ME101 Engineering Mechanics (3-1-0-8)

Prerequisite: Nil

Equivalent Force Systems: concentrated and distributed force systems, simplest resultant (wrench), centre of pressure, centroid, and centre of gravity.

Equilibrium of Rigid Bodies: free body diagram, reactions, equations of equilibrium, static indeterminacy.

Analysis of Structures: analysis of trusses, method of joints and method of sections, analysis of frames and beams, shear force and bending moment, axial force and twisting moment.

Friction: concept of friction, applications of friction to simple machines; rolling resistance.

Virtual Work: principle of virtual work and its application to machines.

Moment of Inertia: moments of inertia of simple and composite bodies, moments of inertia under transformation of axes, principle axes and principle moments of inertia, Mohr's circle.

Kinematics of Particles and Rigid Bodies: rectilinear motion, curvilinear motion, velocity and acceleration in cylindrical and path coordinate system, relative and constrained motion, rate of change of a vector in a rotating frame, three-dimensional motion of a particle relative to a rotating frame, rigid body kinematics.

Kinetics of Systems of Particles and Rigid Bodies: linear and angular momentum of a system of particles and a rigid body, kinetic energy of a system of particle and a rigid body, linear and angular momentum principles, Euler equation of motion.

Impact of Rigid Bodies: linear and angular impulse, impulse-momentum principle, work-energy principle, central and eccentric impacts.

References:

[1] I. H. Shames, Engineering Mechanics: Statics and Dynamics, 4th Edition, PHI, 2002.
[2] F. P. Beer, E. R. Johnston Jr., D. F. Mazurek, P. J. Cornwell, S. Sanghi, Vector Mechanics for Engineers Statics and Dynamics, 10th Edition, McGraw Hill, 2013.
[3] J. L. Meriam, L. G. Kraige, Engineering Mechanics Statics, 7th Edition, John Willey, 2012.