BHUBANANANDA ODISHA SCHOOL OF ENGINEERING, CUTTACK
DEPARTMENT OF CIVIL ENGINEERING
LESSON PLAN

SUBJECT: STRUCTURAL MECHANICS(TH1)

FACULTY: SRADHANJALI SAHOO

ACADEMIC SESSION: 2024-2025

SEMESTER: 3RD

SECTION: B

Sd/-
HOD (civil engg)

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Discipline: Civil Engineering	**Semester: 3rd B**		**Name of the teaching faculty: SRADHANJALI SAHOO**
Subject: Structural Mechanics	**No. of Days/ per week class allotted: 05periods per week Mon-1 period, Tue-1 period, wed-1 period, fri-2 period)**		**Semester From Date: 01-07-2024 To Date: 08-11-2024 No. of weeks: 18 weeks**
Week	**Class Day**	**No of period available**	**Theory Topics**
1ST	01/07/2024	1	1.0 Review of Basic Concepts 1.1 Basic Principle of Mechanics: Force, Moment, support conditions,
	02/07/2024	1	1.1 Conditions of equilibrium, C.G & MI, Free body diagram 1.2 Review of CG of different sections
	03/07/2024	1	1.2 Review of MI of different sections
	05/07/2024	2	2.0 Simple And Complex Stress, Strain 2.1 Simple Stresses and Strains Introduction to stresses and strains
2ND	08/07/2024	1	2.1 Mechanical properties of materials – Rigidity, Elasticity, Plasticity, Compressibility, Hardness, Toughness, Stiffness, Brittleness, Ductility, Malleability, Creep, Fatigue, Tenacity, Durability,
	09/07/2024	1	2.1 Problems on mechanical property
	10/07/2024	1	2.1 Types of stresses -Tensile, Compressive and Shear stresses, Types of strains - Tensile, Compressive and Shear strains,
	12/07/2024	2	2.1 Complimentary shear stress - Diagonal tensile / compressive Stresses due to shear, Elongation and Contraction,
3RD	15/07/2024	1	2.1 Longitudinal and Lateral strains, Poisson’s Ratio, Volumetric strain,

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	16/07/2024	1	2.1 Computation of stress, strain, Poisson's ratio, change in dimensions and volume etc.,
	19/07/2024	2	2.1 Hooke's law - Elastic Constants, Derivation of relationship between the elastic constants
4TH	22/07/2024	1	2.2 Application of simple stress and strain in engineering field: Behavior of ductile and brittle materials under direct loads, Stress Strain curve of a ductile material
	23/07/2024	1	2.2 Limit of proportionality, Elastic limit, Yield stress, Ultimate stress, Breaking stress, Percentage elongation.
	24/07/2024	1	2.2 Percentage reduction in area, Significance of percentage elongation and reduction in area of cross section
	26/07/2024	2	2.2 Deformation of prismatic bars due to uniaxial load, 2.2. Deformation of prismatic bars due to its self-weight
5TH	29/07/2024	1	2.2 Problems on elastic constant and % elongation
	30/07/2024	1	2.3 Complex stress and strain 2.3 Principal stresses and strains: Occurrence of normal and tangential stresses,
	31/07/2024	1	2.3 Concept of Principal stress and Principal Planes, major and minor principal stresses and their orientations
	02/08/2024	2	2.3 Mohr's Circle and its application to solve problems of complex stresses
6TH	05/08/2024	1	3.0 Stresses In Beams and Shafts

