22CE101	ENGINEERING MECHANICS	Semester			II
PREREQUISITES	Category	ES	Credit		3
	Hours/Week	L	T	P	TH
		2	1	0	3

Course Learning Objectives

1	To explain the importance of mechanics in the context of engineering and conservation equations.
2	To apply resolution of forces
3	To explain the significance of centroid, center of gravity and moment of inertia
4	To apply the different principles to study the motion of a body, and concept of relative velocity and acceleration
5	To apply Impulse Momentum principle

Unit I	BASICS & STATICS OF PARTICLES	6	3	0	9

Introduction – Units and Dimensions – Laws of Mechanics – Lame's theorem, Parallelogram and triangular Law of forces – Vectors – Vectorial representation of forces and moments – Vector operations: additions, subtraction, dot product, cross product – Coplanar Forces – Resolution and Composition of forces – Equilibrium of a particle – Equilibrium of a particle in three dimensions – Equivalent systems of forces – Principle of transmissibility – Single equivalent force.

Unit II	EQUILIBRIUM OF RIGID BODIES	6	3	0	9

Free body diagram – Types of supports and their reactions – requirements of stable equilibrium – Moments and Couples – Moment of a force about a point and about an axis – Vectorial representation of moments and couples – Scalar components of a moment – Varignon's theorem – Equilibrium of Rigid bodies in two dimensions – Equilibrium of Rigid bodies in three dimensions.

Unit III	PROPERTIES OF SURFACES AND FRICTION	6	3	0	9

Centroids and centre of mass- Centroids of lines and areas-Rectangular, Circular, triangular areas by integration-T section, I section .-Angle Section, Hollow section by using standard formula Theorems of pappus Area moments of inertia of plane areas-Rectangular, circular, triangular areas by integration-T section, I section , Angle section, Hollow section by using standard formula parallel Axis Theorem and perpendicular Axis Theorem-Principal Moments of Inertia of plane areas Mass moment of inertia.

Unit IV	KINEMATICS AND KINETICS OF PARTICLES	6	3	0	9

Displacement, Velocity and acceleration, their relationship-Relative motion-Newton's low of motion –Work Energy Equation-Impulse and Momentum-Impact of elastic bodies

Unit V	KINEMATICS AND KINETICS OF RIGID BODIES	6	3	0	9

Plane motion– Absolute motion – Relative motion – Translating ares and Rolling Axes- Work and Energy – Impulse and Momentum

Total= 45 Periods

Text Books:

1. Rajasekaran S and Sankara subramanian G., Fundamentals of Engineering Mechanics, Vikas Publishing House Pvt. Ltd., 3rd Edition,2017.
2. Bansal R.K., Engineering Mechanics, Laxmi Publications (P) Ltd., 8th Edition, 2015.
3. Palanichamy M.S. and Nagan S, Engineering Mechanics, Laxmi Publication(P) Ltd.,2022

Reference Books:

1. Kumar K.L., Engineering Mechanic, Tata McGraw–Hill Publishing Company Limited, New Delhi, 4th Edition, 2017.

2	Beer F.P and Johnson Jr. E.R. Vector Mechanics for Engineers, Vol. 1 Statics and Vol. 2 Dynamics, McGraw–Hill International Edition, 12th Edition, 2019
3	Hibbeller R.C., Engineering Mechanics, Vol. 1 Statics, Vol. 2 Dynamics, Pearson Education Asia Pvt. Ltd., 14th Edition, 2017.
4	Irving H. Shames, Engineering Mechanics – Statics and Dynamics, IV Edition – Pearson Education Asia Pvt. Ltd., 4th Edition, 2005.

Course Outcomes: Upon completion of this course, the students will be able to:		**Bloom's Taxonomy Mapped**
CO1	Demonstrate the basics and statics of the particle by applying, knowledge of mathematics and engineering sciences	Apply
CO2	Explain the equilibrium of rigid bodies and draw the free body diagram and mention the supports and the reaction for the diagram.	Apply
CO3	Select and apply appropriate techniques to determine the areas of the surfaces using the various theorems and find the moment of inertia of different body shapes	Apply
CO4	Understand the complex engineering problems to solve the dynamics of particles	Apply
CO5	Understand the mechanisms of rigid bodies using Civil engineering solutions for sustainable development.	Apply

COURSE ARTICULATION MATRIX

COs/ POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	**2**	**3**	**1**	**1**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**
CO2	**2**	**3**	**2**	**1**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**
CO3	**2**	**3**	**2**	**1**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**
CO4	**2**	**3**	**2**	**1**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**
CO5	**2**	**3**	**2**	**1**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**
Avg	**2**	**3**	**1.8**	**1**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**

3/2/1 – indicates strength of **correlation (3- High, 2- Medium, 1- Low)**