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ET-502(B)

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

Term-End Examination

00115

June, 2014

ET-502(B) : STRUCTURAL ANALYSIS

Time : 3 hours *Maximum Marks : 70*

Note : *Attempt any **five** questions. All questions carry equal marks. Use of scientific calculator is permitted.*

1. The span of a simply supported bridge is 30 m. It is crossed from left to right by a train of six loads of magnitude 10, 15, 25, 15, 15 and 10 kN (the leading load). Distances between loads taken in the same order are 1·2 m, 1·0 m, 0·8 m, 0·8 m and 0·6 m respectively. Calculate the maximum bending moment and maximum shear force at a section 10 m from left end of the bridge. *14*

2. A timber beam 100 mm × 200 mm carries a udl 6 kN/m as shown in Figure 1. Determine the deflection at every meter interval if E = 10 GPa for the timber. *14*

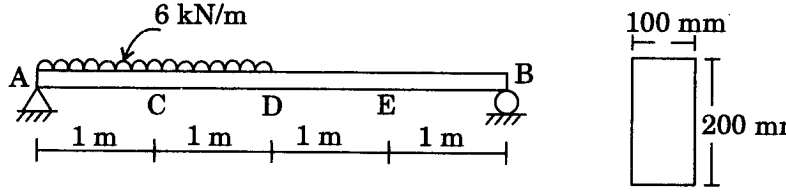

Figure 1

3. Write the characteristic equation of the slope deflection method and discuss how you will use this method to analyse a fixed beam of span 'L', subjected to a concentrated load of magnitude 'P' at the mid span location. *14*

4. Analyze the continuous beam having an internal hinge as shown in Figure 2 by moment distribution method. *14*

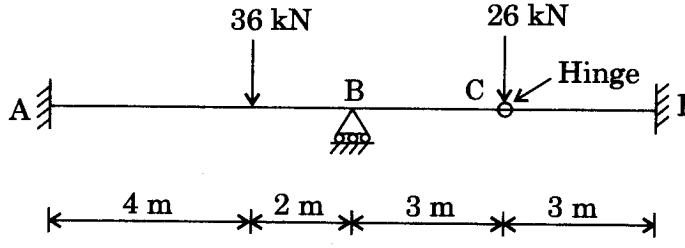

Figure 2

5. Using the column analogy method, obtain bending moment diagram of a propped cantilever AB, of length 12 m which is fixed at A and propped at B. Two concentrated loads of magnitude 100 kN and 80 kN are placed at 4 m and 8 m respectively from A. EI is constant. *14*

6. Calculate the deflection and slope at the free end of a cantilever beam carrying a udl of intensity w per unit length over the entire span. *14*

7. A fixed beam of span L carries a uniformly distributed load w (total) on the left half portion. Using plastic theory, determine the value of w at collapse. The plastic moment of resistance of beam is M_P. *14*

8. Write short notes on any ***two*** of the following topics : *2×7=14*

   (a) Indeterminate structures

   (b) Influence lines

   (c) Characteristics of fixed and hinged supports
