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18ENG25

Second Semester B.Arch. Degree Examination, Feb./Mar.2022
Building Structures – II

Time: 3 hrs. Max. Marks: 100

Note: **1.** ***Answer any FIVE full questions, choosing ONE full question from each module.***
2. ***Follow written dimension, do not scale the drawing.***

Module-1

1 a. Explain briefly different types of stresses and strains. **(10 Marks)**

b. Find the total elongation in the bar and stresses induced in each portion of the bar. Refer Fig. Q1 (b). The Young's modulus of material is 2.0×10^5 N/mm^2. **(10 Marks)**

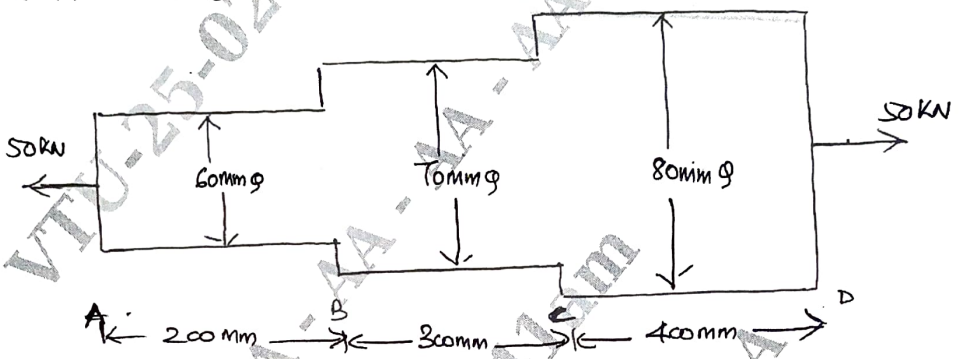


Fig. Q1 (b)

OR

2 a. With help of neat sketch, explain stress-strain curve of mild steel specimen. **(06 Marks)**

b. Find the total strain in the bar, when it is subjected to forces, as shown in Fig. Q2 (b). The cross sectional area throughout is 400 mm^2. Take E = 2.0×10^5 N/mm^2. Determine the stresses in each portion. **(09 Marks)**

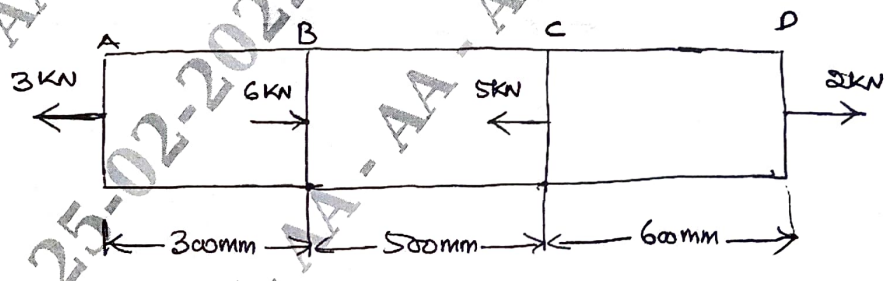


Fig. Q2 (b)

c. Explain briefly,
(i) Poisson's ratio (ii) Bulk modulus (iii) Volumetric strain. **(05 Marks)**

Module-2

3 Draw the shear force diagram and bending moment diagram for the beams shown in Fig. Q3 (a) and Fig. Q3 (b).

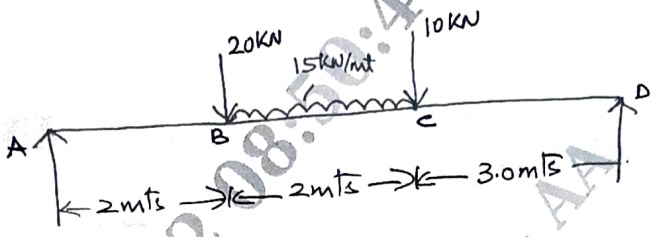


Fig. Q3 (a)

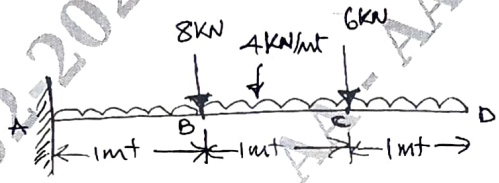


Fig. Q3 (b) **(20 Marks)**

OR

4 a. Obtain a relationship between LOAD, SHEAR FORCE and BENDING MOMENT. **(06 Marks)**

b. Draw the shear force diagram and bending moment diagram for the beam shown in Fig. Q4 (b).

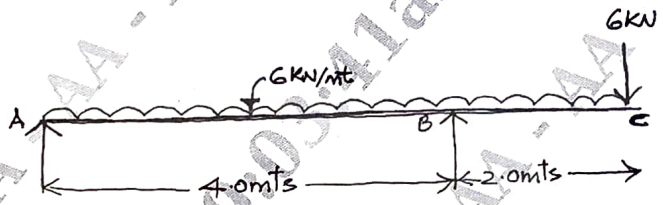


Fig. Q4 (b) **(14 Marks)**

Module-3

5 a. What are the assumptions made in "Theory of Pure Bending"? **(03 Marks)**

b. What is section modulus? Obtain an expression for section modulus for rectangle and circle. **(05 Marks)**

c. Determine the bending stresses across the cross section for the beam shown in Fig. Q5 (c).

