LESSON PLAN FOR WINTER SESSION (2024-25)

PROGRAMME : CIVIL ENGINEERING	NAME OF THE FACULTY: GUEST FACULTY
COURSE NAME : STRUCTURAL MECHANICS	SESSION : 2024-25
COURSE CODE : TH.1	DATE : 01/07/24 To 08/11/24
SEMESTER : 3RD	
PERIODS/WEEK: 5	
TOTAL PERIODS:75	

WEEK	PERIODS	UNITS	TOPICS
July. 1st Week	1	1	**1. Review Of Basic Concepts :** **1.1** Basic Principle of Mechanics: Force, Moment, support conditions.
	2	1	Conditions of equilibrium, C.G & MI, Free body diagram.
	3	1	**1.2** Review of CG and MI of different sections.
	4	2	**2. 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.
	5	2	Brittleness, Ductility, Malleability, Creep, Fatigue, Tenacity, Durability.
July. 2nd Week	6	2	Types of stresses -Tensile, Compressive and Shear stresses.
	7	2	Types of strains - Tensile, Compressive and Shear strains, Complimentary shear stress - Diagonal tensile / compressive Stresses due to shear, Elongation and
	8	2	Longitudinal and Lateral strains, Poisson's Ratio, Volumetric strain, computation of
	9	2	Hooke's law - Elastic Constants, Derivation of relationship between the elastic constants.
	10	2	**2.2 Application of simple stress and strain in engineering field:** Behavior of ductile and brittle materials under direct loads.
July. 3rd Week	11	2	Stress Strain curve of a ductile material, Limit of proportionality,
	12	2	Elastic limit, Yield stress, Ultimate stress, Breaking stress.
	13	2	Percentage elongation and Percentage reduction in area.
	14	2	Significance of percentage elongation and reduction in area of cross section.
	15	2	Deformation of prismatic bars due to uniaxial load.
July. 4th Week	16	2	Deformation of prismatic bars due to its self-weight.
	17	2	Deformation of prismatic bars due to its self-weight.
	18	2	**2.3 Complex stress and strain :** Principal stresses and strains: Occurrence of normal and tangential stresses.
	19	2	Concept of Principal stress and Principal Planes.
	20		**Monthly Test-1**
Aug. 1st Week	21	2	Major and minor principal stresses and their orientations.
	22	2	Mohr's Circle and its application to solve problems of complex stresses.
	23	2	Mohr's Circle and its application to solve problems of complex stresses.
	24	3	**3. Stresses In Beams and Shafts:** 3.1 Stresses in beams due to bending: Bending stress in beams.
	25	3	Theory of simple bending – Assumptions
Aug. 2nd Week	26	3	Moment of resistance – Equation for Flexure– Flexural stress distribution.
	27	3	Curvature of beam – Position of N.A. and Centroidal Axis – Flexural rigidity –
	28	3	Curvature of beam – Position of N.A. and Centroidal Axis – Flexural rigidity –
	29	3	**3.2 Shear stresses in beams:** Shear stress distribution in beams of rectangular

