

MECHANICS

Course Code	20BS1305	Year	II	Semester	I
Course Category	Basic Science	Branch	ME	Course Type	Theory
Credits	3	L-T-P	3-0-0	Prerequisites	Engineering Mathematics
Continuous Internal Evaluation:	30	Semester End Evaluation:	70	Total Marks:	100

Course outcomes: At the end of the course, the student will be able to:

CO	Statement	BTL	Units
CO 1	Understand the principle of laws of mechanics involved in the resultant, moment, properties of areas static and dynamic equilibrium of rigid bodies and also in the practical applications like friction and trusses.	L2	1,2,3,4,5
CO 2	Apply principles of mechanics and law of equilibrium to solve for the resultant, reaction due to supports, and problems related to friction and trusses.	L3	1,2
CO 3	Apply first and second moments of an area to determine centroid and moment of inertia respectively.	L3	3
CO 4	Analyse the dynamics of the rigid bodies using Equation of Motion, D'Alembert's principle and Work-Energy theorem.	L4	4,5

Contribution of Course outcomes towards achievement of programme outcomes & Strength of correlations (High :3, Medium :2, Low :1)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	3	3	2						1	1		2	3	1
CO 2	3	3	2						1	1		2	3	1
CO 3	3	3	2						1	1		2	3	1
CO 4	3	3	2						1	1		2	3	1
CO 5	3	3	2						1	1		2	3	1

Syllabus		
Unit	Contents	Mapped CO
1	Introduction: Significance of Engineering Mechanics, Composition and resolution of forces, parallelogram law, principle of transmissibility, types of force systems - concurrent and non-concurrent, coplanar forces, resultant of coplanar force systems, couple, moment of a force, Varignon's theorem, concept of free body diagrams, concept of equilibrium of coplanar force systems.	CO 1, CO 2
2	Friction: Laws of friction, types of friction, equilibrium of force	CO 1,

	systems involving frictional forces, ladder and wedge friction Analysis of Structures: Introduction to plane trusses, Types of trusses, Assumptions in analysis of truss, analysis of plane trusses by method of joints.	CO 2
3	Centroid: Centroid and centre of gravity, derivation of centroids of rectangle, triangle, circle, semi-circle from first principles, centroid of composite areas. Moment of Inertia: Area moment of inertia of plane and composite figures, parallel axis theorem, perpendicular axis theorem, polar moment of inertia.	CO 1, CO 3
4	Kinematics: Equations of motion for rigid bodies under constant and variable acceleration, rectilinear and curvilinear motion, Rotation of a rigid body about a fixed axis.	CO 1, CO 4
5	Kinetics: Principles of dynamics - Newton's Laws of motion, D'Alembert's principle in rectilinear translation, Rotation under the action of constant moment, principle of work and energy.	CO 1, CO 4

Learning Resources

Text Book(s):

- 1.S. Timoshenko, D.H. Young, J.V. Rao, Sukumar Pati, Engineering Mechanics (in SI units), 5/e, McGraw Hill, 2013.
2. Engineering Mechanics Statics and dynamics, by A.K.Tayal, Umesh Publication, Delhi, 14e, 2010.

References:

1. Irving Shames, G.K.M. Rao, Engineering Mechanics: Statics and Dynamics, 4/e, Pearson, 2009.
2. K.L. Kumar, Veenu Kumar, Engineering Mechanics, 4/e, Tata McGraw Hill, 2010.
- 3.N.H. Dubey, Engineering Mechanics: Statics and Dynamics, Tata McGraw Hill, 2014

E Resources:

1. <https://nptel.ac.in/courses/112/103/112103108/>
2. <https://www.coursera.org/learn/engineering-mechanics-statics>