Code: R7210103

R07

II B.Tech I Semester (R07) Supplementary May 2012 Examinations
STRENGTH OF MATERIALS - I
(Civil Engineering)

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

Answer any FIVE questions
All questions carry equal marks

*****

1. Sketch the stress-strain diagram for a brittle material marking the salient points on it. How is this curve different from that of a ductile material? Explain the procedure of obtaining the yield stress of materials not having a well defined yield point.

2. A vertical bar 4 metre long and of 2000 mm^2 cross-sectional area is fixed at the upper ends and has a collar at the lower end. Determine the maximum stress induced when a weight of:
   (a) 3000 N falls through a height of 20 cm on the collar. (b) 30 kN falls through a height of 2 cm on the collar. Take E=2.0 $x10^5$ N/mm^2.

3. Draw the shear force and B.M diagrams for a simply supported beam of length 9 m and carrying a uniformly distributed load of 15 kN/m for a distance of 4 m as shown in figure 3.

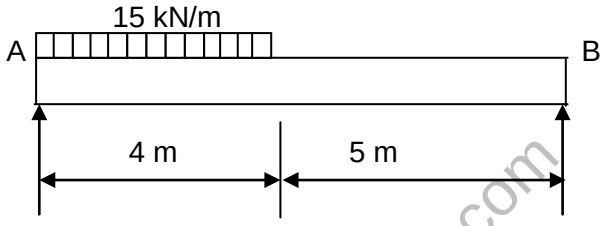

Figure 3

4. A beam is simply supported and carries a uniformly distributed load of 40 kN/m run over the whole span. The section of the beam is rectangular having depth as 500 mm. If the maximum stress in the material of the beam is 120 N/mm^2 and moment of inertia of the section is $7x10^8$ mm^4, find the span of the beam.

5. A 12 cm by 5 cm I-section is subjected to a shearing force of 10 kN. Calculate the shear stress at the neutral axis and at the top of the web. What percentage of shearing force is carried by the web? Given I=220 x $10^4 mm^4$, area = 9.4 x 10^2 mm^2,web thickness = 3.5 mm and flange thickness = 5.5 mm.

6. A cantilever 15 cm wide and 20 cm, deep projects 1.5 m out of wall and is carrying a point load of 20 kN at the free end. Fine the slope and deflection of the cantilever at the free end using moment area method. Take E=210 GN/m^2.

7. A cylindrical thin drum 80 cm in diameter and 3 m long has a shell thickness of 1 cm. If the drum is subjected to an internal pressure of 2.5 N/mm^2, determine
   (a) Change in diameter. (b) Change in length and (c) Change in volume.
   Take E=2 x 10^5 N/mm^2, Poisson's ratio = 0.25.

8. A compound cylinder is formed by shrinking a tube of external diameter 300 mm over another tube of internal diameter 150 mm. After shrinking, the diameter at the junction of the tubes is found to be 250 mm and radial compression as 28 N/mm^2. Find the original difference in radii at the junction. Take E for the cylinder metal as 200 GPa.

*****