

LESSON PLAN OF 5TH SEMESTER CIVIL ENGINEERING

Discipline CIVIL	Semester 3 rd	Name of the Teaching Faculty: - Smt. Rajashree Nayak
Subject: - Mechanics of Materials	No of Days/Per Week Class Allotted: - 03	Semester From: -01.07.2026 to 05.11.2026 No of Weeks: - 15
Week	Class Day	Theory Topics
1 st	1 st	Centre of Gravity and Moment of Inertia: Definition of Centre of gravity -Centre of gravity of Symmetrical shapes rectangular, circular
	2 nd	Centre of gravity of solid / hollow square, I Sections.
	3 rd	Numerical solutions related to Centre of gravity for different shapes like T sections.
2 nd	1 st	Moment of inertia (M.I.): Definition, parallel axis theorem, perpendicular axis theorem.
	2 nd	M.I. of plane lamina, Radius of gyration, section modulus.
	3 rd	M.I. of rectangle, square, circle, semicircle, quarter circle with numerical.
3 rd	1 st	M.I. of semicircle, quarter circle and triangle section with numerical. • Polar Moment of Inertia of solid circular sections.
	2 nd	M.I. of unsymmetrical I-section, Channel section, T-section, Angle section, Hollow sections and built-up sections about centroidal axes and any other reference axis.
	3 rd	Simple Stresses and Strains: Definition of rigid, elastic and plastic bodies, deformation of elastic body under various forces, Definition of stress, strain, elasticity, Hook's law, Elastic limit, Modulus of elasticity.
4 th	1 st	Type of Stresses-Normal, Direct, Bending and Shear and nature of stresses i.e. Tensile and Compressive stresses with numerical.
	2 nd	Standard stress strain curve for steel bar under tension, Yield stress, Proof stress, Ultimate stress, Strain at various critical points, Percentage elongation and Factor of safety.
	3 rd	Deformation of body due to axial force, forces applied at intermediate sections, Maximum and minimum stress induced, Composite section under axial loading.
5 th	1 st	Concept of temperature stresses and strain, Stress and strain developed due to temperature variation in homogeneous simple bar with numerical
	2 nd	Longitudinal and lateral strain, Modulus of Rigidity, Poisson's ratio with numerical.
	3 rd	Numerical related to temperature stresses.
6 th	1 st	Introduction to Biaxial and tri-axial stresses, volumetric strain, change in volume, Bulk modulus with numerical solutions.
	2 nd	Relation between modulus of elasticity, modulus of rigidity and bulk modulus.
	3 rd	Complex Stresses and Strains: Principal stresses and strains: Occurrence of normal and tangential stresses - Concept of Principal stress and Principal Planes.
7 th	1 st	major and minor principal stresses and their orientations – stresses on a given plane – shear and normal stress components on any inclined plane.
	2 nd	Mohr's circle and its use in solving problems on complex stresses - Numerical problems.

	3 rd	Shear Force and Bending Moment: Types of supports, beams and loads. Concept and definition of shear force and bending moment, Relation between load, shear force and bending moment.
8 th	1 st	Shear force and bending moment diagram for cantilever beam subjected to point loads.
	2 nd	Shear force and bending moment diagram for cantilever beam subjected to uniformly distributed loads and couple (combination of any two types of loading), point of contra flexure.
	3 rd	Shear force and bending moment diagram for simply supported beams subjected to point loads, uniformly distributed loads.
9 th	1 st	Shear force and bending moment diagram for simply supported beam subjected to uniformly distributed loads and couple (combination of any two types of loading), point of contra flexure.
	2 nd	Numerical solution related to SFD and BMD.
	3 rd	Numerical solution related to SFD and BMD.
10 th	1 st	Numerical solution related to SFD and BMD.
	2 nd	Numerical solution related to SFD and BMD.
	3 rd	Numerical solution related to SFD and BMD.
11 th	1 st	Bending and Shear Stresses in beams: Concept and theory of pure bending, assumptions, flexural equation bending stresses and their nature, bending stress distribution diagram.
	2 nd	Concept of moment of resistance and simple numerical problems using flexural equation.
	3 rd	Shear stress equation, relation between maximum and average shear stress for rectangular and circular section, shear stress distribution diagram.
12 th	1 st	Shear stress distribution for square, rectangular, circle. Simple numerical problems based on shear equation.
	2 nd	Shear stress distribution for hollow, square, rectangular, circular, angle sections with numerical.
	3 rd	Shear stress distribution for channel section, I-section, T section with numerical.
13 th	1 st	Numerical solution related to shear stress.
	2 nd	Numerical solution related to shear stress.
	3 rd	Numerical solution related to shear stress.
14 th	1 st	Columns: Concept of compression member, short and long column, Effective length, Radius of gyration, Slenderness ratio, Types of end condition for columns, Buckling of axially loaded columns.
	2 nd	Euler's theory, assumptions made in Euler's theory and its limitations, Application of Euler's equation to calculate buckling load.
	3 rd	Rankine's formula and its application to calculate crippling load with numerical.
15 th	1 st	Concept of working load/safe load, design load and factor of safety with numerical.
	2 nd	Numerical solution related to column.
	3 rd	Numerical solution related to column.

R. Nayak
28/06/26

B. Nayak
28/6/26