Code No: R7210103 **R7**

II B.Tech I Semester(R07) Supplementary Examinations, May/June 2010
STRENGTH OF MATERIALS-I
(Civil Engineering)

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

Answer any FIVE Questions
All Questions carry equal marks

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1. A load of 2 MN is applied on a short concrete column 500 mm × 500 mm. The column is reinforced with four steel bars of 10 mm diameter, one in each corner. Find the stresses in the concrete and steel bars. Take E for steel as 2.1×10^5 N/mm^2 and for concrete as 1.4×10^5 N/mm^2. [16]

2. A steel rod is 2 m long and 50 mm in diameter. An axial pull of 100 kN is suddenly applied to the rod. Calculate the instantaneous stress induced and also the instantaneous elongation produced in the rod. Take E = 200 GN/m^2. [16]

3. A cantilever of length 2.0 m carries a uniformly distributed load of 1 kN/m run over a length of 1.5 m from the free end. Draw the shear force and bending moment diagrams for the cantilever. [16]

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 7×10^8 mm^4, find the span of the beam. [16]

5. A circular beam of 100.5 mm diameter is subjected to a shear force of 10 kN. Calculate the value of maximum shear stress, and sketch the variation of the shear stress along the depth of the beam. [16]

6. A simply supported beam of circular cross-section is 5 m long and is of 150 mm diameter. What will be the maximum value of the central load if the deflection of the beam does not exceed 12.45 mm. Also calculate the slope at the supports.
Take E = 2×10^8 kN/m^2. [16]

7. A thin cylindrical shell with following dimensions is filled with a liquid at atmospheric pressure: Length = 1.2 m, external diameter = 20 cm, thickness of metal = 8 mm. Find the value of the pressure exerted by the liquid on the walls of the cylinder and the hoop stress induced if an additional volume of 25 cm^3 of liquid is pumped into the cylinder Take E = 2.1×10^5 N/mm^2 and 1/m= 0.33. [16]

8. A steel tube 240 mm external diameter is to be shrunk on another steel tube of 80 mm internal diameter. After shrinking, the diameter at the junction is 160 mm. Before shrinking on, the difference of diameter at the junction was 0.08 mm. Calculate the radial pressure at the junction and hoop stress developed in the two tubes after shrinking on Take E = 2×10^5 N/mm^2. [16]

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