

**BHUBANANANDA ODISHA SCHOOL OF ENGINEERING, CUTTACK
DEPARTMENT OF CIVIL ENGINEERING**



LESSON PLAN

SUBJECT: STRUCTURAL MACHANICS (TH 1)

FACULTY: DR. S K NAYAK

ACCADEMIC SESSION: 2022-23

SEMESTER: 3RD

SEC: A

Sd/-
H O D (Civil Engg.)

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Discipline: Civil Engineering	Semester: 3rd B		Name of the teaching faculty: Dr S K Nayak
Subject: Structural Mechanics	No. of Days/ per week class allotted: 05 periods per week Mon-1 period, Wed-1 period, Thu-1 period, Fri -2 period)		Semester From Date: 15-09-2022 To Date: 22-12-2022 No. of weeks: 14 weeks
Week	Class Day	No of period available	Theory Topics
1ST	15/09/2022	1	1.0 Review of Basic Concepts 1.1 Basic Principle of Mechanics: Force, Moment, support conditions,
	16/09/2022	2	1.1 Conditions of equilibrium, C.G & MI, Free body diagram
2ND	19/09/2022	1	1.2 Review of CG of different sections
	21/09/2022	1	1.2 Review of MI of different sections
	22/09/2022	1	2.0 Simple And Complex Stress, Strain 2.1 Simple Stresses and Strains Introduction to stresses and strains: Mechanical properties of materials – Rigidity, Elasticity, Plasticity, Compressibility, Hardness, Toughness, Stiffness, Brittleness, Ductility, Malleability, Creep, Fatigue, Tenacity, Durability,
	23/09/2022	2	2.1 Types of stresses -Tensile, Compressive and Shear stresses, Types of strains - Tensile, Compressive and Shear strains,
3RD	26/09/2022	1	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,
	28/09/2022	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.,

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	29/09/2022	1	2.1 Hooke's law - Elastic Constants, Derivation of relationship between the elastic constants
	30/09/2022	2	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
4TH	10/10/2022	1	2.2 Limit of proportionality, Elastic limit, Yield stress, Ultimate stress, Breaking stress, Percentage elongation, Percentage reduction in area, Significance of percentage elongation and reduction in area of cross section
	12/10/2022	1	2.2 Deformation of prismatic bars due to uniaxial load,
	13/10/2022	1	2.2. Deformation of prismatic bars due to its self-weight
	14/10/2022	2	2.3 Complex stress and strain
5TH	17/10/2022	1	2.3 Principal stresses and strains: Occurrence of normal and tangential stresses, Concept of Principal stress and Principal Planes, major and minor principal stresses and their orientations
	19/10/2022	1	2.3 Mohr's Circle and its application to solve problems of complex stresses
	20/10/2022	1	3.0 Stresses In Beams and Shafts 3.1 Stresses in beams due to bending: Bending stress in beams – Theory of simple bending – Assumptions
	21/10/2022	2	3.1 Moment of resistance – Equation for Flexure– Flexural stress distribution –
6TH	26/10/2022	1	3.1 Curvature of beam – Position of N.A. and Centroidal Axis – Flexural rigidity – Significance of Section modulus
	27/10/2022	1	3.2 Shear stresses in beams: Shear stress distribution in beams of rectangular, circular, and standard sections symmetrical about vertical axis.
	28/10/2022	2	3.3 Stresses in shafts due to torsion: Concept of torsion, basic assumptions of pure torsion,

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7TH	31/10/2022	1	Monthly Class Test 1
	02/11/2022	1	3.3 torsion of solid and hollow circular sections, polar moment of inertia torsional shearing stresses, angle of twist, torsional rigidity, equation of torsion
	03/11/2022	1	3.4 Combined bending and direct stresses: Combination of stresses, combined direct and bending stresses, Maximum and Minimum stresses in Sections, Conditions for no tension,
	04/11/2022	2	3.4 Combined bending and direct stresses: Combination of stresses, combined direct and bending stresses, Maximum and Minimum stresses in Sections, Conditions for no tension
8TH	07/11/2022	1	3.4 Limit of eccentricity, Middle third/fourth rule, Core or Kern for square, rectangular, and circular sections, chimneys, dams and retaining walls
	09/11/2022	1	4.0 Columns and Struts
	10/11/2022	1	4.1 Columns and Struts, Definition, Short and Long columns, End conditions, Equivalent length / Effective length, Slenderness ratio,
	11/11/2022	2	4.1 Axially loaded short and long column, Euler's theory of long columns,
9TH	14/11/2022	1	4.1 Critical load for Columns with different end conditions
	16/11/2022	1	Internal Assessment
	17/11/2022	1	5.0 Shear Force and Bending Moment
	18/11/2022	2	5.1 Types of loads and beams: Types of Loads: Concentrated (or) Point load, Uniformly Distributed load (UDL),
10TH	21/11/2022	1	5.1 Types of Supports: Simple support, Roller support, Hinged support, Fixed support,
	23/11/2022	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

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	24/11/2022	1	5.1 S. F and B.M diagrams for Cantilevers, simply supported beams and over hanging beams, Position of maximum BM
	25/11/2022	2	5.1 Point of contra flexure, Relation between intensity of load, S.F and B.M.
11TH	28/11/2022	1	6.0 Slope and Deflection 6.1 Introduction: Shape and nature of elastic curve (deflection curve);
	30/11/2022	1	Monthly Class Test 2
	01/12/2022	1	6.1 Relationship between slope deflection and curvature (No derivation), Importance of slope and deflection
	02/12/2022	2	6.2 Slope and deflection of cantilever and simply supported beams under concentrated and uniformly distributed load (by Double Integration method, Macaulay's method).
12TH	05/12/2022	1	7.0 Indeterminate Beams
	07/12/2022	1	7.1 Indeterminacy in beams, Principle of consistent deformation/compatibility
	08/12/2022	1	7.1 Analysis of propped cantilever, fixed and two span continuous beams by principle of superposition
	09/12/2022	2	7.1 SF and BM diagrams (point load and udl covering full span)
13TH	12/12/2022	1	8.0 Trusses 8.1 Introduction: Types of trusses, statically determinate and indeterminate trusses
	14/12/2022	1	8.2 Analysis of trusses: Analytical method (Method of joints, method of Section)
	15/12/2022	1	Monthly Class Test 3
	16/12/2022	2	Revision
14TH	19/12/2022	1	Revision
	21/12/2022	1	Revision
	22/12/2022	1	Previous Year Questions Discussion