Discipline:CIVIL	Semester: 3RD	Name of Teaching Faculty:-Shrimati Rajashree Nayak
Subject:-MECHANICS OF MATERIALS	No of Days/Week Class alloted:- 03	Semester from date:14.07.2025 to 15.11.2025 No of Weeks: 15
Week	Class Day	Theory Topics
1st	1st	**Centre of Gravity and Moment of Inertia** : Definition of centre of gravity.Centre of gravity of Symmetrical shapes(Solid/hollow square, rectangular,circularand I section)
	2nd	Moment of inertia (M.I.): Definition, M.I. of plane lamina, Radius of gyration, section modulus, Parallel axes theorems (without derivations).
	3rd	Concept of Perpendicular axes Theorem(without derivations).Related Numericals
2nd	1st	M.I. of rectangle, square, circle, semicircle, quarter circle and triangle section (without derivations).
	2nd	Numericals related to Moment of Inertia of rectangular, circular and triangle sections.
	3rd	M.I. of symmetrical and unsymmetrical I-section and Numericals.
3rd	1st	M.I. of Channel section, T-section, Angle section,
	2nd	M.I of Hollow sections and built up sections about centroidal axes and any other referenceaxis.
	3rd	**Simple Stresses and Strains:** Definition of rigid, elastic and plastic bodies, deformation of elastic body under various forces, Definition of stress, strain,
4th	1st	Theory of elasticity, Hook's law, Elastic limit, Modulus of elasticity.Type of Stresses-Normal, Direct, Bending and Shear and nature of stresses i.e. Tensile and Compressive stresses.
	2nd	Standard stress strain curve for tor steel bar under tension, Yield stress, Proof stress, Ultimate stress, Strain at various critical points, Percentage elongation and Factor of safety.
	3rd	Deformation of body due to axial force, forces applied at intermediate sections, Maximum and minimum stress induced, Composite section under axial loading.
5th	1st	Concept of temperature stresses and strain, Stress and strain developed due to temperature variation in homogeneous simple bar (no composite section).Related Numericals.
	2nd	Longitudinal and lateral strain, Modulus of Rigidity, Poisson's ratio, Biaxial and tri-axial stresses, volumetric strain, change in volume, Bulk modulus (Introduction only).
	3rd	Relation between modulus of elasticity, modulus of rigidity and bulk modulus (without derivation).
6th	1st	**COMPLEX STRESSES AND STRAINS:** Principal stresses and strains: Occurrence of normal and tangential stresses.
	2nd	Concept of Principal stress and Principal Planes i.e major and minor principal stresses and their orientations.
	3rd	Numerical problems related to principal stresses and strains.
	1st	Stresses on a given plane –shear and normal stress components on any inclined plane.Concept of Mohr's Circle.How to draw Mohr's Circle.

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7th	2nd	Mohr's circle and its use in solving problems on complex stresses. Problems related to axial stresses, biaxial stresses and mohr circles.
	3rd	**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 (without derivation).
8th	1st	Introduction to concept and numerical Analysis of SF and BM for different beams.
	2nd	Shear force and bending moment diagram for cantilever beams subjected to point loads.
	3rd	Shear force and bending moment diagram for cantilever beams subjected to Uniformly distributed loads.
9th	1st	Shear force and bending moment diagram for cantilever beams subjected to couple (combination of any two types of loading).
	2nd	Calculation of point of contra flexure in cantilever beam. Related problems.
	3rd	Introduction to Shear force and bending moment diagram for simply supported beams subjected to point loads, uniformly distributed loads and couple (combination of any two types of loading), point of contra flexure.
10th	1st	Shear force and bending moment diagram for simply supported beams subjected to point loads.
	2nd	Shear force and bending moment diagram for simply supported beams subjected to Uniformly distributed loads and couples.
	3rd	Calculation of point of contra flexure in simply supported beam. Related problems.
11th	1st	**Bending and Shear Stresses in beams:** Concept and theory of pure bending, assumptions, flexural equation (without derivation), bending stresses and their nature, bending stress distribution diagram.
	2nd	Concept of moment of resistance and simple numerical problems using flexural equation. Shear stresss equation (without derivation).
	3rd	Numerical questions related to pure bending concept.
12th	1st	Relation between maximum and average shear stress for rectangular section, shear stress distribution diagram.
	2nd	Relation between maximum and average shear stress for circular section, shear stress distribution diagram.
	3rd	Shear stress distribution for square, rectangular, circle, hollow, square, rectangular, circular, angle sections.
13th	1st	Shear stress distribution for channel section, I-section. Simple numerical problems based on shear equation.
	2nd	Shear stress distribution for T section. Simple numerical problems based on shear equation.
	3rd	Numerical problems related to all the sections.
14th	1st	**Columns:** Concept of compression member, short and long column, Effective length, Radius of gy-ration, Slenderness ratio, Types of end condition for columns.
	2nd	Buckling of axially loadedcolumns.
	3rd	Euler's theory, assumptions made in Euler's theory and its limitations, Application of Euler's equation to calculate buckling load.
15th	1st	Rankine's formula and its application to calculate crippling load.
	2nd	Related Numericals for the calculation of crippling load.
	3rd	Concept of working load/safe load, design load and factor of safety.

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