Discipline: Civil Engg	Semester: 3rd	Name of the teaching faculty: Mrs Mousumi Debnath
Subject: Structural Mechanics	No of day/ Per week class alloted: 5	Semester from 15/09/22 to 31/1/23 No of week - 15

Week	Class day	Theory
		Review of Basic concepts
1st	1st	1.1 Basic principle of mechanics force, moment, support conditions conditions of equilibrium, C.G & M.I, free body diagram.
	2nd	1.2. Review of CG and MI of different Sections.
		2) Simple and Complex stress, Strain.
	3rd	2.1 Simple Stresses and strains.
	4th	Introduction to stresses and Strains, mechanical Properties of materials - Rigidity, Elasticity Plasticity, Compressibility, Hardness, toughness, Stiffness, Brittleness, Ductility, malleability Creep, fatigue, Tenality,

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	1st	Types of Stresses - Tensile, Compressive and Shear Stresses, Types of Strains - Tensile, Compressive and Shear Strains, Complimentary Shear Stress - Diagnal tensile / Compressive Stresses due to Shear, Elongation
2nd	2nd	and Contraction, Longitudinal and lateral Strains, Poissons Ratio, Volumetric Strain,
	3rd	Computation of Stress, Strain, poissons ratio, Change in dimensions and volume etc, Hooke's law - Elastic Constants, Derivation of relationship between the elastic Constants.
	4th/1st	2.2 Application of Simple Stress and Strain in engineering field:
		Behaviour of ductile and brittle materials under direct loads,
	1st	Stress Strain Curve of a ductile material, Limit of Proportionality,
3rd		Elastic limit, Yield Stress,
	2nd	Ultimate Stress, Breaking Stress, Percentage elongation, Percentage
		reduction in area, Significance
	3rd	of Percentage elongation and reduction in area of cross Section, Deformation of prismatic bars due to uniaxial load,

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Deformation of prismatic bars due to its self weight.

4th — 2.3 Complex Stress and Strain

4th — 1st — Principal Stress and Strains: Occurrence of normal and tangential Stress, Concept of Principal Stress and Principal Planes, major and minor Principal Stress and their Orientations, Mohr's Circle and its application to solve problems of Complex Stresses.

2nd

Stresses in Beams and Shafts

3rd — 3.1. Stresses in beams due to bending: Bending Stress in beams, Theory of simple bending - Assumptions - moment of resistance - Equation for Flexure - Flexural Stress distribution - Curvature of beam - Position of N.A. and Centroidal Axis - Flexural rigidity - Significance of sectional modulus.

4th

1st

5th

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		3.2. Shear Stress in beams:
	2nd	Shear Stress distribution in beams of rectangular, Circular and standard Sections
	3rd	Symmetrical about vertical axis.
		3.3 Stress in Shafts due to torsion.
	4th	Concept of torsion, basic assumptions of pure torsion, torsion of solid and hollow Circular Sections. Polar moment
	5th	of Inertia, torsional Shearing
6th		Stresses, angle of twist, torsional rigidity, equation of torsion.
		3.4 Combined bending and direct Stresses.
	2nd	Combination of Stresses, Combin
		Equivalent length / Effective length, Slenderness ratio.
	3rd	Axially loaded Short and Column, Euler's Theory of long columns, Critical load for columns with different end conditions.

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Shear force and Bending moment

5.1 Types of loads and beams:

1st week

Types of loads Concentrated (or) Point load, uniformly Distributed load (UDL), Types of supports: Simple support, Roller support, Hinged support, fixed support, types of Reactions: Vertical reaction: Vertical reaction, Horizontal reaction, moment reaction, Types of Beams based on support conditions: Calculated of support reactions using equation of static equilibrium.

5.2. Shear force and bending moment in beams.

2nd week

3rd week

Shear force and bending moment Sings Convention for S.f. and B.m of general cases of determinate beams with Concentrated loads and uty only, S.f and B.m diagram for Cantievers, simply

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	4th	Supported beams and over hanging beams, position of maximum Bm, point of contra flexure, Relation between intensity of load S.f. and B.m.
8th	1st	
		(6) Slope and Deflection
	2nd	6.1 Introduction: Shape and natural of elastic curve (diflection curve); Relationship between slope, deflection
	3rd	and curvature (No derivation) Importance intensity of load S.f. and B.m.
	4th	(6.2) Slope and deflection of cantiever and simply supported beams under concentrated
	1st	and uniformly distributed load (by Double integration
9th		method, macaulay's method)
		(7) Indeterminate Beams
	2nd	7.1 Indeterminate in beams, Principal of Consistent deformation
	3rd	Compatibility, Analysis of propped cantiever, fixed and two span continous beams by principal of superposition

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	4th	S.F. and B.M diagram (point load and udl covering full span)
		(8) Trusses
	1st	8.1 Introduction: types of truss, staically determinate and indeterminate trusses degree of indeterminacy stable and unstable trusses, advantages of trusses.
10th	2nd	
11th		Revision.

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12th — Revision

13th — Revision

14th — Revision

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