## **ME-101 Engineering Mechanics**

**Statics of Particles:** Forces in a plane; Newton's First Law, Freebody diagram; Forces in space (rectangular components); Equilibrium of a particle in space.

**Kinematics of Particles:**Rectilinear and curvilinear motion of particles; Components of velocity and acceleration; Motion relative to a frame in translation.

**Kinetics of Particles:**Newton's Second Law; Dynamic equilibrium; Rectilinear and curvilinear motion; Work and energy; Kinetic energy of particle; Principle of Work and Energy; Conservation of energy; Impulse and momentum; Impulsive forces and conservation of momentum; Impact, direct and oblique; Conservation of angular momentum.

**Rigid Bodies:**Equivalent systems of forces; Principle of transmissibility; Moment of a force; Couple; Varignons Theorem. Centre of gravity of a three-dimensional body and centroid of a volume. Moments of inertia, radius of gyration, parallel axis theorem.

**Equilibrium of Rigid Bodies:**Free-body diagram; Equilibrium in two and three dimensions; Reaction of supports and connections; Equilibrium of two-force and three-force bodies.

**Kinematics of Rigid Bodies:**General Plane motions; Absolute and relative velocity and acceleration.

**Plane Motion of Rigid Bodies:**Forces and acceleration; Energy and momentum; Conservation of linear and angular momentum.

**Friction:**Laws of dry friction; Angles of friction; Wedges; Square-threaded screws; Journal and thrust bearings; Belt friction.

Analysis of Structures: Internal forces and Newton's Third Law; Simple and space trusses; Joints and sections; Frames and machines. Forces in cables.

## **Recommended book(s)**

## **Text Books:**

1. <u>Russell Hibbeler</u>, Engineering Mechanics, 14<sup>th</sup> Edition, Pearson, 2015

## **Reference Books:**

1. J. L. Meriam (Author), L. G. Kraige, Engineering Mechanics, Statics and Dynamics, 9<sup>th</sup> Edition, Wiley, 2018