BHUBANANANDA ODISHA SCHOOL OF ENGINEERING, CUTTACK
DEPARTMENT OF CIVIL ENGINEERING

LESSON PLAN

SUBJECT: STRUCTURAL MACHANICS (TH 1)

FACULTY: SRI ADITYA RANJAN PATRA

ACCADEMIC SESSION: 2022-23

SEMESTER: 3RD

SEC: C

Sd/-
H O D (Civil Engg.)

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LESSON PLAN

Discipline: Civil Engineering	Semester: 3rd B		Name of the teaching faculty: Sri Aditya Ranjan Patra
Subject: Structural Mechanics	No. of Days/ per week class allotted: 05periods per week Mon-1 period, Tue-2 period,Wed-1 period, Sat-1 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	17/09/2022	1	**1.0 Review of Basic Concepts** **1.1** Basic Principle of Mechanics: Force, Moment, support conditions,
2ND	19/09/2022	1	**1.0 Review of Basic Concepts** **1.1** Basic Principle of Mechanics: Force, Moment, support conditions **1.1** Conditions of equilibrium, C.G & MI, Free body diagram
	20/09/2022	2	**1.2** Review of CG of different sections
	21/09/2022	1	**1.2** Review of MI of different sections
	24/09/2022	1	**2.0Simple 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,
3RD	26/09/2022	1	2.1 Types of stresses -Tensile, Compressive and Shear stresses, Types of strains - Tensile, Compressive and Shear strains,
	27/09/2022	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,
	28/09/2022	1	2.1Longitudinal and Lateral strains, Poisson's Ratio, Volumetric strain, computation of stress, strain, Poisson's ratio, change in dimensions and volume etc.,

	01/10/2022	1	2.1Hooke's law - Elastic Constants, Derivation of relationship between the elastic constants **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
	11/10/2022	2	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,
	15/10/2022	1	2.2. Deformation of prismatic bars due to its self-weight
5TH	17/10/2022	1	**2.3 Complex stress and strain** 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
	18/10/2022	2	2.3 Mohr's Circle and its application to solve problems of complex stresses
	19/10/2022	1	2.3 Mohr's Circle and its application to solve problems of complex stresses
	22/10/2022	1	**3.0Stresses In Beams and Shafts** **3.1 Stresses in beams due to bending:** Bending stress in beams – Theory of simple bending – Assumptions 3.1 Moment of resistance – Equation for Flexure– Flexural stress distribution –
6TH	25/10/2022	2	3.1 Curvature of beam – Position of N.A. and Centroidal Axis – Flexural rigidity – Significance of Section modulus **3.2 Shear stresses in beams:** Shear stress distribution in beams of rectangular, circular, and standard sections symmetrical about vertical axis.
	26/10/2022	1	**3.3 Stresses in shafts due to torsion:** Concept of torsion, basic assumptions of pure torsion,

	29/10/2022	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
7TH	31/10/2022	1	Monthly Class Test 1
	01/11/2022	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,
	02/11/2022	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
	05/11/2022	1	3.4 Limit of eccentricity, Middle third/fourth rule, Core or Kern for square, rectangular, and circular sections, chimneys, dams and retaining walls
8TH	07/11/2022	1	**4.0 Columns and Struts** **4.1** Columns and Struts, Definition, Short and Long columns, End conditions, Equivalent length / Effective length, Slenderness ratio,
	09/11/2022	1	4.1 Axially loaded short and long column, Euler's theory of long columns,
	12/11/2022	1	4.1 Critical load for Columns with different end conditions
9TH	14/11/2022	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), 5.1 Types of Supports: Simple support, Roller support, Hinged support, Fixed support,
	15/11/2022	2	**Internal Assessment**
	16/11/2022	1	**Internal Assessment**
	19/11/2022	1	5.1 Types of Reactions: Vertical reaction, Horizontal reaction, Moment reaction
10TH	21/11/2022	1	5.1 Types of Beams based on support conditions: Calculation of support reactions using equations of static equilibrium.
	22/11/2022	2	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

	23/11/2022	1	5.1 S. F and B.M diagrams for Cantilevers, simply supported beams and over hanging beams, Position of maximum BM
	26/11/2022	1	5.1 Point of contra flexure, Relation between intensity of load, S.F and B.M.
11TH	28/11/2022	1	**6.0Slope and Deflection** **6.1 Introduction:** Shape and nature of elastic curve (deflection curve);
	29/11/2022	2	6.1Relationship between slope deflection and curvature (No derivation), Importance of slope and deflection
	30/11/2022	1	Monthly Class Test 2
	03/12/2022	1	**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	**6.2** Slope and deflection of cantilever and simply supported beams under concentrated and uniformly distributed load (by Double Integration method, Macaulay's method).
	06/12/2022	2	**7.0Indeterminate Beams** **7.1**Indeterminacy in beams, Principle of consistent deformation/compatibility
	07/12/2022	1	7.1 Analysis of propped cantilever, fixed and two span continuous beams by principle of superposition
	10/12/2022	1	7.1 SF and BM diagrams (point load and udl covering full span)
13TH	12/12/2022	1	**8.0Trusses** **8.1 Introduction:** Types of trusses, statically determinate and indeterminate trusses
	13/12/2022	2	**8.2 Analysis of trusses:** Analytical method (Method of joints, method of Section)
	14/12/2022	1	Monthly Class Test 3
	17/12/2022	1	Revision
14TH	19/12/2022	1	Revision
	20/12/2022	2	Revision
	21/12/2022	1	Previous Year Questions Discussion