Roll No. ..... Total No. of Pages : 02

Total No. of Questions : 09

B.Tech.(CE) (Sem.–4)

STRUCTURAL ANALYSIS-I

Subject Code : CE-208

Paper ID : [A0609]

Time : 3 Hrs. Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. SECTION-A is COMPULSORY.
2. Attempt any FOUR questions from SECTION-B.
3. Attempt any TWO questions from SECTION-C.

SECTION-A (10 × 2 = 20 Marks)

1. Attempt all Parts :
   a) What is thin cylinder?
   b) What are rolling loads?
   c) Define absolute maximum bending moment.
   d) Define the focal length.
   e) Construct influence lines for reaction at left support A, shear and BM at section X of a simple beam.
   f) Define an arch. How an arch differs from a beam?
   g) State Eddy's theorem and prove it.
   h) Derive an expression for the change in a suspension cable due to temperature stress.
   i) Why is the determination of deflection important?
   j) What is a perfect frame?

SECTION-B (4 × 5 = 20 Marks)

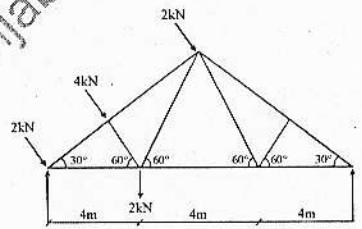
2. A thin cylinder of 100mm internal diameter and wall thickness 2mm has its ends closed by rigid plates and is then filled with water. When an external pull of 20kN is applied to the ends, the water pressure, read by the gauge, is observed to fall by 0.075 n/mm². Neglecting any end effects due to plates, determine the value of Poisson's ratio for the metal. Take E for the metal = 2.1×10^3 N/mm² and bulk modulus of water = 2.17×10^3 N/mm².

3. A suspension cable is suspended from two piers 200 m center to center one support being 5m above the other. The cable carries a uniformly distributed load of 15N/m and has its lowest point 10m below the lower support. The ends of the cable are attached to saddles on rollers at top of piers. The backstays which may be assumed straight are inclined at 60° to the vertical. Determine
   a) the maximum tension of the cable
   b) the tension in the back stays.

4. A masonry dam 6m high, 1.5m wide at the top 4.5m wide at the base has its water face vertical and retains water upto 5m. Calculate the maximum and minimum stress intensities at the base. The density of the masonry is 26 kN/m³ and that of water is 10kN/m³.

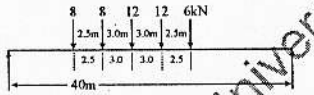
5. A beam of length 'L' is simply supported at its ends and carries point load of 'W' at the centre. The moment of inertia of the beam is 'I' for the left half and '2I' for the right half. Using conjugate beam method calculate slope at each end and at the centre. Also calculate the deflection at the centre.

6. A plane truss is loaded and supported as shown in Fig. Determine the nature and magnitude of the forces in the members.

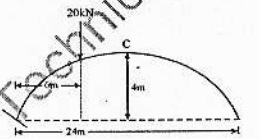


SECTION-C (2 × 10 = 20 Marks)

7. The system of concentrated loads shown in Figure below rolls from left to right across a beam simply supported a span 40m, the 6kN load leading. For a section 15m from the left hand support, determine
   a) The maximum bending moment
   b) The maximum shearing force.



8. From ab initio find the horizontal thurst for the two hinged parabolic arch shown in Fig. The moment of inertia at any section is I_c sec θ is the slope at section at I_c is moment of inertia at the crown. Neglect the effect of rib shortening.



9. Draw the influence lines for the bar forces in members U_1L_1, U_1L_2, U_1U_2, L_2L_3, and U_2L_2 of the pratt truss shown in Fig.