

<u>Discipline</u> (Civil Engg)	<u>Semester</u> 3 rd	<u>Name of the teaching faculty</u> Mrs. Meera Dehuway
<u>Subject</u> Structural Mechanics	<u>No of day / Per week class allotted</u> 5	<u>Semester from</u> 15/09/22 to 31/1/23 <u>No of week</u> - 15
<u>Week</u>	<u>Class days</u>	<u>Theory</u>
		<u>Review of Basic concepts</u>
1 st	1 st	1.1 Basic principle of mechanics Force, moment, support conditions conditions of equilibrium, C.G & m, free body diagram.
	2 nd	1.2. Review of CG and m of different sections.
		2) Simple and Complex stress, Strain.
	3 rd	<u>2.1 Simple Stresses and strains.</u>
		Introduction to stresses and Strains' mechanical Properties of materials - Rigidity, Elasticity, Plasticity, Compressibility, Hardness, toughness, stiffness, Brittleness, Ductility, malleability, Creep, fatigue, Tenacity,
	4 th	

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	1st	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, 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.
2nd	2nd	
	3rd	
	4th	2.2 Application of Simple Stress and Strain in engineering field:
	1st	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, Percentage elongation, Percentage reduction in area, Significance of Percentage elongation and reduction in area of cross section, Deformation of prismatic bar due to uniaxial load,
3rd	2nd	
	3rd	

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		Deformation of Prismatic bars due to its Self weight.
	4th	2.3 <u>Complex Stress and Strain</u>
	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 Stress.
4th	2nd	
		<u>Stresses in Beams and shaft</u>
	3rd	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 - Curvature of beam - Position of N.A. and Centroidal Axis - Flexural rigidity -
5th	1st	Significance of section modulus.

3.2. Shear Stress in beams:

Shear Stress distribution in beams of rectangular, Circular and standard sections symmetrical about vertical axis.

3.3 Stress in shafts due to torsion.

Concept of torsion, basic assumptions of pure torsion, torsion of solid and hollow circular sections, Polar moment of Inertia, torsional Shearing Stresses, angle of twist, torsional rigidity, equation of torsion.

3.4 Combined bending and direct stresses.

Combination of stresses, Combination of length / Effective length, Slenderness ratio, Axially loaded short and column, Euler's Theory of long columns, critical load for columns with different end conditions.

Shear Force and Bending moment

5.1 Types of loads and beams:

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Types of loads Connected
 (or) Point load, uniformly Distributed load (UDL),

7th

1st

Types of SUPPORTS: Simple Support, Roller Support, Hinged Support, Fixed Support, types of Reactions:

2nd

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.

3rd

Shear force and bending moment
 Sign Convention for S.F. and B.M. of general cases of determinate beams with concentrated loads and UDL only. S.F. and B.M. diagram for Cantilever, 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.
1st	Contra flexure, Relation between intensity of load S.f. and B.m.
8th	
	<u>⑥ Slope and Deflection</u>
2nd	6.1 Introduction: Shape and nature of elastic curve (deflection curve); Relationship between slope, deflection and curvature (NO derivation) Importance intensity of load S.f. and B.m.
3rd	
4th	<u>⑥.2</u> Slope and deflection of cantilever and simply supported beams under concentrated and uniformly distributed load (by double integration method, Macaulay's method)
1st	
9th	
	<u>⑦ Indeterminate Beams</u>
2nd	7.1 Indeterminate in beams, Principal of consistent deformation Compatibility, Analysis of propped cantilever, fixed and two span continuous beams by principal of superposition
3rd	

4th

S.R. and Bm diagram
(point load and udl covering full span)

⑧ Trusses

10th

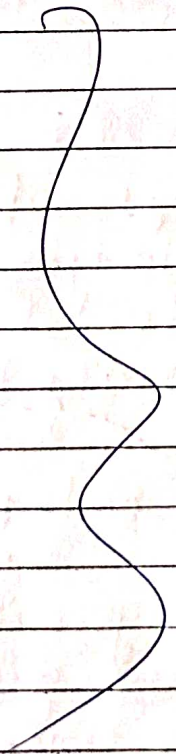
1st

81 Introduction: Types of trusses, statically determinate and indeterminate trusses degree of indeterminacy, stable and unstable trusses, advantages of trusses.

2nd 3rd

11th

Revision.



12th

Revision

13th

Revision

14th

Revision