LESSON PLAN OF 3RD SEMESTER(2023-24) CIVIL ENGINEERING

Discipline :- CIVIL ENGG.	Semester:-3RD	Name of the Teaching Faculty PRIYABRATA TRIPATHY
Subject:- STRUCTURAL MECHANICS (TH-1)	No of Days/per Week Class Allotted :-04	Semester From:- 01/08/23 To:- 30/11/23 No of Weeks:- 18
Week	**Class Day**	**Theory/ Practical Topics**
1st	1st	**1.1** Basic Principle of Mechanics: Force, Moment, support conditions,
	2nd	Conditions of equilibrium, C.G & MI, Free body diagram
	3rd	**1.2** Review of CG and MI of different sections
	4th	**2.1 Simple Stresses and Strains** Introduction to stresses and strains: Mechanical properties of materials – Rigidity, Elasticity, Plasticity, Compressibility,
2nd	1st	Hardness, Toughness, Stiffness, Brittleness, Ductility, Malleability, Creep, Fatigue, Tenacity, Durability
	2nd	Types of stresses -Tensile, Compressive and Shear stresses, Types of strains - Tensile, Compressive and Shear strains,
	3rd	Complimentary shear stress - Diagonal tensile / compressive Stresses due to shear, Elongation and Contraction, Longitudinal and Lateral strains
	4th	Poisson's ratio, change in dimensions and volume etc,Volumetric strain
3rd	1st	computation of stress, strain
	2nd	, Hooke's law - Elastic Constants Elastic limit derivation of relation between elastic constants
	3rd	, **2.2 Application of simple stress and strain in engineering field:** Behaviour of ductile and brittle materials under direct loads,
	4th	Stress Strain curve of a ductile material,
4th	1st	Limit of proportionality Derivation of relationship between the elastic Percentage elongation, Percentage reduction in area,
	2nd	Significance of percentage elongation and reduction in area of cross section, Deformation of
	3rd	prismatic bars due to uniaxial load, Deformation of prismatic bars due to its self weight
	4th	**2.3 Complex stress and strain** Principal stresses and strains: Occurrence of normal and tangential stresses,
5th	1st	Concept of Principal stress and Principal Planes, major and minor principal stresses and their orientations, Mohr's Circle and its application to solve
	2nd	problems of complex stresses, Yield stress, Ultimate stress, Breaking stress
	3rd	,**Stresses in Beams and Shafts** **3.1 Stresses in beams due to bending:** Bending stress in beams – Theory of simple bending – Assumptions – Moment of resistance
	4th	Equation for Flexure– Flexural stress distribution –
6th	1st	Curvature of beam – Position of N.A. and Centroidal Axis – Flexural rigidity – Significance of Section modulus
	2nd	**3.2 Shear stresses in beams:** Shear stress distribution in beams of Rectangular Section
	3rd	, circular and standard sections symmetrical about vertical axis.
	4th	**3.3 Stresses in shafts due to torsion:** Concept of torsion, basic assumptions of pure torsion,
7th	1st	, torsion of solid and hollow circular
	2nd	sections polar moment of inertia, torsional shearing stresses,
	3rd	angle of twist, torsional rigidity, equation of torsion
	4th	**3.4 Combined bending and direct stresses:** Combination of stresses, Combined direct and bending stresses,

Mr. Lect (Civil) upload in website

27/7/23
Principal
GIET (Polytechnic)
Jagatpur, Cuttack

8th	1st	Maximum and Minimum stresses in Sections, Conditions for no tension,
	2nd	Limit of eccentricity, Middle third/fourth rule, Core or Kern for square,
	3rd	rectangular and circular sections, chimneys, dams and retaining walls
	4th	**4.1** Columns and Struts, Definition, Short and Long columns, End conditions,
9th	1st	Equivalent length / Effective length, Slenderness ratio, Axially loaded short and long column,
	2nd	Euler's theory of long columns, Critical load for Columns with different end conditions
	3rd	**5.1 Types of loads and beams:** Types of Loads: Concentrated (or) Point load, Uniformly Distributed load (UDL), Types of Supports: Simple support
	4th	Problem practice
10th	1st	Problem practice
	2nd	5.1 Roller support, Hinged support, Fixed support, Types of Reactions: Vertical reaction, Horizontal reaction,
	3rd	Problem practice
	4th	5.1 Moment reaction, Types of Beams based on support conditions:
11th	1st	Calculation of support reactions using equations of static equilibrium Problem practice
	2nd	**5.2 Shear force and bending moment in beams:** Shear Force and Bending Moment: Signs Convention for S.F. and B.M,
	3rd	5.2 S.F and B.M of general cases of determinate beams with concentrated loads and udl only,
	4th	Problem practice
12th	1st	Problem practice
	2nd	5.2 S.F and B.M diagrams for Cantilevers, Simply supported beams and
	3rd	Over hanging beams, Position of maximum BM, Point of contra flexure,
	4th	Relation between intensity of load, S.F and B.M.
13th	1st	Problem practice
	2nd	Problem practice
	3rd	Problem practice
	4th	**6.1 Introduction:** Shape and nature of elastic curve (deflection curve); Relationship between slope, deflection and curvature (No derivation),
14th	1st	Importance of slope and deflection
	2nd	Problem practice
	3rd	Problem practice
	4th	Problem practice **6.2** Slope and deflection of cantilever and simply supported beams under
15th	1st	concentrated and uniformly distributed load (by Double Integration method, Macaulay's method).
	2nd	Problem practice
	3rd	Problem practice
	4th	Problem practice
16th	1st	Problem practice
	2nd	**7.1** Indeterminacy in beams, Principle of consistent
	3rd	deformation/compatibility, Analysis of propped cantilever
	4th	fixed and two span continuous beams by principle of superposition, SF and
17th	1st	BM diagrams (point load and udl covering full span)
	2nd	Problem practice
	3rd	Problem practice
	4th	Problem practice
18th	1st	**8.1 Introduction:** Types of trusses, statically determinate and indeterminate trusses8.1 degree of indeterminacy.
	2nd	8.1 stable and unstable trusses, advantages of trusses
	3rd	8.2 ANALYSIS OF TRUSSES; Analytical method (Method of joint,Method of section)
	4th	8.2 ANALYSIS OF TRUSSES; Analytical method (Method of joint,Method of section)