GANAPATI INSTITUTE OF ENGINEERING AND TECHNOLOGY (POLYTECHNIC),JAGATPUR,CUTTACK DEPARTMENT OF MECHANICAL ENGINEERING.		
DISCIPLINE: MECHANICAL ENGG.	**SEMESTER-** 3RD	**NAME OF THE TECHING FACULTY:** Er.PRAVAT KUMAR SWAIN
SUBJECT :STRENGTH OF MATERIAL [**MEPC203 (TH:2)**]	**NO OF DAYS PER WEEK CLASS ALLOTED:**03	**SEMESTER FROM DATE:** 14/07/2025 TO 15/11/2025 **NO OF WEEKS:**-15
WEEK	**CLASS DAY**	**THEORY TOPICS**
1ST	1ST	TOPIC-1 Simple Stresses and Strains: • Types of forces; Stress, Strain and their nature
	2ND	• Mechanical properties of common engineering materials
	3RD	• Significance of various points on stress – strain diagram for M.S. and C.I. specimens
2ND	1ST	• Significance of factor of safety; Relation between elastic constants
	2ND	• Stress and strain values in bodies of uniform section and of composite section under the influence of normal forces
	3RD	• Thermal stresses in bodies of uniform section and composite sections
3RD	1ST	• Related numerical problems on the above topics
	2ND	• Strain Energy: Strain energy or resilience, proof resilience and modulus of resilience
	3RD	• Derivation of strain energy for the following cases: i) Gradually applied load, ii) Suddenly applied load, iii) Impact/ shock load
4TH	1ST	• Derivation of strain energy for the following cases: i) Gradually applied load, ii) Suddenly applied load, iii) Impact/ shock load Related numerical problems.
	2ND	TOPIC-2 Shear Force & Bending Moment Diagrams: • Types of beams with examples: a) Cantilever beam, b) Simplysupported beam, c) Over hanging beam, d)Continuous beam, e) Fixed beam
	3RD	• Types of Loads – Point load, UDL and UVL; Definition and explanation of shear force and bending moment
5TH	1ST	• Calculation of shear force and bending moment and drawing the S.F and B.M. diagrams by the analytical method only for the following cases a) Cantilever with point loads
	2ND	• Calculation of shear force and bending moment and drawing the S.F and B.M. diagrams by the analytical method only for the following cases b) Cantilever with uniformly distributed load
	3RD	• Calculation of shear force and bending moment and drawing the S.F and B.M. diagrams by the analytical method only for the following cases c) Simply supported beam with point loads
6TH	1ST	• Calculation of shear force and bending moment and drawing the S.F and B.M. diagrams by the analytical method only for the following cases d) Simply supported beam with UDL,
	2ND	• Calculation of shear force and bending moment and drawing the S.F and B.M. diagrams by the analytical

		method only for the following cases e) Over hanging beam with point loads, at the center and at free ends,
	3RD	• Calculation of shear force and bending moment and drawing the S.F and B.M. diagrams by the analytical method only for the following cases f) Over hanging beam with UDL throughout
7TH	1ST	• Calculation of shear force and bending moment and drawing the S.F and B.M. diagrams by the analytical method only for the following cases g) Combination of point and UDL for the above, Related numerical problems
	2ND	• TOPIC-3 Theory of Simple Bending and Deflection of Beams: • Explanation of terms: Neutral layer, Neutral Axis, Modulus of Section, Moment of Resistance, Bending stress, Radius of curvature
	3RD	• Explanation of terms: Neutral layer, Neutral Axis, Modulus of Section, Moment of Resistance, Bending stress, Radius of curvature
8TH	1ST	• Assumptions in theory of simple bending; Bending Equation M/I = σ/Y = E/R with derivation
	2ND	• Problems involving calculations of bending stress, modulus of section and moment of resistance
	3RD	• Calculation of safe loads and safe span and dimensions of crosssection
9TH	1ST	• Definition and explanation of deflection as applied to beams
	2ND	• Deflection formulae without proof for cantilever and simply supported beams with point load and UDL only (Standard cases only);
	3RD	• Related numerical problems
10TH	1ST	• CLASS TEST
	2ND	• TOPIC-4 Torsion in Shafts and Springs: • Definition and function of shaft; Calculation of polar M.I. for solid and hollow shafts.
	3RD	• Assumptions in simple torsion; Derivation of the equation T/J=fs/R=Gθ/L.
11TH	1ST	• Problems on design of shaft based on strength and rigidity;
	2ND	• Numerical Problems related to comparison of strength and weight of solid and hollow shafts
	3RD	• Classification of springs; Nomenclature of closed coil helical spring.
12TH	1ST	• Deflection formula for closed coil helical spring (without derivation).
	2ND	• Stiffness of spring; Numerical problems on closed coil helical spring to find safe load, deflection, size of coil and number of coils.
	3RD	• Numerical problems on closed coil helical spring to find safe load, deflection, size of coil and number of coils.
13TH	1ST	• CLASS TEST
	2ND	• TOPIC-5: Thin Cylindrical Shells: Explanation of longitudinal and hoop stresses in the light of circumferential and longitudinal failure ofshell

14TH	1ST	• Derivation of expressions for the longitudinal and hoop stress for seamless and seam shells
	2ND	• Derivation of expressions for the longitudinal and hoop stress for seamless and seam shells
	3RD	• Related numerical Problems for safe thickness and safe working pressure
15TH	1ST	• Related numerical Problems for safe thickness and safe working pressure
	2ND	• CLASS TEST
	3RD	• REVISION

REFERENCES BOOKS:

1. Strength of Materials – D.S. Bedi, Khanna Book Publishing Co. (P) Ltd., Delhi, 2017
2. Strength of Materials – B.C.Punmia, Ashok Kumar Jain & Arun Kumar Jain, Laxmi Publications, New Delhi, 2013
3. Strength of Materials – R.S. Khurmi, S.Chand Company Ltd. Delhi

12/07/25

Head of the Dept
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Principal
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