R18

Code No: 155DC

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

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

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)	Mention the examples where arch action is usually encountered.	[2]
b)	What is distribution factor and what is carry over moment?	[3]
c)	List out the different types of cable structures.	[2]
d)	Why is Kani's method called as displacement method?	[3]
e)	List the Assumptions in the Portal Method of Analysis.	[2]
f)	List the Steps involved in the Substitute frame method.	[3]
g)	What is meant by flexibility?	[2]
h)	Prove that the flexibility Matrix is the inverse of Stiffness matrix.	[3]
i)	State the importance of Influence line diagram.	[2]
j)	Briefly explain Muller Breslau principle.	[3]

PART – B

(50 Marks)

2. A parabolic two hinged arch has a span of 40m and a rise of 5m. A concentrated load 10kN acts at 15m from the left support. 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 maximum bending moment at the section. [10]

OR

3. Analyze the portal frame shown in Figure 1 by Moment Distribution method. The end A is fixed and D is hinged. The joints B and C are rigid. Draw the B.M.D and sketch the deflected shape of the frame. [10]

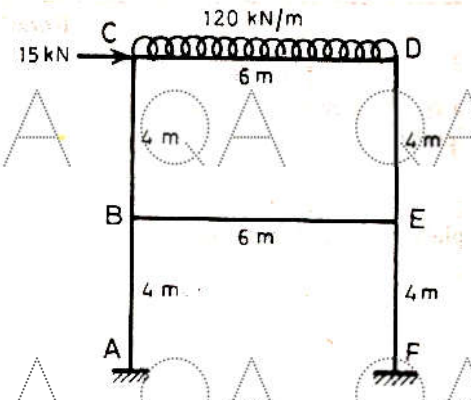

Figure 1

4. A horizontal beam ABCD is carried on hinged support and is continuous over the three equal spans each of 3m. All the supports are initially at the same level. The beam is loaded as shown in Figure 2. Plot the B.M.D and sketch the deflected shape of the beam if the support A settles by 10mm, B settles by 30mm and C settles by 10 mm. The moment of inertia is 2.4×10^6 mm^4 units. Take $E=2\times10^5$ N/mm^2 use Kani's Method. [10]

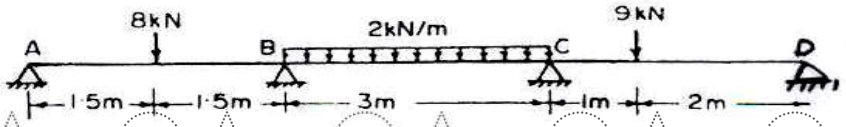

Figure 2

OR

5. A suspension bridge of 250m span has two numbers of three hinged stiffening girder supported by cables with a central dip of 25m. If 4 point load of 300kN each are placed at the centre line of the roadway at 20, 30, 40 and 50m from the left hand hinge, Estimate the shear force and bending moment in each girder at 62.5m from each end. Estimate also the maximum tension in the cable. [10]

