

LESSON PLAN

Discipline: Civil Engineering		Name of The Teaching Faculty: Lect-II-ANITA PRADHAN			
Subject: Structural mechanics (TH1)		Semester From Date: 02.07.2024 To 08.11.2024			
SEMESTER-3rd		No. Of Weeks: 16			5P/WEEK
No. of Days/week class allotted: 05 period per week (Mon, Tues, thus-1 period, fri-2 period)					TOTAL PERIOD-75
MONTH	Week	DATE	DAYS	Syllabus to be covered	NO. OF PERIODS AVAILABLE
				1. Review Of Basic Concepts	4
	1ST	02.07.2024	Mon	Basic Principle of Mechanics: Force, Moment, support conditions, Conditions of equilibrium,	1
		03.07.2024	Tues	C.G & MI, Free body diagram	1
		04.07.2024	Thu	Review of CG and MI of different sections	1
		05.07.2024	Fri	Numerical problems	1
				2. Simple And Complex Stress, Strain	15
		05.07.2024	Fri	2.1 Simple Stresses and Strains	1
	2ND	08.07.2024	Mon	Introduction to stresses and strains: Mechanical properties of materials – Rigidity, Elasticity, Plasticity, Compressibility, Hardness, Toughness, Stiffness, Brittleness, Ductility, Malleability, Creep, Fatigue, Tenacity, Durability,	1
		09.07.2024	Tues	Types of stresses - Tensile, Compressive and Shear stresses, Types of strains - Tensile, Compressive and Shear strains, Complimentary shear stress - Diagonal tensile / compressive Stresses due to shear, Elongation and Contraction, Longitudinal and Lateral strains,	1
		11.07.2024	Thu	Poisson's Ratio, Volumetric strain, computation of stress, strain, Poisson's ratio, change in dimensions and volume etc, Hooke's law - Elastic Constants, Derivation of relationship between the elastic constants	1
		12.07.2024	Fri	Numerical problems	1
		12.07.2024	Fri	2.2 Application of simple stress and strain in engineering field:	
JULY	3RD	15.07.2024	Mon	Behaviour of ductile and brittle materials under direct loads, Stress Strain curve of a ductile material, Limit of proportionality, Elastic limit, Yield stress, Ultimate stress, Breaking stress,	1
		16.07.2024	Tues	Percentage elongation, Percentage reduction in area, Significance of percentage elongation and reduction in area of cross section	1
		18.07.2024	Thu	Numerical problems	1
		19.07.2024	Fri	Deformation of prismatic bars due to uniaxial load	1
		19.07.2024	Fri	Deformation of prismatic bars due to its self weight.	1

2.3 Complex stress and strain

			Principal stresses and strains: Occurrence of normal and tangential stresses	
4TH	22.07.2024	Mon		
	23.07.2024	Tues	Concept of Principal stress and Principal Planes	1
	25.07.2024	Thu	major and minor principal stresses and their orientations	1
	26.07.2024	Fri	Mohr's Circle and its application to solve problems of complex stresses	1
	26.07.2024	Fri	Numerical problems	1
5TH	29.07.2024	Mon	Numerical problems	1
			3.Stresses In Beams and Shafts	10
	30.07.2024	Tues	Stresses in beams due to bending: Bending stress in beams – Theory of simple bending – Assumptions – Moment of resistance – Equation for Flexure– Flexural stress distribution	1
1ST	01.08.2024	Thu	Curvature of beam – Position of N.A. and Centroidal Axis – Flexural rigidity – Significance of Section modulus	1
	02.08.2024	Fri	Shear stresses in beams: Shear stress distribution in beams of rectangular, circular and standard sections symmetrical about vertical axis.	1
	02.08.2024	Fri	Numerical problems	1
2ND	05.08.2024	Mon	Stresses in shafts due to torsion: Concept of torsion, basic assumptions of pure torsion,	1
	06.08.2024	Tues	Torsion of solid and hollow circular sections, polar moment of inertia	1
	08.08.2024	Thu	Torsional shearing stresses, angle of twist, torsional rigidity, equation of torsion	1
	09.08.2024	Fri	Combined bending and direct stresses: Combination of stresses, Combined direct and bending stresses, Maximum and Minimum stresses in Sections	1
	09.08.2024	Fri	Numerical problems	1
AUG 3RD	12.08.2024	Mon	Conditions for no tension, Limit of eccentricity, Middle third/fourth rule, Core or Kern for square, rectangular and circular sections, chimneys, dams and retaining walls	1
			4.Columns and Struts	4
	13.08.2024	Tues	Columns and Struts	1
	16.08.2024	Fri	Definition Short and Long columns, End conditions	1
	16.08.2024	Fri	Equivalent length / Effective length, Slenderness ratio, Axially loaded short and long column	1

