B.E. Civil Engineering (Model Curriculum) Semester-V

PCCCE504 - Structural Analysis-I

P. Pages : 3 **GUG/W/23/13727**

Time : Three Hours * 7 3 1 3 * Max. Marks : 80

Notes : 1. All questions carry equal marks.
2. Due credit will be given to neatness and adequate dimensions.
3. Illustrate your answers wherever necessary with the help of neat sketches.

1. Analysis the continuous beam shown in figure by three moment theorems. Draw bending moment diagram. (EI constant) **16**

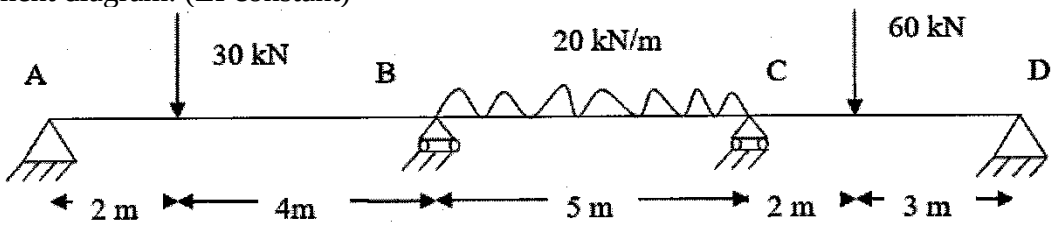

Figure 1

OR

2. Analysis the portal frame shown in figure 2 by slope deflection method. Draw bending moment diagram. **16**

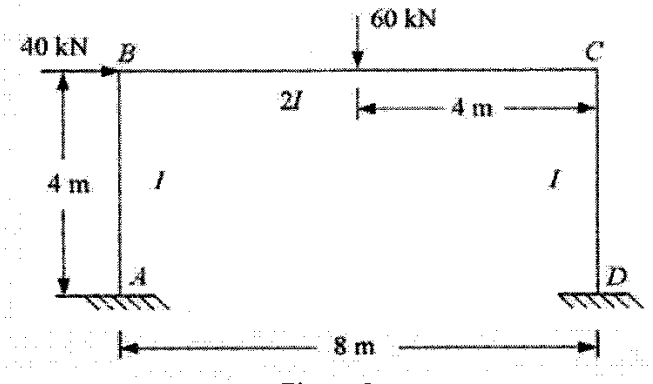

Figure 2

3. A continuous beam ABCD, simply supported at A, B, C and D is loaded as shown in figure by moment distribution method. **16**

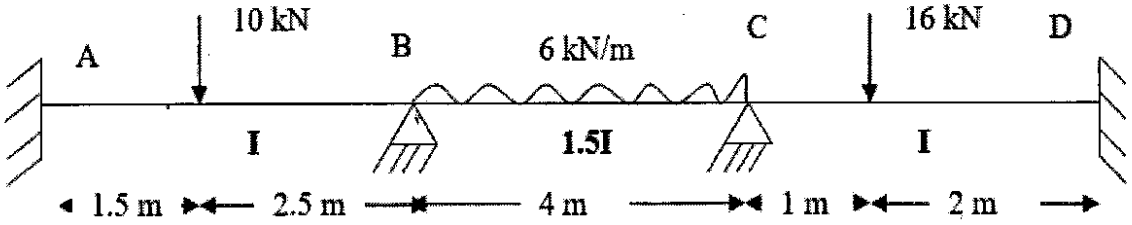

Figure 3

OR

4. Analysis the portal frame shown in figure 4 by moment distribution method. Draw bending moment diagram. **16**

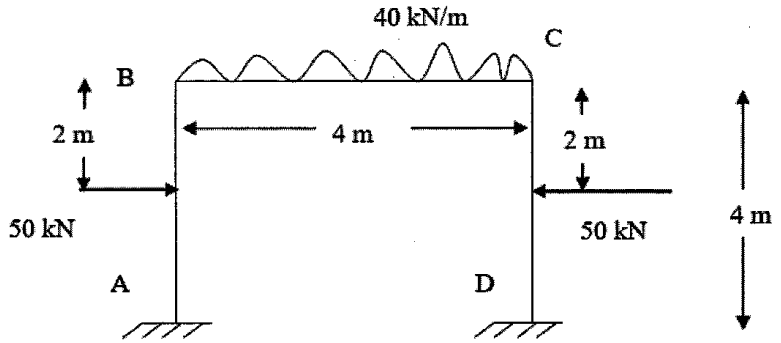

Figure 4

5. a) Two wheel loads of 16kN and 8kN, at a fixed distance apart of 2m, cross a beam of 10m span. Draw the influence line diagram for bending moment and shear force for a point 4m from left support and find maximum for bending moment and shear force at that point. **8**

b) The rolling load of UDL of intensity 2kN/m of span 5m, cross a beam of 12 m span. Draw the influence line diagram for bending moment and shear force for a point 3 m from left support and find maximum for bending moment and shear force at that point. **8**

