3503

BOARD DIPLOMA EXAMINATION, (C-09)

MARCH/APRIL - 2019

DIPLOMA IN MECHANICAL ENGINEERING

STRENGTH OF MATERIALS

FOURTH SEMESTER EXAMINATION

Time: 3 Hours **Total Marks: 80**

PART - A (10 x 3 = 30 Marks)

Note 1:Answer all questions and each question carries 3 marks

2:Answers should be brief and straight to the point and shall not exceed 5 simple sentences

1. A M. S bar carries on axial load of 75 kN. If the allowable tensile stress is 50 N/mm². Find the diameter of the bar.
2. Define a) Linear Strain b) Lateral Strain and c) establish the relation between them.
3. An Axial Pull of 50 kN is suddenly applied to Steel rod 2 m long and 1000 mm^2 in cross section. Calculate the Strain Energy that can be absorbed by the rod, if E = 200 kN/mm^2.
4. Define the following terms.
   a) Reactions b) Point of Contraflexure.
5. A Simply Supported beam of span 6 m carries a concentrated load of 50 kN at the middle of the span. Draw Shear Force and Bending Moment Diagrams.
6. A Steel beam of 1 meter deep is bent into a circular arc of 6 m radius. Draw a sketch indicating the neutral layer and layer of maximum stress.
7. A Cantilver beam of length 3m carries point load at free end. If the maximum slope is 0.01 radians, calculate the deflection at free end.
8. A Solid shaft is having 50 mm diameter. Find out the Modulus of Section.
9. List various types of Springs.
10. A 12 mm thin cylindrical shell having 2.2 m diameter and 5 m length is subjected to a fluid pressure of 2 N/mm^2. Calculate circumferential strain. Assume poisson's ratio as 0.3 and Young Modulus as 2.1×10^5 N/mm^2.

PART - B (5 x 10 = 50 Marks)

Note 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

11. Briefly explain how Thermal stresses are induced in a simple bar.
12. A concrete cylinder of diameter 150 mm and length 300 mm when subjected to an axial compressive load of 240 kN resulted in an increase of diameter by 0.127 mm and decrease in length by 0.28 mm. Find the Poisson's ratio and values of three Elastic Constants.

13. The following data refers to a Tensile test:
    (i) Diameter of steel bar = 300 mm
    (ii) Gauge length = 200 mm
    (iii) Extension at a load of 100 kN = 0.139 mm
    (iv) Load at elastic limit = 200 kN
    Calculate :
        (i) Resilience
        (ii) Proof resilience
        (iii) Modulus of resilience.

14. Explain the following with sketches.
    (a) Types of Beams b) Types of Loads

15. A Cantilever of length 3 m carries a point loads of 50 kN, 30 kN, 10 kN and 40 kN at 0.5 m, 1.5 m, 2 m and 3 m from fixed end respectively. Draw Shear Force and Bending Moment Diagrams

16. A Circular pipe having 80 mm external diameter and 10 mm thick is used as a freely supported beam over a span of 4 m. Find the maximum load that can be applied at the centre of the beam, If the permissible stress is not to exceed 125 N/mm².

17. A hollow shaft is to transmit 300 kW at 900 rpm. If the shear stress must not exceed to 50 N/mm², find the external and internal diameters of shaft. Assume that internal diameter is 0.6 of the external diameter.

18A. A spring balance has to shown a deflection of 20 mm under a load of 50N. The balance is made of 5 mm Steel wire and having a mean diameter of 50 mm. Find no. of turns to be wound. Take $G = 0.8 \times 10^5$ N/mm^2.

B. A Boiler Shell is to be made of 10 mm thick plate having limiting tensile stress of 105 N/mm², if the efficiencies of longitudinal and circumferential joints are 70% and30% respectively, Find the permissible intensity of Internal Pressure, when the Shell diameter is 1.3m.

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