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

LESSON PLAN

SUBJECT: Th-1 (STRUCTURAL MECHANICS)

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	4
2	Simple and Complex Stress, Strain	15	15
3	Stresses in Beams	10	10
4	Columns and Struts	4	4
6	Shear Force and Bending Moment	12	12
7	Slope and Deflection	10	10
8	Indeterminate Beams	10	10
9	Trusses and Frames	10	10
	Total Period:	75	75

Discipline: CIVIL ENGINEERING	Semester: 3rd	**Name of the Teaching Faculty:** Er. Gayatri Behera
Week	**Class Day**	**Theory / Practical Topics**
1st	1st	1. Review Of Basic Concepts 1.1 BasicPrinciple of Mechanics: Force, Moment, support conditions, Conditions of equilibrium, C.G & MI, Free body diagram
	2nd	1. Review Of Basic Concepts 1.1 BasicPrinciple of Mechanics: Force, Moment, support conditions, Conditions of equilibrium, C.G & MI, Free body diagram
	3rd	1. Review Of Basic Concepts 1.2 Review of CG and MI of different sections
	4th	1. Review Of Basic Concepts 1.2 Review of CG and MI of different sections
	5th	2. Simple And Complex Stress, Strain 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	1st	2. Simple And Complex Stress, Strain Simple Stresses and Strains Types of stresses -Tensile, Compressive and Shear stresses
	2nd	2. Simple And Complex Stress, Strain Simple Stresses and Strains Types of strains - Tensile, Compressive and Shear strains, Complimentary shear stress - Diagonal tensile / compressive Stresses due to shear.
	3rd	2. Simple And Complex Stress, Strain 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. Simple And Complex Stress, Strain Simple Stresses and Strains Hooke's law - Elastic Constants, Derivation of relationship between the elastic constants

	5th	2. Simple And Complex Stress, Strain 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
3rd	**1st**	2. Simple And Complex Stress, Strain 2.2 Application of simple stress and strain in engineering field Limit of proportionality, Elastic limit, Yield stress, Ultimate stress, Breaking stress
	2nd	2. Simple And Complex Stress, Strain 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
	3rd	2. Simple And Complex Stress, Strain 2.2 Application of simple stress and strain in engineering field Deformation of prismatic bars due to uniaxial load
	4th	2. Simple And Complex Stress, Strain 2.2 Application of simple stress and strain in engineering field Deformation of prismatic bars due to its self weight
	5th	2. Simple And Complex Stress, Strain 2.3 Complex stress and strain Principal stresses and strains: Occurrence of normal and tangential stresses
4th	**1st**	2. Simple And Complex Stress, Strain 2.3 Complex stress and strain Concept of Principal stress and Principal Plane
	2nd	2. Simple And Complex Stress, Strain 2.3 Complex stress and strain Major and minor principal stresses and their orientations
	3rd	2. Simple And Complex Stress, Strain 2.3 Complex stress and strain Mohr's Circle and its application to solve problems of complex stresses
	4th	2. Simple And Complex Stress, Strain 2.3 Complex stress and strain Mohr's Circle and its application to solve problems of complex stresses
	5th	3. Stresses In Beams and Shafts Stresses in beams due to bending Bending stress in beams – Theory of simple bending – Assumptions – Moment of resistance – Equation for Flexure– Flexural stress distribution

5th	1st	3. Stresses In Beams and Shafts Stresses in beams due to bending Curvature of beam – Position of N.A. and Centroidal Axis – Flexural rigidity – Significance of Section modulus
	2nd	3. Stresses In Beams and Shafts 3.2 Shear stresses in beams Shear stress distribution in beams of rectangular, circular and standard sections symmetrical about vertical axis
	3rd	3. Stresses In Beams and Shafts 3.2 Shear stresses in beams Shear stress distribution in beams of rectangular, circular and standard sections symmetrical about vertical axis
	4th	3. Stresses In Beams and Shafts 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, torsional shearing stresses, angle of twist, torsional rigidity, equation of torsion
	5th	3. Stresses In Beams and Shafts 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, torsional shearing stresses, angle of twist, torsional rigidity, equation of torsion
6th	1st	3. Stresses In Beams and Shafts 3.4 Combined bending and direct stresses Combination of stresses, Combined direct and bending stresses, Maximum and Minimum stresses in Sections
	2nd	3. Stresses In Beams and Shafts 3.4 Combined bending and direct stresses Conditions for no tension, Limit of eccentricity, Middle third/fourth rule
	3rd	3. Stresses In Beams and Shafts 3.4 Combined bending and direct stresses Core or Kern for square, rectangular and circular sections, chimneys, dams and retaining walls
	4th	3. Stresses In Beams and Shafts 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 Columns and Struts, Definition, Short and Long columns, End conditions, Equivalent length / Effective length, Slenderness ratio
	1st	4. Columns and Struts Axially loaded short and long column, Euler's theory of long columns

