

**19ME102****ENGINEERING MECHANICS**

Hours Per Week :

L	T	P	C
3	1	0	4

Total Hours :

L	T	P	WARA	SSH/HS	CS	SA	S	BS
45	15	-	15	25	-	-	-	4

**COURSE DESCRIPTION AND OBJECTIVES:**

This course applies laws of mechanics to solve common engineering problems and gives a working knowledge of static force equilibrium and free body diagrams. The objective of this course is to predict and determine the effect of forces on engineering structures.

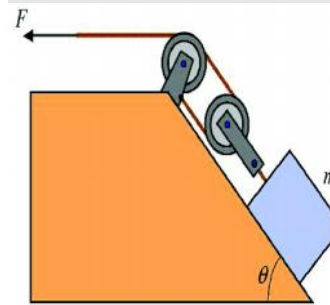
**COURSE OUTCOMES:**

Upon completion of the course, the student will be able to achieve the following outcomes:

COs	Course Outcomes	POs
1	Apply basic knowledge of mathematics and physics in real world problem.	1
2	Understand scalar and vector analytical techniques.	1
3	Calculate forces in statically determinate structures.	2
4	Determine the angle of repose and location of C.G for a rigid body system.	2
5	Solve engineering problems using energy method.	2

**SKILLS:**

- ✓ Understand basic force concepts: resultant, equilibrant, moment and couple.
- ✓ Apply the laws of mechanics in real-world problems.
- ✓ Predict the stability of a structure.
- ✓ Locate the centroid of a composite shapes and C.G. of a rigid body.
- ✓ Estimate the amount of energy lost in friction.



<https://www.real-world-physics-problems.com/pulley-problems.html>

**UNIT-I****L-9 T-3**

**GENERAL PRINCIPLES:** Introduction to engineering mechanics, Vectors and scalar quantities, Laws of mechanics.

**FORCE SYSTEM AND RESULTANT:** System of forces, Resolution of forces, Moment of force, Couple, Moment of couple, Characteristics of couple.

**EQUILIBRIUM OF BODIES:** Conditions of equilibrium, Principle of equilibrium - two, three, four force principle; Lami's theorem.

**UNIT-II****L-9 T-3**

**BASIC STRUCTURAL ANALYSIS:** Equilibrium in three dimensions, Simple Trusses, Method of Joints, Method of Sections, Determination of member is in tension or compression, Zero force members, Introduction to beams, structures and machines.

**UNIT-III****L-9 T-3**

**FRICTION:** Introduction, Types of friction, Laws of friction, Coefficient of friction, Angle of friction, Angle of repose, Cone of friction, Ladder friction, Wedge friction.

**UNIT-IV****L-9 T-3**

**CENTROID & CENTER OF GRAVITY:** Introduction, Centroid of lines, Centroid of surfaces, Centroid of simple figures, Centroid of composite figures, Center of gravity, Center of mass.

**MOMENT OF INERTIA:** Moment of inertia of plane areas, Polar moment of inertia, Parallel axis theorem, Perpendicular axis theorem, Moment of inertia of composite areas, Mass moment of inertia - introduction, Mass moment of inertia of circular disc & cylinder.

**UNIT-V****L-9 T-3**

**VIRTUAL WORK & ENERGY METHOD:** Virtual displacements, Principle of virtual work, Ideal system of rigid bodies, Degrees of freedom, Active force diagram, Mechanical efficiency, Conservative forces, Potential energy, Energy equation for equilibrium, Applications of energy method for equilibrium.

**TEXT BOOKS:**

1. A K Tayal, "Engineering Mechanics: Statics and Dynamics", 14<sup>th</sup> edition, Umesh Publications, 2010.
2. S. Timoshenko, D.N.Young, J.V.Rao, P. Sukumar, "Engineering Mechanics", 5<sup>th</sup> edition, Tata McGraw-Hill Education, 2013.

**REFERENCE BOOKS:**

1. Basudeb Bhattacharyya, "Engineering Mechanics", 2<sup>nd</sup> edition, Oxford University Press, 2014.
2. N. H. Dubey, "Engineering Mechanics: Statics and Dynamics", 1<sup>st</sup> edition, Tata McGraw-Hill, 2015.
3. S.S.Bhavikatti, "Engineering Mechanics", 1<sup>st</sup> edition, New Age International, Reprint 2015.