LESSON PLAN (WINTER-2021)	
DEPARTMENT OF CIVIL ENGINEERING	
SUBJECT- STRUCTURAL MECHANICS(Th.01) , 3rd SEMESTER	
FACULTY-SUDHASHREE MUNDA	
TOPICS TO BE COVERED	**WEEK/MONTH**
CHAPTER-1 : Review Of Basic Concepts	1st
~Basic Principle of Mechanics: Force, Moment, support conditions, Conditions of equilibrium	
~C.G & MI, Free body diagram , Review of CG and MI of different sections	2nd
Revision	
CHAPTER-2 : Simple And Complex Stress, Strain	
• **Simple Stress and Strain** ~Introduction to stresses and strains: Mechanical properties of materials – Rigidity, Elasticity, Plasticity, Compressibility, Hardness, Toughness, Stiffness, Brittleness, Ductility, Malleability, Creep, Fatigue, Tenacity, Durability	
~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	3rd
~ 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.	
• **Application of simple stress and strain in engineering field:** ~Behavior 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 bars due to uniaxial load, Deformation of prismatic bars due to its self-weight.	4th
• **Complex stress and strain** ~Principal stresses and strains: Occurrence of normal and tangential stresses	
~Concept of Principal stress and Principal Planes, major and minor principal stresses and their orientations	
~Mohr's Circle and its application to solve problems of complex stresses , **Revision**	5th
CHAPTER-3 : Stresses In Beams and Shafts	
• **Stresses in beams due to bending:** ~ Bending stress in beams – Theory of simple bending – Assumptions modulus, Moment of resistance – Equation for Flexure– Flexural stress distribution	
~ Curvature of beam – Position of N.A. and Centroidal Axis, Flexural rigidity – Significance of Section modulus	6th
• **Shear stresses in beams:** ~Shear stress distribution in beams of rectangular, circular and standard sections symmetrical about vertical axis.	
Monthly Class test	
• **Stresses 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.	
• **Combined bending and direct stresses:** ~Combination of stresses, Combined direct and bending stresses, Maximum and Minimum stresses in Sections.	
~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. &	

Revision	7th
CHAPTER-4 : Columns and Struts	
Columns and Struts, Definition, Short and Long columns, End conditions, Equivalent length / Effective length, Slenderness ratio.	
~Axially loaded short and long column, Euler's theory of long columns, Critical load for Columns with different end conditions.	
CHAPTER-5 : Shear Force and Bending Moment	8th
• **Types of loads and beams:** ~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, Horizontal reaction, Moment reaction. Types of Beams based on support conditions: Calculation of support reactions using equations of static equilibrium.	
• **Shear force and bending moment in beams:** ~Shear Force and Bending Moment: Signs Convention for S.F. and B.M, S.F and B.M of general cases of determinate beams with concentrated loads and udl only.	9th
Internal Assessment	
~S.F and B.M diagrams for Cantilevers, Simply supported beams and Over hanging beams.	
~Position of maximum BM, Point of contra flexure, Relation between intensity of load, S.F and B.M.	
CHAPTER-6 : Slope and Deflection	
• **Introduction:** ~Shape and nature of elastic curve (deflection curve), Relationship between slope, deflection and curvature (No derivation)	10th
~Importance of slope and deflection. Slope and deflection of cantilever and simply supported beams under concentrated and uniformly distributed load (by Double Integration method, Macaulay's method).	
Revision and Monthly Class test	
Problem Solving	11th
Revision	
CHAPTER-7 : Indeterminate Beams	
~Indeterminacy in beams, Principle of consistent deformation/compatibility	
~Analysis of propped cantilever, fixed and two span continuous beams by principle of superposition,	12th
~SF and BM diagrams (point load and udl covering full span)	
CHAPTER-8 : Trusses	
• **Introduction:** ~Types of trusses, statically determinate and indeterminate trusses,	
~ degree of indeterminacy, stable and unstable trusses, advantages of trusses	13th
• **Analysis of trusses:** ~Analytical method (Method of joints, method of Section)	
MODEL TEST	14th
Revision	

Signature of Faculty

01/10/2024

HOD

Department of Civil Engineering