Code No: 155DC

R18

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech III Year I Semester Examinations, January/ February - 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) Write the expression for Radial shear at any section of a Two hinged parabolic arch. [2]
b) Define the terms 'rotational stiffness', 'distribution factor' and 'carry over factor', used in the Moment Distribution Method. [3]
c) What is meant by 'Rotational Factor' in Kani's method? What is it's value at a fixed end? [2]
d) What is a Suspension bridge? What are it's components? [3]
e) List the advantages of 'approximate methods' of analysis. [2]
f) What are the assumptions made in the 'Cantilever Method'? [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) Define the term 'Influence Line'. [2]
j) State Muller Breslau's principle. [3]

PART – B

(50 Marks)

2. A two hinged parabolic arch of 28 m span and central rise of 4 m. It carries an *udl* of 25 kN/m over the right half of the span and concentrated load of 160 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]

OR

3. Analyse the portal frame shown in figure 1, using Moment-distribution method. Draw bending moment diagram and elastic curve. [10]

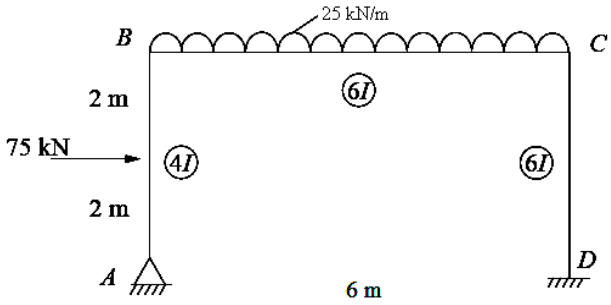

Figure 1

4. Analyse the frame shown in the figure 2 using Kani's method. Assume moment of inertia for the beams as 1.4I. Draw BMD and elastic curve. [10]

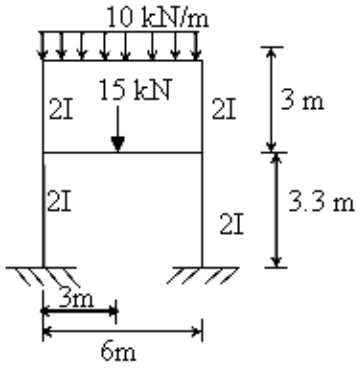

Figure 2

OR

5. A cable is suspended from two points A and B which are 100 m apart. The point A is 4 m below the point B. The lowest point on the cable is 10 m below the point A. The cable supports an *udl* of 15 kN/m over its entire span. Calculate (a) the reactions at the supports A and B and (b) the maximum tension in the cable. [10]

6. Calculate the moment at mid-span BC for portal frame shown in figure 3, if it is loaded with live loads on the spans AB and CD, in addition to the dead load. Use Substitute Frame Method. Dead load = 15 kN/m and Live load = 25 kN/m. [10]

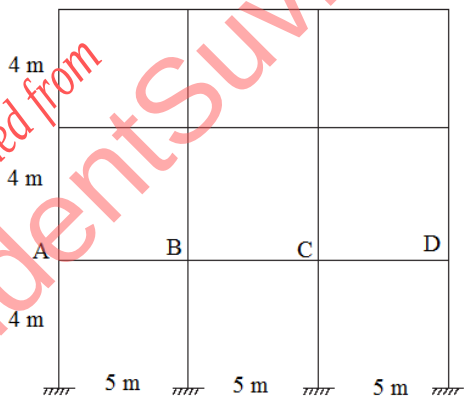

Figure 3

OR

7. Analyse the frame shown in figure 4, using Portal method. Draw the bending moment diagram and sketch elastic curve. Cross-sectional area of all columns is equal. [10]