OR

6. Construct an influence line for the force in the member CD of the truss shown in figure 5 and calculate the force in the member produced by the loads positioned at C, D and E. **16**

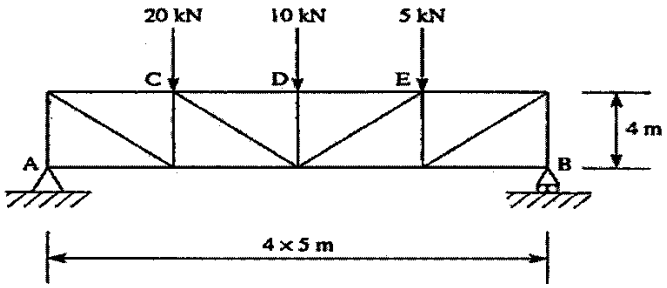

Figure 5

7. Analysis the portal frame shown in figure 7 by strain energy method. Draw bending moment diagram. **16**

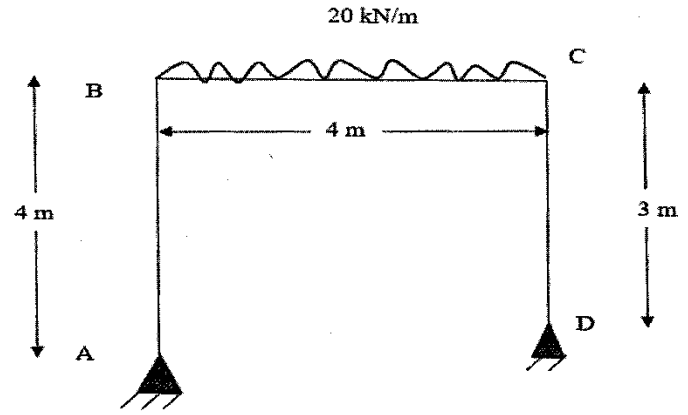

Figure 7

OR

8. Analysis the redundant truss shown in figure 8 by strain energy method. **16**

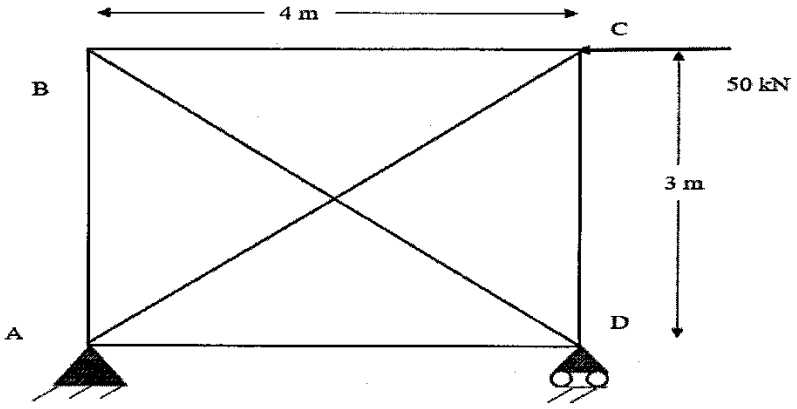

Figure 8

9. a) Derive the expression of buckling load of column if the both ends are hinged. **8**

b) A copper $(E = 1.1 \times 10^5 \text{ MPa})$ column built into the ground has length, L = 5 m, fixed at both end and is under axial compressive load P. The dimensions of the cross-section are b = 180 mm and d = 260 mm. Determine the critical load to buckle the column. **8**

OR

10. A parabolic arch, hinged at ends has a span 36 m and rise 6 m. the arch subjected 20 kN/m over entire span. Calculate the horizontal thrust and the reactions at the hinges. Also, calculate the maximum bending moment anywhere on the arch. **16**

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