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: Upon successful completion of the course, the student will be able to

CO	Statement	Skill	BTL	Units
CO1	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.	Understand	L2	1,2,3,4,5
CO2	Apply principles of mechanics and law of equilibrium to solve for the resultant, reaction due to supports, and problems related to friction and trusses.	Apply	L3	1,2
CO3	Apply first and second moments of an area to determine centroid and moment of inertia respectively.	Apply	L3	3
CO4	Analyse the dynamics of the rigid bodies using Equation of Motion, D'Alembert's principle and Work-Energy theorem.	Analyze	L4	4,5

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

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2						1	1		2	3	1
CO2	3	3	2						1	1		2	3	1
CO3	3	3	2						1	1		2	3	1
CO4	3	3	2						1	1		2	3	1

Syllabus

Unit	Contents	Mapped CO
I	**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.	CO1, CO2
II	**Friction:** Laws of friction, types of friction, equilibrium of force 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.	CO1, CO2
III	**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	CO1, CO3

	figures, parallel axis theorem, perpendicular axis theorem, polar moment of inertia.	
IV	**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.	**CO1, CO4**
V	**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.	**CO1, CO4**

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 Dynam-ics, 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,TataMcGrawHill,2014
E Resources:
1. https://nptel.ac.in/courses/112/103/112103108/ 2. https://www.coursera.org/learn/engineering-mechanics-statics