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	30	3	Circular and standard sections symmetrical about vertical axis.
Aug. 3rd Week	31	3	**3.3 Stresses in shafts due to torsion:** Concept of torsion, basic assumptions of
	32	3	Torsion of solid and hollow circular sections, polar moment of inertia.
	33	3	Torsion of solid and hollow circular sections, polar moment of inertia.
	34	3	Torsional shearing stresses, angle of twist.
	35	3	Torsional rigidity, equation of torsion.
Aug. 4th Week	36	3	**3.4 Combined bending and direct stresses:** Combination of stresses, Combined
	37	3	Maximum and Minimum stresses in Sections.
	38	3	Conditions for no tension, Limit of eccentricity.
	39	3	Middle third/fourth rule, Core or Kern for square, rectangular and circular, chimneys, dams and retaining walls.
	40		**Monthly Test-2**
Sept. 1st Week	41	4	**4. Columns and Struts** **4.1** Columns and Struts, Definition, Short and Long columns.
	42	4	End conditions, Equivalent length / Effective length.
	43	4	Slenderness ratio, Axially loaded short and long column.
	44	4	Euler's theory of long columns.
	45	4	Critical load for Columns with different end conditions.
Sept. 2nd Week	46	**Internal Assessment Exam**	
	47	5	**5. Shear Force and Bending Moment** **5.1 Types of loads and beams:** Types of Loads: Concentrated (or) Point load, Uniformly Distributed load (UDL).
	48	5	Types of Loads: Concentrated (or) Point load, Uniformly Distributed load (UDL).
	49	5	Types of Supports: Simple support, Roller support, Hinged support, Fixed support.
	50	5	Types of Reactions: Vertical reaction, Horizontal reaction, Moment reaction.
Sept. 3rd Week	51	5	Types of Beams based on support conditions: Calculation of support reactions
	52	5	**5.2 Shear force and bending moment in beams:** Shear Force and Bending Moment: Signs Convention for S.F. and B.M.
	53	5	S.F and B.M of general cases of determinate beams with concentrated loads and udl
	54	5	S.F and B.M diagrams for Cantilevers.
	55	5	S.F and B.M diagrams for Simply supported beams & Overhanging beam.
Sept. 4th Week	56		**Monthly Test-3**
	57	5	Position of maximum BM, Point of contra flexure & Relation between intensity of
	58	6	**6. Slope and Deflection** **6.1 Introduction:** Shape and nature of elastic curve (deflection curve) .
	59	6	Relationship between slope, deflection and curvature & Importance of slope and
	60	6	**6.2** Slope and deflection of cantilever beam under concentrated load. (By Double Integration method, Macaulay's method).

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Oct. 1st Week	61	6	Slope and deflection of cantilever beam under uniformly distributed load
	62	6	Slope and deflection of simply supported beams under concentrated load. (By
	63	6	Slope and deflection of simply supported beams under uniformly distributed load (By Macaulay's method & Double Integration method).
	64	7	**7. Indeterminate Beams** **7.1** Indeterminacy in beams, Principle of consistent deformation/compatibility.
	65	7	Analysis of propped cantilever & Fixed beams by principle of superposition.
Oct. 2nd Week	**Puja Holidays**		
Oct. 3rd Week	66	7	Analysis of Fixed beams by principle of superposition.
	67	7	Two span continuous beams by principle of superposition.
	68	7	SF& BM diagrams (point load)
	69	7	SF & BM diagrams (udl covering full span)
	70	8	**8. Trusses** **8.1 Introduction:** Types of trusses, statically determinate and indeterminate
Oct. 4th Week	71	8	Degree of indeterminacy, Stable and unstable trusses, advantages of trusses
	72	8	**8.2 Analysis of trusses:** Analytical method (Method of joints)
	73	8	**8.2 Analysis of trusses:** Analytical method (method of Section)
	74		**8.2 Analysis of trusses:** Analytical method (method of Section)
	75		**Doubt Clearing Class & Previous year question Paper discussion.**
Oct. 5th Week	76		**Doubt Clearing Class & Previous year question Paper discussion.**
	77		**Doubt Clearing Class & Previous year question Paper discussion.**
	78		**Doubt Clearing Class & Previous year question Paper discussion.**
	79		**Doubt Clearing Class & Previous year question Paper discussion.**
	80		**Doubt Clearing Class & Previous year question Paper discussion.**
Nov. 1st Week	81		**Doubt Clearing Class & Previous year question Paper discussion.**
	82		**Doubt Clearing Class & Previous year question Paper discussion.**
	83		**Doubt Clearing Class & Previous year question Paper discussion.**
	84		**Doubt Clearing Class & Previous year question Paper discussion.**
	85		**Doubt Clearing Class & Previous year question Paper discussion.**

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16/8/24
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