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	06/08/2024	1	3.1 Stresses in beams due to bending: Bending stress in beams – Theory of simple bending – Assumptions
	07/08/2024	1	3.1 Moment of resistance – Equation for Flexure– Flexural stress distribution
	09/08/2024	2	3.1 Curvature of beam – Position of N.A. and Centroidal Axis – Flexural rigidity – Significance of Section modulus
7TH	12/08/2024	1	3.2 Shear stresses in beams: Shear stress distribution in beams of rectangular, circular, and standard sections symmetrical about vertical axis.
	13/08/2024	1	3.3 Stresses in shafts due to torsion: Concept of torsion, basic assumptions of pure torsion
	14/08/2024	1	3.3 torsion of solid and hollow circular sections, polar moment of inertia torsional shearing stresses,
	16/08/2024	2	3.3 angle of twist, torsional rigidity, equation of torsion
8TH	20/08/2024	1	3.3 Problems based on torsion.
	21/08/2024	1	3.4 Combined bending and direct stresses: Combination of stresses, combined direct and bending stresses
	23/08/2024	2	3.4 Maximum and Minimum stresses in Sections, Conditions for no tension, 3.4 Limit of eccentricity, Middle third/fourth rule, Core or Kern for square, rectangular, and circular sections
9TH	27/08/2024	1	3.4 chimneys, dams and retaining walls
	28/08/2024	1	4.0 Columns and Struts 4.1 Columns and Struts, Definition, Short and Long columns
	30/08/2024	2	4.1 End conditions, Equivalent length / Effective length, Slenderness ratio

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10TH	02/09/2024	1	4.1 Axially loaded short and long column, Euler's theory of long columns,
	03/09/2024	1	4.1 Critical load for Columns with different end conditions Problems on column.
	04/09/2024	1	CLASS TEST-1
	06/09/2024	2	5.0 Shear Force and Bending Moment 5.1 Types of loads and beams: Types of Loads: Concentrated (or) Point load, Uniformly Distributed load (UDL),
11TH	09/09/2024	1	5.1 Types of Supports: Simple support, Roller support, Hinged support, Fixed support,
	10/09/2024	1	5.1Types of Reactions: Vertical reaction, Horizontal reaction, Moment reaction
	11/09/2024	1	5.1Types of Beams based on support conditions:
	13/09/2024	2	INTERNAL ASSESMENT-I
12TH	17/09/2024	1	5.1 Calculation of support reactions using equations of static equilibrium
	18/09/2024	1	5.1 Shear Force and Bending Moment: Signs Convention for S.F. and B.M, S.F and B.M of general cases of determinate beams with concentrated loads and Udl only.
	20/09/2024	2	6.0 Slope and Deflection 6.1 Introduction: Shape and nature of elastic curve (deflection curve);
13TH	23/09/2024	1	6.1Relationship between slope deflection and curvature (No derivation), Importance of slope and deflection

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			6.2 Slope and deflection of cantilever and simply supported beams under concentrated and uniformly distributed load (by Double Integration method)
	24/09/2024	1	6.1Relationship between slope deflection and curvature (No derivation), Importance of slope and deflection
	25/09/2024	1	6.2 Slope and deflection of cantilever and simply supported beams under concentrated and uniformly distributed load (Macaulay's method).
	27/09/2024	2	**CLASS TEST-2**
14TH	30/09/2024	1	7.0 Indeterminate Beams 7.1 SF and BM diagrams (point load and udl covering full span)
	01/10/2024	1	7.1Indeterminacy in beams, Principle of consistent deformation/compatibility
	04/10/2024	2	7.1 Analysis of propped cantilever, fixed and two span continuous beams by principle of superposition
15TH	14/10/2024	1	8.0Trusses 8.1 Introduction: Types of trusses, statically determinate and indeterminate trusses
	15/10/2024	1	8.1 discussion of stable and unstable trusses and calculation of zero forces.
	18/10/2024	2	8.2 Analysis of trusses: Analytical method (Method of joints)
16TH	21/10/2024	1	8.2 Numerical problems on truss by joint method
	22/10/2024	1	8.2 Analysis of trusses: Analytical method (method of Section)
	23/10/2024	1	8.2 Numerical problems on truss by section method
	25/10/2024	2	**CLASS TEST-3**
17TH	28/10/2024	1	Revision
	29/10/2024	1	Revision
	30/10/2024	1	Revision

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18TH	04/11/2024	1	Previous Year Questions Discussion
	05/11/2024	1	Previous Year Questions Discussion
	06/11/2024	1	Previous Year Questions Discussion
	08/11/2024	2	Previous Year Questions Discussion