

PART – B (5 x 3= 15 Marks)

6. State the principle of Virtual work. CO1-R
7. Mention the causes for sway in portal frames. CO2-U
8. What is the use of distribution factors? CO3-U
9. What are influence lines? CO4-U
10. Give the applications of two hinged arches. CO5-U

PART – C (5 x 16= 80Marks)

11. (a) Determine the vertical and horizontal deflection of joint C of the truss in Fig.1. Take $E=200 \times 10^6 \text{ kN/m}^2$ and the sectional area of each bar is $100 \times 10^{-6} \text{ m}^2$, using the principles of virtual work. CO1-App (16)

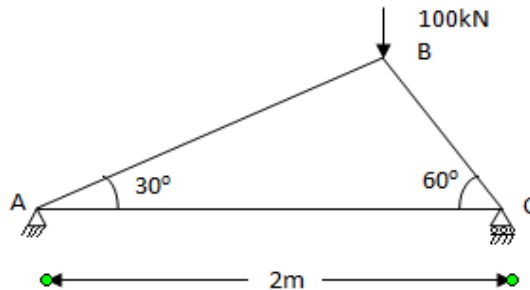


Figure.1

Or

- (b) Determine the deflection at centre of the beam and slope at the end A of the beam shown in Fig 2. Take $E=200 \times 10^6 \text{ kN/m}^2$ and $I= 13 \times 10^{-6} \text{ m}^4$. Use the principle of virtual work. CO1-App (16)

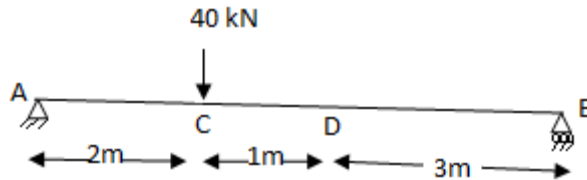


Figure.2

12. (a) ABC is a Continuous beam with constant EI throughout its length 24m. The end supports A and C are fixed and the beam is having a middle support B at a distance 12m from left support A. Span BC is uniformly loaded with 15kN/m length while a concentrated vertical download of 125kN acts at the mid span of AB. Calculate the moments by slope deflection method. CO2-App (16)

Or

- (b) Analyse the portal frame shown in Fig.3. Take $I_1:I_2:I_3=3:2:1$ by using slope deflection method. CO2-App (16)

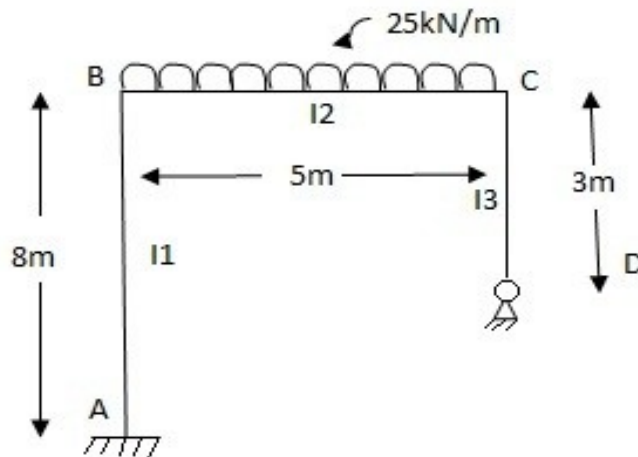


Figure.3

13. (a) The portal frame ABCD with ends A and D are hinged. Joints B and C are rigid. Span AB = CD = 4m. Span BC = 6m. A uniformly distributed load of 8kN/m acts on the span BC. Determine the bending moment at the supports by using moment distribution method. CO3-App (16)

Or

- (b) A Continuous beam ABCD consists of three spans with fixed supports on both ends and simple supports at B and C. Span AB=7m, BC=6m and CD=6m. An uniformly distributed load of 3kN/m acts on AB. A point load of 6kN acts at 3m from B. A point load of 9kN acts at the mid span of CD. Flexural rigidities are I, 2I and I for AB, BC and CD respectively. Determine the Bending moments at the supports, using moment distribution method. CO3-App (16)

14. (a) A simply supported beam of 15m span is subjected to an UDL of 5kN/m (self weight) and an UDL of 12kN/m (live load) acting for 6m length travelling from right to left. Draw the ILD for shear force and bending moment at a section 10m from the right end. Use these diagrams to determine the maximum shear force and bending moment at this section. CO4-App (16)

Or

- (b) Two point loads of 100kN and 200kN spaced 3m apart cross girder of span 12m from left to right with the 100kN loading. Draw the ILD for shear force and Bending moment and find the values of maximum shear force and bending moment at a section 4m from the left hand support. Also evaluate the absolute maximum bending moment due to the given loading system. CO4-App (16)

15. (a) A parabolic three hinged arch carries a UDL of 15kN/m over the left half of the span. The span of the arch is 18m and the central rise is 2.8m. Determine the resultant reaction at the supports. Find also the bending moment, normal thrust and radial shear at a section 4.5m from the left support. CO5-App (16)

Or

- (b) A two hinged parabolic arch of span 25m and rise 5m carries a uniformly distributed load of 35kN/m covering a distance of 10m from left end. Find the horizontal thrust, the reactions at the hinges and the maximum negative moment. CO5-App (16)