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09ENG2.5

Second Semester B. Arch Degree Examination, Dec. 2015/Jan. 2016

Structures – II

Time: 3 hrs. Max. Marks: 100

Note: ***Answer any FIVE full questions,***

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

b. The following data refer to a tension test conducted on mild steel bar.

i) Diameter of steel bar = 30mm
ii) Extension at a load of 100kN = 0.139mm
iii) Gauge length = 200mm
iv) Ultimate load = 360kN
v) Load @ elastic limit = 230kN
vi) Total extension = 56mm
vii) Diameter of the rod @ the failure = 22.25mm

Calculate i) Stress @ elastic limit ii) Young's modulus iii) % elongation
iv) % Decrease in area v) Ultimate stress **(12 Marks)**

2 a. Define the terms i) Young's modulus ii) Shear modulus
iii) Bulk modules iv) Poisson's ratio. **(10 Marks)**

b. A cube of side 60mm is subjected to a tensile force of 108kN in x-direction, and compressive forces of 36kN in other two directions.
Calculate the changes in dimensions of the cube and also change in volume of the cube, if $E = 1 \times 10^4$ N/mm^2 and $\mu = 0.4$ **(10 Marks)**

3 a. With usual notation show that $E = \dfrac{9KG}{3K+G}$ **(12 Marks)**

b. A 15mm diameter bar is subjected to pull of 10kN, reduction in diameter is 0.002 mm. Calculate value of Poisson's ratio and young's modulus if modulus of rigidity is 4GPa. **(08 Marks)**

4 a. A member ABCD is subjected to point loads P_1, P_2, P_3, P_4 as shown in Fig 4(a). Calculate the force P_3 necessary for equilibrium if P_1 = 120kN, P_2 = 220kN, P4 = 160kN. Determine also the change in length. Assume E = 200GPa. **(12 Marks)**

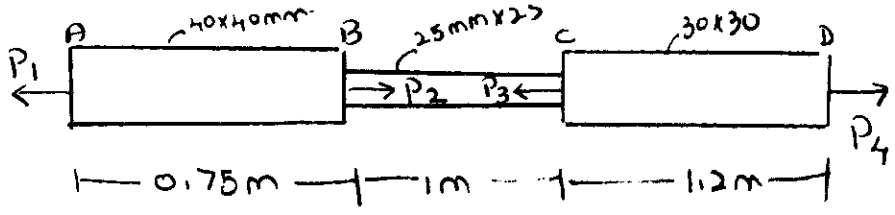

Fig.Q4(a)

b. Derive an equation for volumetric strain of rectangular section subjected to an axial force. **(08 Marks)**

5 a. Obtain a relationship between the intensity of load, shearing force and bending moment. **(06 Marks)**

b. Draw SFD and BMD for the beam shown in Fig. Q5(b) **(14 Marks)**

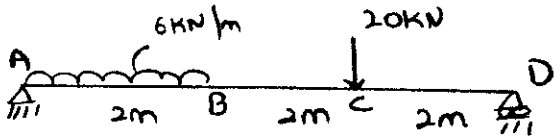

Fig.Q5(b)

6 a. Show that the maximum bending moment for a simply supported beam with UDL through out is $WL^2/8$ @ the mid span. **(10 Marks)**

b. Draw SFD and BMD for the beam shown in Fig. Q6(b). Indicate the salient points and locate point of contra flexure. **(10 Marks)**

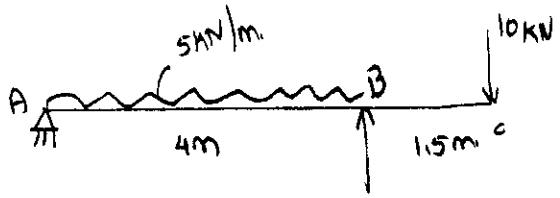

Fig. Q6(b)

7 a. Derive the expression $\frac{M}{I} = \frac{f}{y} = \frac{E}{R}$ with usual notation. **(10 Marks)**

b. A circular pipe of external diameter 70mm and thickness 8mm is used as simply supported beam over an effective span is 2.5m. Find the maximum concentrated load that can be applied @ the centre of the span if permissibly stress in tube is $150N/mm^2$ **(10 Marks)**

8 a. Derive the expression for shear stress in beams $q = \frac{F A \bar{Y}}{I b}$ **(10 Marks)**

b. The unsymmetrical I – section shown in Fig. Q8 (a) is subjected to shear force of 40kN. Draw shear stress variation across the depth

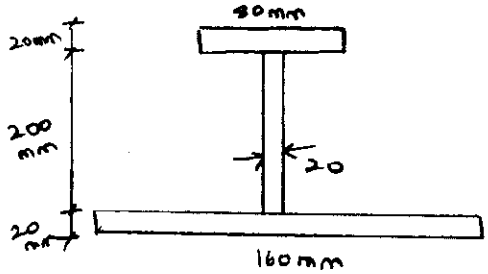

Fig. Q8(b)

(10 Marks)

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