1/4 B.Tech. SECOND SEMESTER

ME2T4 ENGINEERING MECHANICS-II Credits: 4

Lecture: 4 periods/week **Internal assessment: 30 marks**
Tutorial: 1 period /week **Semester end examination: 70 marks**

Objectives:

1. Gain a basic knowledge of rigid-body mechanics.
2. Know the elasticity and structural analysis concepts
3. Recognize the Moment of inertia of plane areas and to know the behavior of dynamics of particles and rigid bodies.

Learning outcomes:

At the end of course the student will be able to:

1. Express the knowledge on Kinetics and Kinematics of rectilinear translation
2. Describe the concept of curvilinear motion pertain to Kinetics and Kinematics.
3. Elucidate on Moment of inertia of laminas and 3D bodies.
4. Enlighten on the kinematic rotation of a rigid body.
5. Illustrate the concept of plane body motion dealing with kinetics and kinematics.

Pre-Requisites:

Engineering Mechanics I.

UNIT – I
KINEMATICS OF RECTILINEAR TRANSLATION: Introduction, displacement, velocity and acceleration. Motion with Uniform and Variable acceleration.

UNIT –II
KINETICS OF RECTILINEAR TRANSLATION: Equations of rectilinear motion. Equations of Dynamic Equilibrium: D'Alembert's Principle. Work and Energy, Conservation of energy, Impulse and Momentum, Impact-Direct central Impact.

UNIT – III
KINEMATICS OF CURVILINEAR MOTION: Introduction, rectangular components of velocity & acceleration. Normal and Tangential acceleration. Motion of projectiles.

UNIT – IV

KINETICS OF CURVILINEAR MOTION: D'Alembert's Principle in curvilinear motion – Work and energy.

UNIT – V

MOMENT OF INERTIA OF MATERIAL BODIES: Moment of inertia of a rigid body – Moment of inertia of laminas- slender bar, rectangular plate, Circular plate, circular ring, Moment of inertia of 3D bodies- cone, solid cylinder, sphere & parallelepiped.

UNIT – VI

ROTATION OF A RIGID BODY ABOUT A FIXED AXIS: Kinematics of rotation, Equation of motion for a rigid body rotating about a fixed axis – Rotation under the action of a constant moment.

UNIT – VII

KINEMATICS OF PLANE MOTION: Concepts of relative velocity and instantaneous center.

UNIT – VIII

KINETICS OF PLANE MOTION: Equations of motion, Dynamic equilibrium of symmetrical rolling bodies.

Learning resources

Text books:

1. Engineering Mechanics, (2nd Edition), by S.Timoshenko & D.H.Young, McGraw Hill publications,.
2. Engineering Mechanics Statics and dynamics, by A.K.Tayal, Umesh Publication, Delhi, 2009.

Reference books:

1. Vector Mechanics for Engineers Statics and Dynamics, (9^{th} edition), by Beer and Johnston,Tata McGraw Hill Publishing Company, New Delhi..
2. S Engineering. Mechanics, by .S. Bhavikatti & J.G. Rajasekharappa, New Age International Publishers. New Delhi, 2008.
3. Engineering Mechanics Statics and Dynamics, (3^{ed} edition), by K.Vijaya Kumar Reddy and J Suresh Kumar, BS Publications,.