Register Number | | | | | | | |

SATHYABAMA UNIVERSITY

(Established under section 3 of UGC Act,1956)

Course & Branch :B.E - CIVIL
Title of the Paper :Mechanics of Solids – I Max. Marks :80
Sub. Code :6C0081 Time : 3 Hours
Date :12/11/2009 Session :FN

PART - A (10 x 2 = 20)

Answer ALL the Questions

1. Write the relationship between E, K and C.
2. What is thermal stress, and give the formula.
3. What is point of contra flexure?
4. Give the relationship between BM and SF for simply supported beam.
5. Write the formula for M.I (a) Hollow Rectangular section and (b) hollow circular section.
6. Find the extreme intensities of stresses for short column of hollow cyclindrical section 25 cm outside and 15 cm inside diameter carrying vertical load of 400 kN with eccentricity of 10 cm away from the axis of the column.
7. Write the formula for power transmitter by the shaft.
8. Write the formula for deflection in closed coiled spring and open coiled spring.
9. Define proof resilience.
10. Give the advantages of method of joints and method of sections.

PART – B (5 x 12 = 60)

Answer All the Questions

11. (a) Diameter of bar = 300 mm
Textile load p = 50 kn
Gauge length 1 = 300 mm
Extension of bar ($\delta 1$) = 0.12 mm
Change in diameter (δd) = 0.0366 mm
Calculate (i) Poisson's ratio, (ii) The values of 3 moduli.

(b) A C.I flat 300mm long and of 30 mm x 50 mm uniform section, is acted upon by the following forces uniformly distributed over the respective cross-section.

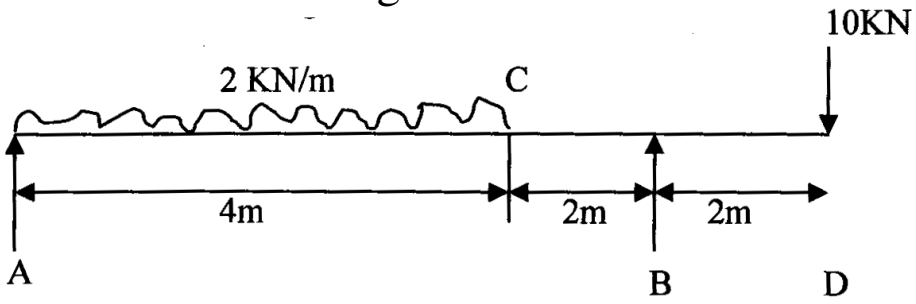
25kn in direct length (tensile)
350kn in direction of width (compression)
200kn in direction of thickness (tensile)
Determine the change in volume of the flat.

(or)

12. (a) A copper rod of 40mm diameter surrounded highly by a last iron tube of 80 mm external diameter, the ends being firmly fastened together. When put of a compression load of 30 KN. What load is shared by each material and also determine the bar shortened. (8)

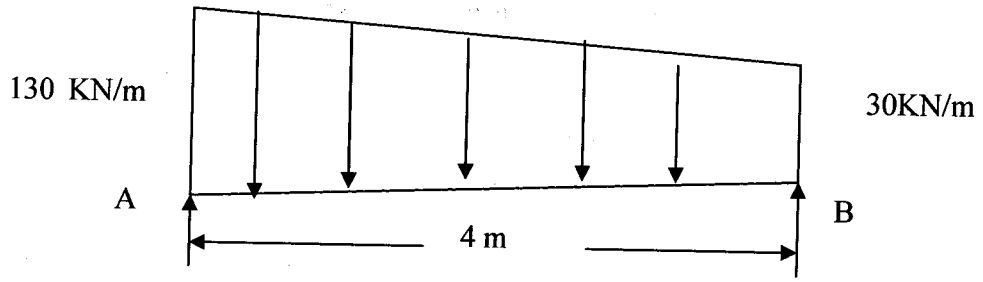
(b) Derive the formula for stress and elongation produced in bar due to its self-weight. (4)

13. Draw the S.F and B.M diagram for a beam.

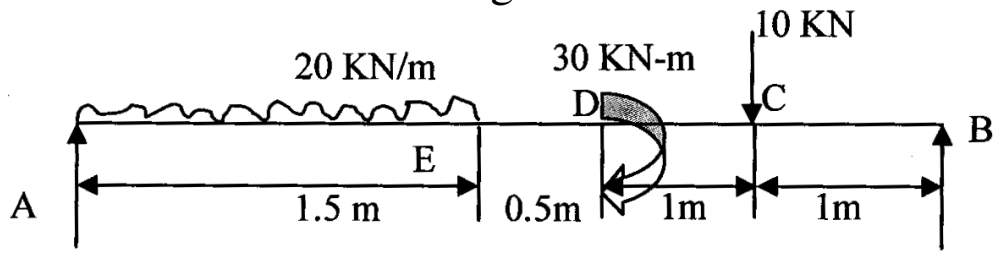


(or)

