Code No: 136AA

R16

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech III Year II Semester Examinations, March - 2024

ADVANCED STRUCTURAL ANALYSIS

(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) Indicate the degree of internal and external indeterminacies for the frame shown in Figure 1 below. [2]

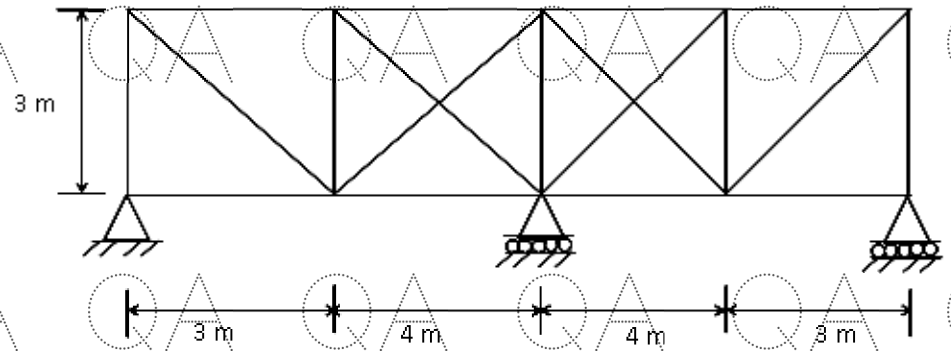

Figure 1

b) Write the expression for bending moment at any section of a Two hinged parabolic arch subjected to udl. [3]

c) Define the terms 'Stiffness factor' and 'Distribution factor'. [2]

d) In a single bay, single storey portal frame, if there a settlement of right support with respect to left support, show the fixed end moments developed in the beam. [3]

e) What is 'Rotation Factor' in Kani's method? [2]

f) What are the support moments when there is a relative displacement of δ at the supports? [3]

g) Define the term 'Stiffness' of a structure. [2]

h) Define 'Flexibility Coefficient'. What is the relation between 'Flexibility Matrix' and 'Stiffness Matrix'? [3]

i) What are the assumptions made in the 'Portal Method'? [2]

j) State Muller Breslau's principle. [3]

PART – B

(50 Marks)

2. Analyse the truss shown in figure 2. Determine the forces in all the members. AE is constant. [10]

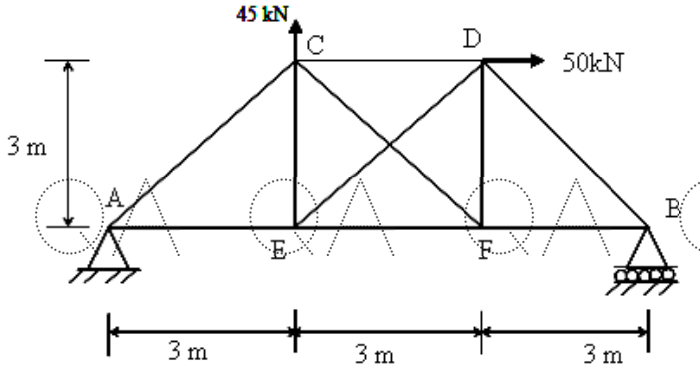

Figure 2

OR

3. A two hinged parabolic arch of 28 m span and central rise of 4 m. It carries an *udl* of 30 kN/m over the right half of the span and concentrated load of 180 kN at the crown. Locate and find the magnitude of maximum bending moment. Also find the shear force and normal thrust at quarter span section from the left support. Assume that moment of inertia at a section varies as secant of the slope. Neglect the effect of rib shortening.[10]

4. Analyse the frame shown in figure 3 using Slope-Deflection method, and draw bending moment diagram. Draw elastic curve. [10]

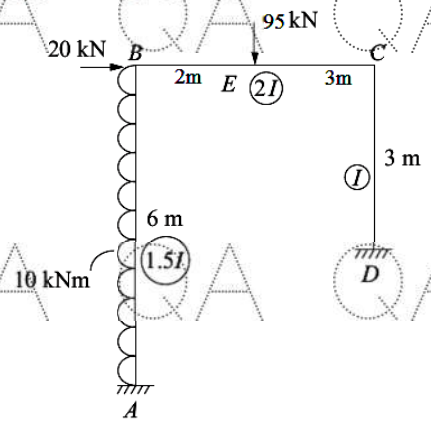

Figure 3

OR

5. Analyse the frame shown in figure 4, using Moment distribution method, and draw bending moment diagram. Also draw elastic curve. [10]

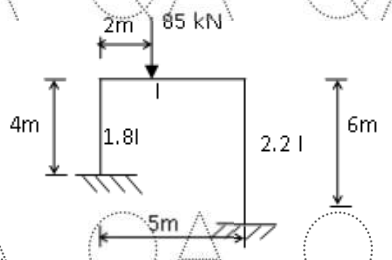

Figure 4

6. Analyse the frame shown in figure 5 using Kani's method, and draw shear force and bending moment diagrams. Draw elastic curve. [10]

