B. Tech Degree III Semester Examination, November 2007

CE/EE 303 STRENGTH OF MATERIALS

(2006 Admissions)

Time : 3 Hours | Maximum Marks : 100

PART – A

(Answer ***ALL*** Questions)

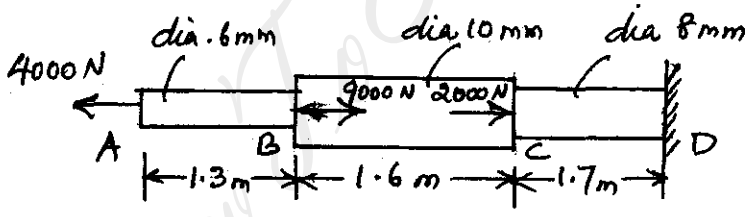
(8 x 5 = 40)

I. (a) Draw the stress strain diagram for mild steel and explain the salient points.
(b) Explain the terms (i) Creep (ii) Hokes Law (iii) Poisson's Ratio.
(c) Prove the relationship between modules of elasticity E and rigidity modules G.
(d) Explain the relation ship between shear force and bending moment.
(e) State the assumptions made in the theory of Simple Bending.
(f) Explain the terms Principal Planes and Principal Stresses.
(g) Determine the deflection at the force end of a cantilever supporting a concentrated load P at the free end.
(h) Explain the term effective length of columns. Also write the effective length factor for different end conditions.

PART – B

(4 x 15 = 60)

I. The bar ABCD shown in figure consists of three cylindrical steel segments each with a different cross sectional area. Axial load are applied as shown. Calculate the normal stress in each segment.

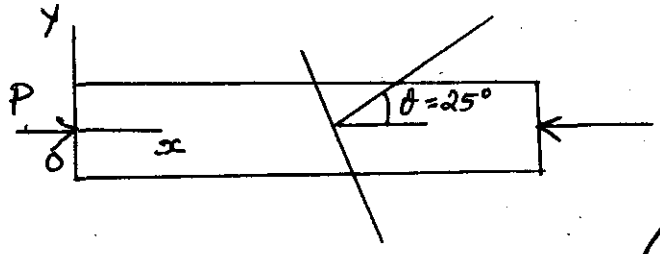


OR

II. A prismatic bar having cross sectional area A = 1200 mm^2 is compressed by an axial load P = 90 KN.

(i) Determine the stresses acting on an inclined section PQ cut through the bar at an angle $\theta = 25°$

(ii) Determine the complete state of stress for $\theta = 25°$ and show the stresses on a properly oriented stress element.

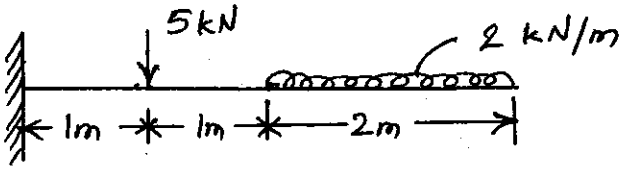


(Turn Over)

III. A solid shaft 125 mm in diameter transmits 120 KW at 160 rpm. Find the maximum shear stress induced in the shaft. Find also the angle of twist in a length of 7.5 m.
Take modulus of rigidity $G = 8 \times 10^4 N/mm^2$.

OR

IV. Draw the shear force and bending moments diagrams for the cantilever shown in figure.



V. A wooden beam AB supporting two concentrated loads P has a rectangular cross section of width b = 100 mm and height h = 150 mm. The distance from each end of beam to the nearest load a = 0.5 m. Determine the maximum permissible value P max of the loads if the allowable stress in bending σ allow = 11 Mþá (for both tension and compression) and the allowable stress in horizontal sheer $\tau allow = 1.2 M$þá.

OR

VI. At a certain point in a strained material the intensities of normal stresses on two planes at right angles to each other are 20 N/mm^2 and 10 N/mm^2, both tensile. They are accompanied by shear stress at 10/mm^2. Find the principal planes and principal stresses. Find also the maximum shear stress.

VII. A timber beam 100 mm wide and 250 mm deep is simply supported over a span of 4 m. Find the uniformity distributed load that can be applied on the beam over the whole span so that the deflection at the centre may not exceed 6 mm
Take $E = 1.12 \times 10^4 N/mm^2$.

OR

VIII. A mild steel tube 4 m long 30 mm internal diameter and 4 mm thick is used as a sturt with both ends hinged. Find the collapsing load. Take $E = 2.1 \times 10^5 N/mm^2$.

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