SYNERGY SCHOOL OF ENGINEERING, DHENKANAL
LESSON PLAN
SESSION 2025-2026
DEPARTMENT OF CIVIL ENGINEERING

Discipline: Civil Engineering	**Semester:** 3rd/W 2025	**Name of the Faculty:** SATYA PRAKASH ROUT (Lecturer) **Email:** satyaprakash.13.ce.rout@gmail.com
Subject: MECHANICS OF MATERIAL	**No. of Days/week:** 03	**Start Date:** 14/7/25. **End Date:** 15/11/25.

Week	Class Day	Theory Topics
1st	1st	Definition of center of gravity -Centre of gravity of Symmetrical shapes (solid / hollow square, rectangular, circular, I Sections)
	2nd	Moment of inertia (M.I.): Definition, M.I. of plane lamina, Radius of gyration,
	3rd	section mod- ulus, Parallel and Perpendicular axes theorems (without derivations)
2nd	1st	M.I. of rectangle & square
	2nd	M.I. of circle, semicircle, quarter circle and triangle section (without derivations).
	3rd	M.I. of symmetrical and unsymmetrical I-section, Channel section,
3rd	1st	M.I. of T-section, Angle section, Hollow sections and built up sections about centroidal axes and any other reference axis.
	2nd	Polar Moment of Inertia of solid circular sections.
	3rd	Definition of rigid, elastic and plastic bodies, deformation of elastic body under various forces, Definition of stress, strain
4th	1st	Definition of elasticity, Hook's law, Elastic limit, Modulus of elasticity. Type of Stresses-Normal, Direct
	2nd	Bending and Shear and nature of stresses i.e. Tensile and Compressive stresses. Standard stress strain curve for tor steel bar under tension,
	3rd	Yield stress, Proof stress, Ultimate stress, Strain at various critical points, Percentage elongation and Factor of safety.
5th	1st	Deformation of body due to axial force, forces applied at intermediate sections, Maximum and minimum stress induced
	2nd	Composite section under axial loading. Concept of temperature stresses and strain,
	3rd	Stress and strain developed due to temperature variation in homogeneous simple bar (no composite section)
6th	1st	Longitudinal and lateral strain
	2nd	Modulus of Rigidity, Poisson's ratio, Biaxial and tri-axial stresses
	3rd	Poisson's ratio, Biaxial and tri-axial stresses, volumetric strain, change in volume, Bulk modulus (Introduction only).
7th	1st	Relation between modulus of elasticity, modulus of rigidity and bulk modulus (without derivation).
	2nd	Shear and normal stress components on any inclined plane – Mohr's circle and its use in solving problems on complex stresses - Numerical problems
	3rd	Types of supports, beams and loads.
8th	1st	Concept and definition of shear force

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	2nd	Concept and definition of bending moment
	3rd	Relation between load, shear force and bending moment (without derivation).
9th	1st	Shear force and bending moment diagram for cantilever and beams subjected to po nt loads, uniformly distributed loads and couple (combination of any two types of loading),
	2nd	Shear force and bending moment diagram for simply supported beams subjected to point loads, uniformly distributed loads
	3rd	Shear force and bending moment diagram for cantilever subjected to couple
10th	1st	Shear force and bending moment diagram for simply supported beams subjected to couple
	2nd	Shear force and bending moment diagram subjected to combination of point load and uniformly distributed load.
	3rd	Point of contra flexure.
11th	1st	Concept and theory of pure bending, assumptions
	2nd	flexural equation (without derivation), bending stresses and their nature
	3rd	Bending stress distribution diagram
12th	1st	Concept of moment of resistance and simple numerical problems using flexural equation.
	2nd	Shear stresss equation (without derivation), relation between maximum and average shear stress for rectangular and circular section
	3rd	shear stress distribution diagram. Shear stress distribution for square
13th	1st	Shear stress distribution for rectangular, circle, hollow, square
	2nd	Shear stress distribution for rectangular, circular, angle sections, channel section, I-section, T section
	3rd	Simple numerical problems based on shear equation.
14th	1st	Concept of compression member, short and long column, Effective length,
	2nd	Radius of gyration, Slenderness ratio, Types of end condition for columns, Buckling of axially loaded columns.
	3rd	Euler's theory, assumptions made in Euler's theory and its limitations
15th	1st	Application of Euler's equation to calculate buckling load.
	2nd	Rankine' s formula and its application to calculate crippling load.
	3rd	Concept of working load/safe load, design load and factor of safety.
16th	1st	Doubt Clearing, Numerical solving & Previous year question discussion
	2nd	Doubt Clearing, Numerical solving & Previous year question discussion
	3rd	Doubt Clearing, Numerical solving & Previous year question discussion

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