No. of Printed Pages : 4

BAS-008

B.Tech. (AEROSPACE ENGINEERING) (BTAE)

Term-End Examination

00340

June, 2015

BAS-008 : STRENGTH OF MATERIALS

Time : 3 hours *Maximum Marks : 70*

Note : *Attempt any **seven** questions. All questions carry equal marks. Use of scientific calculator is permitted.*

1. (a) Draw the typical stress – strain diagram for mild steel indicating the salient points. *4*

(b) Determine the stresses in various segments of the circular bar shown in Figure 1. Also compute the total elongation of the bar. Take modulus of elasticity of the bar material as 195·0 GPa. *6*

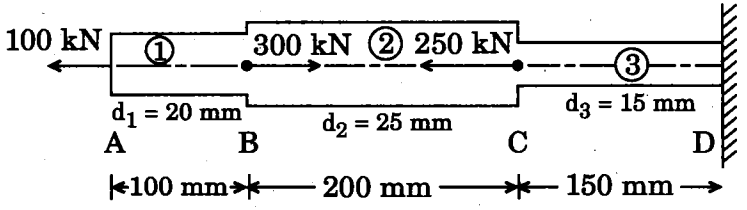


Figure 1

2. A tapering round bar, whose diameter is varying from d_1 to d_2, is subjected to axial load of P. If the length of the bar is L and Young's modulus of elasticity of the bar material is E, then prove that the total elongation of the bar is given by $\frac{4\,PL}{\pi\,E\,d_1 d_2}$. *10*

3. Determine the change in the volume of a steel bar of 25 mm diameter and 500 mm length, when subjected to a tensile stress of 200 MPa. Take E_s = 200 GPa and Poisson's ratio = 0·30. *10*

4. For the rectangular block of material subjected to stresses as shown in Figure 2, determine the direction of principal planes and magnitude of principal stresses. *10*

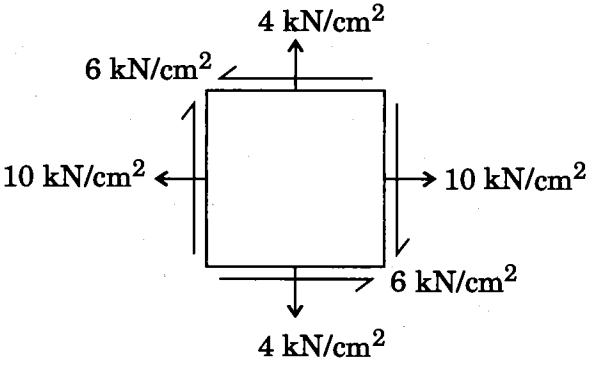


Figure 2

5. Draw the BMD and SFD for the simple beam shown in Figure 3. *10*

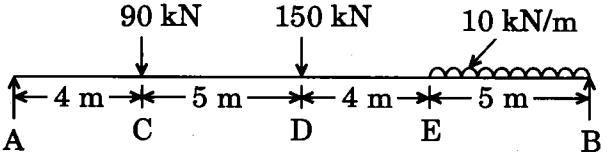


Figure 3

6. For a given stress determine the ratio of moment of resistance of a square beam placed with two sides horizontal and with a diagonal horizontal as shown in Figure 4. *10*

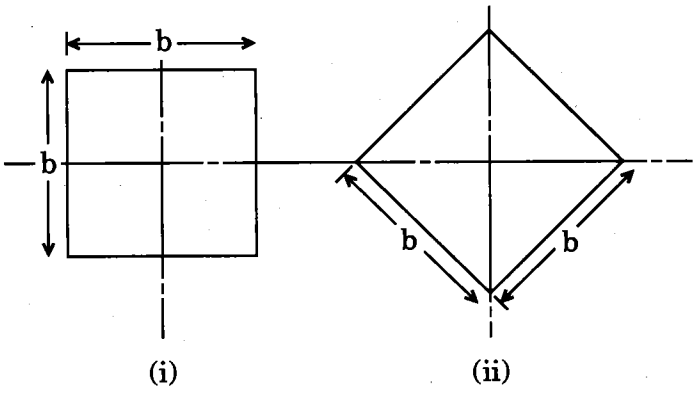


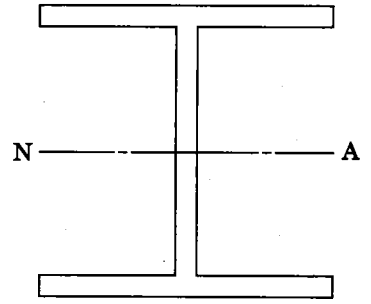
Figure 4

7. Determine and show the shear stress distribution over a rectangular beam section and prove that the maximum shear stress at Neutral Axis is 50% more than the mean shear stress. *10*

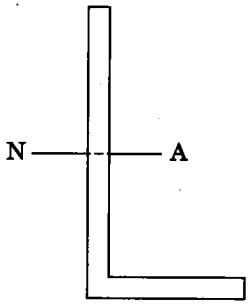
8. (a) Define the term strain energy due to normal stress and proof resilience. *4*

(b) A mild steel bar of diameter 30 mm and length 2·4 m is subjected to a tensile load of 90 kN. Find the strain energy stored in the bar, if the load is applied gradually. Also determine the modulus of resilience, if proportional limit = 220 MPa.
Take E = 200 GN/m^2. *6*

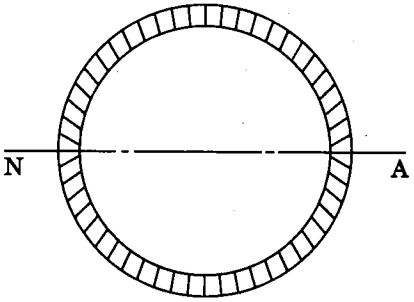
9. Draw the typical shear stress distribution for the following beam sections : $4 \times 2\frac{1}{2} = 10$



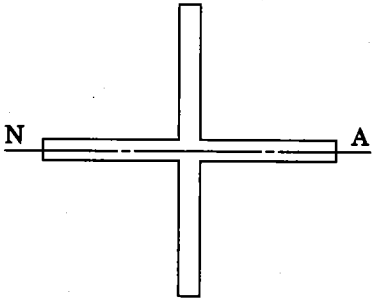
(a)



(b)



(c)



(d)

10. Define any ***four*** of the following terms : $4 \times 2\frac{1}{2} = 10$

(a) Bulk modulus
(b) Flitched beams
(c) State of pure shear
(d) Principal planes
(e) Section modulus
(f) Castigliano's first theorem