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ET-502(B)

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B.Tech. Civil (Construction Management) / B.Tech. Civil (Water Resources Engineering)

Term-End Examination

December, 2010

ET-502(B) : STRUCTURAL ANALYSIS

Time : 3 hours *Maximum Marks : 70*

Note : *Attempt any five questions. All questions carry equal marks. Use of calculator is permitted. Assume any missing data, if required and state that clearly in your answer.*

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1. For the beam with an internal hinge, as shown in figure 1, plot the influence lines for reaction at A(R_A), reaction at B (R_B), bending moment at B(M_B), shear force at D (F_D) and bending, moment at D (M_D). Section D is at a distance x from C, as shown, in the figure. **14**

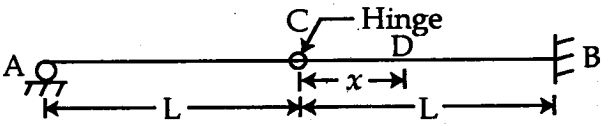


Figure - 1

2. Determine the vertical displacement and slope at free end B of a cantilever beam, carrying a udl 'w' per unit length over the half span, as shown in figure 2. **14**

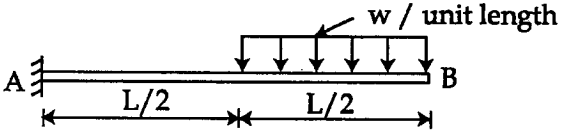


Figure - 2

3. A symmetrical three - hinged parabolic arch has a span of 24 m and central rise of 6 m. It carries a concentrated load of 60 kN at the left quarter - point. Determine the horizontal thrust in the arch and the maximum bending moment. **14**

4. Analyze the continuous beam, shown in figure 3, by the slope deflection method. Draw shear force and bending moment diagrams. Sketch the deflected shape also. **14**

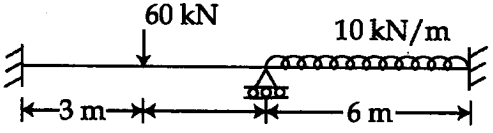


Figure - 3

5. Find the collapse load for a propped cantilever subjected to a uniformly distributed load w/unit length, as shown in figure 4. **14**

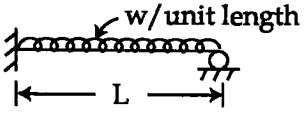


Figure - 4

6. A simply supported wooden beam 2 m long and of a rectangular section 100 mm wide and 150 mm deep is shown in figure 6. It carries a udl of 2 kN/m. Determine the amount of strain energy stored in the beam. Take $E = 2 \times 10^5$ N/mm^2 **14**

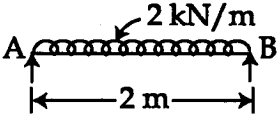
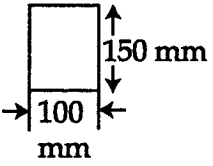


Figure - 5



7. A bar is used as a simply supported beam and is subjected to a total load of 96 kN which is uniformly distributed over the entire span. The deflection at the centre is 1/100 of span. Determine the crippling load if it is used as a column with both ends hinged. **14**

8. Write short notes on any four of the following. **4x3½=14**
   (a) Strain energy.
   (b) Buckling of columns.
   (c) Plastic hinge.
   (d) Determinate structures.
   (e) Portal method.