

Code No: 114DQ

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech II Year II Semester Examinations, February -2024

STRUCTURAL ANALYSIS - I

(Civil Engineering)

Time: 3 Hours

Max. Marks: 75

**Note:** i) Question paper consists of Part A, Part B.

ii) Part A is compulsory, which carries 25 marks. In Part A, answer all questions.

iii) In Part B, Answer any one question from each unit. Each question carries 10 marks and may have a, b as sub questions.

**PART - A****(25 Marks)**

- 1.a) Define perfect frames and briefly explain their significance. [2]
- b) Distinguish between method of joints and method of sections. [3]
- c) Explain Castigliano's first theorem. [2]
- d) Discuss the Linear Arch and Eddy's theorem. [3]
- e) Illustrate the approximate deflection for the propped cantilever shown in Figure.1. [2]

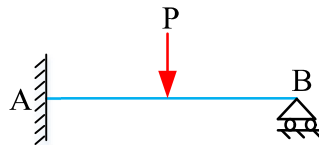


Figure 1

- f) How does a propped cantilever beam differ from a cantilever beam? [3]
- g) Define the term distribution factor. [2]
- h) Determine the magnitude of bending moment at A for the beam shown in Figure.2 [3]

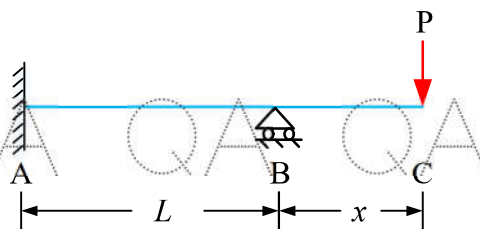


Figure 2

- i) Draw the Influence Line Diagram (ILD) for the reaction of a simply supported beam. [2]
- j) What is difference between ILD and SFD? [3]

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**PART - B**

**(50 Marks)**

2. Use method of sections to find the member forces A, B, C marked in Figure 3 (pin jointed). [10]

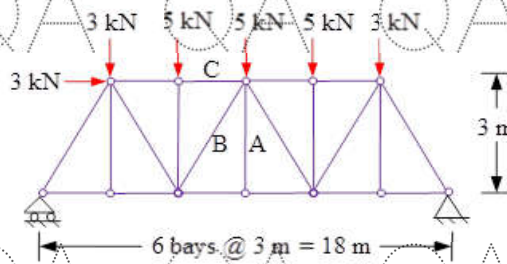


Figure 3

**OR**

3. Use method of tension coefficients to find the forces in the pin jointed truss as shown in Figure 4. [10]

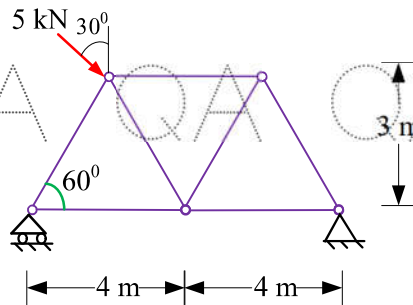


Figure 4

4. Determine the horizontal deflection at B of the truss shown in Figure 5. Use  $E = 200 \text{ GPa}$  and  $A = 1200 \text{ mm}^2$ . Assume EA to be constant. [10]

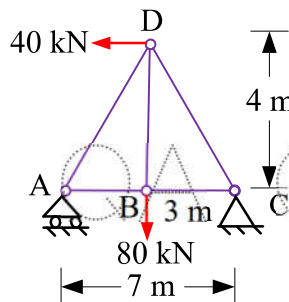


Figure 5

**OR**

5. A uniformly distributed load of  $5 \text{ kN/m}$  covers the left half of the span of a three hinged parabolic arch. The span of the arch is  $30 \text{ m}$  with a rise of  $8 \text{ m}$ . Determine the normal thrust and radial shear at  $3 \text{ m}$  from the support. [10]

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6. Determine the reactions and draw the shear force and bending moment diagram for the beam shown in Figure. 6. Clearly differentiate straight-line and curved portions of the diagrams. [10]



Figure. 6  
OR

7. Construct the shear-force and bending moment diagrams for the beam shown in Figure.7. Clearly differentiate straight-line and curved portions of the diagrams. Assume EI to be constant. Ignore the effect of axial loads. [10]

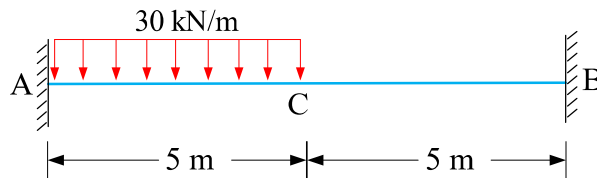


Figure 7

8. Determine the reactions and draw the shear and bending moment diagrams for the two-span continuous beam shown in Figure. 8 by the slope-deflection method. Draw BMD. [10]

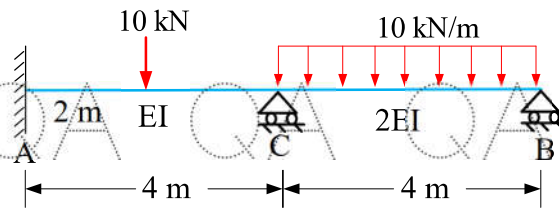


Figure. 8  
OR

9. Determine the reactions for the continuous beam shown in Figure. 9 by the Clapeyron's theorem of three-moment equation. Assume EI to be constant. Draw BMD. [10]

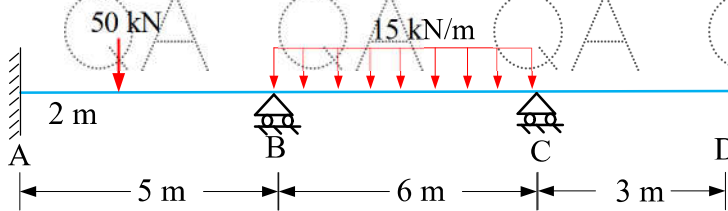


Figure. 9

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