CBCS SCHEME - Summer Semester

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21ARC36

Third Semester B.Arch. Degree Examination, June/July 2026
Building Structures – II

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Sketch and explain stress-strain relationship for HYSD and Brittle materials. **(08 Marks)**

b. A steel rod 800 mm long and 60mm × 20 mm in cross-section is subjected to an axial push of 89 KN. If modulus of elasticity is 2.1×10^5 N/mm^2. Calculate stress, strain and reduction in length of rod. **(12 Marks)**

OR

2 a. Briefly explain different types of Stresses and Strains. **(08 Marks)**

b. A stepped bar is pulled by 20 KN force as shown in the Fig.Q2(b).

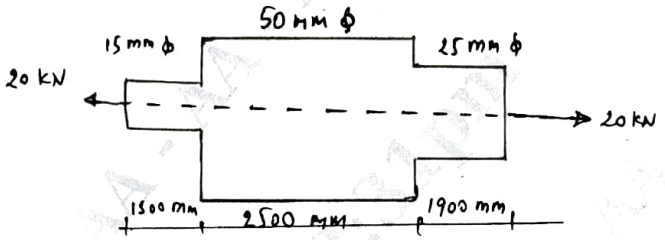

Fig.Q2(b)

Find the total elongation of the bar. Take E = 2×10^5 N/mm^2. **(12 Marks)**

Module-2

3 a. Explain the following terms :
(i) Modulus of Rigidity (ii) Bulk Modulus
(iii) Poisson's Ratio (iv) Modulus of Elasticity **(08 Marks)**

b. A copper wire 20 mm^2 in cross-section and steel wire 30 mm^2 in cross section both 1 m long are rigidly connected to plates on either side. They jointly share a load of 8 KN. $E_{steel} = 20\times10^5$ MPa and $E_{copper} = 1\times10^5$ MPa. Find stress produced in each material. **(12 Marks)**

OR

4 a. Explain briefly longitudinal strain, lateral strain and volumetric strain. **(08 Marks)**

b. A metal bar of 40 mm × 40 mm in section is subjected to a compressive load of 500 KN. The contraction is 200 mm gauge length is found to be 0.6 mm and increase in thickness is 0.04 mm. Find the value of Poisson's ratio and three elastic constants. **(12 Marks)**

Module-3

5 a. Briefly explain effective length for various end conditions of column. **(10 Marks)**

b. A hollow CI column has 200×150 mm outer dimensions and 150×100 mm inner dimensions. Height of the column is 6m. The column is fixed at both the ends. If E = 1200 N/mm^2. Find buckling load by Euler's Formula. **(10 Marks)**

OR

6 a. Explain Euler's formula and assumptions made in the same. **(08 Marks)**

b. A solid round bar of 60 mm diameter and 25 m long is used as a column. Find safe load for the following conditions. Take $E = 2\times10^5$ N/mm^2 and FOS = 3.
(i) Both ends are hinged (ii) Both ends are fixed. **(12 Marks)**

Module-4

7 a. Explain briefly :
(i) Point of contraflexure (ii) Shear force diagram
(iii) Bending moment diagram (iv) Sign convention for SFD and BMD **(08 Marks)**

b. Calculate shear force and bending moment and draw SFD and BMD. [Refer Fig.Q7(b)].

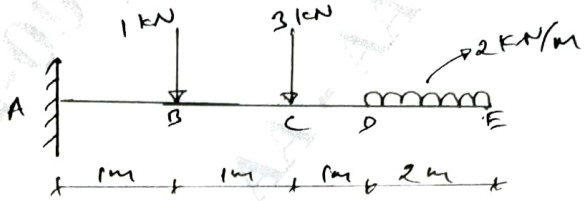

Fig.Q7(b) **(12 Marks)**

OR

8 A simply supported beam is loaded as shown in Fig.Q8. Calculate SF and BM and locate the point of contraflexure.

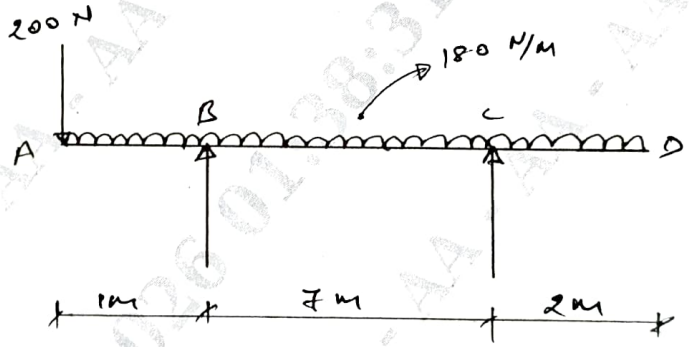

Fig.Q8 **(20 Marks)**

Module-5

9 a. Define Bending Stress with explanation of its formula. Write down the assumptions made in the theory of simple bending. **(10 Marks)**

b. A cantilever is 2 m long and is subjected to a UDL of 2 KN/m. The cross section of a cantilever is T-section with flange of 80 mm × 10 mm and web of 10 mm × 120 mm such that its total depth is 130 mm. The flange is at the top and web is vertical. Determine the maximum tensile and compressive stress developed and their positions. **(10 Marks)**

OR

10 A beam AB supported at its ends has the span of 2 m and carries a UDL of 200 KN/m over the entire span. The cross section of the beam is T-section having flange width 125 mm, flange thickness 25 mm, web thickness 25mm and overall depth 200 mm. Calculate maximum shear stress in the beam and draw shear stress distribution diagram. **(20 Marks)**

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