

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



SUBJECT: STRUCTURAL MECHANICS(TH1)

FACULTY: SRADHANJALI SAHOO

ACADEMIC SESSION: 2023-2024

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: 05 periods per week Mon-1 period, Tue-1 period, Thurse-2 period, Sat-1 period)		Semester From Date: 01-08-2023 To Date: 30-11-2023 No. of weeks: 18 weeks
Week	Class Day	No of period available	Theory Topics
1ST	01/08/2023	1	1.0 Review of Basic Concepts 1.1 Basic Principle of Mechanics: Force, Moment, support conditions,
	03/08/2023	2	1.1 Conditions of equilibrium, C.G & MI, Free body diagram 1.2 Review of CG of different sections
	05/08/2023	1	1.2 Review of MI of different sections
2ND	07/08/2023	1	2.0 Simple And Complex Stress, Strain
	08/08/2023	1	2.1 Simple Stresses and Strains Introduction to stresses and strains
	10/08/2023	2	2.1 Mechanical properties of materials – Rigidity, Elasticity, Plasticity, Compressibility, Hardness, Toughness, Stiffness, Brittleness, Ductility, Malleability, Creep, Fatigue, Tenacity, Durability,
	12/08/2023	1	2.1 Problems on mechanical property
3RD	14/08/2023	1	2.1 Types of stresses -Tensile, Compressive and Shear stresses, Types of strains - Tensile, Compressive and Shear strains,
	17/08/2023	2	2.1 Complimentary shear stress - Diagonal tensile / compressive Stresses due to shear, Complimentary shear stress - Diagonal tensile / compressive Stresses due to shear, Elongation and Contraction,

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	19/08/2023	1	2.1 Longitudinal and Lateral strains, Poisson's Ratio, Volumetric strain, computation of stress, strain, Poisson's ratio, change in dimensions and volume etc.,
4TH	21/08/2023	1	2.1 Hooke's law - Elastic Constants, Derivation of relationship between the elastic constants
	22/08/2023	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
	24/08/2023	2	2.2 Limit of proportionality, Elastic limit, Yield stress, Ultimate stress, Breaking stress, Percentage elongation.
	26/08/2023	1	2.2 Percentage reduction in area, Significance of percentage elongation and reduction in area of cross section
5TH	28/08/2023	1	2.2 Deformation of prismatic bars due to uniaxial load, 2.2. Deformation of prismatic bars due to its self-weight
	29/08/2023	1	2.3 Complex stress and strain 2.3 Principal stresses and strains: Occurrence of normal and tangential stresses,
	31/08/2023	2	2.3 Concept of Principal stress and Principal Planes, major and minor principal stresses and their orientations
	02/09/2023	1	2.3 Mohr's Circle and its application to solve problems of complex stresses
6TH	04/09/2023	1	3.0 Stresses In Beams and Shafts
	05/09/2023	1	3.1 Stresses in beams due to bending: Bending stress in beams – Theory of simple bending – Assumptions

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	07/09/2023	2	3.1 Moment of resistance – Equation for Flexure– Flexural stress distribution
	09/09/2023	1	3.1 Curvature of beam – Position of N.A. and Centroidal Axis – Flexural rigidity – Significance of Section modulus
7TH	11/09/2023	1	3.2 Shear stresses in beams: Shear stress distribution in beams of rectangular, circular, and standard sections symmetrical about vertical axis.
	12/09/2023	1	3.3 Stresses in shafts due to torsion: Concept of torsion, basic assumptions of pure torsion
	14/09/2023	2	3.3 torsion of solid and hollow circular sections, polar moment of inertia torsional shearing stresses,
	16/09/2023	1	3.3 angle of twist, torsional rigidity, equation of torsion
8TH	18/09/2023	1	3.3 Problems based on torsion.
	21/09/2023	2	Class Test 1
	23/09/2023	1	3.4 Combined bending and direct stresses: Combination of stresses, combined direct and bending stresses
9TH	25/09/2023	1	3.4 Maximum and Minimum stresses in Sections, Conditions for no tension,
	26/09/2023	1	3.4 Limit of eccentricity, Middle third/fourth rule, Core or Kern for square, rectangular, and circular sections, chimneys, dams and retaining walls
	28/09/2023	2	4.0 Columns and Struts 4.1 Columns and Struts, Definition, Short and Long columns
	30/09/2023	1	4.1 End conditions, Equivalent length / Effective length, Slenderness ratio,
10TH	03/10/2023	1	4.1 Axially loaded short and long column, Euler's theory of long columns,

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	05/10/2023	2	4.1 Critical load for Columns with different end conditions Problems on column.
	07/10/2023	1	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	09/10/2023	1	5.1 Types of Supports: Simple support, Roller support, Hinged support, Fixed support,
	10/10/2023	1	INTERNAL ASSSMENT.
	12/10/2023	2	5.1Types of Reactions: Vertical reaction, Horizontal reaction, Moment reaction
	14/10/2023	1	5.1Types of Beams based on support conditions:
12TH	16/10/2023	1	5.1 Calculation of support reactions using equations of static equilibrium.
	17/10/2023	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.
	19/10/2023	2	6.0 Slope and Deflection 6.1 Introduction: Shape and nature of elastic curve (deflection curve);
13TH	30/11/2023	1	6.1Relationship between slope deflection and curvature (No derivation), Importance of slope and deflection 6.2 Slope and deflection of cantilever and simply supported beams under concentrated and uniformly distributed load (by Double Integration method)
	31/11/2023	1	6.1Relationship between slope deflection and curvature (No derivation), Importance of slope and deflection

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	02/11/2023	2	6.2 Slope and deflection of cantilever and simply supported beams under concentrated and uniformly distributed load (Macaulay's method).
	04/11/2023	1	CLASS TEST-2
14TH	06/11/2023	1	7.0 Indeterminate Beams 7.1 SF and BM diagrams (point load and udl covering full span)
	07/11/2023	1	7.1 Indeterminacy in beams, Principle of consistent deformation/compatibility
	09/11/2023	2	7.1 Analysis of propped cantilever, fixed and two span continuous beams by principle of superposition
	11/11/2023	1	8.0 Trusses
15TH	13/11/2023	1	8.1 Introduction: Types of trusses, statically determinate and indeterminate trusses
	14/11/2023	1	8.2 Analysis of trusses: Analytical method (Method of joints)
	16/11/2023	2	8.2 Analysis of trusses: Analytical method (method of Section)
	18/11/2023	1	CLASS TEST-3
16TH	20/11/2023	1	Revision
	21/11/2023	1	Revision
	23/11/2023	2	Revision
	25/11/2023	1	Previous Year Questions Discussion
17TH	28/11/2023	1	Previous Year Questions Discussion
	30/11/2023	2	Previous Year Questions Discussion