CBCS SCHEME

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21ARC36

Third Semester B.Arch. Degree Examination, Dec.2025/Jan.2026
Building Structure – II

Time: 3 hrs. Max. Marks: 100

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

Module-1

1 a. Explain the following terms :
   i. Stress
   ii. Strain
   iii. Young's modulus
   iv. Factor of safety. **(10 Marks)**

b. Explain stress-strain curve for mild steel subjected to tensile load. **(10 Marks)**

OR

2 a. A steel rod of 2.5 cm diameter is subjected to forces as shown in Fig.Q2(a) find total elongation of the rod. Take E = 200 kN/mm^2.

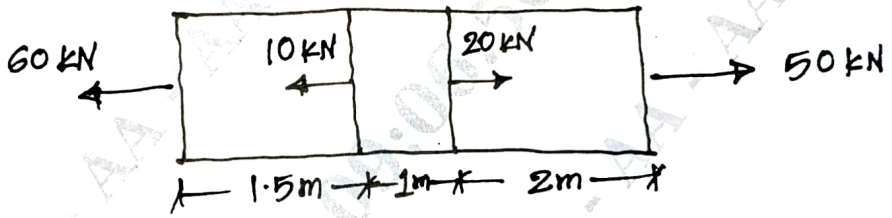

Fig.Q2(a) **(10 Marks)**

b. Find maximum and minimum stresses produced in the stepped bar shown in Fig.Q2(b), due to axially applied compressive load of 20 kN.

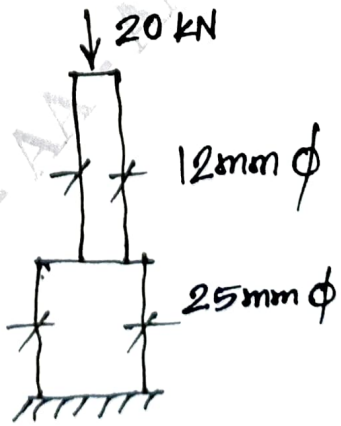

Fig.Q2(b) **(10 Marks)**

Module-2

3 a. Define the following :
i. Bulk modulus
ii. Rigidity modulus
iii. Poisson's ratio
iv. Temperature stresses. **(10 Marks)**

b. A copper rod of 20 mm in diameter is encased in a steel tube 25 mm internal diameter and 30 mm external diameter. Their ends are rigidly connected. The composite bar is 400 mm long and is subjected to an axial pull of 25 kN. If E = 215 kN/mm^2 and E_C = 110 kN/mm^2 calculate the stress induced in the rod and the tube. **(10 Marks)**

OR

4 a. A steel rod 6 m long is connected to two grills one at each end at a temperature of 40°C. Find the stresses developed when the temperature rises to 100°C.
i. If the ends do not yield
ii. If the ends yield by 1mm
iii. Elongation if it is free to expand. **(12 Marks)**

b. Explain the concept of temperature stresses on structural elements. **(08 Marks)**

Module-3

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

b. Calculate the safe compressive load on a hollow cast iron column (one end rigid and other hinge) of 15 cm external diameter, 10 cm internal diameter and 10 m in length. Use Euler's formula with a factor of safety 5 and E = 95 kN/mm^2. **(10 Marks)**

OR

6 a. Explain Euler's formula for long columns. What are the assumptions and limitations of Euler's theory for critical load on a long column? **(10 Marks)**

b. A solid round bar 3m long and 5 cm in diameter is used as a strut with both ends hinged. Determine the crippling load. Take E = 2 × 105 N/mm^2. Determine the crippling load if both ends of the strut are fixed. **(10 Marks)**

Module-4

7 a. A simply supported beam of 6m long is subjected to point load of 2 kN, 5 kN and 4 kN at distance 1.5 m, 3 m and 4.5 m from the left support respectively. Draw SFD and BMD for the beam. **(10 Marks)**

b. A simply supported beam of span 6 m is subjected to a concentrated load of 25 kN acting at a distance of 2 m from left support. The beam is also subjected to an udl of 10 kN/m over the entire span. Draw SFD and BMD indicating maximum and minimum values. **(10 Marks)**

OR

8 Draw BMD and SFD for overhanging beam shown in Fig.Q8.

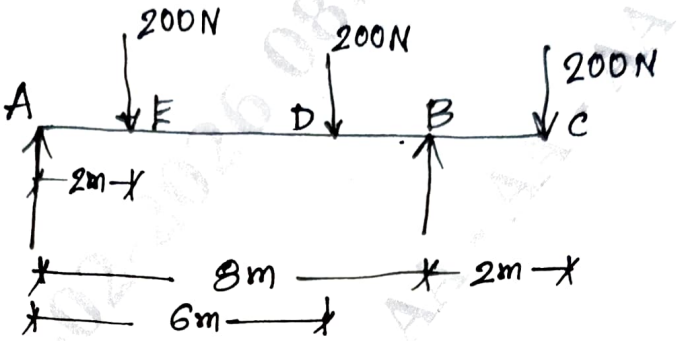

Fig.Q8 **(20 Marks)**

Module-5

9 a. Write expression for section modulus for the following :
   i. Rectangular section
   ii. Hollow rectangular
   iii. Circular
   iv. Hollow circular section. **(10 Marks)**

   b. A rectangular beam 300 mm deep is simply supported over a span of 4 m. What udl the beam may carry if the bending stress is not to exceed 120 N/mm^2. Take I = 8000 × 104 mm^4. **(10 Marks)**

OR

10 a. Write bending equation and what are the assumptions made in theory of simple bending. **(08 Marks)**

   b. A beam T-section flange – 100 × 20 mm and web – 80 × 20 mm is simply supported on a span of 8 m. The beam carries a udl of 1.5 kN/m length on the entire span. Determine the maximum tensile and maximum compressive stresses. **(12 Marks)**

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