GOVERNMENT POLYTECHNIC BALASORE
LESSIONPLAN–STRENGTH OF MATERIALS

Discipline: **MECHANICAL ENGG.**	Semester:**3RD**	Name of the Teaching Faculty: **SRI DEBABRATA GHOSH**
Subject**: SOM (MEPC203)**	No. of Days/perweek classallotted: 3P/W	SemesterFromdate: **14.07.2025** To Date: **15.11.2025** No. of Weeks: 15Week
Week	**ClassDay**	**TheoryTopics**
1ST	1st	**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; Related numerical problems on the above topics.
3RD	1st	Strain Energy: Strain energy or resilience, proof resilience and modulus of resilience.
	2nd	Derivation of strain energy for the following cases: i) Gradually applied load.
	3rd	ii) Suddenly applied load, iii) Impact/ shock load.
4TH	1st	Related numerical problems.
	2nd	**Shear Force & Bending Moment Diagrams** Types of beams with examples: a) Cantilever beam, b) Simply supported beam, c) Over hanging beam.
	3rd	d) Continuous beam, e) Fixed beam.
5TH	1st	Types of Loads – Point load, UDL and UVL; Definition and explanation of shear force and bending moment.
	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.
	3rd	a) Cantilever with point loads, b) Cantilever with uniformly distributed load.
6TH	1st	c) Simply supported beam with point loads.
	2nd	d) Simply supported beam with UDL, e) Over hanging beam with point loads, at the center and at free ends.
	3rd	f) Over hanging beam with UDL throughout, g) Combination of point and UDL for the above.
7TH	1st	Related numerical problems.
	2nd	**Theory of Simple Bending and Deflection of Beams** Explanation of terms: Neutral layer, Neutral Axis.

	3rd	Modulus of Section, Moment of Resistance.
8TH	1st	Bending stress, Radius of curvature; Assumptions in theory of simple bending.
	2nd	Bending Equation $M/I = \sigma/Y = E/R$ with derivation.
	3rd	Problems involving calculations of bending stress, modulus of section and moment of resistance.
9TH	1st	Calculation of safe loads and safe span and dimensions of cross- section.
	2nd	Definition and explanation of deflection as applied to beams.
	3rd	Deflection formulae without proof for cantilever and simply supported beams with point load and UDL only (Standard cases only).
10TH	1st	Related numerical problems.
	2nd	**Torsion in Shafts and Springs** Definition and function of shaft.
	3rd	Calculation of polar M.I. for solid and hollow shafts.
11TH	1st	Assumptions in simple torsion.
	2nd	Derivation of the equation $T/J=fs/R=G\theta/L$; Problems on design of shaft based on strength and rigidity.
	3rd	Numerical Problems related to comparison of strength and weight of solid and hollow shafts.
12TH	1st	Classification of springs; Nomenclature of closed coil helical spring.
	2nd	Deflection formula for closed coil helical spring (without derivation).
	3rd	Stiffness of spring.
13TH	1st	Numerical problems on closed coil helical spring to find safe load, deflection, size of coil and number of coils.
	2nd	**Thin Cylindrical Shells** Explanation of longitudinal and hoop stresses in the light of circumferential and longitudinal failure of shell.
	3rd	Explanation of longitudinal and hoop stresses in the light of circumferential and longitudinal failure of shell.
14TH	1st	Explanation of longitudinal and hoop stresses in the light of circumferential and longitudinal failure of shell.
	2nd	Derivation of expressions for the longitudinal and hoop stress for seamless and seam shells.
	3rd	Derivation of expressions for the longitudinal and hoop stress for seamless and seam shells.
15TH	1st	Derivation of expressions for the longitudinal and hoop stress for seamless and seam shells.
	2nd	Related numerical Problems for safe thickness and safe working pressure.
	3rd	Related numerical Problems for safe thickness and safe working pressure.