

2018-19 Onwards (MR18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. I Semester		
Code: 80304	ENGINEERING MECHANICS (Common for CE, ME and Min.E)	L	T	P
Credits: 3		3	-	-

Prerequisites: Nil

Course Objectives:

The objective of this subject is to provide the basic concepts and effect of system forces on rigid bodies, Geometrical Properties of Planes and Solids, problem solving in kinematics and kinetics using different methods and to analyze the types of friction for moving bodies and problems related to friction.

MODULE I: Introduction to Mechanics & System of Forces 12 Periods

Introduction: Basic Concepts, Laws of Motion, Force - types, characteristics - Principle of transmissibility - Types of Forces - Concurrent and non-concurrent Forces - Composition of force – Resultant - Triangle, Polygon and Parallelogram Law of Forces - Moment of Force and its Application - Varignon's theorem, Couples - Free Body Diagrams, Types of Supports and their reactions, Internal and External Forces - Types of Equilibrium, Equations of Equilibrium, Conditions of Equilibrium - Lami's Theorem.

MODULE II: Friction, Centroid and Center of Gravity 12 Periods

Friction: Types of friction, Limiting friction, Laws of friction, static and dynamic friction, application of laws of friction. Motion of bodies - wedge, screw, screw jack.

Centroid and Center of Gravity: Introduction, Centroids of Lines and Areas - simple figures - Centroid of composite figures. Pappus theorem - Centre of gravity of simple solids, composite solids - Centroids of volumes.

MODULE III: Moment of Inertia 12 Periods

A: Area Moment of Inertia: Definition - Moment of Inertia of plane areas, Polar Moment of Inertia, Transfer Theorem, Moments of Inertia of Composite Figures.

B: Mass Moment of Inertia: Introduction-moment of inertia of masses - Radius of gyration- Transfer formula for mass moment of inertia- by integration - Moment of Inertia of composite bodies.

MODULE IV: Kinematics & Kinetics 12 Periods

Kinematics: Rectilinear motion - Motion of Rigid Body under uniform and variable accelerations - motion under gravity- curvilinear motion – Projectiles - rotary motion.

Kinetics: Analysis as a Particle and Analysis as a Rigid Body in Translation - D'Alemberts Principle - Connected bodies- Kinetics of rotating bodies.

MODULE V: Work, Power, Energy & Mechanical Vibrations 12 Periods

Work, Power and Energy: Introduction, work-energy equation - motion of connected bodies -

work done by a spring - general plane motion.

Mechanical Vibrations: Definitions, concepts - simple harmonic motion - free vibrations - Simple and compound pendulums.

TEXT BOOKS

1. S. Timoshenko, D.H. Young, J.V. Rao and Sukumar Pati, “**Engineering Mechanics**”, Tata McGraw-Hill Education, 5th Edition, 2013.
2. K.Vijaya Kumar Reddy, J. Suresh Kumar, “**Engineering Mechanics**”, B S Publications, 3rd Edition, 2013.

REFERENCES

1. Beer, F.P and Johnston Jr. E.R. “**Vector Mechanics for Engineers**”, Tata McGraw-Hill Education 10th Edition (India) Pvt Ltd.. 2013.
2. Fedinand. L. Singer, “**Engineering Mechanics**”, Harper & Row Publishers, 3rd Edition, 1975.
3. R.S. Khurmi, “**A Text Book of Engineering Mechanics**”, S.Chand Publications, 21st Edition, 2007.
4. K L Kumar, “**Engineering Mechanics**”, Tata McGraw Hill Education, 4th Edition, 2011.
5. D.S.Kumar Patil, “**Engineering Mechanics**”, SK Kataria & Sons Publishers, 2nd Edition, 2009.

E - RESOURCES

1. <http://www.mathalino.com/reviewer/engineering-mechanics/equilibrium-force-system>
2. <http://nptel.ac.in/courses/112103109/>
3. <http://ascelibrary.org/journal/jenmdt>
4. <https://tll.mit.edu/sites/default/files/SUTDVideoThumb/freebodydiagrams.pdf>
5. <http://nptel.ac.in/courses/112106180/>
6. <http://nptel.ac.in/courses/115104094/>

Course Outcomes

At the end of the course students will be able to

1. Determine the resultant of a system of forces and draw free body diagrams and can frame appropriate equilibrium equations from the free body diagram.
2. Understand and solve the fundamental static problems and able to find centroid and centre of gravity.
3. Determine area and mass moment of inertia for various sections.
4. Apply fundamental concepts of kinetics and kinematics of particles to the analysis of simple practical problems.
5. Understand and solve fundamental work, power and energy related problems and know the concepts of mechanical vibrations.