

Reg No :

Name :

**MAR ATHANASIOUS COLLEGE OF ENGINEERING, KOTHAMANGALAM**

(Govt. Aided Autonomous Institution)

Fourth Semester B.Tech. Degree Examination, May, 2026

Course Code: B24CE2T04

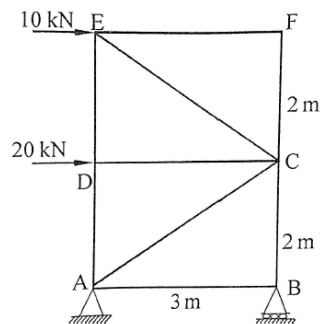
Course Name: STRUCTURAL ANALYSIS

Max. Marks: 100

Duration:3 Hours

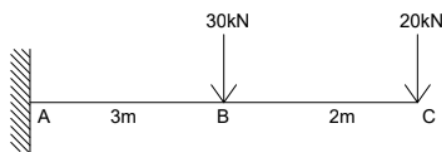
Answer any one full question from each module. Each question carries 20 marks.**Module 1**

1. Analyse the truss shown in figure using method of joints and tabulate the force table.

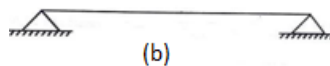
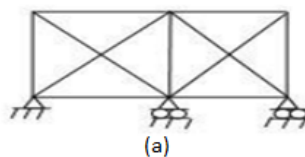


OR

2. (a) State and explain Moment-Area theorems with the help of neat sketches. (5 Marks)
- (b) Determine the slope and deflection at the free end of the cantilever beam by moment area method. Take $EI = 400 \text{ kNm}^2$. (15 Marks)

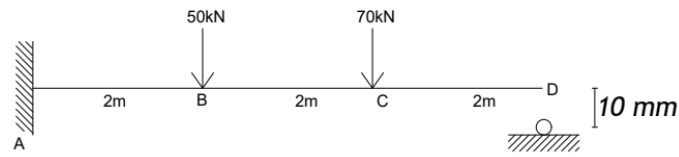
**Module 2**

3. (a) Determine the static indeterminacy of the following figures. (5 Marks)



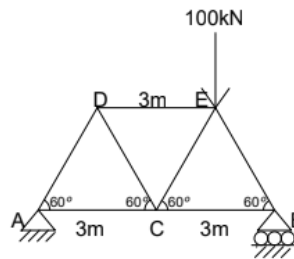
- (b) The cantilever shown in the figure has a rigid support 10mm below the free end. (15 Marks)

Determine the reaction components of the beam for the given loading using consistent deformation method. Take $EI=15 \times 10^4 \text{ kNm}^2$.



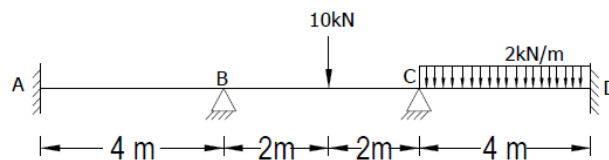
OR

4. Find the vertical deflection at point C for the truss shown in figure using unit load method. The area of cross-section of all the members is 1500 mm^2 . $E=2 \times 10^5 \text{ N/mm}^2$.



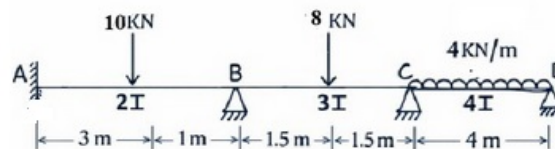
Module 3

5. (a) Brief the sway analysis procedure for the analysis of portal frames using slope-deflection method. (5 Marks)
- (b) Using the slope deflection method, determine the moments at supports for the beam shown in figure and draw the bending moment diagram. (15 Marks)



OR

6. Analyse the continuous beam shown in figure by moment distribution method and draw the BMD and SFD.



Module 4

7. A circular arch of span 25m with a central rise 5m is hinged at the crown and springing. It carries a point load of 100kN at 6m from the left support. Calculate (i) the reactions at the support (ii) the reactions at crown (iii) moment at 5m from the left support.

OR

8. (a) With the help of a neat sketch illustrate the different parts of a suspension bridge, indicating the load path. (4 marks)

- (b) A light cable is supported at two ends at the same level with 16m span. The cable supports two concentrated loads 80 kN and 120 kN at quarter points. The point of 80 kN load is at 4m below the support. Find shape of the cable and tension in cable (16 marks)

Module 5

9. Four point loads 10kN, 30kN, 30kN and 25kN have centre to centre spacing of 2m between consecutive loads and they traverse a girder of 30m span from left to right with 25kN load leading. Calculate the maximum bending moment and shear force at 8m from the left support.

OR

10. Illustrate how influence diagram can be used to identify the position of moving loads for which the shear force and bending moment values are maximum and for calculating the maximum values, for the following types of loads in a simply supported beam. (a) Single point load (b) Uniformly distributed load longer than span (c) Uniformly distributed load shorter than span.
