

20BS1304 - APPLIED MECHANICS

Offering Branches	CE		
Course Category:	Basic Sciences	Credits:	3
Course Type:	Theory	Lecture-Tutorial-Practical:	3-0-0
Prerequisites:	20BS1101- Calculus and Linear Algebra 20BS1201- Differential Equations and Vector Calculus	Continuous Evaluation:	30
		Semester End Evaluation:	70
		Total Marks:	100

Course Outcomes

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

CO1	Compute the resultant of concurrent and non-concurrent system of forces	K3
CO2	Solve the equilibrium problems of concurrent and non-concurrent system of forces	K3
CO3	Solve the problems related to plane truss, Wedge, and ladder frictions	K3
CO4	Calculate centroidal distances and moment of inertia of compound lamina	K3
CO5	Solve the problems related to rectilinear motion, projectiles, curvilinear Motion	K3

Contribution of Course Outcomes towards achievement of Program Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	2	2	2	2	2					2	2	
CO2	2	2	2	2	2	2	2					2	2	
CO3	3	3	3	3	3	2	2					2	3	
CO4	2	2	2	2	2	2	2					2	2	
CO5	2	2	2	2	2	2	2					2	2	
Avg.	2					2	2							

1- Low

2-Medium

3-High

Course Content

UNIT-1	<p>Concurrent system of forces: Introduction, definition of a force, classification of system of forces, principle of transmissibility, resolution of a force, composition of forces, resultant and equilibrant. Triangle law of forces, polygon law of forces. Analytical method of determination of the resultant of the system of forces Problems on the determination of resultant of concurrent coplanar system of forces.</p> <p>Non-concurrent system of forces: Moment of a force, Varignon's theorem of moments, couples and their characteristics. Determination of magnitude, direction and position of resultant of non-concurrent coplanar system of forces. Example problems</p>	CO1
UNIT-2	<p>Equilibrium of system of forces: Definition, conditions of equilibrium for concurrent coplanar system of forces, Lami's theorem. Example problems.</p> <p>Types of supports, loads and beams. Determination of support reactions for statically determinate beams and other simple structures.</p>	CO2
UNIT-3	<p>Trusses: Definition: Plane truss, space truss, determinate truss and indeterminate truss. Analysis of plane truss using method of joints and method of sections. Numerical examples.</p> <p>Friction: Introduction, angle of friction, coefficient of friction, cone friction, limiting friction, types of friction, laws of static friction, Example problems related to impending motion on horizontal and inclined planes, wedge friction.</p>	CO3
UNIT-4	<p>Centroid and Centre of Gravity: Definition, derivation of expressions for centroidal distances of simple planar laminas like rectangle, triangle, quarter and semi-circle. Determination of centroidal distances of compound laminas.</p> <p>Moment of Inertia: Introduction, Definition, Theorems of perpendicular and</p>	CO4

	parallel axis. Concept of axis of symmetry, derivations of expressions for moment of inertia of simple planar laminas like rectangle, triangle, quarter, and semi-circle and circle. Definitions of polar moment of inertia, radius of gyration, Determination of moment of inertia, polar moment of inertia, radius of gyration of compound laminas about centroidal axes and about any specified reference line.	
UNIT-5	Dynamics Of Particles: Displacements, Velocity and acceleration, their relationship in rectilinear motion, Curvilinear motion in rectangular coordinates, normal and tangential coordinates, projectile motion, Newton's law, D'Alembert's Principle.	CO5
Learning Resources		
Text Books	<ol style="list-style-type: none"> 1. A. K. Tayal, Engineering Mechanics (Statics and Dynamics), Umesh Publications, 14th Edition, 2011. 2. N.H. Dubey, Engineering Mechanics(Statics and Dynamics), McGraw Hill Education (India) Private Limited, 2016. 	
Reference Books	<ol style="list-style-type: none"> 1. S. Timoshenko & D. H. Young, and JV Rao, Engineering Mechanics, 4th Ed., TMH Education, 2006. 2. K. Vijay Kumar Reddy, J. Suresh Kumar, Singer's Engineering Mechanics Statics and Dynamics, BS Publications, 3rd Edition, 2011. 	
e-Resources& other digital material	<ol style="list-style-type: none"> 1. http://nptel.ac.in/courses.php 2. http://jntuk-coeerd.in/ 	