4TH	20.08.2024	Tues	Euler's theory of long columns, Critical load for Columns with different end conditions	1	
			5. Shear Force and Bending Moment	12	
			5.1 Types of loads and beams:		
	22.08.2024	Thu	Types of Loads: Concentrated (or) Point load, Uniformly Distributed load (UDL)	1	
	23.08.2024	Fri	Types of Supports: Simple support, Roller support, Hinged support, Fixed support	1	
	23.08.2024	Fri	Types of Reactions: Vertical reaction, Horizontal reaction, moment reaction	1	
5TH	27.08.2024	Tues	Calculation of support reactions using equations of static equilibrium.	1	
			5.2 Shear force and bending moment in beams:		
	29.08.2024	Thu	Shear Force and Bending Moment: Signs Convention for S.F. and B.M	1	
	30.08.2024	Fri	B.M of general cases of determinate beams with concentrated loads and udl only	1	
	30.08.2024	Fri	S.F and B.M diagrams for Cantilevers, Simply supported beams and Over hanging beams,	1	
1ST	02.09.2024	Mon	Numerical problems	1	
	03.09.2024	Tues	Numerical problems	1	
	05.09.2024	Fri	Numerical problems	1	
	05.09.2024	Fri	Position of maximum BM, Point of contra flexure	1	
	09.09.2024	Mon	Relation between intensity of load, S.F and B.M.	1	
			6. Slope and Deflection	10	
	2ND	10.09.2024	Tues	Introduction: Shape and nature of elastic curve (deflection curve)	1
		12.09.2024	Fri	Relationship between slope, deflection and curvature (No derivation), Importance of slope and deflection.	1
		12.09.2024	Fri	Revision	1
	3RD	17.09.2024	Mon	Slope and deflection of cantilever and simply supported beams under concentrated load (by Double Integration method)	1
19.09.2024		Thu	Slope and deflection of cantilever and simply supported beams uniformly distributed load (by Double Integration method)	1	
20.09.2024		Fri	Slope and deflection of cantilever and simply supported beams under concentrated load (by Macaulay's method)	1	
20.09.2024		Fri	Slope and deflection of cantilever and simply supported beams uniformly distributed load (by Macaulay's method)	1	
SEP	23.09.2024	Mon	Numerical problems	1	
	24.09.2024	Tues	Numerical problems	1	

		7. Indeterminate Beams			
	4TH	26.09.2024	Fri	Indeterminacy in beams	1
		26.09.2024	Fri	Principle of consistent deformation/compatibility	1
	5TH	30.09.2024	Mon	Principle of consistent deformation/compatibility	1
OCT	1ST	01.10.2024	Tues	Analysis of propped cantilever beam by principle of superposition	1
		03.10.2024	Thu	Analysis of fixed beam by principle of superposition	1
		04.10.2024	Fri	Analysis of two span continuous beams by principle of superposition	1
		04.10.2024	Fri	SF diagrams (point load and udl covering full span)	1
	3RD	14.10.2024	Mon	BM diagrams (point load and udl covering full span)	1
		15.10.2024	Tues	BM diagrams (point load and udl covering full span)	1
		17.10.2024	Thu	Numerical problems	1
				8. Trusses	10
	4TH	18.10.2024	Fri	Introduction	1
		18.10.2024	Fri	Types of trusses	1
		21.10.2024	Mon	statically determinate and indeterminate trusses	1
		22.10.2024	Tues	Degree of indeterminacy	1
		24.10.2024	Thu	Stable and unstable trusses	1
		25.10.2024	Fri	Advantages of trusses.	1
		25.10.2024	Fri	Analysis of trusses: Analytical method (Method of joints, method of Section)	1
5TH	28.10.2024	Mon	Analysis of trusses: Analytical method (Method of joints, method of Section)	1	
	29.10.2024	Tues	Analysis of trusses: Analytical method (Method of joints, method of Section)	1	
NOV	1ST	01.11.2024	Fri	Numerical problems	1