7th	2nd	4. Columns and Struts Critical load for Columns with different end conditions
	3rd	4. Columns and Struts Critical load for Columns with different end conditions
	4th	5. Shear Force and Bending Moment 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
	5th	5. Shear Force and Bending Moment Types of loads and beams Types of Reactions: Vertical reaction, Horizontal reaction, Moment reaction
8th	1st	5. Shear Force and Bending Moment Types of loads and beams Types of Beams based on support conditions: Calculation of support reactions using equations of static equilibrium
	2nd	5. Shear Force and Bending Moment Types of loads and beams Types of Beams based on support conditions: Calculation of support reactions using equations of static equilibrium
	3rd	5. Shear Force and Bending Moment 5.2 Shear force and bending moment in beams Shear Force and Bending Moment: Signs Convention for S.F. and B.M
	4th	5. Shear Force and Bending Moment 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
	5th	5. Shear Force and Bending Moment 5.2 Shear force and bending moment in beams S.F and B.M diagrams for Cantilevers beams
9th	1st	5. Shear Force and Bending Moment 5.2 Shear force and bending moment in beams S.F and B.M diagrams for Simply supported beams and Over hanging beams
	2nd	5. Shear Force and Bending Moment 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. Shear Force and Bending Moment 5.2 Shear force and bending moment in beams Position of maximum BM, Point of contra flexure

	4th	5. Shear Force and Bending Moment 5.2 Shear force and bending moment in beams Relation between intensity of load, S.F and B.M.
	5th	5. Shear Force and Bending Moment 5.2 Shear force and bending moment in beams Relation between intensity of load, S.F and B.M.
10th	**1st**	6. Slope and Deflection Introduction Shape and nature of elastic curve (deflection curve)
	2nd	6. Slope and Deflection Introduction Shape and nature of elastic curve (deflection curve)
	3rd	6. Slope and Deflection Introduction Relationship between slope, deflection and curvature (No derivation)
	4th	6. Slope and Deflection Introduction Importance of slope and deflection
	5th	6. Slope and Deflection 6.2 Slope and deflection of cantilever and simply supported beams under concentrated and uniformly distributed load (by Double Integration method, Macaulay's method).
11th	**1st**	6. Slope and Deflection 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. Slope and Deflection 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. Slope and Deflection 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. Slope and Deflection 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. Slope and Deflection 6.2 Slope and deflection of cantilever and simply supported beams under concentrated and uniformly distributed load (by Double Integration method, Macaulay's method).

12th	**1st**	7. Indeterminate Beams Indeterminacy in beams, Principle of consistent deformation/compatibility
	2nd	7. Indeterminate Beams Indeterminacy in beams, Principle of consistent deformation/compatibility
	3rd	7. Indeterminate Beams Analysis of propped cantilever
	4th	7. Indeterminate Beams Analysis of propped cantilever
	5th	7. Indeterminate Beams fixed and two span continuous beams by principle of superposition
13th	**1st**	7. Indeterminate Beams fixed and two span continuous beams by principle of superposition
	2nd	7. Indeterminate Beams SF and BM diagrams (point load and udl covering full span)
	3rd	7. Indeterminate Beams SF and BM diagrams (point load and udl covering full span)
	4th	7. Indeterminate Beams SF and BM diagrams (point load and udl covering full span)
	5th	7. Indeterminate Beams SF and BM diagrams (point load and udl covering full span)
14th	**1st**	8. Trusses Introduction Types of trusses, statically determinate and indeterminate trusses
	2nd	8. Trusses Introduction degree of indeterminacy, stable and unstable trusses
	3rd	8. Trusses Introduction degree of indeterminacy, stable and unstable trusses
	4th	8. Trusses Introduction advantages of trusses
	5th	8. Trusses 8.2 Analysis of trusses Analytical method (Method of joints, method of Section)

15th	**1st**	8. Trusses 8.2 Analysis of trusses method (Method of joints, method of Section)	Analytical
	2nd	8. Trusses 8.2 Analysis of trusses method (Method of joints, method of Section)	Analytical
	3rd	8. Trusses 8.2 Analysis of trusses method (Method of joints, method of Section)	Analytical
	4th	8. Trusses 8.2 Analysis of trusses method (Method of joints, method of Section)	Analytical
	5th	8. Trusses 8.2 Analysis of trusses method (Method of joints, method of Section)	Analytical