Indian Institute of Technology (Indian Institute of Technology) Dhanbad
Department of Mechanical Engineering

NMEC101: ENGINEERING MECHANICS (3-0-0) - 2025-26

Name of the Instructor: Dr. Sarthak S. Singh (e-mail id: sarthakssingh@iitism.ac.in)

Group email id: nmec101_me@iitism.ac.in

Module 1: Introduction, Idealization of Mechanics, Equilibrium of Rigid Bodies: Equivalent Force Systems; Wrench; Equilibrium of a Rigid Body in Three Dimensions

Module 2: Analysis of structures: Trusses, Frames and Machines

Module 3: Friction: Wedges, Screw Jack and Belt Friction; Axle and Disk Friction

Module 4: Distributed forces: Centroids of Lines, Areas and Composite Plates; Center of Gravity; Moment of Inertia and Product of Inertia

Module 5: Method of Virtual Work: Stability and Equilibrium

Module 6: Kinematics of Particles: Motion Relative to a Frame, Tangential and Normal Components, Radial and Transverse Components

Module 7: Kinetics of Particles: Rate of Change of Angular Momentum, Impulse; Equations of Motion in Terms of Radial and Transverse Components, Work-Energy Principle

Module 8: Kinematics of Rigid Bodies (Planar Motion): Rotation of a Rigid Body about a Fixed Axis, General Plane Motion; Instantaneous Center of Rotation in Plane Motion;

Module 9: Kinematics of Rigid Bodies (spatial motion): Spherical Motion, Chasles' Theorem, Coriolis Acceleration, Euler angles.

Module 10: Kinetics of Rigid Bodies in 3D; Angular Momentum, Kinetic energy, Euler's Equations of Motion, Gyroscopic Motion with Steady Precession.

Text Book

- Vector Mechanics for Engineers: Statics and Dynamics (Beer and Johnston), McGraw Hill Publishers

Reference Books

- Engineering Mechanics: Statics and Dynamics (R. C. Hibbeler), Pearson Publishers
- Engineering Mechanics: Statics and Dynamics (Meriam, Kraige, and Bolton), Wiley Publishers

Class Timings

- Monday (08:00–08:50 AM), Tuesday (08:00–08:50 AM), Wednesday (08:00–08:50 AM)

Examination (Closed book system will be followed):

- ***Mid Semester Examination:*** (***30 marks***). It will be conducted anyday between 16th to 21st Sept, 2025. The final date will be announced by the Dean Academics.
- ***End Semester Examination:*** (***50 marks***). It will be conducted anyday between 19th to 30th Nov, 2025. The final date will be announced by the Dean Academics.
- ***Assignments:*** 4 Assignments (***20 marks***).