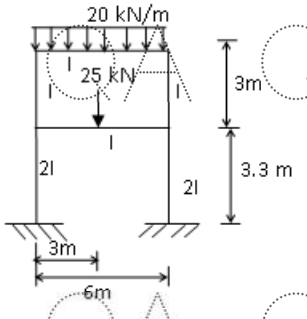

Figure 5

OR

7. Analyse the frame shown in the figure 6, using Kani's method. Assume moment of inertia for beams as I. [10]

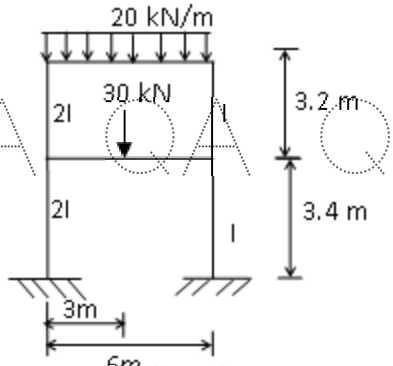

Figure 6

8. Analyse the continuous beam shown in the figure 7 using Stiffness Method. Draw shear force and bending moment diagrams. Also draw Elastic curve. [10]

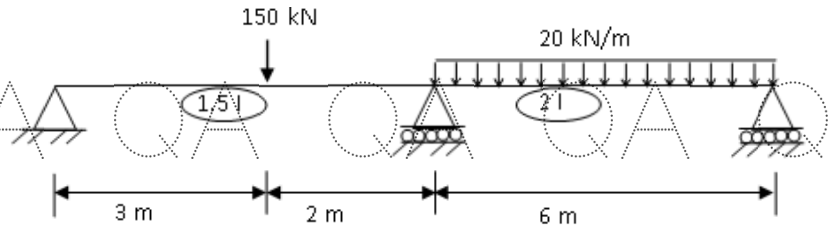

Figure 7

OR

9. Analyse the continuous beam shown in figure 8 using Flexibility Method. Draw bending moment diagram. Assume constant EI throughout the beam. Locate and find the distances of the points of contra-flexure from supports. Draw elastic curve. [10]

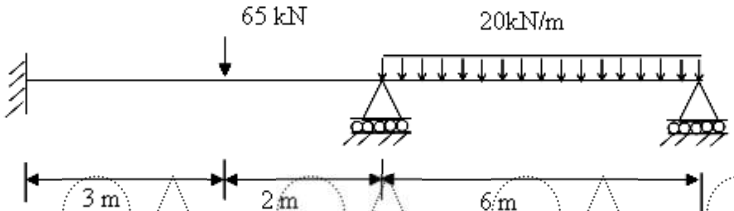

Figure 8

10. Analyse the frame shown in figure 9 by Cantilever method. Draw the bending moment diagram and sketch elastic curve. Cross-sectional area of all columns is equal. [10]

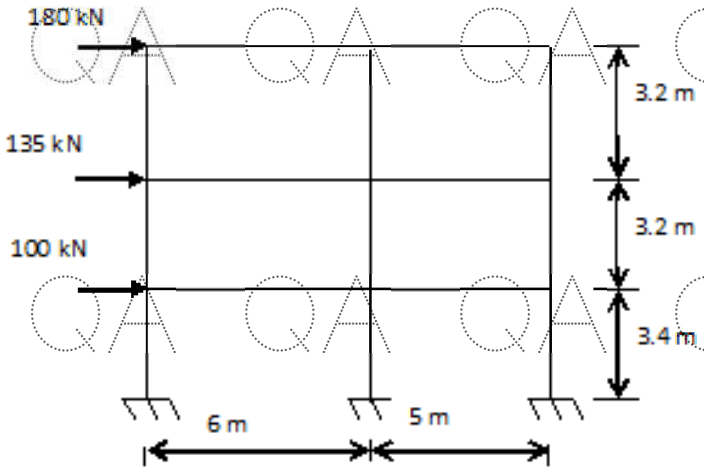

Figure 9

OR

11. Draw the influence diagram for the middle support moment M_B and determine its value (figure 10). [10]

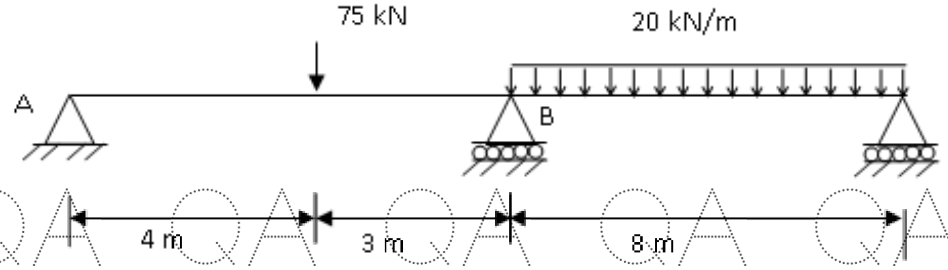

Figure 10

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