3503

C09-M-403

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BOARD DIPLOMA EXAMINATION, (C-09)
OCTOBER/NOVEMBER-2018
DME - FOURTH SEMESTER EXAMINATION

STRENGTH OF MATERIALS

Time : 3 Hours] [Total Marks: 80

PART-A

3X10=30

Instructions :
1. Answer **All** questions.
2. Each question carries **three** marks.
3. Answer should be brief and straight to the point and shall not exceed five simple sentences.

1. Calculate the Modulus of Rigidity of a cylindrical bar having Passion's ratio 0.25 and Modulus of elasticity 1×10^5 N/mm^2
2. A M.S. bar carries on axial load of 75kN. If the allowable tensile stress is 50 N/mm^2. Find the diameter of the bar.
3. Define (a) Resilience (b) Proof resilience (c) Modulus of resilience.
4. A simply supported beam of length 4m carries a uniformly distributed load of 20 kN/m over the complete span. Draw shear force and bending moment diagrams
5. A cantilever beam of length 5m carries uniformly distributed load of 2kN/m over a length of 2m from fixed end. Draw the shear force diagram.
6. A square beam under the action of load the maximum bending stress induced is 150 N/mm^2 and bending moment is 4000 N.m. Find the dimensions of cross-section of beam.
7. Define the following terms (a) Neutral axis (b) Moment of resistance.
8. A close coiled helical spring of 10 coils has a wire diameter of 12mm mean coil diameter of 120mm. Find the stiffness of spring. G = 8.4×10^4 N/mm^2
9. Define the term modulus of section.
10. In a thin cylindrical seamed type shell, it is observed that the hoop and longitudinal stresses are equal. Establish the relation between efficiencies.

PART-B

10X5=50

Instructions : 1. Answer any **Five** questions.
2. Each question carries **ten** marks.

11. Briefly explain any five mechanical properties of engineering materials.
12. A 15mm diameter steel rod passes centrally through a copper tube 30mm external diameter and 20mm internal diameter. The composite bar is rigidly joined at both the ends. If the temperature of the assembly is raised by 100°C, calculate the stresses developed in steel and copper.

    Take $E_S = 2 \times 10 N/mm^2$ $E_c = 1.05 \times 10^5 N/mm^2$
    $\alpha_s = 12 \times 10^{-6}/^oC$ $\alpha_c = 17.5 \times 10^{-6}/^oC$
13. (a) A compressive load of 40KN is suddenly applied to a bar 30mm diameter and 4m long. What is the work done on the bar? E = 200 KN/mm^2

    (b) Is the strain energy same in the cases of gradually applied and suddenly applied loads? Discuss.
14. Draw shear force and bending moment diagrams for a beam of 16m long with equal over hangs of 2m carrying UDL of 5 kN/m on each of its over hangs.
15. (a) Explain the following terms (a) Shear force (b) Bending moment.

    (b) Explain different types of beams.
16. Sketch the deflection profile in each of the following cases, indicating the position and value of maximum deflection.
    a) Cantilever beam with a point load at its free end.
    b) Cantilever beam with a UDL throughout is length.
    c) Simply supported beam with UDL throughout its span.
    d) Simply supported beam with a central point load.
17. A laminated spring is to be made of 10 plates of 50mm wide and 6mm thick. Calculate the length of the spring, so that is can carry a central load of 3kN and bending stress is limited to 120 N/mm^2 and deflection. E = 2×10^5 N/mm^2
18. (a) A hollow shaft of 100mm outside diameter and 80mm inside diameter is having an allowable stress of 60 N/mm^2. Find the torque transmitted and stress at a radius of 40mm from the axis of the shaft.

    (b) A 10mm thin cylindrical shell having 1.5m diameter and 5m length is subjected to a fluid pressure of 3 N/mm^2. Calculate volumetric. Assume poison ratio as 0.32 and Young modulus as 2.1×10^5 N/mm^2.

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