APPLIED MECHANICS
(SYLLABUS)

Course Code	23CE2702D	Year	IV	Semester	I
Course Category	OPEN ELECTIVE IV	Branch	CIVIL	Course Type	Theory
Credits	3	L-T-P	3-0-0	Prerequisites	Mechanics of Solids
Continuous Internal Evaluation	30	Semester End Evaluation	70	Total Marks:	100

Course Objectives:

The objective of this course is to:

1. To solve the resultant of any force system.
2. To analyze the types of frication for moving bodies and problems related to friction.
3. To determine the centroid of an area and center of gravity of body.
4. To understand the concept of area moment and mass moment about any axes.
5. Understand the work-energy principle

Course Outcomes:

Course will enable the student to:

CO	Statement	Blooms level
CO 1	Analyze different types of force systems and determine the resultant, moments, and equilibrium conditions for coplanar and spatial systems using free body diagrams.	**L4**
CO 2	Evaluate the effects of friction in engineering applications and solve problems related to dry friction, ladder, wedge, and screw mechanisms.	**L5**
CO 3	Determine the centroid and center of gravity for simple and composite geometrical figures and bodies using standard methods and theorems.	**L3**
CO 4	Compute area and mass moments of inertia for various sections and bodies, including composite configurations, using analytical and integration methods.	**L3**
CO 5	Apply principles of kinetics, including D'Alembert's principle and work-energy methods, to analyze motion of rigid bodies and connected systems.	**L4**

Course Articulation Matrix:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	1	2								2	1
CO2	3	2	1	2								2	1
CO3	3	2		1								2	1
CO4	3	2		2								2	1
CO5	3	3	1	2								3	2

Syllabus

Unit No	Content	Mapped COs
I	Introduction to Mechanics: Basic Concepts, system of Forces Coplanar Concurrent Forces - Components in Space -Resultant -Moment of Forces and its Application - Couples and Resultant of Force Systems. Equilibrium of system of Forces: Free body diagrams, Equations of Equilibrium of Coplanar Systems and Spatial Systems.	CO1
II	Friction: Types of friction -Limiting friction -Laws of Friction -static and Dynamic Frictions, – Types of friction – Dry friction – Ladder friction – Wedge friction – Screw friction –Simple Screw Jack	CO2
III	Centroid and Center of Gravity: Introduction – Centroids of lines – Centroids of area - Centroids of Composite figures - Theorem of Pappus -Centre of Gravity - Center of gravity of composite bodies.	CO3
IV	Area moments of Inertia: Introduction – Definition of Moment of Inertia -Polar Moment of Inertia – Radius of gyration - Transfer Theorem for moment of inertia – Moments of inertia by integration - Moments of Inertia of Composite Figures. Mass Moment of Inertia: Introduction - Moment of Inertia of Masses – Radius of gyration - Transfer Formula for Mass Moments of Inertia – Mass moments of inertia by integration - Mass moment of inertia of composite bodies – Product of Inertia.	CO4
V	Kinetics of Rigid Bodies: Types of motion, D'Alemberts principle and its applications in plane motion and connected bodies; Work energy principle and its application in plane motion of connected bodies; kinetic of rigid body rotation.	CO5

Learning Resource(s)

Text Book(s)

1. Engineering Mechanics by R.K.Bansal, Laxmi Publications (P) Ltd.
2. Engineering Mechanics by S.S. Bhavikatti and K.G.Rajashekarappa, New Age International (P) Ltd Publishers.

Reference Book(s)

1. Engineering Mechanics by S.P. Timoshenko & D.H. Young, J.V.Rao, Sukumar Pati,McGraw Hill Education.
2. Engineering Mechanics Statics and Dynamics by R.C. Hibbeler, Pearson Education India.
3. Engineering Mechanics Statics and Dynamics by Tayal A.K, Umesh Publications.
4. Engineering Mechanics: Statics and Dynamics by S.Rajasekaran and G.Sankarasubramaniam, Vikas Publishing house Pvt Ltd.

E- Resources:

1. https://onlinecourses.nptel.ac.in/noc25_me20/preview?utm_source=chatgpt.com
2. https://onlinecourses-archive.nptel.ac.in/noc17_me01/course
3. https://archive.nptel.ac.in/courses/112/103/112103109/
4. https://ocw.mit.edu/courses/2-003sc-engineering-dynamics-fall-2011/resources/lecture-videos/?utm_source=chatgpt.com