Course code	ENGINEERING MECHANICS	L	T	P	C
		2	1	0	3
Pre-requisite	NIL	Syllabus version			

Course Objectives:

1. To enable students to apply fundamental laws and basic concepts of rigid body mechanics to solve problems of bodies under rest or in motion.
2. To enable the students to apply conditions of static equilibrium to analyse physical systems.
3. To compute the properties of areas and bodies.

Course Outcome:

Upon successful completion of the course the students will be able to

1. Compute the resultant and analyse equilibrium (without and with friction) of system of forces acting on particles and rigid bodies in plane and space.
2. Predict the support-reactions and the internal forces of the members of trusses and frames.
3. Apply transfer theorems to determine properties of various sections.
4. Calculate motion parameters of particles and rigid bodies.

Module:1	Statics of Particles	5 hours

Fundamental concepts and principles - Resolution of a force -Resultant of forces in a plane- Equilibrium of a particle in a plane; Addition of concurrent forces in space- Equilibrium of a particle in space.

Module:2	Statics of Rigid Bodies	7 hours

Equivalent systems of forces- Principle of Transmissibility - Moment of a force about a point and an axis- Couples and force-couple systems- Equilibrium of rigid bodies in two and three dimensions- Types of beams, supports and reactions; Principle of virtual work – System of connected rigid bodies.

Module:3	Analysis of Structures	5 hours

Analysis of plane trusses - Method of joints and method of sections- Frames

Module:4	Friction	5 hours

The laws of dry friction – Coefficients of Friction- Angles of Friction- Types of Friction Problems - Wedges and Ladder friction- Belt friction.

Module:5	Properties of Surfaces and Solids	7 hours

First moments of areas and lines- Centroids of composite areas and lines- - Theorems of Pappus-Guldinus- Second moment of area- Parallel axis theorem- Rectangular and Polar Moments of inertia of composite areas- Radius of Gyration- Product of Inertia- Principal Axes and Principal Moments of Inertia- Mass moments of inertia of thin plates.

Module:6	**Dynamics of Particles**	**8 hours**

Kinematics of Particles-Displacement, Velocity and Acceleration – Rectilinear motion – Curvilinear motion – Tangential and Normal components – Radial and Transverse components.

Kinetics of Particles- Newton's Second Law- Energy and Momentum Methods-Principle of Work and Energy-Principle of Impulse and Momentum- Direct Central Impact

Module:7	**Dynamics of Rigid Bodies**	**8 hours**

Kinematics of rigid bodies- Translation and fixed-axis rotation- General plane motion: velocity- Instantaneous centre of rotation- General plane motion: acceleration.

Kinetics of rigid bodies- Equations of motion -Angular momentum- Plane motion of a rigid body- Principle of work and energy for rigid bodies- Principle of impulse and momentum for rigid bodies.

	Total Lecture hours:	**45 hours**

Text Book(s)

1. Beer, Johnston, Cornwell, David Mazurek, and Sanghi, Vector Mechanics for Engineers: Statics and Dynamics, 12th Edition, McGraw-Companies, Inc., New York, 2019.

Reference Books

1. Russell C Hibbeler, Engineering Mechanics: Statics and Dynamics (14th Edition), Pearson Education Inc., Prentice Hall, 2016.
2. Meriam J.L and Kraige L.G., Engineering Mechanics, Volume I - Statics, Volume II - Dynamics, 9th Edition, John Wiley & Sons, New York, 2018.

Mode of Evaluation: CAT, Assignment , Quiz and FAT			
Recommended by Board of Studies			
Approved by Academic Council		Date	

Programme Articulation Matrix

	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
Engineering Mechanics															

Syllabus short form

Engineering Mechanics

3 Credits (2-1-0)

Resultant of forces in a plane and space-Equilibrium of a particle; Moment of a force, force-couple systems, Equilibrium of rigid bodies; Virtual work; Analysis of plane trusses; Dry friction- wedges, ladder and belt friction; Centroids and second moment of composite areas; Dynamics of particles and rigid bodies.

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