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09ENG2.5

Second Semester B. Arch. Degree Examination, June/July 2014
Structures – II

Time: 3 hrs. Max. Marks:100

Note: ***1. Answer any FIVE full questions.***
2. Missing data, if any, may be suitably assumed.

1 a. Define terms : i) Elastic limit ii) Yield stress iii) Factor of safety. **(06 Marks)**

b. A specimen of steel 200 mm gauge length is tested in tension. It has an extension of 0.16 mm under a load of 50 kN. The load at elastic limit is 70 kN. Maximum load is 120 kN. The total extension at the fracture is 60 mm and diameter at neck is 14 mm. Find, initial diameter of specimen is 20 mm
i) Stress at elastic limit ii) Young's modulus iii) Percentage elongation in length
iv) Percentage reduction in area v) Ultimate stress. **(14 Marks)**

2 a. Draw the typical stress – strain curve for mild steel and explain salient points. **(10 Marks)**

b. A bar shown in Fig. Q2(b) is subjected to an axial force of 50 kN. Calculate total elongation. Give, $E = 2 \times 10^5$ N/mm^2. Also, calculate stresses in all the three portions. **(10 Marks)**

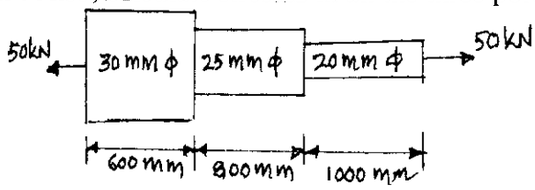

Fig. Q2(b)

3 a. Define the terms : i) Volumetric strain ii) Poisson's ratio iii) Shear modulus **(06 Marks)**

b. A 60 × 40 × 20 mm block carries axial loads as follows :
i) 100 kN tension acts on 40 × 20 mm face
ii) 150 kN compression acts on 60 × 40 mm face
iii) 120 kN tension acts on 60 × 20 mm face $\mu = 0.25$; $E = 2 \times 10^5$ N/mm^2
Calculate volumetric strain and change in volume. **(14 Marks)**

4 a. Derive the relationship between Young's modulus and bulk modulus. **(06 Marks)**

b. A bar 25 × 25 × 200 mm long is subjected to a pull of 60 kN in the direction of length. The extension of bar was found to be 0.1 mm, while the decrease in lateral dimension was found to be 0.003 mm. Find the Young's modulus, Poisson's ratio, modulus of rigidity and bulk modulus for the material of the bar. **(14 Marks)**

5 a. Define : i) Shear force ii) Bending moment iii) Point of contra-flexure. **(06 Marks)**

b. Draw SFD and BMD for the beam shown in Fig. Q5(b). Also locate the point of contra-flexure. **(14 Marks)**

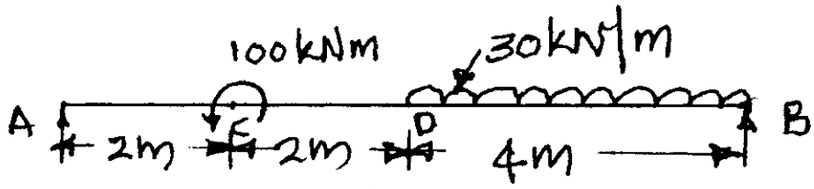

Fig. Q5(b)

6 a. Derive the relationship between load intensity w, shear force F and bending moment M. **(06 Marks)**

b. Draw SFD and BMD. Locate the point of contra-flexure (Fig. Q6(b)). **(14 Marks)**

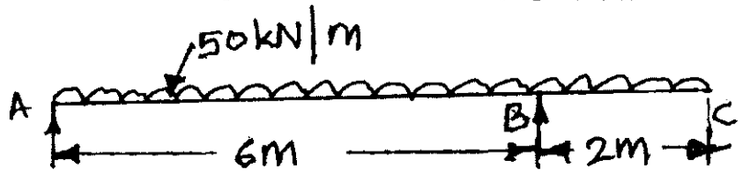

Fig. Q6(b)

7 a. Explain : i) Pure bending ii) Beams of uniform strength. **(06 Marks)**

b. A T-section as shown in Fig. Q7(b) is subjected to moment 20 kN m. Find the stress at the extreme fibres of cross section. Plot the bending stress diagram. **(14 Marks)**

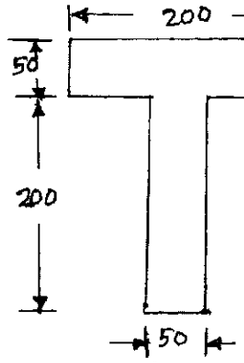

Fig. Q7(b)

8 a. Draw the shear stress distribution for a rectangle, T section and I section. **(06 Marks)**

b. The symmetrical I section of a beam subjected to shear force of 100 kN. Calculate shear stresses at the neutral axis and at the junction of a web and flange. Plot the shear stress diagram. **(14 Marks)**

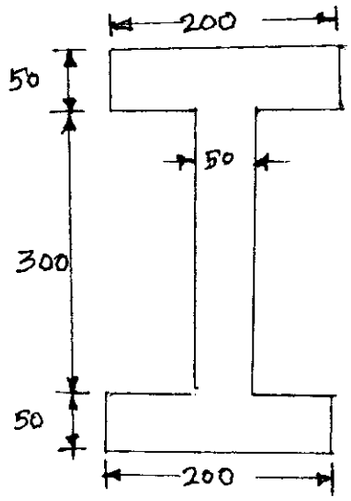

Fig. Q8(b)

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