Code No. 2258

FACULTY OF ENGINEERING

B.E. 2/4 (Mech./Prod.) I-Semester(Main) Examination, November / December 2012

Subject : Mechanics of Materials

Time : 3 Hours **Max. Marks: 75**

Note: *Answer **all** questions of Part - A and answer any **five** questions from Part-B.*

PART – A (25 Marks)

1. Draw stress strain curve for Mild steel specimen indicating its salient features. (2)
2. Give relationship between Bulk Modulus and Modulus of Elasticity in terms of Poisson's ratio. (2)
3. What is point of contraflexure? (2)
4. Distinguish between Bending spring and Torsion spring. (2)
5. When will the Mohr circle be a point? State the condition of stress. (3)
6. Distinguish between thin and thick cylindrical shells. (3)
7. What do you mean by terms column and strut? Distinguish clearly between long column and short column. (2)
8. Sketch the shear stress distribution in a T-Section, I-Section. (3)
9. Calculate Torsional rigidity of a circular shaft of 120mm diameter, Take G= $8x10^4$N / mm^2. (3)
10. What is core of the section of a column and draw the core of Rectangular section? (3)

PART – B (5x10=50 Marks)

11. A copper rod 25 mm in diameter is encased in steel tube 30 mm internal diameter and 35 mm external diameter. The ends are rigidly attached. The composite bar is 500 mm long and is subjected to an axial pull of 60 kN. Find the stress induced in the rod and the tube. (10)
Take E_s=$2x10^5$N/mm^2, E_c=$1x10^5$N/mm^2

12.(a) A steel plate, 6m long, 150mm x 20mm cross section carries an axial tensile load of 30kN along its length through the centroid of its cross section. Calculate the change in length, width and thickness of the plate. Also find the increase in volume of the plate. Take E = 200 kN/mm^2 and $\frac{1}{m}$ = 0.3 (7)

(b)Using Euler's formula write the critical load values for the column having the following end conditions. (3)
(i) both ends hinged (ii) both ends fixed (iii) one end fixed, other end free

13. Sketch the SFD and BMD for the beam loaded as shown in figure (1) (10)

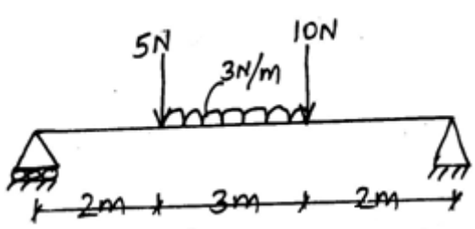

Fig. 1

14.(a) Derive the general equation of simple Bending. (6)
(b) Calculate the slope and max deflection for a cantilever beam of length 'l' subjected to point load 'w' at the free end. Use double integration method. (4)

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15.(a) Write down the limitations of Macaulay's method. (4)

(b) A Hallow circular shaft of 6m length with inner and outer diameter as 75 mm and 100 mm respectively is subjected to a Torque of 10kN-M. If G = 80GPa. Determine the maximum shear stress produced and the total angle of twist. (6)

16. A Beam of T section shown in figure 2 is subjected to a shear force of 30 kN. Find the maximum shear stress and draw the shear stress distribution diagram. (10)

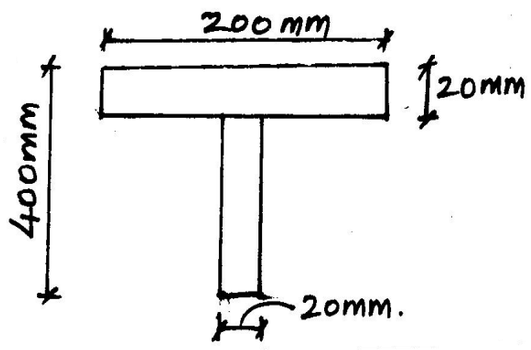

Fig. 2

17. A compound cylinder is composed of a tube of 250 mm internal diameter and 25 mm wall thickness. It is shrunk onto a tube of 200 mm internal diameter. The radial pressure at the junction is 8N/mm^2. Find the variation of hoop stress across the wall of the compound cylinder, if it is under an internal fluid pressure of 60N/mm^2. The wall thickness for inner tube is 25mm. (10)

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