ENGINEERING MECHANICS

II Semester: AE / CE / ME

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AME002	Foundation	3	1	-	4	30	70	100
Contact Classes:45	Tutorial Classes: 15	Practical Classes: Nil				Total Classes: 60		

I. COURSE OVERVIEW:

Engineering Mechanics is a branch of Physics that deals with the study of the system of forces acting on a particle which is at rest or in motion. The course emphasizes thorough understanding of theories and principles related to static and dynamic equilibrium of rigid bodies to acquire the analytical capability required for solving engineering problems and are one of the foundation courses that form the basis of many of the traditional branches of engineering such as aerospace, civil and mechanical engineering.

II. OBJECTIVES:

The course should enable the students to:

I. Develop the ability to work comfortably with basic engineering mechanics concepts required for analyzing static structures.
II. Identify an appropriate structural system to studying a given problem and isolate it from its environment, model the problem using good free body diagrams and accurate equilibrium equations.
III. Identify and model various types of loading and support conditions that act on structural systems, apply pertinent mathematical, physical and engineering mechanical principles to the system to solve and analyze the problem.
IV. Solve the problem of equilibrium by using the principle of work and energy in mechanical design and structural analysis.
V. Apply the concepts of vibrations to the problems associated with dynamic behavior.

III. COURSE OUTCOMES:

After successful completion of the course, students should be able to:

CO 1	**Make use of** principles for rectilinear motion of particles to solve problems in motion curves, rigid body motion and fixed axis rotation.	Apply
CO 2	**Apply** D'Alembert's principle to a dynamic equilibrium system by introducing the inertia force for knowing the acceleration and forcesinvolved in the system.	Apply
CO 3	**Develop** the relations for the motion of body in lift and on inclined plane to identify the unknown forces and the forces due to gravity.	Create
CO 4	**Understand** the concept of virtual work to solve problems involving displacements and time with respect to impact and impulse momentumequation.	Understand
CO 5	**Determine** the effect of law of conversation of energy when the system involves before and after collision.	Evaluate
CO 6	**Develop** the governing equation for momentum and vibration phenomenon of mechanical system by using energy principles for obtaining co efficient and circular frequency.	Create

IV. SYLLABUS:

UNIT-I	KINEMATICS OF PARTICLES RECTILINEAR MOTION	Classes: 12

Kinematics of particles rectilinear motion:Motion of a particle**,** rectilinear motion**,** motion curves**,** rectangular components of curvilinear motion, kinematics of rigid body, types of rigid body motion, angular motion, fixed axis rotation**.**

UNIT-II	KINETICS OF PARTICLE	Classes: 15

Kinetics of particle:Introduction, definitions of matter, body, particle, mass, weight, inertia, momentum, Newton's law of motion, relation between force and mass, motion of a particle in rectangular coordinates, D'Alembert'sprinciple, motion of lift, motion of body on an inclined plane, motion of connected bodies.

UNIT-III	IMPULSE AND MOMENTUM, VIRTUAL WORK	Classes: 11

Impulse and momentum:Introduction; Impact, momentum, impulse, impulsive forces, units, law of conservation of momentum, Newton's law of collision of elastic bodies.

Coefficient of restitution, recoil of gun, impulse momentum equation; Virtual work:Introduction, principle of virtual work, applications, beams, lifting machines, simple framed structures.

UNIT-IV	WORK ENERGY METHOD	Classes: 12

Work energy method:Law of conservation of energy, application of work energy, method to particle motion and connected system, work energy applied to connected systems, work energy applied to fixed axis rotation.

UNIT-V	MECHANICAL VIBRATIONS	Classes: 10

Mechanical vibrations:Definitions and concepts**,** simple harmonic motion**,** free vibrations,simple and compound pendulum, torsion pendulum, free vibrations without damping, general cases.

Text Books:

1. R. C.Hibbler, "EngineeringMechanics",PrenticeHall, 12th Edition, 2009.
2. Timoshenko, D. H.Young, "EngineeringMechanics",Tata Mc Graw hill, 5th Edition, 2013.

Reference Books:

1. S.Bhavikatti, "A Text Book of EngineeringMechanics", NewAgeInternational, 1st Edition, 2012.
2. A. K. Tayal, "EngineeringMechanics",UmaPublications, 14th Edition, 2013.
3. R. K. Bansal "Engineering Mechanics", Laxmi Publication, 8th Edition, 2013.
4. BasudebBhattacharya, "EngineeringMechanics", Oxford UniversityPress, 2nd Edition, 2014.
5. K.Vijay Reddy, J. Suresh Kumar, "Singer's EngineeringMechanics Statics and Dynamics",B SPublishers, 1st Edition, 2013.

Web References:

1.https://en.wikipedia.org/wiki/Dynamics_(mechanics)
2.https://www.youtube.com/playlist?list=PLUl4u3cNGP62esZEwffjMAsEMW_YArxYC

E-Text Books:

1. http://www.freeengineeringbooks.com/Civil/Engineering-Mechanics-Books.php
2. http://www.textbooksonline.tn.nic.in/books/11/stdxi-voc-ema-em-2.pdf
3. http://www.faadooengineers.com/threads/17024-Engineering-mechanics-pdf-Free-Download

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