C-09-M-**403**

3503

BOARD DIPLOMA EXAMINATION, (C-09)
MARCH / APRIL - 2019
DME - IV SEMESTER EXAMINATION
STRENGTH OF MATERIALS

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

PART - A   3×10=30

Instructions :   (1) *Answer **ALL** questions.*
          (2) *Each question carries **THREE** marks.*
          (3) *Answer should be brief and straight to the point.*

1   A.M.S. bar of diameter 10 mm and 350 mm long is subjected to an axial load of 15 kN. Calculate the Extension of the bar and change in diameter. Assume $E_s = 2 \times 10^5 N/mm^2$ and poisson's ratio 0.25.

2   A Steel rod 3 m long is fixed rigidity at the ends and heated through a temperature of $800°C$ Find the prevented expansion take $\alpha_s as = 12 \times 10^{-6}/°C$.

3   An M. S specimen of 15 mm diameter and 50 mm. gauge length is subjected to a sudden axial pull of 32 kN. Calculate the maximum stress and elongation. Take $E = 200 KN/mm^2$.

4   A Simply Supported Beam having a span of 10 m carries u.d.l. of 3 kN/m over its entire span. Find max Bending Moment.

5   Define the following terms.

(a) Reactions (b) Point of Contraflexure.

6   A Steel strip of 10 mm thick is bent round a circular drum of 3 m diameter. Calculate the maximum Stress developed in the strip. Take E for Steel $200\ kN/mm^2$.

7   State Bending equation and mention the terms.

8   A Laminated Spring of 1 m long is made of 11 no. of Steel plates each 50 mm wide and 10 mm. thick. Find Bending Stress induced, if it is to carry a central point load of $5\ kN$.

9   A close coiled helical spring of 20 coils has a wire diameter of 5 mm and mean coil diameter of 3o mm. Find the stiffness of spring. Take $G = 8.4 \times 10^4\ N/mm^2$.

10   A Thin Cylindrical Shell having 2 m diameter and 5 m length is subjected to a hoop stress of $75\ N/mm^2$ Calculate change in length. Assume poinson's ratio as 0.32 and Young's Modulus as $2.1 \times 10^5\ N/mm^2$.

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PART - B   10×5=50

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Instructions :   (1) *Answer any **FIVE** questions.*

              (2) *Each question carries **TEN** marks.*

              (3) *Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.*

11   Discuss the behaviour of a Mild Steel specimen when subjected to a tensile test.

12   Write short: notes an the following five Mechanical Properties of materials,

     (a) Modulus of Elasticity

     (b) Ductility

     (c) Malleability

     (d) Brittleness

     (e) Hardness.

13 A Mild Steel-bar of length 3 m and diameter of 50 mm hangs vertically and a load of $200\,kN$ falls on a collar attached to the lower end. Find the maximum stress when

   (a) Height of fall is 150 mm

   (b) Load is applied suddenly with out impact

   (c) Load is applied gradually. Take $E = 2 \times 10^5\, N/mm^2$.

14 Explain the following with sketches,

   (a) Types of Beams

   (b) Types of Loads

15 A Cantilever beam of 5 m long subjected to a u.d.l of $10\,kN/m$ over a length of 2 m. commenced at 2.5 m from fixed end and carries point loads of $25\,kN$ and $30\,kN$ at its free end and at 1 m from fixed end respectively. Draw the Load Diagram, Shear Force Diagram and Bending Moment Diagram.

16 A beam having 300 mm cross section is Simply Supported over a span of 5 meters. Determine the maximum central point load that can be placed if the

   (a) Bending-Stress is not to exceed $80 N/mm^2$

   (b) Maximum Deflection is limited to 8 mm. $E = 2 \times 10^5\, N/mm^2$

17 (a) State the assumptions made in Torsion equation,

   (b) Write dawn the Torsion equation with usual notations and describe the terms involved

18 (a) A hollow shaft of 100 mm outside diameter and 80 mm inside diameter is having an allowable stress of $60\, N/mm^2$. Find. the Torque transmitted and stress at a radius of 40 mm from the axis of the shaft.

   (b) A water main 1.5m. diameter contains water at a pressure head of 100 m. If the specific weight of water is $9810\, N/m^3$, find the thickness of the metal required for water main. Given permissible stress is $30\, N/mm^2$.