PNS School of Engineering & Technology, Marshaghai,Kendrapara			
LESSON PLAN			
Session 2025-26			
Discipline: Civil Engineering		Semester: 3rd	Name of the faculty: Er. Santoshi Dipty Prusty
Subject: Mechanics of Materials		No. of Days/week: 04 (Class Alloted -60)	Start Date: 14/07/2025
			End Date: 15/11/2025
Week	**Class Day**	**Theory Topics**	
1st	1st	**Introduction:** Review Of Basic Concepts,Basic Principle of Mechanics: Force, Moments	
	2nd	support conditions, Conditions of equilibrium	
	3rd	C.G & MI, Free body diagram	
	4th	Review of CG and MI of different sections	
2nd	1st	**Simple And Complex Stress, Strain**	
	2nd	Simple Stresses and Strains, Introduction to stresses and strains	
	3rd	Mechanical properties of materials – Rigidity, Elasticity, Plasticity, Compressibility, Hardness, Toughness, Stiffness, Brittleness	
	4th	Ductility, Malleability,Creep, Fatigue, Tenacity, Durability	
3rd	1st	Types of stresses -Tensile, Compressive and Shear stresses, Types of strains	
	2nd	Tensile, Compressive and Shear strains, Complimentary shear stress - Diagonal tensile / compressive Stresses due to shear, Elongation and Contraction, Longitudinal and Lateral strains	
	3rd	Poisson's Ratio, Volumetric strain, computation of stress, strain, Poisson's ratio	
	4th	change in dimensions and volume etc, Hooke's law - Elastic onstants, Derivation of relationship between the elastic constants	
4th	1st	**Application of simple stress and strain in engineering field:**	
	2nd	Behaviour of ductile and brittle materials under direct loads	
	3rd	Stress Strain curve of a ductile material	
	4th	Limit of proportionality	
5th	1st	Elastic limit, Yield stress, Ultimate stress, Breaking stress, Percentage elongation,	
	2nd	Percentage reduction in area, Significance of percentage elongation and reduction in area of cross section.	
	3rd	Deformation of prismatic bars due to uniaxial load	
	4th	Deformation of prismatic bars due to its self weight.	
6th	1st	**Complex stress and strain**	
	2nd	Principal stresses and strains: Occurrence of normal and tangential stresses,	
	3rd	Concept of Principal stress and Principal Planes, major and minor principal stresses and their orientations,	
	4th	Mohr's Circle and its application to solve problems of complex stresses	
7th	1st	**Stresses In Beams and Shafts**	
	2nd	Stresses in beams due to bending: Bending stress in beams	
	3rd	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 – Significance of Section modulus	
	1st	**Shear stresses in beams:**	

8th	2nd	Shear stress distribution in beams of rectangular, circular and standard sections symmetrical about vertical axis.
	3rd	Stresses in shafts due to torsion: Concept of torsion, basic assumptions of pure torsion
	4th	torsion of solid and hollow circular sections, polar moment of inertia, torsional shearing stresses
9th	1st	angle of twist, torsional rigidity, equation of torsion
	2nd	Combined bending and direct stresses: Combination ofstresses, Combined direct and bending stresses, Maximum and Minimum stresses in Sections
	3rd	Conditions for no tension, Limit of eccentricity, Middle third/fourth rule, Core or Kern for square
	4th	Rectangular and circular sections, chimneys, dams and retaining walls
10th	1st	Shear Force and Bending Moment.Types of loads and beams: Types of Loads: Concentrated (or) Point load, Uniformly Distributed load (UDL)
	2nd	Types of Supports: Simple support, Roller support, Hinged support, Fixed support
	3rd	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
	4th	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,
11th	1st	S.F and B.M diagrams for Cantilevers, Simply supported beams and Over hanging beams
	2nd	Position of maximum BM, Point of contra flexure,
	3rd	Relation between intensity of load, S.F and B.M.
	4th	**Columns** Concept of compression member, short and long column,
12th	1st	Effective length, Radius of gy- ration, Slenderness ratio
	2nd	Types of end condition for columns
	3rd	Buckling of axially loaded columns.
	4th	Euler's theory, assumptions made in Euler's theory and its limitations
13th	1st	Application of Eu- ler's equation to calculate buckling load.
	2nd	Rankine' s formula and its application to calculate crippling load.
	3rd	Concept of working load/safe load.
	4th	design load and factor of safety
14th	1st	Revision
	2nd	Revision
	3rd	Revision
	4th	Revision
15th	1st	Important Question & Answer Discussion
	2nd	Important Question & Answer Discussion
	3rd	Important Question & Answer Discussion
	4th	Important Question & Answer Discussion

Sign. of Teacher Sign. of H.O.D Sign. of Principal