

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 ALLOCOTED:03	SEMESTER FROM DATE: 01/07/2026 TO 05/11/2026 NO OF WEEKS:-15
WEEK	CLASS DAY	THEORY TOPICS
1 ST	1 ST	TOPIC-1 Simple Stresses and Strains: • Types of forces; Stress, Strain and their nature
	2 ND	• Mechanical properties of common engineering materials
	3 RD	• Significance of various points on stress – strain diagram for M.S. and C.I. specimens
2 ND	1 ST	• Significance of factor of safety; Relation between elastic constants
	2 ND	• Stress and strain values in bodies of uniform section and of composite section under the influence of normal forces
	3 RD	• Thermal stresses in bodies of uniform section and composite sections
3 RD	1 ST	• Related numerical problems on the above topics
	2 ND	• Strain Energy: Strain energy or resilience, proof resilience and modulus of resilience
	3 RD	• Derivation of strain energy for the following cases: i) Gradually applied load, ii) Suddenly applied load, iii) Impact/ shock load
4 TH	1 ST	• Derivation of strain energy for the following cases: i) Gradually applied load, ii) Suddenly applied load, iii) Impact/ shock load Related numerical problems.
	2 ND	TOPIC-2 Shear Force & Bending Moment Diagrams: • Types of beams with examples: a) Cantilever beam, b) Simply supported beam, c) Over hanging beam, d) Continuous beam, e) Fixed beam
	3 RD	• Types of Loads – Point load, UDL and UVL; Definition and explanation of shear force and bending moment
5 TH	1 ST	• 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
	2 ND	• 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
	3 RD	• 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
6 TH	1 ST	• 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,
	2 ND	• Calculation of shear force and bending moment and drawing the S.F and B.M. diagrams by the analytical

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

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	3 RD	Thin Cylindrical Shells: Explanation of longitudinal and hoop stresses in the light of circumferential and longitudinal failure of shell
14 TH	1 ST	Derivation of expressions for the longitudinal and hoop stress for seamless and seam shells
	2 ND	Derivation of expressions for the longitudinal and hoop stress for seamless and seam shells
	3 RD	Related numerical Problems for safe thickness and safe working pressure
15 TH	1 ST	Related numerical Problems for safe thickness and safe working pressure
	2 ND	CLASS TEST
	3 RD	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

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