Code : R7210304

R7

II B.Tech. I Semester(R07) Supplementary Examinations, May/June 2010
MECHANICS OF SOLIDS
(Mechanical Engineering)

Time: 3 hours **Max Marks: 80**

(Answer any FIVE Questions)
All questions carry equal marks

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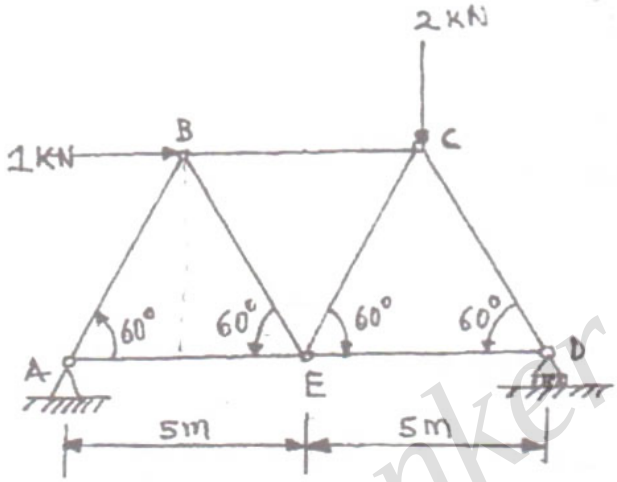
1. Determine the forces acting in all the members of the frame shown below indicate the nature of forces also. (Tension as +ve and compression as -ve)



2. A beam 4m long simply supported at the ends carries loads of 20 KN each at a distance of 1m from each end. Determine the slope at the ends and the maximum deflection. E = 200KN/ mm^2 I = 5000 Cm^2.

3. A cantilever 3m long has moment of inertia 800 Cm^4 for 1m length from the free end, 1600 Cm^4 for the next 1m length 2400 Cm^4 for the last 1m. length. At the free end a load of 1 KN acts on the cantilever. Determine the slope and deflections at the free end of the cantilever E= 210 GN/ m^2

4. A thin cylindrical shell of 0.6 meter diameter and 0.9 meter long is subjected to an internal pressure 1.2 N/mm^2. Thickness of cylinder wall is 15 mm. Determine
   (a) longitudinal stress, circumferential stress and maximum shear stress induced and
   (b) Change in diameter, length and volume. Take E = 200 Gpa and 1/m = 0.3

5. A thin spherical shell 500 mm diameter, 2.5 mm thick is full of water at atmospheric pressure. Find the internal pressure developed in the vessel if 40 X 10^3 mm^3 of water at atmospheric pressure is pumped into it. Calculate the resulting hoop stress and the change in volume of the shell if E = 200 Gpa, Poission's ratio = 0.25 and bulk modulus of water = 2360 N/mm^2.

6. Show that a thin walled spherical vessel of diameter d and thickness t is subjected to an internal pressure p, the increase in volume is equal to πpd^4 / 8 t E (1-ν).

7. Derive a formula for the difference of radii for shrinkage of a compound thick cylindrical shell.

8. A compound cylinder is formed by shrinking one steel tube onto another, the final dimensions being, internal diameter 180 mm, external diameter 360 mm, common diameter 300 mm. If the radial pressure at the junction is 25 N/mm^2, calculate the maximum and minimum hoop stresses in the two tubes. Also calculate the initial difference in diameters of the common surface. E for steel = 200 GPa.

   If the compound cylinder is subjected to an internal pressure of 50 N/mm^2, calculate the final hoop stresses in the two tubes. z

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