

**G. NARAYANAMMA INSTITUTE OF TECHNOLOGY & SCIENCE**  
(For Women)

(AUTONOMOUS)  
Shaikpet, HYDERABAD - 500 104

**B.Tech. II year , I-Semester**

L T P C  
3 - - 3

**ENGINEERING MECHANICS**  
(Common to CSE & IT)

**Course Objectives:**

The course will enable the students

1. To understand the resolving forces and moments for a given force system.
2. To analyze the types of friction for moving bodies and problems related to friction.
3. To determine the centroid and second moment of area.
4. To understand the basic concept of kinetics of bodies.

**UNIT 1: (10 Lecture Hours)**

Introduction to Mechanics - Basic Concepts, system of Forces Coplanar Concurrent Forces - Moment of Forces and its Application - Couples and Resultant of Force Systems. Equilibrium of system of Forces: Free body diagrams, Equations of Equilibrium of Coplanar Systems.

13) *Reddy*  
14) *Reddy*

**UNIT 2: ( 8 Lecture Hours)**

Friction- Types of friction, Limiting friction, Laws of Friction. Static and Dynamic Frictions - Motion of Bodies - ladder & Wedge friction.

15) *ABay*  
16) *R. Balasubramaniam*

**UNIT 3: ( 8 Lecture Hours)**

Centroid and Center of Gravity - Introduction, Centroids of lines, Centroids of area, Centroids of Composite figures. Theorem of Pappus, Centre of Gravity of Bodies, Centroids of Volumes, Center of gravity of composite bodies. Area moments of Inertia- Introduction, Definition of Moment of Inertia, Polar Moment of Inertia, Radius of gyration. Transfer Theorem for moment of inertia, Moments of inertia by integration, Moments of Inertia of Composite Figures.

**UNIT 4: (8 Lecture Hours)**

**Mass Moment of Inertia:** Introduction - Moment of Inertia of Masses - Radius of gyration - Transfer Formula for Mass Moments of Inertia - Mass moments of inertia by integration - Mass moment of inertia of composite bodies.

1) *N. Madhukalyan* 5) —  
2) *D. Subrahmanyam* 6) *Reddy*  
3) *EM* 7) *Reddy*  
4) *S. S. Subrahmanyam* 8) *Reddy*

9) *Reddy*  
10) *Reddy*  
11) *Reddy*  
12) —

**UNIT 5: ( 10 Lecture Hours)**

**Kinetics:** Kinetics of a particle - D'Alemberts principle. Work-energy and power. Principle of conservation of energy, Kinetics of rigid body in translation, work done, Principle of work-energy.

**Text Books:**

1. K. Vijaya Kumar Reddy, J. Suresh Kumar, Singer's Engineering Mechanics Statics and Dynamics, BSP, 2016.
2. S.S. Bhavikatti A Text Book of Engineering Mechanics, New Age International (P) Limited Publications, New Delhi, 2018.
3. N.H. Dubey, Engineering Mechanics Statics and Dynamics, McGraw Hill Education (India) Private Limited, New Delhi, 2016.

**Reference Books:**

1. Beer F.P & Johnston E.R Jr. Vector Mechanics for Engineers, 2016, TMH.
2. Hibbeler R.C & Ashok Gupta, Engineering Mechanics, 2010, Pearson Education.
3. Tayal A.K., Engineering Mechanics – Statics & Dynamics, 2011, Umesh Publications.
4. Meriam. J. L., Engineering Mechanics, Volume-I Statics, 2012, John Wiley & Sons.
5. Andrew Pytel., Jaan Kiusalaas., Engineering Mechanics, 2014, Cengage Learning .

**Online Resources:**

1. <https://freevideolectures.com>.
2. <https://www.mathalino.com>, Virtual labs ([www.vlab.co.in](http://www.vlab.co.in))

**Course Outcomes:**

At the end of the course, the students should be able to

1. Judge whether the body under the action of planer force system is at rest or in motion.
2. Analyze equilibrium of a body subjected to a system of forces including free body diagrams.
3. Solve the problems of Bodies subjected to friction.
4. Locate centroids/centre of gravity and compute moment of Inertia of various sections.
5. Compute mass moment of Inertia of standard and composite sections.
6. Understands the concept of kinetics, impulse momentum equations of bodies.

- |                      |                       |                        |
|----------------------|-----------------------|------------------------|
| 1) N. Malleshwari    | 6) <del>Sharma</del>  | 11) <del>R. B.</del>   |
| 2) T. Subramanian    | 7) M. Reddy           | 12) —                  |
| 3) E.M.              | 8) K. S.              | 13) K. Reddy           |
| 4) S. S. Subramanian | 9) <del>Sharma</del>  | 14) R. M.              |
| 5) —                 | 10) <del>Sharma</del> | 15) M. Reddy           |
|                      |                       | 16) R. Balasubramanian |