GOVERNMENT POLTECHNIC KANDHAMAL, PHULBANI

LESSON PLAN: STRENGTH OF MATERIALS

Subject Name: Strength of Materials

Subject Code: MEPC203 (TH:2)

Semester: 3rd, **Branch:** Mechanical Engineering

Academic Calendar: Winter 2026

Name of the Faculty: Dr Dillip Kumar Panigrahi, Lecturer in Mechanical, Govt. Polytechnic Kandhamal, Phulbani

<table>
<tr><td>L</td><td>T</td><td>P</td><td rowspan="8">Total Marks: 100</td><td>Course Code: MEPC203</td></tr>
<tr><td>3</td><td>0</td><td>3</td><td>Theory Assessment</td></tr>
<tr><td colspan="3">Total Contact Hours</td><td>End Term Exam: 70</td></tr>
<tr><td colspan="3">Theory: 45 Hrs</td><td>Progressive Assessment: 30</td></tr>
<tr><td colspan="3"></td><td></td></tr>
<tr><td colspan="3">Pre-Requisite: Nil</td><td></td></tr>
<tr><td colspan="3">Credit: 3</td><td>Category of Course: PC</td></tr>
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RATIONALE:

Strength of materials deals with the internal behaviour of solid bodies loaded in different manner. The common solid bodies e.g. shafts, bars, beams, plates and columns are the basic components of structures and machines. This subject primarily focuses on mechanical properties of materials, analysis of stress, strain and evaluation of deformation. Hence all students should have acquainted with strength of materials to become successful technician.

LEARNING OUTCOMES:

After completion of the course, the students will be able to

- Apply the concept of Simple Stresses and Strains.
- Describe the concept of Strain Energy.
- Define the concept of Shear Force and Bending Moment Diagrams.
- Apply the concept of Theory of Simple Bending and Deflection of Beams.
- Outline the concept of Torsion in Shafts and Springs.
- Illustrate the concept of Thin Cylindrical Shells.

SI No.	Date	Topics to be Covered as per Lesson Plan	Points / Contents to be Discussed (in detail)
1st Week	01-07-2026 to 04-07-2026	➢ Simple Stresses and Strains (Unit-1)	➢ Types of forces; Stress, Strain and their nature. ➢ Mechanical properties of common engineering materials; ➢ Significance of various points on stress- strain diagram for M.S. and C.I. specimens; ➢ Significance of factor of safety.
2nd Week	06-07-2026 to 10-07-2026	➢ Simple Stresses and Strains (Unit-1)	➢ Relation between elastic constants. ➢ Stress and strain values in bodies of uniform section and of composite section under the influence of normal forces; ➢ Thermal stresses in bodies of uniform section and composite sections; ➢ Related numerical problems on the above topics.
3rd Week	13-07-2026 to 18-07-2026	➢ Simple Stresses and Strains (Unit-1)	➢ Strain Energy: Strain energy or resilience, proof resilience and modulus of resilience; ➢ Derivation of strain energy for the following cases: i) Gradually applied load, ii) Suddenly applied load, iii) Impact/ shock load; ➢ Related numerical problems.
	16-07-2026	➢ **Rath Yatra**	

4th Week	20-07-2026 to 24-07-2026	➢ Simple Stresses and Strains (Unit-1) ➢ Shear Force & Bending Moment Diagrams (Unit-2)	➢ Numericals on Simple Stresses and Strains ➢ Types of beams with examples: a) Cantilever beam, b) Simply supported beam, c) Over hanging beam, d) Continuous beam, e) Fixed beam; ➢ Types of Loads – Point load, UDL and UVL; ➢ Definition and explanation of shear force and bending moment;
5th Week	27-07-2026 to 01-08-2026	➢ Shear Force & Bending Moment Diagrams (Unit-2)	➢ 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, b) Cantilever with uniformly distributed load, c) Simply supported beam with point loads. ➢ Related numerical problems.
6th Week	03-08-2026 to 07-08-2026	➢ Shear Force & Bending Moment Diagrams (Unit-2)	➢ Calculation of shear force and bending moment and drawing the S.F and B.M. diagrams by the analytical method for the following cases: d) Simply supported beam with UDL, e) Over hanging beam with point loads, at the centre and at free ends. ➢ Related numerical problems.
7th Week	10-08-2026 to 15-08-2026	➢ Shear Force & Bending Moment Diagrams (Unit-2)	➢ Calculation of shear force and bending moment and drawing the S.F and B.M. diagrams by the analytical method for the following cases: f) Over hanging beam with UDL throughout, g) Combination of point and UDL for the above. ➢ Related numerical problems.
	15-08-2026	➢ **Independence Day**	
8th Week	17-08-2026 to 21-08-2026	➢ Shear Force & Bending Moment Diagrams (Unit-2)	➢ Calculation of shear force and bending moment and drawing the S.F and B.M. diagrams by the analytical method for the following cases: f) Over hanging beam with UDL throughout, g) Combination of point and UDL for the above. ➢ Related numerical problems.
9th Week	24-08-2026 to 29-08-2026	➢ Theory of Simple Bending and Deflection of Beams (Unit-3)	➢ Explanation of terms: Neutral layer, Neutral Axis, Modulus of Section, Moment of Resistance, Bending stress, Radius of curvature; ➢ Assumptions in theory of simple bending; ➢ Bending Equation $M/I = \sigma/Y = E/R$ with derivation;
	26-08-2026	➢ **Birthday of Prophet Mohammad**	

