

### **ME 101 Engineering Mechanics (3-1-0-8)**

Basic principles: Equivalent force system; Equations of equilibrium; Free body diagram; Reaction; Static indeterminacy. Structures: Difference between trusses, frames and beams, Assumptions followed in the analysis of structures; 2D truss; Method of joints; Method of section; Frame; Simple beam; types of loading and supports; Shear Force and bending Moment diagram in beams; Relation among load, shear force and bending moment. Friction: Dry friction; Description and applications of friction in wedges, thrust bearing (disk friction), belt, screw, journal bearing (Axle friction); Rolling resistance. Virtual work and Energy method: Virtual Displacement; Principle of virtual work; Applications of virtual work principle to machines; Mechanical efficiency; Work of a force/couple (springs etc.); Potential energy and equilibrium; stability. Center of Gravity and Moment of Inertia: First and second moment of area; Radius of gyration; Parallel axis theorem; Product of inertia, Rotation of axes and principal moment of inertia; Moment of inertia of simple and composite bodies. Mass moment of inertia. Kinematics of Particles: Rectilinear motion; Curvilinear motion; Use of Cartesian, polar and spherical coordinate system; Relative and constrained motion; Space curvilinear motion. Kinetics of Particles: Force, mass and acceleration; Work and energy; Impulse and momentum; Impact problems; System of particles. Kinematics and Kinetics of Rigid Bodies: Translation; Fixed axis rotational; General plane motion; Coriolis acceleration; Workenergy; Power; Potential energy; Impulse-momentum and associated conservation principles; Euler equations of motion and its application.

#### *Texts:*

- [1] I.H. Shames, Engineering Mechanics: Statics and Dynamics, 4th Ed., PHI, 2002.
- [2] F. P. Beer and E. R. Johnston, Vector Mechanics for Engineers, Vol I - Statics, Vol II – Dynamics, 3rd Ed., Tata McGraw Hill, 2000.

#### *References:*

- [1] J. L. Meriam and L. G. Kraige, Engineering Mechanics, Vol I – Statics, Vol II – Dynamics, 5th Ed., John Wiley, 2002.
- [2] R. C. Hibbler, Engineering Mechanics, Vols. I and II, Pearson Press, 2002.