ENGINEERING MECHANICS

Course Code	19ME3301	**Year**	II	**Semester**	I
Course Category	Program Core	**Branch**	ME	**Course Type**	Theory
Credits	3	**L – T – P**	2 – 1 – 0	**Prerequisites**	Engineering Mathematics
Continuous Internal Evaluation	30	**Semester End Evaluation**	70	**Total Marks**	100

Course Outcomes		**Levels**
After successful completion of the course, the student will be able to		
CO1	Determine the resultant force, moment and static equilibrium of a rigid body subjected to a force system.	L3
CO2	Analyze planar force systems to determine the forces in the members of trusses and solve friction related problems.	L4
CO3	Determine centroids and moment of inertia for simple and composite areas	L3
CO4	Apply kinematic principles to the rigid bodies under translation and rotation motion.	L3
CO5	Determine the motion parameters for a body subjected to a given force system.	L3

Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3-High, 2: Medium, 1: Low)

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	3	2							1		2	3	1
CO2	3	3	2							1		2	3	1
CO3	3	3	2							1		2	3	1
CO4	3	3	2							1		2	3	1
CO5	3	3	2							1		2	3	1

Syllabus

Unit No.	**Contents**	**Mapped COs**
I	**INTRODUCTION**: Significance of Engineering Mechanics, Composition and resolution of forces, parallelogram law, principle of transmissibility, types of force systems - concurrent and non-concurrent, coplanar forces, resultant of coplanar force systems, couple, moment of a force, Varignon's theorem, concept of free body diagrams, concept of equilibrium of coplanar force systems.	CO1
II	**FRICTION:** Laws of friction, types of friction, equilibrium of force systems involving frictional forces, ladder and wedge friction **ANALYSIS OF STRUCTURES:** Introduction to plane trusses, Types of trusses, Assumptions in analysis of truss, analysis of plane trusses by method of joints.	CO2
III	**CENTROID:** Centroid and centre of gravity, derivation of centroids of rectangle, triangle, circle, semi-circle from first principles, centroid of composite areas.	CO3

	MOMENT OF INERTIA: Area moment of inertia of plane and composite figures, parallel axis theorem, perpendicular axis theorem, polar moment of inertia.	
IV	**KINEMATICS:** Equations of motion for rigid bodies under constant and variable acceleration, rectilinear and curvilinear motion, Rotation of a rigid body about a fixed axis- Rotation under the action of constant moment.	CO4
V	**KINETICS:** Principles of dynamics - Newton's Laws of motion, D'Alembert's principle in rectilinear translation, principle of work and energy. **IDEAL SYSTEMS:** Principle of conservation of energy, conservation of linear momentum, principle of momentum and impulse, impact – Direct central impact	CO5

Learning Recourse(s)
Text Book(s)
1. S. Timoshenko, D.H. Young, J.V. Rao, Sukumar Pati, Engineering Mechanics (in SI units), 5/e, McGraw Hill, 2013. 2. Engineering Mechanics Statics and dynamics, by A.K.Tayal, Umesh Publication, Delhi, 14e, 2010.
Reference Book(s)
1. Irving Shames, G.K.M. Rao, Engineering Mechanics: Statics and Dynam-ics, 4/e, Pearson, 2009. 2. K.L. Kumar, Veenu Kumar, Engineering Mechanics, 4/e, Tata McGraw Hill, 2010. 3. N.H. Dubey, Engineering Mechanics: Statics and Dynamics,TataMcGrawHill,2014
e-Resources & other digital material
1. https://nptel.ac.in/courses/112/103/112103108/ 2. https://www.coursera.org/learn/engineering-mechanics- statics