NILASAILA INSTITUTE OF SCIENCE & TECHNOLOGY
SERGARH-756060, BALASORE (ODISHA)
(Approved by AICTE& affiliated to SCTE&VT, Odisha)

LESSON PLAN

SUBJECT: Th-1 (STRUCTURAL MECHANICS)

Name Of The Faculty :- Er. Kumar Swatiranjan
Branch :- Civil Engineering
Session :- 2024-25
Semester :- 3rd
Examination :- 2024 (w)

CHAPTER WISE DISTRIBUTION OF PERIODS

Sl.No.	Name of the chapter as per the Syllabus	No. of Periods as per the Syllabus	No. of periods actually needed
1	Review of Basic Concepts	4	5
2	Simple and Complex Stress, Strain	15	17
3	Stresses in Beams	10	12
4	Columns and Struts	4	4
5	Shear Force and Bending Moment	12	14
6	Slope and Deflection	10	12
7	Indeterminate Beams	10	12
8	Trusses and Frames	10	10
	Total Period:	75	86

Sign of Faculty

Sign of H.O.D.

Discipline: CIVIL ENGINEERING	Semester: 3rd	**Name of the Teaching Faculty:** Er. Kumar Swatiranjan
		SESSION : 2024-25 **EXAMINATION :** 2024 (W)
Week	**Class Day**	**Topics to be Covered**
1st	1st	1. Review Of Basic Concepts 1.1 Basic Principle of Mechanics: Force, Moment, support conditions, Conditions of equilibrium, C.G & MI, Free body diagram
	2nd	1.1 Basic Principle of Mechanics: Force, Moment, support conditions, Conditions of equilibrium, C.G & MI, Free body diagram
	3rd	1.2 Review of CG and MI of different sections
	4th	1.2 Review of CG and MI of different sections
	5th	1.2 Review of CG and MI of different sections
2nd	1st	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, Brittleness, Ductility, Malleability, Creep, Fatigue, Tenacity, Durability
	2nd	2.1 Simple Stresses and Strains Types of stresses -Tensile, Compressive and Shear stresses
	3rd	2.1 Simple Stresses and Strains Types of strains - 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
	4th	2.1 Simple Stresses and Strains Hooke's law - Elastic Constants, Derivation of relationship between the elastic constants
	5th	2.1 Simple Stresses and Strains Hooke's law - Elastic Constants, Derivation of relationship between the elastic constants
3rd	1st	2.2 Application of simple stress and strain in engineering field Behaviour of ductile and brittle materials under direct loads, Stress Strain curve of a ductile material
	2nd	2.2 Application of simple stress and strain in engineering field Limit of proportionality, Elastic limit, Yield stress, Ultimate stress, Breaking stress
	3rd	2.2 Application of simple stress and strain in engineering field Percentage elongation, Percentage reduction in area, Significance of percentage elongation and reduction in area of cross section
	4th	2.2 Application of simple stress and strain in engineering field Deformation of prismatic bars due to uniaxial load
	5th	2.2 Application of simple stress and strain in engineering field Deformation of prismatic bars due to its self weight

4th	1st	2.2 Application of simple stress and strain in engineering field Deformation of prismatic bars due to its self weight
	2nd	2.2 Application of simple stress and strain in engineering field Deformation of prismatic bars due to its self weight
	3rd	2.3 Complex stress and strain Major and minor principal stresses and their orientations
	4th	2.3 Complex stress and strain Major and minor principal stresses and their orientations
	5th	2.3 Complex stress and strain Mohr's Circle and its application to solve problems of complex stresses
5th	1st	2.3 Complex stress and strain Mohr's Circle and its application to solve problems of complex stresses
	2nd	2.3 Complex stress and strain Mohr's Circle and its application to solve problems of complex stresses
	3rd	3. Stresses In Beams and Shafts 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
	4th	3.1 Stresses in beams due to bending Curvature of beam – Position of N.A. and Centroidal Axis – Flexural rigidity – Significance of Section modulus.
	5th	3.2 Shear stresses in beams Shear stress distribution in beams of rectangular, circular and standard sections symmetrical about vertical axis.
6th	1st	3.2 Shear stresses in beams Shear stress distribution in beams of rectangular, circular and standard sections symmetrical about vertical axis
	2nd	3.3 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,
	3rd	3.3 Stresses in shafts due to torsion Torsional shearing stresses, angle of twist, torsional rigidity, equation of torsion
	4th	3.4 Combined bending and direct stresses Combination of stresses, Combined direct and bending stresses, Maximum and Minimum stresses in Sections
	5th	3.4 Combined bending and direct stresses Conditions for no tension, Limit of eccentricity, Middle third/fourth rule
7th	1st	3.4 Combined bending and direct stresses Conditions for no tension, Limit of eccentricity, Middle third/fourth rule
	2nd	3.4 Combined bending and direct stresses Core or Kern for square, rectangular and circular sections, chimneys, dams and retaining walls

