in a plane
- To understand force systems in space
- To study Principle of virtual work
- To study friction

### Course Outcomes :

- Solve problems involving concurrent forces in a plane
- Solve problems involving parallel forces in a plane
- Solve problems involving general case of forces in a plane
- Solve problems involving force systems in space
- Apply Principle of virtual work to static problems
- Solve problems involving friction

### Unit - I

#### Concurrent Forces in a Plane

Principles of statics, Rectangular components of a force, Resultant and equilibrium of concurrent forces in a plane, Method of projections.

### Unit – II

#### Parallel Forces in a Plane

Moment of a force about a point, Couple, Resultant and equilibrium of parallel forces in a plane, Centre of parallel forces and centre of gravity, Centroids of composite plane figures and curves

### Unit – III

#### General Case of Forces in a Plane

Resultant and equilibrium of general case of parallel forces in a plane, Statically determinate plane trusses– Method of joints and Method of sections

#### Friction

Types of friction, Dry friction – Mechanism of friction , Types of friction problems

### Unit – IV

#### Principle of virtual work

Equilibrium of ideal systems, Stable and Unstable equilibrium

#### Force Systems in Space (using vector notation)

Position vector, Unit vector, Force vector , Component of a force about an axis, Moment of a force about a point, Moment of a force about an axis, Couple, Resultant and equilibrium of

concurrent forces in space, Resultant and equilibrium of parallel forces in space, Centre of parallel forces and centre of gravity

**TEXT BOOK:**

Engineering mechanics by S. Timoshenko , D. H. Young and J. Rao , Tata McGraw Hill Publishing Company Ltd.,2007.

**REFERENCE BOOK:**

1. Engineering mechanics by J. L. Meriam and L. Kraige , 6<sup>th</sup> Edition, John Wiley & Sons,2010.