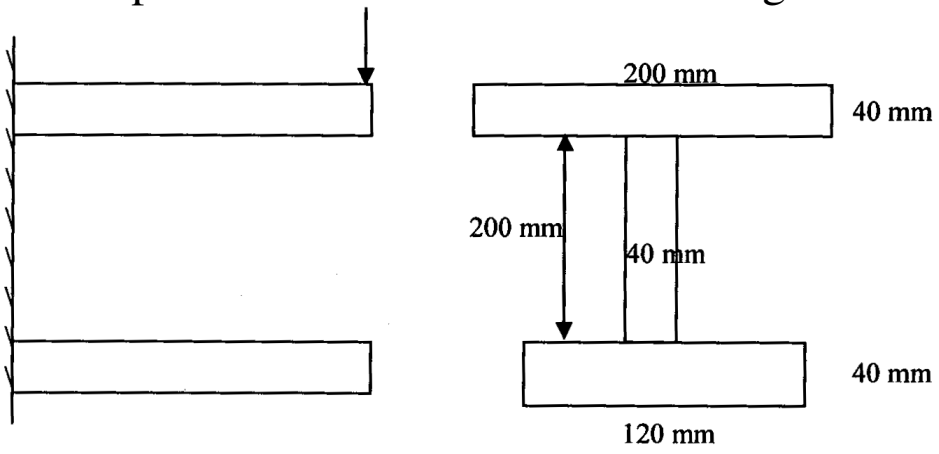
14. (a) Draw the S.F and B.M diagrams and find the maximum B.M.



(b) Draw the S.F and B.M diagrams and find the maximum B.M



15. (a) Find the position of N.A and M.I about the Neutral axis from the figure shown in below. Determine the maximum bending moment that should be imposed on this section if the tensile stress in the top flange is not to exceed $40MN/m^2$. What is the value of compressive stress in the bottom flange?



(b) A cast iron water main 12m long, 500mm inside diameter and 25mm wall thickness runs full of water and is supported at its ends. Calculate the maximum stress in the metal if density of cast iron is 7200 kg/m^3 and that of water is 1000 kg/m^3.

(or)

16. A long rectangular wall 2.5 m wide. If the maximum wind pressure on the face of the wall is 1.1 KN/m^2, find the maximum height of the wall, so that there is no tension in the base of the wall. The specific weight of the masonry 22 KN/m^2

17. (a) A closed coiled spring as mean diameter 75 mm and spring constant of 90 KN-m. It has 8 coils. What is the suitable diameter of the spring wire if the maximum shear stress is not to exceed 250 MN/m^2 and modulus of rigidity of the spring is 80 GN. Find the maximum axial load.

(b) A opened coiled helical spring diameter 12 mm, mean coil radius 84 mm, helix angle 20° carries an axial load of 480 N. Determine the shear stress and direct stress developed at the inner radius of coil.

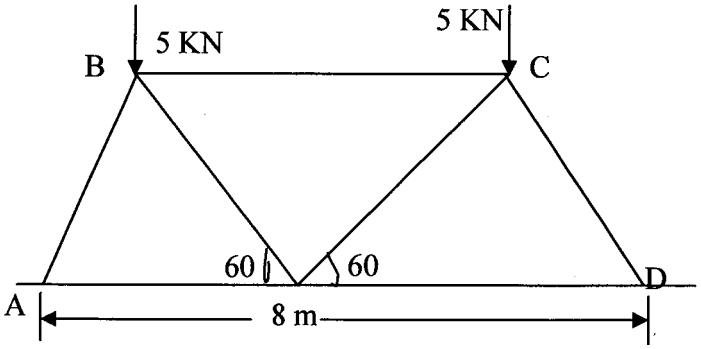
(or)

18. A hallow shaft is to transmit power of 300 kW at 8 RPM, if the shear stress is not to exceed 60 MN/m^2. The internal diameter is 0.6 times to external diameter. Find the internal and external diameter, assuming the maximum torque 1.4 times the mean.

19. Derive the formula for strain energy stored in beam due to (a) BM (b) Shear stress and (c) Torsion.

(or)

20.



Analyze the frame by method of joints and method of sections.