LESSON PLAN OF **CEPC205 TH:3 Mechanics of Materials** FOR THE SESSION 2025-26(WINTER-2025) BATCH-2024-27, GOVT. POLYTECHNIC,KANDHAMAL

Discipline: **civil engineering**	Semester: **3rd**	Name of the Teaching Faculty: **Swastik Pradhan,Lecture stage II in Cvil Engg.**
Subject: **CEPC205 TH:3 Mechanic of Material**	No. of days/ per week class allotted: **3**	Semester From Date : **14/07/2025** to Date: **15/11/2025** No. of Weeks: **15**

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

	3rd	Types ofsupports, beams and loads.
8th	1st	Concept and definition of shear force and bending moment, Relation between load, shear force and bending moment (without derivation).
	2nd	Shear force and bending moment diagram for cantilever subjected to point load
	3rd	Shear force and bending moment diagram for cantilever subjected to Uniformly distributed load and couple
9th	1st	MONTHLY TEST
	2nd	Shear force and bending moment diagram for simply supported beams subjected to point loads, uniformly distributed loads,couple and point for contraflexure
	3rd	Concept and theory of pure bending, assumptions, flexural equation (without derivation), bending stresses and their nature, bending stress distribution diagram.
10th	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, shear stress distri' ution diagram.
	3rd	Numerical problems on shear stress distribution for square, rectangular, circlular section
11th	1st	Numerical problems on shear stress distribution for hollow, square, rectangular, circularsection
	2nd	Numerical problems on shear stress distribution for angle sections
	3rd	Numerical problems on shear stress distribution for channel section
12th	1st	Numerical problems on shear stress distribution for I section
	2nd	Numerical problems on shear stress distribution for T section
	3rd	Concept of compression member, short and long column, Effective length, dius of gy- ration, Slenderness ratio
13th	1st	MONTHLY TEST
	2nd	Types of end condition for columns, Buckling of axially loadedcolumns.Types of end condition for columns, Buckling of axially loadedcolumns.Euler's theory, assumptions made in Euler's theory and its limitations
	3rd	Application of Euler's equation to calculate buckling load
14th	1st	Numericals based on Euler equation for buckling load
	2nd	Numericals based on Euler equation for buckling load
	3rd	Rankine' s formula and its application to calculate crippling load
15th	1st	Numerical problems on Rankine's Formula
	2nd	Concept of working load/safe load, design load and factor of safety.
	3rd	Discussion on previous year questions

14/07/2025

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