7th	3rd	3.4 Combined bending and direct stresses Core or Kern for square, rectangular and circular sections, chimneys, dams and retaining walls
	4th	3.4 Combined bending and direct stresses Core or Kern for square, rectangular and circular sections, chimneys, dams and retaining walls
	5th	4. Columns and Struts 4.1 Columns and Struts, Definition, Short and Long columns, End conditions, Equivalent length / Effective length, Slenderness ratio
8th	1st	4.1 Axially loaded short and long column, Euler's theory of long columns
	2nd	4.1 Critical load for Columns with different end conditions
	3rd	4.1 Critical load for Columns with different end conditions
	4th	5. Shear Force and Bending Moment 5.1 Types of loads and beams Types of Loads: Concentrated (or) Point load, Uniformly Distributed load (UDL)
	5th	5.1 Types of loads and beams Types of Supports: Simple support, Roller support, Hinged support, Fixed support
9th	1st	5.1 Types of loads and beams Types of Reactions: Vertical reaction, Horizontal reaction, Moment reaction
	2nd	5.1 Types of loads and beams Types of Beams based on support conditions: Calculation of support reactions using equations of static equilibrium
	3rd	5.1 Types of loads and beams Types of Beams based on support conditions: Calculation of support reactions using equations of static equilibrium
	4th	5.2 Shear force and bending moment in beams Shear Force and Bending Moment: Signs Convention for S.F. and B.M
	5th	5.2 Shear force and bending moment in beams S.F and B.M of general cases of determinate beams with concentrated loads and udl only
10th	1st	5.2 Shear force and bending moment in beams S.F and B.M diagrams for Cantilevers beams
	2nd	5.2 Shear force and bending moment in beams S.F and B.M diagrams for Simply supported beams and Over hanging beams
	3rd	5.2 Shear force and bending moment in beams S.F and B.M diagrams for Simply supported beams and Over hanging beams
	4th	5.2 Shear force and bending moment in beams Position of maximum BM, Point of contra flexure
	5th	5.2 Shear force and bending moment in beams Relation between intensity of load, S.F and B.M.

11th	1st	**INTERNAL ASSESMENT**
	2nd	**INTERNAL ASSESMENT**
	3rd	5.2 Shear force and bending moment in beams Relation between intensity of load, S.F and B.M.
	4th	5.2 Shear force and bending moment in beams Relation between intensity of load, S.F and B.M.
	5th	6. Slope and Deflection 6.1 Introduction Shape and nature of elastic curve (deflection curve)
12th	1st	6.1 Introduction Shape and nature of elastic curve (deflection curve)
	2nd	6.1 Introduction Relationship between slope, deflection and curvature (No derivation)
	3rd	6.1 Introduction Relationship between slope, deflection and curvature (No derivation)
	4th	6.1 Introduction Importance of slope and deflection
	5th	6.2 Slope and deflection of cantilever and simply supported beams under concentrated and uniformly distributed load (by Double Integration method, Macaulay's method).
13th	1st	6.2 Slope and deflection of cantilever and simply supported beams under concentrated and uniformly distributed load (by Double Integration method, Macaulay's method).
	2nd	6.2 Slope and deflection of cantilever and simply supported beams under concentrated and uniformly distributed load (by Double Integration method, Macaulay's method).
	3rd	6.2 Slope and deflection of cantilever and simply supported beams under concentrated and uniformly distributed load (by Double Integration method, Macaulay's method).
	4th	6.2 Slope and deflection of cantilever and simply supported beams under concentrated and uniformly distributed load (by Double Integration method, Macaulay's method).
	5th	6.2 Slope and deflection of cantilever and simply supported beams under concentrated and uniformly distributed load (by Double Integration method, Macaulay's method).
14th	1st	6.2 Slope and deflection of cantilever and simply supported beams under concentrated and uniformly distributed load (by Double Integration method, Macaulay's method).
	2nd	7. Indeterminate Beams 7.1Indeterminacy in beams, Principle of consistent deformation/compatibility
	3rd	7.1Indeterminacy in beams, Principle of consistent deformation/compatibility
	4th	7.1 Indeterminate Beams Analysis of propped cantilever

14th	5th	7.1 Indeterminate Beams Analysis of propped cantilever
15th	1st	7.1fixed and two span continuous beams by principle of superposition
	2nd	7.1fixed and two span continuous beams by principle of superposition
	3rd	7.1fixed and two span continuous beams by principle of superposition
	4th	7.1fixed and two span continuous beams by principle of superposition
	5th	7.1SF and BM diagrams (point load and udl covering full span)
16th	1st	7.1SF and BM diagrams (point load and udl covering full span)
	2nd	7.1SF and BM diagrams (point load and udl covering full span)
	3rd	7.1SF and BM diagrams (point load and udl covering full span)
	4th	8. Trusses 8.1 Introduction Types of trusses, statically determinate and indeterminate trusses
	5th	8.1 Introduction degree of indeterminacy, stable and unstable trusses
17th	1st	8.1 Introduction degree of indeterminacy, stable and unstable trusses
	2nd	8.1 Introduction advantages of trusses
	3rd	8.2 Analysis of trusses Analytical method (Method of joints, method of Section)
	4th	8.2 Analysis of trusses Analytical method (Method of joints, method of Section)
	5th	8.2 Analysis of trusses Analytical method (Method of joints, method of Section)
18th	1st	8.2 Analysis of trusses Analytical method (Method of joints, method of Section)
	2nd	8.2 Analysis of trusses Analytical method (Method of joints, method of Section)
	3rd	8.2 Analysis of trusses Analytical method (Method of joints, method of Section)
	4th	Revision
	5th	Revision

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