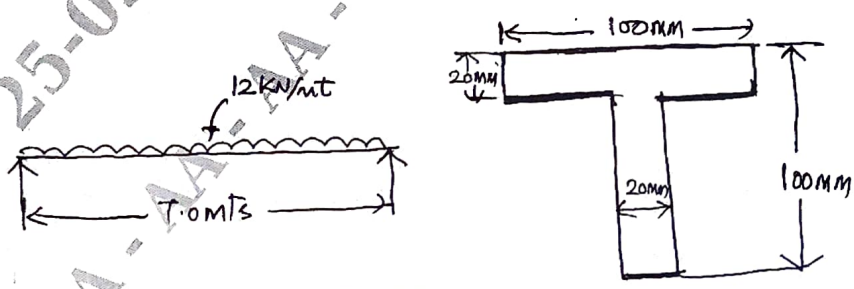


Fig. Q5 (c) **(12 Marks)**

OR

6 a. From the 1st principles, prove that max shear stress in a rectangular section is 1.5 average shear stress. **(10 Marks)**

b. Determine the shear stress variation across the cross section (Refer Fig. Q5 (c)) and sketch the shear stress variation. **(10 Marks)**

Module-4

7 a. Determine the buckling load for a strut in Fig. Q7 (a). The strut is 3 mts long and is hinged at both ends. Take E = 200 GN/mt^2. **(10 Marks)**

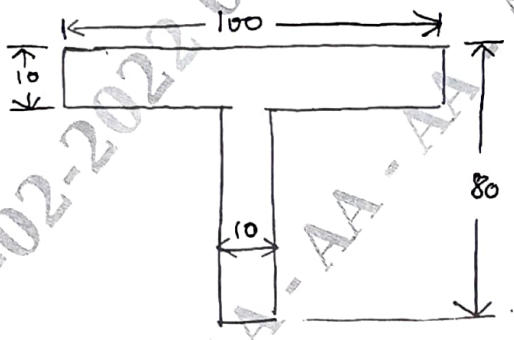


Fig. Q7 (a)

b. A hollow circular column is 3.5 mts long, both the ends of column are fixed. If E = 2.0×10^5 N/mm^2. Determine the safe load on the column, take factor of safety as 3.0. The outer diameter is 60 mm and thickness of the column is 5 mm. **(10 Marks)**

OR

8 a. Define Slenderness Ratio and Buckling load. **(04 Marks)**

b. Explain the limitations of Euler's theory. **(06 Marks)**

c. A built up I section has an overall depth of 400 mm width of flanges 300 mm, thickness of flanges 50 mm and web thickness 30 mm. It is used as a beam with simply supported ends and it deflects by 10 mm, when subjected to a load of 40 KN/mt lengths. Find the safe load if this I section is used as column with both ends hinged. Assume factor of safety = 1.75 and E = 2.0×10^5 N/mm^2. **(10 Marks)**

Module-5

9 a. Determine the maximum slope and maximum deflection for a Cantilever beam shown in Fig. Q9 (a) in terms of EI. **(10 Marks)**

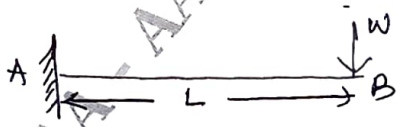
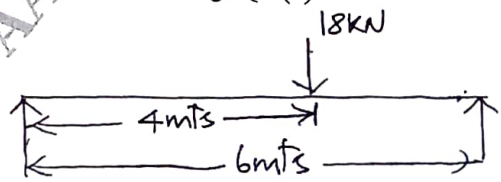


Fig. Q9 (a)

b. Determine the (i) Slope at mid point and (ii) Deflection under the load. E is 200 GPa, I = 15×10^6 mm^4 Refer Fig. Q9 (b)



Refer Fig. Q9 (b) **(10 Marks)**

OR

10 a. Determine the slope at supports and maximum deflection of the beam shown in Fig. Q10 (a) in terms of EI. **(10 Marks)**

Fig. Q10 (a)

b. Find the deflection at 'C' for the beam shown in Fig. Q10 (b). $EI = 1 \times 10^{13}$ N mm^2. **(10 Marks)**

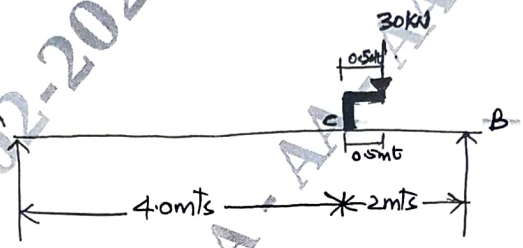


Fig. Q10 (b)

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