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09ENG2.5

Second Semester B.Arch. Degree Examination, Dec.2014/Jan.2015
Structures – II

Time: 3 hrs. Max. Marks:100

Note: 1. ***Answer any FIVE full questions.***
2. ***Any missing data may suitably be assumed.***

1 a. Explain with neat sketch, stress strain diagram for a mild steel specimen and indicate the salient points. **(08 Marks)**

b. A steel rod 1500 mm long and diameter 20 mm is under an axial pull of 20 kN. If modulus of elasticity of the material is 2×10^5 N/mm^2, Determine
i) Stress ii) Strain iii) Elongation of the rod. **(12 Marks)**

2 a. Define : i) Hookes law and Modulus of rigidity.
ii) Modulus of elasticity and factor of safety.
iii) Longitudinal strain and lateral strain. **(06 Marks)**

b. An axial pull of 35 kN is acting on a bar is shown in Fig. Q2 (b) below. If Youngs modulus is 2.1×10^5 N/mm^2. Determine i) Stresses in each section ii) Total extension of the bar **(14 Marks)**

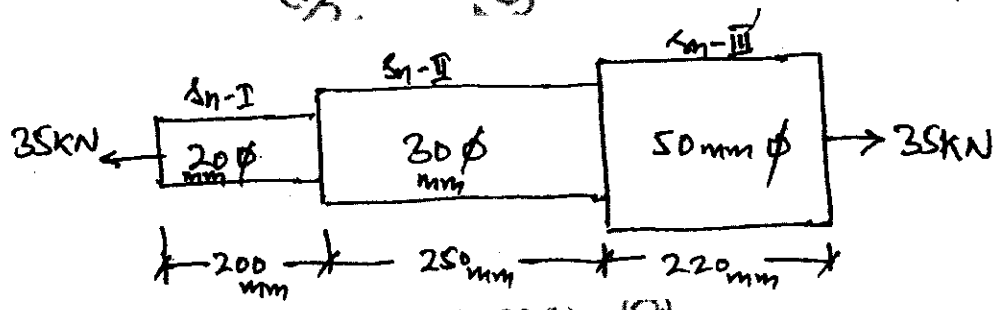

Fig. Q2 (b)

3 a. Define: i) Bulk modulus ii) Poisson's ratio
iii) Shear modulus iv) Volumetric strain **(08 Marks)**

b. A brass bar having cross sectional area of 1000 mm^2, is subjected to axial forces as shown in Fig. Q3 (b), find the total elongation of the bar $E = 1.05\times10^5$ N/mm^2 **(12 Marks)**

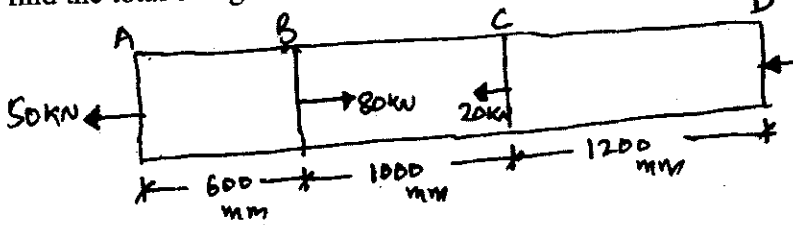

Fig. Q3 (b)

4 a. Show that $e_v = \frac{\delta L}{L}(1-2\mu)$ with usual notations. **(08 Marks)**

b. A bar of 30 mm dia is subjected to a pull of 60 kN. The measured extension is 0.1 mm over an length of 200 mm and change in dia is 0.004 mm. Calculate
i) Young's modulus ii) Poisson's ratio
iii) Bulk modulus iv) Modulus of rigidity **(12 Marks)**

5 a. Obtain the relationship between the intensity of load, shear force and bending moment. **(08 Marks)**

b. Draw SFD and BMD for the beam shown in Fig. Q5 (b). **(12 Marks)**

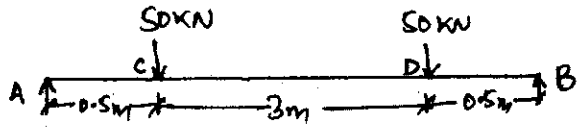

Fig. Q5 (b)

6 a. Define bending moment, shear force and point of contraflexure. **(06 Marks)**

b. Draw SFD and BMD for the beam shown in Fig. Q6 (b). **(14 Marks)**

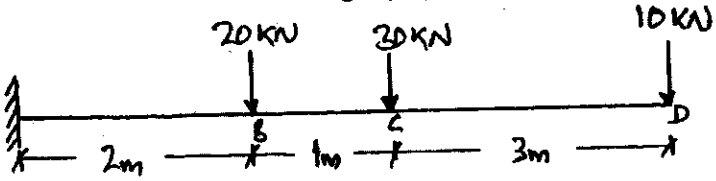

Fig. Q6 (b)

7 a. From First principles, derive an equation for bending as $\frac{M}{I} = \frac{F}{y} = \frac{E}{R}$. **(10 Marks)**

b. Draw shear stress distribution across the cross section for the section shown in Fig. Q7 (b). Take shear force = 100 kN. **(10 Marks)**

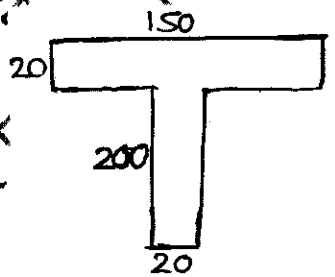

Fig. Q7 (b)

8 a. Enumerate the assumptions made in theory of simple bending. **(06 Marks)**

b. A beam is simply supported and carries a udl of 40 kN/m run over the total span. The beam is rectangular having a depth of 500 mm. If the maximum stress in the material of the beam is 120 N/mm^2 and moment of inertia of the section is 7×10^8 mm^4. Find the span of the beam. **(14 Marks)**

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