C-09-M-403

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BOARD DIPLOMA EXAMINATION, (C-09)
OCTOBER / NOVEMBER - 2011
D.M.E. - IV SEMESTER EXAMINATION
STRENGTH OF MATERIALS

Time : 3 Hours] [Total Marks : 80

PART - A 10×3 = 30

Instructions : *(1) Answer all questions and each question carries three mark.*
(2) Answers should be brief and straight to the point and shall not exceed five simple sentences.
(3) Assume missing data wherever necessary.

1 List out the three elastic constants and write down the relation between them. $1\frac{1}{2}+1\frac{1}{2}$

2 Define thermal stress. 3

3 State the difference between suddenly applied load and impact load. $1\frac{1}{2}+1\frac{1}{2}$

4 A cantilever beam of span 4m carries a uniformly distributed load of 2kN/m on whole span. Determine the maximum shear force and bending moment. $1\frac{1}{2}+1\frac{1}{2}$

5 State the differences between cantilever beam and overhanging beam. 3

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6 To what radius a steel strip of thickness 5mm can be bent if the maximum stress in the strip is not to exceed 100 N/mm^2. E for steel = 2×10^5 N/mm^2. 3

7 A cantilever beam with a span of 3m carries a point load of 30 kN at a distance of 2m from the fixed end. Find the deflection at free end. E = 2×10^5 N/mm^2, M.I.=120×10^6 mm^4. 3

8 Write the expressions for polar moment of inertia for solid and hollow shaft. $1\frac{1}{2}+1\frac{1}{2}$

9 Define the terms spring index and stiffness related to coil springs. $1\frac{1}{2}+1\frac{1}{2}$

10 A thin cylindrical shell having 2.2 m diameter and 5 m length is subjected to a hoop stress of 65 N/mm^2. Calculate circumferential strain. Assume Poisson's ratio as 0.32 and Young's modulus as 2.1×10^5 N/mm^2. 3

PART - B

$5 \times 10 = 50$

Instructions : *(1) Answer any five questions and each question carries 10 marks.*

(2) The answers should be comprehensive and the criteria for valuation is the content but not the length of the answer.

(3) Assume missing data wherever necessary.

11 The bars A and B made up of same material and same length 1.0 m are subjected to same axial load. The diameter of bar A is 25mm for a part of length and 30 mm for the remaining length. The bar B is having a diameter of 18 mm. If the elongation of the bar A is 35% of the elongation of the bar B, what is the length of bar A of diameter 25mm. 10

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12 Explain any five mechanical properties of materials. 5×2

13 The following data refers to a tensile test :

(i) Diameter of steel bar = 30 mm

(ii) Gauge length = 200 mm

(iii) Extension at a load of 100 kN = 0.139 mm

(iv) Load at elastic limit = 230 kN

Calculate

(i) Resilience

(ii) Proof resilience

(iii) Modulus of resilience

14 (a) Explain the types of loads with sketches 5

(b) Explain the following terms : $2\frac{1}{2}+2\frac{1}{2}$

(i) Shear force

(ii) Bending moment

15 A simply supported beam of length 10 m carries uniformly distributed load of 2 kN/m over the entire span and two point loads 3kN and 4kN at a distance of 3m and 7m from left support respectively. Draw shear force and bending moment diagrams. 10

16 Derive the simple bending equation with usual notations. 10

17 A hollow shaft is to transmit 300 kW at 900 rpm. If the shear stress must not exceed to 50 N/mm^2. Find the external and internal diameters of shaft. Assume the internal diameter is 0.6 of the external diameter. 10

18 (a) State the assumptions made in torsion equation. 5

(b) Derive the equation of hoop stress for a thin cylindrical shell. 5

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