	27-08-2026	➢ **Jhulana Purnima**	
10th Week	31-08-2028 to 05-09-2026	➢ Theory of Simple Bending and Deflection of Beams (Unit-3)	➢ Problems involving calculations of bending stress, modulus of section and moment of resistance; ➢ Calculation of safe loads and safe span and dimensions of cross- section;
	04-09-2026	➢ **Janmastami**	
11th Week	07-09-2029 to 11-09-2026	➢ Theory of Simple Bending and Deflection of Beams (Unit-3)	➢ Definition and explanation of deflection as applied to beams; ➢ Deflection formulae without proof for cantilever and simply supported beams with point load and UDL only (Standard cases only); ➢ Related numerical problems.
12th Week	14-09-2026 to 19-09-2026	➢ Theory of Simple Bending and Deflection of Beams (Unit-3)	➢ Deflection formulae without proof for cantilever and simply supported beams with point load and UDL only (Standard cases only); ➢ Related numerical problems.
	14-09-2026	➢ **Ganesh Puja**	
	15-09-2026	➢ **Nuakhai**	
	16-09-2026	➢ **Day following Nuakhai**	
	21-09-2026 to 25-09-2026	➢ Torsion in Shafts and Springs (Unit-4)	➢ Definition and function of shaft; Calculation of polar M.I. for solid and hollow shafts; Assumptions in simple torsion; ➢ Derivation of the equation T/J=fs/R=Gθ/L;
13th Week	28-09-2026 to 03-10-2026	➢ Torsion in Shafts and Springs (Unit-4)	➢ Problems on design of shaft based on strength and rigidity; ➢ Numerical Problems related to comparison of strength and weight of solid and hollow shafts;
	02-10-2026	➢ **Gandhi Jayanti**	
14th Week	05-10-2026 to 09-10-2026	➢ Torsion in Shafts and Springs (Unit-4)	➢ Classification of springs; Nomenclature of closed coil helical spring; ➢ Deflection formula for closed coil helical spring (without derivation); stiffness of spring;
15th Week	12-10-2026 to 17-10-2026	➢ Torsion in Shafts and Springs (Unit-4)	➢ Deflection formula for closed coil helical spring (without derivation); stiffness of spring; ➢ Numerical problems on closed coil helical spring to find safe load, deflection, size of coil and number of coils.
	17-10-2026	➢ **Maha Saptami**	

16th Week	19-10-2026 to 23-10-2026	➢ Thin Cylindrical Shells (Unit-5)	➢ Explanation of longitudinal and hoop stresses in the light of Circumferential and longitudinal failure of shell; ➢ Derivation of expressions for the longitudinal and hoop stress for seamless shells; ➢ Related Numerical Problems
	19-10-2026	➢ **Maha Nabami**	
	20-10-2026	➢ **Vijaya Dasami**	
17th Week	26-10-2026 to 31-10-2026	➢ Thin Cylindrical Shells (Unit-5)	➢ Derivation of expressions for the longitudinal and hoop stress for seam shells; ➢ Related Numerical Problems ➢ Related numerical Problems for safe thickness and safe working pressure.
18th Week	02-11-2026 to 05-11-2026	➢ Revision	
	05-11-2026	➢ **Closing of Attendance**	

REFERENCES:

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

Dr. Dillip Kumar Panigrahi
Lecturer (Stage-1), Mechanical Engineering
Government Polytechnic Kandhamal, Phulbani