Code No: NR210102 **NR**

II B.Tech I Semester Supplementary Examinations, May 2005
STRENGTH OF MATERIALS-I
(Civil Engineering)

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

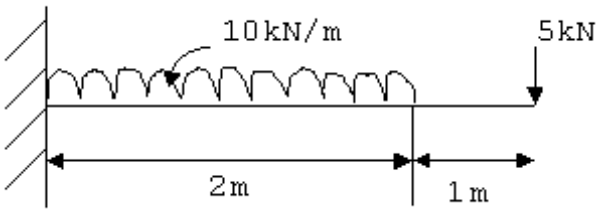
Answer any FIVE Questions
All Questions carry equal marks

⋆ ⋆ ⋆ ⋆ ⋆

1. A rigid platform rests on two aluminium bars each of C.S.A. 50 sq. mm and length 250 mm. In the middle there is another steel bar of same length but different C.S.A. of 100 sq. mm. If a load of 100 kN is placed on the platform, calculate the stresses induced in each bar and the reduction in their lengths, if E_S = 200 GPa and Ea = 100 GPa.

2. Two rods of same length and same material are subjected to the same axial load. The first rod is of uniform dia. D. The second bar has a dia. D for 1/3 of its length and 2D for the remaining length. Compare the strain energies of the two bars.

3. Construct the S. F. D. and B. M. D. for the cantilever beam shown and identify the maximum values for each.



4. For triangular section (b x h) subjected to a S.F. (F), obtain the shear stress distribution. Mark the salient values.

5. Explain the analysis of trusses by:
   (a) Method of joints
   (b) Method of sections
   (c) Tension coefficient method.

6. A Cantilever of length L carries a uniformly distributed load of w per unit run over the whole length. If the free end be supported over a rigid prop, find the reaction of the prop and sketch S.F and B.M diagrams. Find also the maximum deflection.

7. Determine the safe load and the efficiency of a double cover butt Joint. The main plates are 14mm thick connected by 18mm diameter rivets at a pitch of 100mm. Design the cover plates also. What is the percentage reduction in the efficiency of the Joint if the plates are lap Jointed.

8. (a) A steel cylinder 240mm internal diameter is to withstand an internal pressure of 5N/mm^2. The increase in area of the bore due to the resulting radial expansion is limited to 0.1% of the nominal area. Calculate the necessary thickness of the cylinder and the circumferential stress induced in the section. Take E = $2X10^5 N/mm^2, \mu = 0.3$.

   (b) A long boiler tube has to withstand an internal pressure of 6N/mm^2. The internal diameter of the tube is 60 mm. Determine the thickness and mass/m of the tube if the circumferential stress is not to exceed 130 N/mm^2. Mass density of steel is 7850 kg/m^3.

⋆ ⋆ ⋆ ⋆ ⋆