		L	T	P	C
15ME102	**ENGINEERING MECHANICS**	**3**	**2**	**0**	**4**
	Prerequisite				
	Nil				

PURPOSE

To develop the ability, in the engineering student, to understand, formulate, and solve a given problem in a logical manner and to apply it to solve a few basic problems in engineering mechanics.

INSTRUCTIONAL OBJECTIVES

At the end of this course the student should be able to apply concepts of

1. Static equilibrium of particles and rigid bodies
2. Analysis of trusses and friction
3. Properties of surfaces and volumes
4. Dynamic equilibrium of particles
5. Dynamic equilibrium of rigid bodies

in solving basic problems in engineering mechanics

UNIT I: STATICS OF PARTICLES **16**

Equilibrium of Particles: Fundamental concepts and principles of engineering mechanics - Forces on particles –vector addition- Concurrent forces in a plane - Resolution of forces - Resultant of several concurrent forces - Free body diagram –Forces in space. **Equilibrium of rigid bodies**: Principles of transmissibility - Moment of a force - Varignon's theorem - Equivalent system of forces - Reduction of system of forces into single force and couple-Equipollent system of forces - Types of supports and corresponding reactions - Equilibrium of rigid bodies in two dimensions.- Equilibrium of a two force body , statically determinate and indeterminate structures

UNIT II: ANALYSIS OF TRUSSES AND FRICTION **15**

Trusses: Definition of a truss - Simple Trusses - Analysis of Trusses - Method of joints- Method of sections. **Friction**: Laws of Friction - Angle of Friction –Dry friction- Wedges - Rolling friction - Belt Friction - Thrust and Journal bearings.

UNIT III: PROPERTIES OF SURFACES AND VOLUMES **14**

Centre of Gravity: - Centroids of lines, areas, and volumes –Determination of centroids by integration - Theorem of Pappus-Guldinus - **Moment of Inertia**: Second moment or Moment of inertia of an area**-** Determination of moment of inertia of area by integration - Radius of gyration - Parallel and perpendicular axis theorems - Polar moment of inertia - Mass moment of inertia.

UNIT IV: DYNAMICS OF PARTICLES **15**

Rectilinear motion –uniform velocity and uniformly accelerated motion- Rectangular components of velocity and acceleration- Curvilinear motion –Normal and tangential components- Radial and transverse components-Newton second law – D'Alembert's principle- Principle of work and energy –Applications- Conservative forces-Principle of impulse and momentum - Impulsive motion - Impact of elastic bodies – Direct central- Oblique central impact.

UNIT V: DYNAMICS OF RIGID BODIES **15**

Introduction to Kinematics of rigid bodies - Translation and rotation of rigid bodies - Fixed axis rotation – General plane motion –Absolute and Relative velocity in plane motion - Instantaneous center of rotation in plane motion - Principle of work and energy for a rigid body - Principle of impulse and momentum for the plane motion of a rigid body.

TOTAL 75

TEXT BOOKS

1. Ferdinand P. Beer, E. Russell Johnston Jr., David Mazurek, Philip J Cornwell, *Vector Mechanics for Engineers: Statics and Dynamics* , McGraw - Hill, New Delhi, Tenth Edition 2013
2. Palanichamy, M. S., and Nagan, S., *Engineering Mechanics (Statics and Dynamics)*, Tata McGraw Hill, New Delhi Eighth reprint 2011(Third edition)

REFERENCE BOOKS

1. Timoshenko, and Young, *Engineering Mechanics*, Tata Mc-Graw Hill Book Company, Edition 4, New Delhi, 1988
2. Mclean, and Nelson, Theory and problems of *Engineering Mechanics (Statics and Dynamics)*, 3rd Edition Schaum Series, 1980
3. Rajasekaran, S., & Sankarasubramanian, G., *Engineering Mechanics*, Vikas Publishing House Pvt Ltd, 2011
4. Shames, I.H., and Krishna Mohana Rao, G., *Engineering Mechanics (Statics and Dynamics)*, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education), 2006
5. Dr.R.K.Bansal & Sanjay Bansal, *A Text book of Engineering Mechanics*, Lakshimi publications, Edition 7, 2011.

15ME102 - ENGINEERING MECHANICS												
Course designed by		**Department of Mechanical Engineering**										
1	**Student Outcome**	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
		×				×					×	
2	**Mapping of instructional objectives with student outcome**	**1,2, 3,4,5**				**1,2,3, 4,5**					**1,2,3, 4,5**	
3	**Category**	**GENERAL (G)**		**BASIC SCIENCES (B)**			**ENGINEERING SCIENCES & TECHNICAL ART (E)**				**PROFESSIONAL SUBJECTS (P)**	
				X								
4	**Approval**	23rd meeting of the Academic Council , May 2013										