

B.Tech. CIVIL ENGINEERING (BTCLEVI)**Term-End Examination**

00216

June, 2016

BICE-011 : STRUCTURAL ANALYSIS – II*Time : 3 hours**Maximum Marks : 70*

Note : Attempt any five questions. All questions carry equal marks. Assume any missing data.

1. Determine the vertical deflection of the joint H of the truss as shown in Figure 1. Area of cross-section of each member = 2000 mm^2 . Take $E = 200 \text{ kN/mm}^2$. If the temperature of the bottom chord member goes up by 20°C , what will be the additional deflection of the joint H ?
 $\alpha = 12 \times 10^{-6}/^\circ\text{C}$.

14

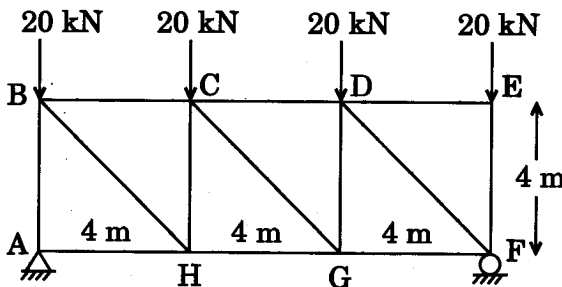


Figure 1

2. A simply supported beam has a span of 15 m. Uniformly Distributed Load (UDL) of 40 kN/m and 5 m long crosses the girder from left to right. Draw the influence line diagram for shear force and bending moment at a section of 6 m from the left end. Use these diagrams to calculate the maximum shear force and bending moment at this section. 14

3. A three-hinged parabolic arch has a span of 50 m and a rise of 15 m. It carries a point load of 10 kN at quarter span as shown in Figure 2. Calculate the reactions and draw the bending moment diagram. Also calculate the normal thrust and radial shear force at quarter span. 14

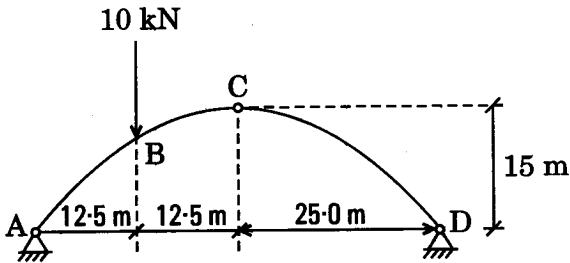


Figure 2

4. Determine the fixed end moments developed in the fixed beam of span L subjected to uniformly varying load as shown in Figure 3. 14

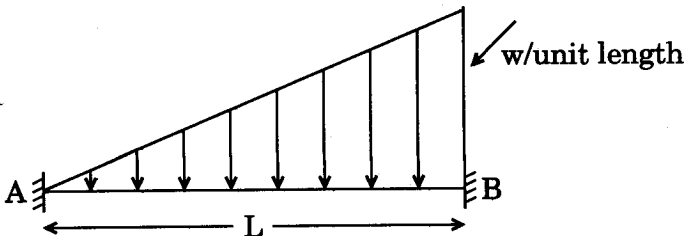


Figure 3

5. Determine the reaction components in the continuous beam ABC as shown in Figure 4. Flexural rigidity is constant throughout. 14

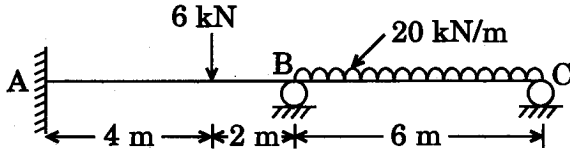


Figure 4

6. A continuous beam ABCD is 12 m long and is loaded as shown in Figure 5. Analyse the beam by slope deflection method, if the following movements takes place simultaneously :

- (a) The end A yields turning through $\frac{1}{250}$ radians in the clockwise direction.
 (b) End B sinks 30 mm in downward direction.
 (c) End C sinks 20 mm in downward direction.

The beam has constants

$$I = 38 \cdot 20 \times 10^5 \text{ mm}^4; E = 2 \times 10^5 \text{ N/mm}^2. \quad 14$$

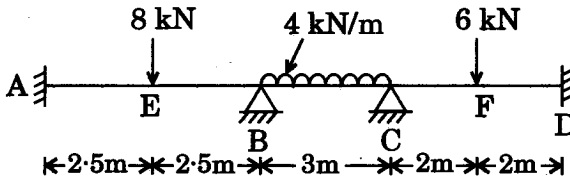


Figure 5

7. A continuous beam ABC is supported on an elastic column BD and is loaded as shown in Figure 6. Treating B as rigid, analyse the frame and plot the BMD by moment distribution method. 14

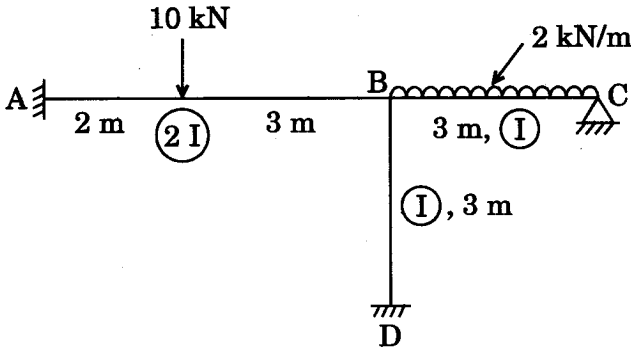


Figure 6

8. A steel two-hinged circular arch rib has a span of 30 m and a rise of 3 m. The rib section is uniform throughout with an overall depth of 0.7 m. Neglecting all effects except bending, find the bending stress at crown due to a temperature change of 30 K.

Take $E = 2 \times 10^5 \text{ N/mm}^2$, $\alpha = 11 \times 10^{-8} \text{ per K}$. 14