

R13

Code No: 126DZ

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech III Year II Semester Examinations, July - 2023

STRUCTURAL ANALYSIS - II

(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 the term "Distribution Factor". [2]
b) If the point 'O' is assumed to be rigid as shown in figure 1, find the rotational stiffness of the frame at point O. [3]

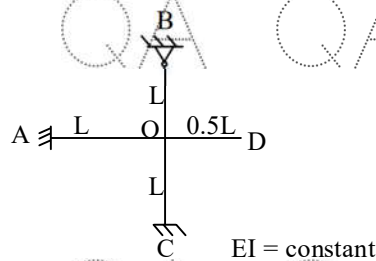


Figure 1

- c) Name two secondary stresses that can occur in two hinged arches due to temperature and elastic shortening of the rib. [2]
d) Discuss the analysis process for two hinged parabolic arches and explain any assumptions made in the analysis. [3]
e) Explain two key factors considered in the factor method for analyzing multi-storey frames under lateral loads. [2]
f) List out the three limitations of the cantilever method for analyzing multi-storey frames subjected to lateral loads. [3]
g) Define kinematic indeterminacy. [2]
h) Develop the flexibility matrix for the co-ordinate system as shown in figure 2. [3]

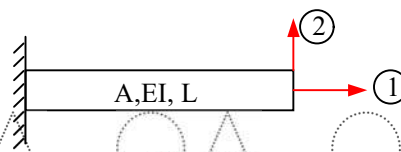


Figure 2

- i) Explain the significance of Castiglano's second theorem in the analysis of indeterminate trusses. [2]
j) Explain in detail the Muller Breslau's Principle with suitable examples. [3]

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PART - B**(50 Marks)**

2. A rigid portal frame ABCD has two unequal vertical leg $AB = 4\text{ m}$ and $CD = 6\text{ m}$ with members BC horizontal and 8 m long. The bases A and D are fixed, and all the members have the same moment of inertia I . The member BC carries a UDL of 4 kN/m and a horizontal force H act at C. Using the moment distribution method find the magnitude and the sense of H such that the portal frame does not sway under the given loading.

[10]

OR

3. Analyse the beam shown in figure 3, using Kani's method. Assume constant EI . Draw BMD and Elastic curve.

[10]

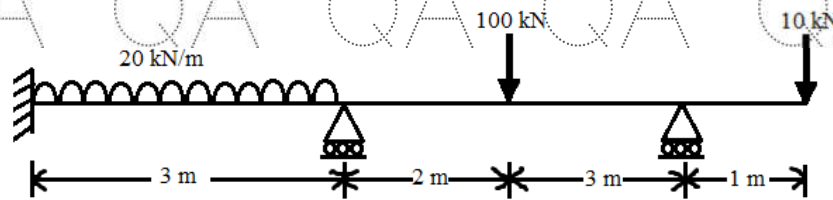


Figure 3

4. Analyse the frame shown in figure 4 using slope deflection method. Draw BMD.

[10]

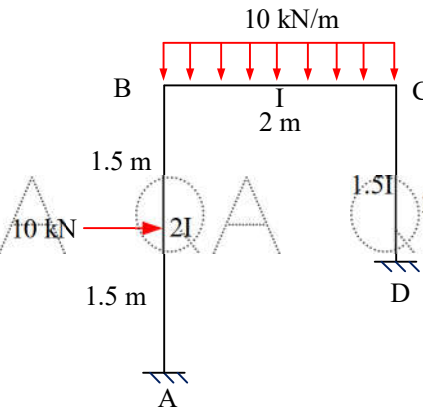


Figure 4

OR

5. A parabolic arch hinged at the ends has a span of 50 m and a rise of 10 m . A concentrated load of 5 kN acts at 15 m from the left hinge. The second moment of area varies as the secant of the inclination of the arch axis. Calculate the horizontal thrust and reactions at the hinge. Also calculate the net bending moment at the section.

[10]

6. Discuss the concept of the substitute frame method and its application in the analysis of multi-storey frames under vertical loads. Explain the process of creating a substitute frame and how it simplifies the analysis.

[10]

OR

7. Explain the purpose and components of mill bents and discuss the analysis techniques employed for both lateral and vertical loads. Provide relevant examples or case studies to illustrate the challenges and design considerations specific to mill bents.

[10]

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