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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 consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students has to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students has to attempt any TWO questions.

SECTION-A

1. Write briefly :

   a. When is the longitudinal stress in thin cylinders 'zero'?

   b. What are the boundary conditions in case of simply supported beam for determining deflection?

   c. Define absolute maximum shear force.

   d. List the components of a suspension bridge.

   e. State and prove Cable Theorem.

   f. Construct influence lines for reaction at left support A, shear and BM at section X of a simple beam.

   g. Define an Arch. How an arch differ from a beam?

   h. State the Eddy's theorem, for which purpose this is used?.

   i. Derive an expression for the change in a suspension cable due to temperature stress.

   j. Distinguish between "*bending moment at a section*" and "*influence line for bending moment at a section*".

SECTION-B

2. A thin cylinder of 900mm length 150mm internal diameter and wall thickness of 5mm steel plates. It is subjected to an internal pressure of $7N/mm^2$. The increase in volume due to internal pressure is 16000 mm^3. Determine the value of Poisson's ratio and modulus of rigidity for the metal. Take E for the metal = 2.1×10^5 N/mm^2

3. A suspension cable is suspended from two piers 180 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 :

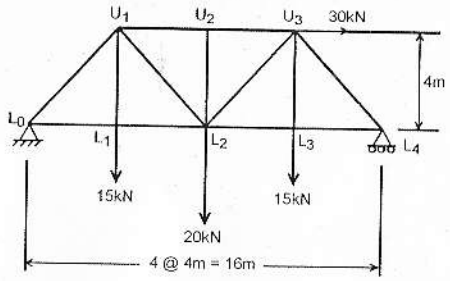
   a. The maximum tension of the cable

   b. The tension in the back stays

4. A masonry dam 10m high, 2m wide at the top 5m wide at the base has its water face vertical. Calculate the height upto which water may be stored without causing any tension at the base. Also calculate the width at base required if the dam is completely filled with water. The density of the masonry is 26 kN/m^3 and that of water is $10kN/m^3$.

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 '3I' 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. Find the forces in the member U_1U_2 and L_1L_2 of the roof truss shown in fig.



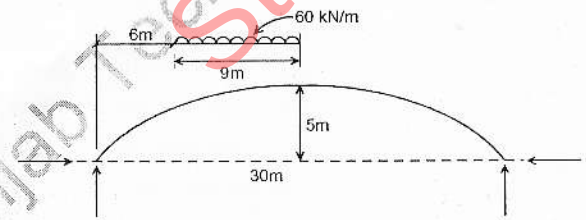
SECTION-C

7. The system of concentrated loads shown in Fig rolls from left to right across a beam simply supported a span 45m, the 4kN load leading. For a section 15m from the left hand support, determine

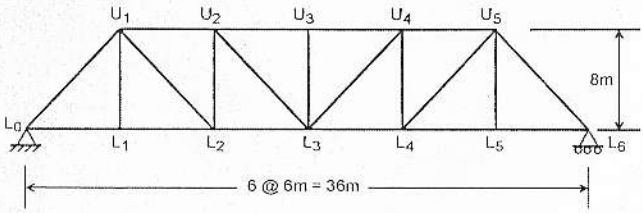
   a. The maximum bending moment

   b. The maximum shearing force.

8. From ab initio find the horizontal thrust for the two-hinged parabolic arch shown in Fig. The moment of inertia at any section is $I_c \sec\theta$ is the slope at section at I_c is moment of inertia at the crown. Neglect the effect of rib shortening. Determine the position and magnitude of maximum bending moment.



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 truss shown in Fig.



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