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| **B. TECH 2nd SEMESTER** | **L** | **T** | **L** | **C** |
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| **16ME2T02: Engineering Mechanics** |

# COURSE OBJECTIVES

1. To understand the vectorial and scalar representation of forces and moments, static equilibrium of particles and rigid bodies in two and three dimensions.
2. To understand the principle of work and energy, the effect of friction in equilibrium, the kinematics and laws of motions and the dynamic equilibrium.

# COURSE OUTCOMES

At the end of the course student able to

1. Analyze the principles of statics of particles to solve engineering problems.
2. Establish various forces and moments acting on rigid bodies.
3. Define properties and theories related to surfaces and solids.
4. Describe the principles of various types of friction.
5. Analyze the principles of dynamics of particles to solve engineering problems.

**UNIT– I**

**CONCURRENT FORCES IN A PLANE:** Principles of statics, composition and resolution of forces, Equilibrium of concurrent forces in a plane, Method of projections, Equilibrium of three forces in a plane, Method of moments.

**PARALLEL FORCES IN A PLANE:** Two parallel forces, General case of parallel forces in a plane, Center of parallel forces

**UNIT – II**

**GENERAL CASE OF FORCES IN A PLANE:** Composition of forces in a plane, Equilibrium of forces in a plane

**FORCE SYSTEMS IN SPACE:** Concurrent forces in space: method of projections, Method of moments, couples in space, Parallel forces in space, General case of forces in space

**UNIT – III**

**FRICTION:** Introduction, Angle of Repose, Laws of Friction, and Friction of Bodies moving Up and Down on an Inclined Plane, Wedge Friction, Screw Jack.

**UNIT - IV**

**CENTROID AND CENTER OF GRAVITY:** Centroid of simple figures and Centroid of Compositefigures. Center of Gravity of simple Bodies and Center of Gravity of Composite Bodies, Pappus Theorem.

**MOMENT OF INERTIA:** Introduction, Polar Moment of Inertia, Radius of Gyration, Parallel AxisTheorem, Moment of Inertia of Composite Areas, Product of Inertia.

**MASS MOMENT OF INERTIA:** Introduction, Radius of Gyration, Transfer Formula for CompositeBodies.

**UNIT – V**

**KINETICS:** Analysis as a Particle and analysis as a Rigid Body in Translation–Central Force Motion–Equations of Plane Motion – Fixed Axis Rotation – Rolling Bodies.

**KINEMATICS:** Rectilinear and Curvilinear Motion–Velocity and Acceleration–Motion of Rigid Body

– Types and their Analysis in Planar Motion.

**UNIT – VI**

**WORK-ENERGY METHOD:**

Equations for Translation, Work-Energy Applications to Particle Motion, Connected System-Fixed Axis Rotation and Plane Motion. Impulse momentum method.

**Text Books:**

 1. ENGINEERING MECHANICS - S. Timoshenko & D.H. Young, McGraw Hill

 2. ENGINEERING MECHANICS - A.K.TAYAL – UMESH Publications

 3. ENGINEERING MECHANICS - BASUDEB BHATTACHARYA – Oxford University Press.

**Reference Books:**

 1. ENGINEERING MECHANICS - A. NELSON, McGraw Hill Publications

 2. ENGINEERING MECHANICS - Ferdinand L. Singer, Harper Collins Publishers

 3. ENGINEERING MECHANICS - S. S. Bhavikatti, New Age Publishers