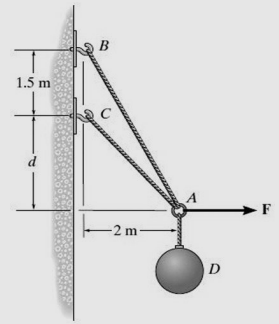


# 22ME102 ENGINEERING MECHANICS

Hours Per Week :

L	T	P	C
3	2	0	4



Source: <http://www.mathskey.com/question2answer/31644/engineering-mechanics-statics-13th-hibbler-chapter-problem>.

**PREREQUISITE KNOWLEDGE:** Basics of physics and mathematics.

## COURSE DESCRIPTION AND OBJECTIVES:

This course applies the fundamental laws of mechanics to rigid bodies and gives a working knowledge of static equilibrium and free body diagrams. The objective of this course is to determine the net force acting and the effect of forces on engineering structures.

## MODULE-1

### UNIT-1

9L+6T+0P=15 Hours

**Resultant and Equilibrium:** Laws of mechanics, Characteristics of a force, System of forces, Resolution of forces, Moment, Couple. Conditions of equilibrium, Free body diagram, Lami's theorem. Simple trusses, Method of joints, Method of sections.

### UNIT-2

15L+10T+0P=25Hours

**Forces on Structures:** Determining the resultant force using the parallelogram law of forces and the resolution of the forces methods. Effect of moment and couple on rigid bodies, Application of equations of equilibrium, law of transmissibility of forces, Lami's theorem, Determination of forces on connected bodies, nature of forces on members of a truss, zero force member.

### PRACTICES:

- Basic force concepts: resultant, equilibrant, moment and couple.
- Lami's theorem and the laws of mechanics to predict the stability of a structure.

## MODULE-2

### UNIT-1

9L+6T+0P=15 Hours

### FRICTION AND MOMENT OF INERTIA:

Laws of friction, Coefficient of friction, Angle of friction, Angle of repose, cone of friction. Centroid and Center of gravity, Parallel axis theorem, Perpendicular axis theorem, Moment of inertia of plane areas, Polar moment of inertia. Moment of inertia of composite areas, Mass moment of inertia.

### UNIT-2

15L+10T+0P=25 Hours

**Force Analysis:** Determination of minimum force to overcome friction, Analyze the ladder friction, wedge friction, angle of repose, Calculations of area moment of inertia of composite sections, polar moment of inertia, Mass moment of inertia of cylinder and circular disc. Application of area moment of inertia and mass moment of inertia.

### PRACTICES:

- Force required to overcome friction.
- Position of the centroid of composite shapes and C.G. of rigid bodies.

**SKILLS:**

- ✓ *Net force in a system.*
- ✓ *Equilibrium conditions.*
- ✓ *Force required to overcome friction.*

**COURSE OUTCOMES:**

Upon successful completion of this course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Estimate the forces in statically determinate structures by using principles of mathematics and physics.	Analyzing	1	1, 2, 11
2	Apply the equilibrium conditions and Lami's theorem in statically determinate structures.	Applying	1	1, 2, 11
3	Analyze the friction force, angle of repose, ladder friction, and wedge friction.	Analyzing	2	1, 2
4	Locate the centroid of a section and centre of gravity of a rigid body.	Applying	2	1, 2

**TEXT BOOKS:**

1. James L. Meriam and L. G. Kraige, "Engineering Mechanics: Statics", SI Version, 9th edition, 2020, John Wiley & Sons.
2. S. Timoshenko, D.H. Young, "Engineering-Mechanics-SI-Units", 5th Edition, 2017, TATA McGraw-Hill Education.

**REFERENCE BOOKS:**

1. Russell Hibbeler, "Engineering Mechanics: Statics", Pearson 14th Edition, 2016.
2. Dr. U.C. Jindal, "Engineering Mechanics", Made Easy Publications, 2nd Edition, 2019.