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DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/MANAGEMENT/ COMMERCIAL PRACTICE, NOVEMBER - 2025

STRENGTH OF MATERIALS

[Maximum marks: 75] [Time: 3 Hours]

PART A

I. Answer all the following questions in one word or one sentence. Each question carries 1 mark.

(9 x 1 = 9 Marks)

		Module outcome	Cognitive level
1	Define poisons ratio.	M1.01	U
2	Define significance of factor safety.	M1.02	U
3	Beam with both ends are fixed is called ……..	M2.01	R
4	Define shear force diagram.	M2.02	U
5	The types of beam is kept on roller is called ……	M2.01	R
6	Define overhanging beam.	M2.01	U
7	Define the term slenderness ratio.	M3.05	A
8	List different types of stress developed in cylindrical shell.	M4.03	U
9	List different types of springs.	M4.02	U

PART B

II. Answer any eight questions from the following. Each question carries 3 marks.

(8 x 3 = 24 Marks)

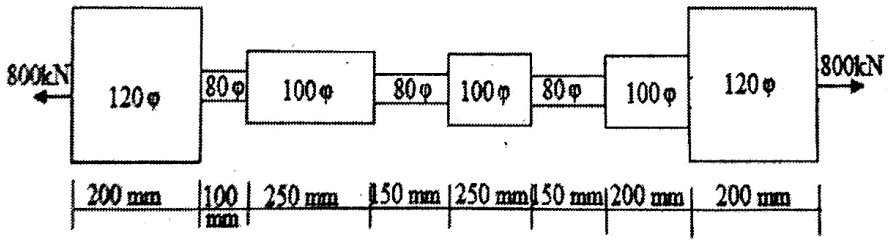
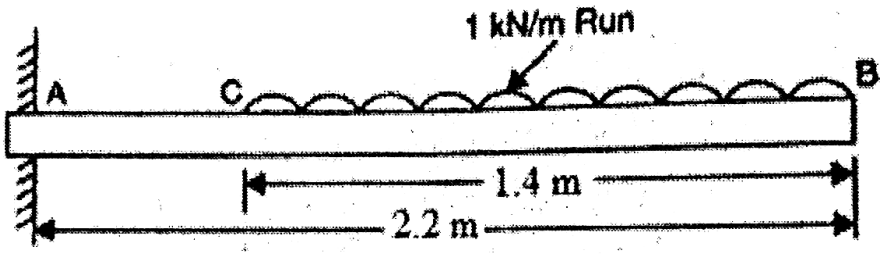
		Module outcome	Cognitive level
1	Explain thermal stress and derive expression for thermal stress when support yields.	M1.04	A
2	Explain stress-strain diagram for ductile materials.	M1.02	U
3	Explain different types of forces.	M1.01	U
4	Explain different types of stresses.	M1.02	U
5	Define Bending moment.	M2.02	U
6	Explain shear force & Bending moment diagram for cantilever beam with load at free end.	M2.02	U
7	Define shear force diagram with example.	M2.03	A
8	List different types of end conditions of columns.	M3.04	A

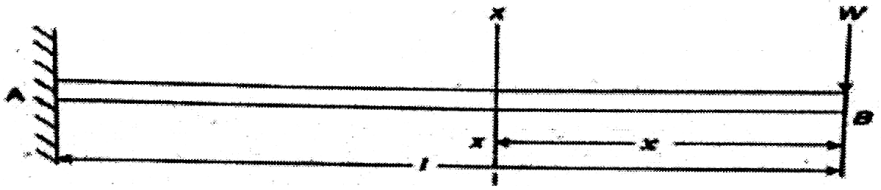
9	Write expression for deflection in helical spring.	M4.02	U
10	List assumptions in torsional equation.	M4.01	U

PART C

Answer all questions. Each question carries seven marks.

(6 x 7 = 42 Marks)

		Module outcome	Cognitive level
III	A rod as shown in figure is subjected a pull of 800KN on the ends. Take E=2.05x10^5 N/mm^2. Find the extension of the rod.  	M1.05	A
	OR		
IV	A rod of steel is 25m long at a temperature of 20℃. Find the free expansion of the rod when the temperature is raised to 65℃. Find the temperature stress produced (i) When Compression of the rod is prevented. (ii) When Expansion permitted is 6mm $\alpha = 12 \times 10^{-6}/℃$ $E = 2 \times 10^5$ N/mm^2	M1.05	A
V	A cantilever beam of length 2.2m carries a uniformly distributed load of 1KN/m run over a length of 1.4m from the free end. Draw the shear force & bending moment diagram for the cantilever beam.  	M2.03	A

	OR		
VI	Derive Shear force and bending moment for Cantilever beam with Point load at free end. And also draw the shear force & bending moment diagram.  	M2.03	U
VII	A cantilever of length 2.5m carries a uniform distributed load of 16.4 KN/m over entire length. If the moment of inertia of the beam =7.95 x 10^7 mm^4 and value of E = 2 x 10^5 N/mm^2, determine the deflection at free end.	M3.03	A
	OR		
VIII	A timber beam of 150mm x 300mm cross section is supports a central point load on a span of 4metre. If the maximum bending stress is 8N/mm^2. What is the maximum deflection? Take E=0.1 x $10^5$$N/mm^2$.	M3.04	A
IX	Explain the theory of bending. And also list the Assumptions in the theory of bending.	M3.02	U
	OR		
X	Define Rankine's formula for column.	M3.05	U
XI	A hollow shaft of 160mm outside diameter and 120mm inside diameter. If the maximum allowable shear stress is 55MPa. What is the strength of the shaft?	M4.01	A
	OR		
XII	Calculate the maximum wall thickness of a thin cylinder 1m in diameter if subjected to an internal pressure of 2N/mm^2. The hoop stress should not exceed 40N/mm^2 and the longitudinal stress not exceed 30N/mm^2.	M4.03	A
XIII	What are the assumptions used in deriving torsional equation and explain torsional equation.	M4.01	U
	OR		
XIV	Explain the longitudinal and hoop stress in the failure of cylindrical shell.	M4.03	U

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