BHUBANANANDA ODISHA SCHOOL OF ENGINEERING, CUTTACK
DEPARTMENT OF CIVIL ENGINEERING

LESSON PLAN

SUBJECT: STRUCTURAL MACHANICS (TH 1)

FACULTY: DR. S K NAYAK

ACCADEMIC SESSION: 2023-24

SEMESTER: 3RD

SEC: A

Sd/-
H O D (Civil Engg.)

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

Discipline: **Civil Engineering**	**Semester: 3rdA**		**Name of the teaching faculty:** **Dr S K Nayak**
Subject: **Structural Mechanics**	**No. of Days/ per week class allotted:** **05periods per week** **Mon-1 period,Tue-1 period, Wed-1 period,Thu-1 period, Fri -1 period)**		**Semester From Date: 01-08-2023 To Date: 30-11-2023** **No. of weeks: 17 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,
	02/08/2023	1	1.1 Basic Principle of Mechanics: Force, Moment, support conditions
	03/08/2023	1	1.1 Conditions of equilibrium, C.G & MI, Free body diagram
	04/08/2023	1	1.1 Conditions of equilibrium, C.G & MI, Free body diagram
2ND	07/08/2023	1	1.2 Review of CG of different sections
	08/08/2023	1	1.2 Review of MI of different sections
	09/08/2023	1	2.0Simple And Complex Stress, Strain
	10/08/2023	1	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,
	11/08/2023	1	2.1 Types of stresses -Tensile, Compressive and Shear stresses, Types of strains - Tensile, Compressive and Shear strains,
3RD	14/08/2023	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,
	16/08/2023	1	2.1Longitudinal and Lateral strains, Poisson's Ratio, Volumetric strain, computation of stress, strain, Poisson's ratio, change in dimensions and volume etc.,
	17/08/2023	1	2.1Hooke's law - Elastic Constants, Derivation of relationship between the elastic constants
	18/08/2023	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
4TH	21/08/2023	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
	22/08/2023	1	2.2 Deformation of prismatic bars due to uniaxial load,
	23/08/2023	1	2.2. Deformation of prismatic bars due to its self-weight
	24/08/2023	1	2.3 Complex stress and strain
	25/08/2023	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
5TH	28/08/2023	1	2.3 Mohr's Circle and its application to solve problems of complex stresses
	29/08/2023	1	3.0Stresses In Beams and Shafts
	31/08/2023	1	3.0Stresses In Beams and Shafts 3.1 Stresses in beams due to bending: Bending stress in beams – Theory of simple bending – Assumptions
	01/09/2023	1	3.1 Moment of resistance – Equation for Flexure– Flexural stress distribution

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

6TH	04/09/2023	1	3.1 Curvature of beam – Position of N.A. and Centroidal Axis – Flexural rigidity – Significance of Section modulus
	05/09/2023	1	3.2 Shear stresses in beams: Shear stress distribution in beams of rectangular, circular, and standard sections symmetrical about vertical axis
	07/09/2023	1	3.2 Shear stresses in beams: Shear stress distribution in beams of rectangular, circular, and standard sections symmetrical about vertical axis.
	08/09/2023	1	3.3 Stresses in shafts due to torsion: Concept of torsion, basic assumptions of pure torsion,
7TH	11/09/2023	1	Monthly Class Test 1
	12/09/2023	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
	13/09/2023	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
	14/09/2023	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
	15/09/2023	1	3.4 Limit of eccentricity, Middle third/fourth rule, Core or Kern for square, rectangular, and circular sections, chimneys, dams and retaining walls
8TH	18/09/2023	1	4.0Columns and Struts
	21/09/2023	1	4.1 Columns and Struts, Definition, Short and Long columns, End conditions, Equivalent length / Effective length, Slenderness ratio,
	22/09/2023	1	4.1 Axially loaded short and long column, Euler's theory of long columns,

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

9TH	25/09/2023	1	4.1 Critical load for Columns with different end conditions
	26/09/2023	1	5.0 Shear Force and Bending Moment
	27/09/2023	1	5.0 Shear Force and Bending Moment
	28/09/2023	1	5.1 Types of loads and beams: Types of Loads: Concentrated (or) Point load, Uniformly Distributed load (UDL),
10TH	03/10/2023	1	5.1 Types of Supports: Simple support, Roller support, Hinged support, Fixed support,
	04/10/2023	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
	05/10/2023	1	5.1 S. F and B.M diagrams for Cantilevers, simply supported beams and over hanging beams, Position of maximum BM
	06/10/2023	1	5.1 S. F and B.M diagrams for Cantilevers, simply supported beams and over hanging beams, Position of maximum BM
11TH	09/10/2023	1	5.1 Point of contra flexure, Relation between intensity of load, S.F and B.M.
	10/10/2023	1	Internal Assessment
	11/10/2023	1	Internal Assessment
	12/10/2023	1	Monthly Class Test 2
	13/10/2023	1	5.1 Point of contra flexure, Relation between intensity of load, S.F and B.M.
12TH	16/10/2023	1	6.0Slope and Deflection
	17/10/2023	1	6.1 Introduction: Shape and nature of elastic curve (deflection curve);
	18/10/2023	1	6.1 Introduction: Shape and nature of elastic curve (deflection curve);

	19/10/2023	1	6.1Relationship between slope deflection and curvature (No derivation), Importance of slope and deflection
	20/10/2023	1	6.1Relationship between slope deflection and curvature (No derivation), Importance of slope and deflection
13TH	30/10/2023	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).
	31/10/2023	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).
	01/11/2023	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).
	02/11/2023	1	7.0Indeterminate Beams
	03/11/2023	1	7.0Indeterminate Beams
14TH	06/11/2023	1	7.1Indeterminacy in beams, Principle of consistent deformation/compatibility
	07/11/2023	1	7.1Indeterminacy in beams, Principle of consistent deformation/compatibility
	08/11/2023	1	7.1 Analysis of propped cantilever, fixed and two span continuous beams by principle of superposition
	09/11/2023	1	7.1 Analysis of propped cantilever, fixed and two span continuous beams by principle of superposition
	10/11/2023	1	7.1 SF and BM diagrams (point load and udl covering full span)
15TH	13/11/2023	1	7.1 SF and BM diagrams (point load and udl covering full span)
	14/11/2023	1	8.0Trusses 8.1 Introduction: Types of trusses, statically determinate and indeterminate trusses
	15/11/2023	1	8.2 Analysis of trusses: Analytical method (Method of joints
	16/11/2023	1	8.2 Analysis of trusses: Analytical method (Method of joints
	17/11/2023	1	Monthly Class Test 3

16TH	20//11/2023	1	Revision
	21//11/2023	1	Revision
	22//11/2023	1	Revision
	23//11/2023	1	Revision
	24//11/2023	1	Revision
17TH	28/11/2023	1	Previous Year Questions Discussion
	29/11/2023	1	Previous Year Questions Discussion
	30/11/2023	1	Previous Year Questions Discussion