6. Analyze the building frame shown in Figure 3 by Portal frame method. Draw BMD. [10]

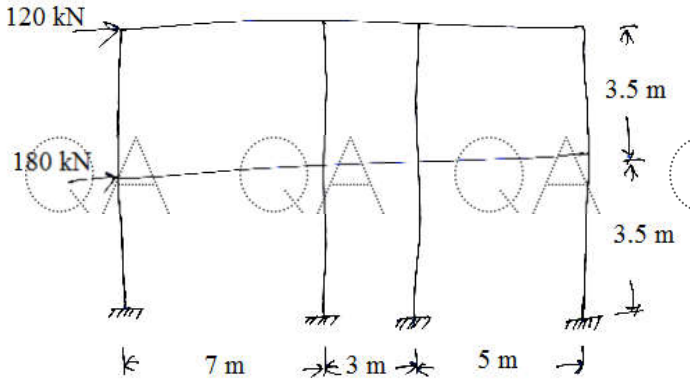

Figure 3

OR

7. Analyze the building frame shown in Figure 4 by Cantilever method. Draw BMD. [10]

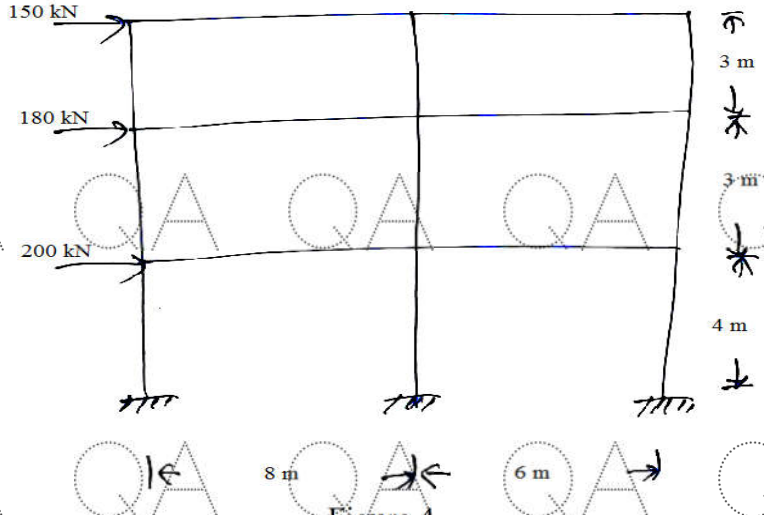

Figure 4

8. Analyze the continuous beam ABCD shown in Figure 5 below by flexibility matrix method and draw the bending moment diagram. M_B and M_C are redundant. [10]

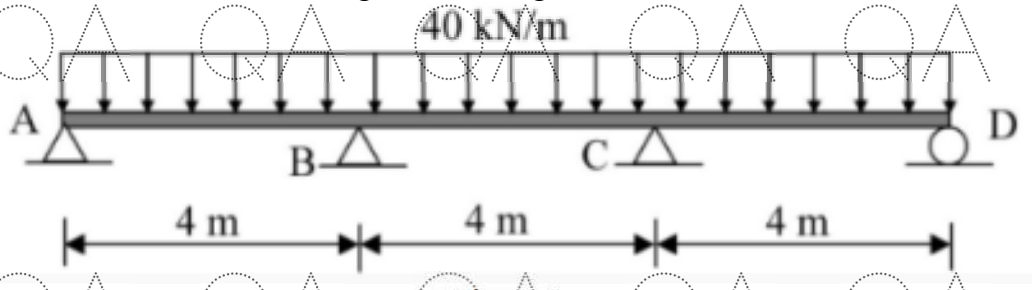

Figure 5

OR

9. Analyze the continuous beam shown in Figure 6 by stiffness matrix method, if the supports B and C sink by 3 mm and 5 mm respectively with respect to the support A. Take I = 4×10^7 mm^4 and E=200 kN/mm^2. Draw BMD. [10]

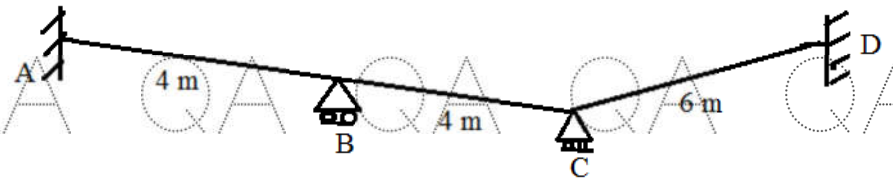

Figure 6

10. Draw the IL for reaction at B and for the support moment M_A at A for the propped cantilever AB of 12m as shown in figure 7. Compute influence line coordinates at 1.5 m intervals. [10]

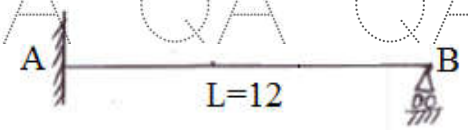

Figure 7

OR

11. Draw the influence line for shear force at D, the midpoint of span BC, support moment MB of a continuous beam shown in figure 8 Compute the influence line ordinates at 1.5m intervals. [10]

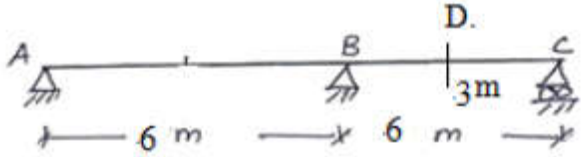

Figure 8

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