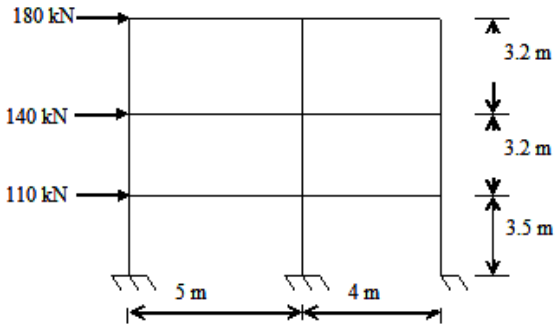

Figure 4

8. Analyse the continuous beam shown in the figure 5 using Stiffness Method. Draw shear force and bending moment diagrams. Also draw Elastic curve. [10]

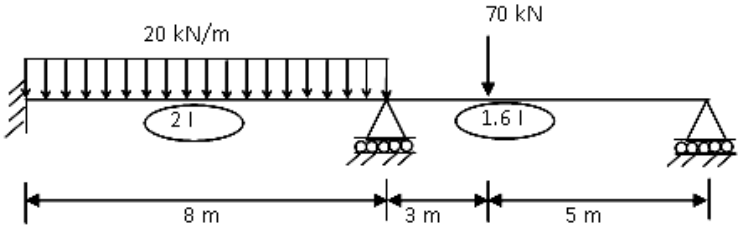

Figure 5

OR

9. Analyse the continuous beam shown in the figure 6 using Flexibility Method. Draw shear force and bending moment diagrams. Assume constant EI throughout the beam. Also draw Elastic curve. [10]

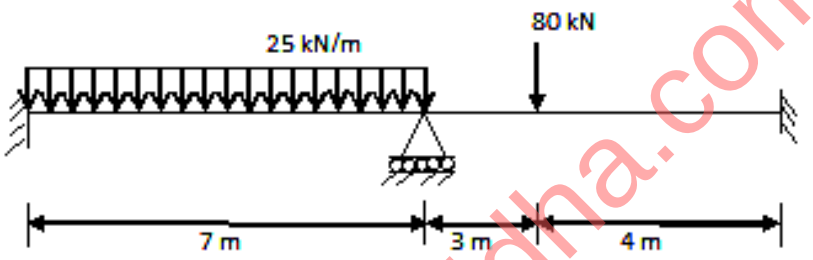

Figure 6

10. Draw the influence for reaction at the middle support. Compute the ordinates at 2 m intervals (figure 7). [10]

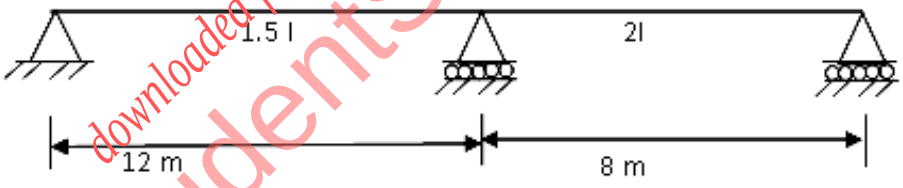

Figure 7

OR

11. Draw the influence diagram for the middle support moment M_B and determine its value (figure 8). [10]

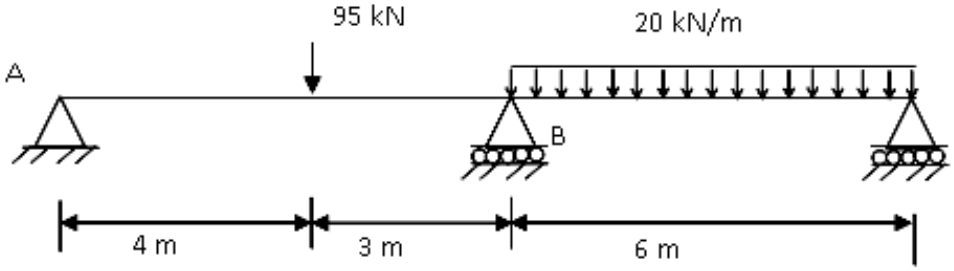

Figure 8

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