



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA
KAKINADA – 533 003, Andhra Pradesh, India

DEPARTMENT OF CIVIL ENGINEERING

I Year - II Semester		L	T	P	C
		3	0	0	3
ENGINEERING MECHANICS (ESC1201)					

Objectives: The students completing this course are expected to understand the concepts of forces and its resolution in different planes, resultant of force system, Forces acting on a body, their free body diagrams using graphical methods. They are required to understand the concepts of centre of gravity and moments of inertia and their application, Analysis of frames and trusses, different types of motion, friction and application of work - energy method.

- The students are to be exposed to the concepts of force and friction, direction and its application.
- The students are to be exposed to application of free body diagrams. Solution to problems using graphical methods and law of triangle of forces.
- The students are to be exposed to concepts of centre of gravity
- The students are to be exposed to concepts of moment of inertia and polar moment of inertia including transfer methods and their applications.
- The students are to be exposed to motion in straight line and in curvilinear paths, its velocity and acceleration computation and methods of representing plane motion.
- The students are to be exposed to concepts of work, energy and particle motion

UNIT – I Introduction to Engg. Mechanics – Basic Concepts.

Systems of Forces: Coplanar Concurrent Forces – Components in Space – Resultant – Moment of Force and its Application – Couples and Resultant of Force Systems. Introduction, limiting friction and impending motion, coulomb's laws of dry friction, coefficient of friction, cone of friction

UNIT II Equilibrium of Systems of Forces : Free Body Diagrams, Equations of Equilibrium of Coplanar Systems,

Spatial Systems for concurrent forces. Lami's Theorem, Graphical method for the equilibrium of coplanar forces, Converse of the law of Triangle of forces, converse of the law of polygon of forces condition of equilibrium.

UNIT – III Centroid : Centroids of simple figures (from basic principles) – Centroids of Composite Figures

Centre of Gravity : Centre of gravity of simple body (from basic principles), centre of gravity of composite bodies, Pappus theorem.

FRICITION

Types of friction – Limiting friction – Laws of Friction – static and Dynamic Frictions – Angle of Friction – Cone of limiting friction – Friction of wedge, block and Ladder



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA
KAKINADA – 533 003, Andhra Pradesh, India

DEPARTMENT OF CIVIL ENGINEERING

UNIT IV

Area moments of Inertia : Definition – Polar Moment of Inertia, Transfer Theorem, Moments of Inertia of Composite Figures, Products of Inertia, Transfer Formula for Product of Inertia.

Mass Moment of Inertia : Moment of Inertia of Masses, Transfer Formula for Mass Moments of Inertia, mass moment of inertia of composite bodies.

UNIT – V

Kinematics: Rectilinear and Curvelinear motions – Velocity and Acceleration – Motion of Rigid Body – Types and their Analysis in Planar Motion.

Introduction – Rectilinear motion – Motion with uniform and variable acceleration–Curvilinear motion–Components of motion– Circular motion – Projectiles- Instantaneous centre

Kinetics: Kinetics of a particle – D’Alembert’s principle – Motion in a curved path – work, energy and power. Principle of conservation of energy – Kinetics of a rigid body in translation, rotation – work done – Principle of work-energy – Impulse-momentum

TEXT BOOKS:

1. Engineering Mechanics - S.Timoshenko&D.H.Young., 4thEdn , Mc Graw Hill publications.
2. Engineering Mechanics statics and dynamics – R.C.Hibbeler, 11thEdn – Pearson Publ.

REFERENCES:

1. Engineering Mechanics, statics and Dynamics, J.L.Meriam, 6thEdn – Wiley India Pvt Ltd.
2. Engineering Mechanics: Statics and Dynamics 3rd edition, Andrew Pytel and JaanKiusalaas, Cengage Learning publishers.
3. Engineering Mechanics, dynamics, Bhavikatti S.S – NewAge International Publishers.
4. Engineering Mechanics, statics and dynamics – I.H. Shames, – PearsonPublications
5. Mechanics For Engineers, statics -F.P.Beer&E.R.Johnston – 5thEdn Mc Graw Hill Publ.
6. Mechanics For Engineers, dynamics - F.P.Beer&E.R.Johnston – 5thEdn McGraw Hill Publ.
7. Theory & Problems of engineering mechanics, statics & dynamics – E.W.Nelson, C.L.Best& W.G. McLean, 5thEdn – Schaum’s outline series - Mc Graw Hill Publ.
8. Engineering Mechanics, Ferdinand . L. Singer, Harper – Collins.
9. Engineering Mechanics statics and dynamics, A Nelson, Mc Graw Hill publications
10. Engineering Mechanics, Tayal. Umesh Publications.