TED (21) - 3021
(REVISION-2021)

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Reg.No……
Signature…….

DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/ MANAGEMENT/COMMERCIAL PRACTICE, NOVEMBER - 2024

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 'one' marks.

(9 x 1 = 9 Marks)

		Module Outcome	Cognitive level
1	The ability of a material to resist abrasion, scratching or indentation is known as …….	M1.01	R
2	The relation between Young's modulus of elasticity (E), modulus of rigidity(G) and Poisson's ratio (μ) is…….	M1.02	R
3	The unit of coefficient of thermal expansion is…….	M1.04	R
4	The algebraic sum of the forces acting to the right or left of a beam section is known as……	M2.02	R
5	The relation between bending moment (M) and shear force (F) is given by …….	M2.02	U
6	Slenderness ratio of a column of length 'l' and diameter'd' is given by …….	M3.05	R
7	Euler's equation for finding buckling load is not suitable for ……..columns.	M3.05	U
8	Spring index for a spring with mean coil diameter 'D' and spring wire diameter 'd' is given by …….	M4.02	R
9	Hoop stress in a thin cylindrical shell subjected to internal pressure is ……. times longitudinal stress.	M4.03	U

PART - B

II. Answer *any eight* questions from the following. Each question carries 'Three' marks.

(8 x 3 = 24 Marks)

		Module Outcome	Cognitive level
1	Differentiate between malleability and ductility.	M1.01	U
2	Define the term factor of safety. Explain its importance.	M1.02	U
3	State Hooke's law and write the equation.	M1.01	R
4	Define the following: i) Young's Modulus ii) Modulus of rigidity iii) Bulk modulus	M1.01	R
5	Draw the shear force and bending moment diagram of a beam of span 'l' subjected to point load at its midpoint of the span.	M2.03	U
6	Draw the shear force and bending moment diagrams for a simply supported beam carrying uniformly distributed load of 'w' per unit length over the entire span.	M2.03	U
7	Define buckling load of columns. Write the Euler's formula for buckling load.	M3.05	R
8	Define the term polar moment of inertia. Write the expression for	M4.01	R

	polar moment of inertia for a hollow circular shaft of external diameter 'D' and internal diameter'd'.		
9	Explain the following terms of a helical spring: i) Solid length ii) Free length iii)Spring stiffness	M4.02	R
10	A 1000 mm diameter pipe contains a fluid at a pressure of 2 N/mm^2. If the safe tensile stress is 100 N/mm^2. Find the pipe thickness.	M4.03	A

PART - C

Answer all the questions from the following. Each question carries 'seven' marks.

(6 x 7 = 42 Marks)

		Module Outcome	Cognitive level
III.	Draw the stress-strain diagram for mild steel under tension and mark the important points in it.	M1.02	U
	OR		
IV.	A rod 200 cm long and of diameter 3 cm is subjected to an axial pull of 30 kN. If the Young's modulus of the rod material is 2x 10^5 N/mm^2,determine: i) Stress ii) Strain iii) Elongation of the rod	M1.05	A
V.	Draw the shear force and bending moment diagram for a simply supported beam of length 9m and carrying a uniformly distributed load of 10kN/m for a distance of 6m from the left end.	M2.03	U
	OR		
VI.	Explain the different types of loads in beams with the help of sketches.	M2.01	U
VII.	Calculate the deflection at the free end of a cantilever beam of length 6m carrying a uniformly distributed load of 15kN/m. Given I = 95x$10^7$$mm^4$ and E = 2x 10^5 N/mm^2.	M3.03	A
	OR	M3.05	U
VIII.	Explain the important end conditions for a column with figures.		
IX.	Determine the maximum bending stress induced in a pipe of external diameter 60mm and internal diameter 40mm subjected to a point load of 100N at its center. The length of the pipe is 5 m and is supported at its ends.	M3.03	A
	OR		
X.	Explain the term section modulus. Determine the section modulus for circular and hollow circular sections.	M3.03	U
XI	Compare the weights of solids shaft and hollow shaft of same material and lengths and subjected to same torque. The inside diameter of the hollow shaft is 2/3 of its outside diameter and the maximum shear stress developed in each shaft is same.	M4.01	A
	OR		
XII.	A cylinder pipe of diameter 2m and thickness 2 cm is subjected to an internal fluid pressure of 1.5N/mm^2. Determine the longitudinal and circumferential stress developed in the pipe material.	M4.03	A
XIII.	Derive the torsion equation : $\frac{T}{J} = \frac{\tau}{R} = \frac{G\theta}{l}$	M4.01	U
	OR		
XIV.	Explain the classification of springs with suitable figures.	M4.02	U

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