CBCS SCHEME

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21ENG36/21ARC36

# Third Semester B.Arch. Degree Examination, Jan./Feb. 2023
## 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. Find the Young's modulus of a brass rod of diameter 25 mm and a length 250 mm which is subjected to a tensile load of 50 kN when the extension of the rod is equal to 0.3 mm. **(10 Marks)**

b. An axial pull of 35 kN is acting on a bar consisting of 3 lengths as shown in Fig. Q2 (b). If young's modulus = $2.1\times10^5$ N/mm$^2$. Determine : (i) Stresses in each section and (ii) Total extension of the bar.

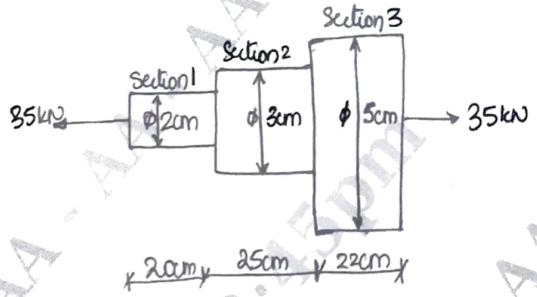


Fig. Q2 (b) **(10 Marks)**

### Module-2

3 a. Define the following : (i) Bulk modulus (ii) Rigidity modulus (iii) Modulus of Elasticity (iv) Temperature stress **(10 Marks)**

b. Determine the value of Young's modulus and Poisson's ratio of a metallic bar of length 30 cm, breadth 4 cm and depth 4 cm when the bar is subjected to an axial compressive load of 400 kN. The decrease in length is given as 0.075 cm and increase in breadth is 0.03 cm. **(10 Marks)**

**OR**

4 a. A steel rod of 3 cm diameter is enclosed centrally in a hollow copper tube of external diameter 5 cm and internal diameter of 4 cm. The composite bar is then subjected to an axial pull of 45 kN. If the length of each bar is equal to 15 cm. Determine the stress in the rod and tube and load carried by each bar. $E_s = 2.10\times10^5$ N/mm$^2$, $E_C = 1.1\times10^5$ N/mm$^2$. **(14 Marks)**

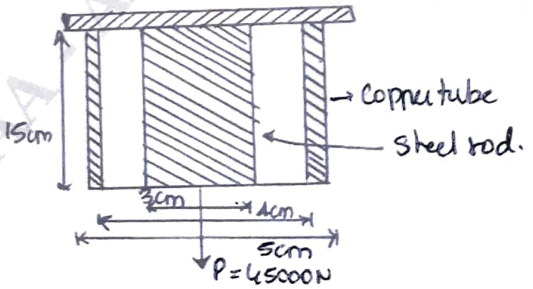


Fig. Q4 (a)

b. Explain the concept of temperature stresses on structural elements. **(06 Marks)**

## Module-3

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

b. Calculate the safe compressive load on a hollow cast iron column (one end rigidly fixed and other hinged) 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 3 m long and 5 cm in diameter is used as a strut with both ends hinged. Determine the crippling load. Take $E = 2\times10^5\ N/mm^2$. Determine the crippling load if both ends of the strut are fixed. **(10 Marks)**

## Module-4

7 a. Explain the following :

(i) Bending Moment Diagram (BMD).
(ii) Shear Force Diagram (SFD).
(iii) Sign convention followed to represent BMD and SFD.
(iv) Types of loads on beams **(10 Marks)**

b. A simply supported beam shown in the figure below carries two concentrated loads and a uniformly distributed load. Draw the SFD and the BMD. **(10 Marks)**

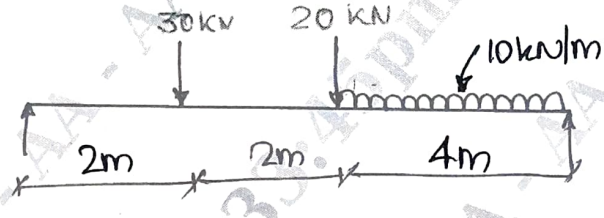


Fig. Q7 (b)

**OR**

8 Draw BMD and SFD for overhanging beam shown in the Fig. Q8. Clearly indicate the point of contraflexure. **(20 Marks)**

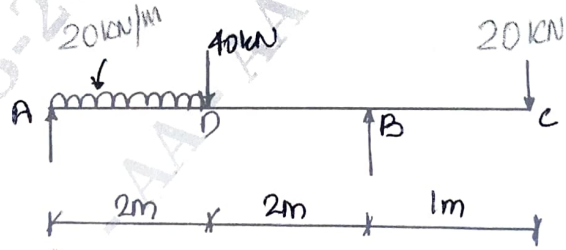


Fig. Q8

## Module-5

9 a. State the assumptions made in theory of simple bending. **(06 Marks)**

b. The Fig. Q9 (b) below shows the cross section of a beam which is supported to a shear force of 20 kN. Draw shear stress distribution across the depth showing values at salient points. **(14 Marks)**

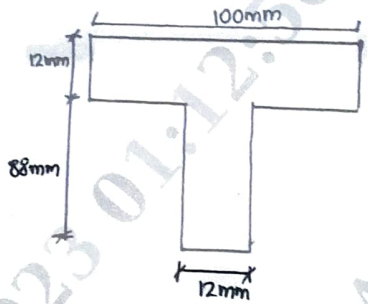


Fig. Q9 (b)

**OR**

10 a. Write the expression for section modulus for the following :

(i) Rectangular section.
(ii) Hollow rectangular
(iii) Circular section
(iv) Hollow circular section **(10 Marks)**

b. A simply supported beam of span 5 m has a cross section $150\text{mm} \times 250\text{mm}$. If the permissible stress is 10 $N/mm^2$. Find the maximum intensity of uniformly distributed load it can carry. **(10 Marks)**

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