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 $P_1 = 120$kN, $P_2 = 220$kN, $P_4 = 160$kN. Determine also the change in length. Assume E = 200GPa.   **(12 Marks)**
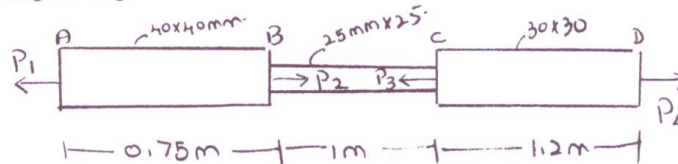

Fig.Q4(a)

  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)**
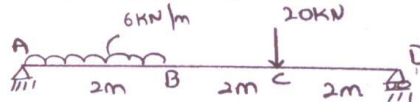

Fig.Q5(b)

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)**
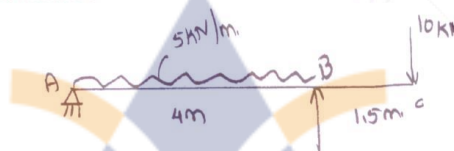

Fig. Q6(b)

7   a.   Derive the expression $\dfrac{M}{I} = \dfrac{f}{y} = \dfrac{E}{R}$ 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 $q = \dfrac{F\,A\overline{Y}}{I\,b}$ **(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
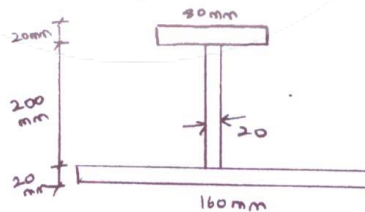

Fig. Q8(b)

(10 Marks)

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