R18

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech III Year I Semester Examinations, February - 2022
STRUCTURAL ANALYSIS – II
(Civil Engineering)

Time: 3 Hours

Max. Marks: 75

Answer any five questions
All questions carry equal marks
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1. An RCC two-hinged parabolic arch has 40 m span and central rise of 6 m, is subjected to a concentrated load of 90 kN at centre. Determine the horizontal thrust, if the arch is subjected to rise in temperature of 30^0C. The second moment of the area of the arch rib varies as the secant of the slope of the rib axis. Assume the cross-section of the arch is 900 mm × 400 mm and concrete of grade M35. [15]

2. Using moment distribution method, analyse the frame shown in figure 1 and draw the bending moment diagram and Elastic curve. [15]
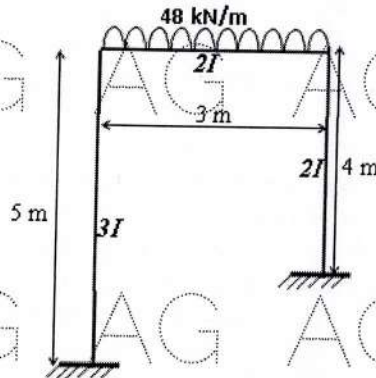

Figure 1

3. Using Kani's method, analyze the frame shown in figure 2 and draw the bending moment diagram. Elastic curve. [15]
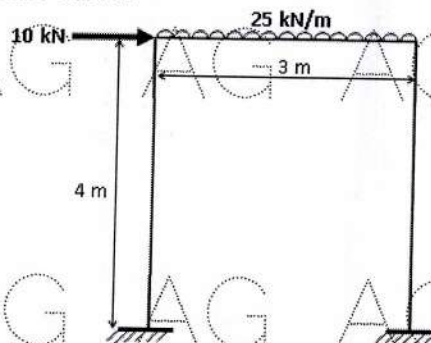

Figure 2

4. A suspension bridge of 150 m span has two three-hinged stiffening girders supported by two cables with a central dip of 15 m. If four concentrated loads of 125 kN each are placed along the centre line of the roadway at 15 m, 30 m, 45 m and 60 m from the right end. Find the shear force and bending moment at a section located at 50 m from the right end, in each girder. Also find the maximum tension in the cable. [15]

5. Using Portal method, analyze the plane frame shown in figure 3. And draw the bending moment diagram. [15]

75 kN →
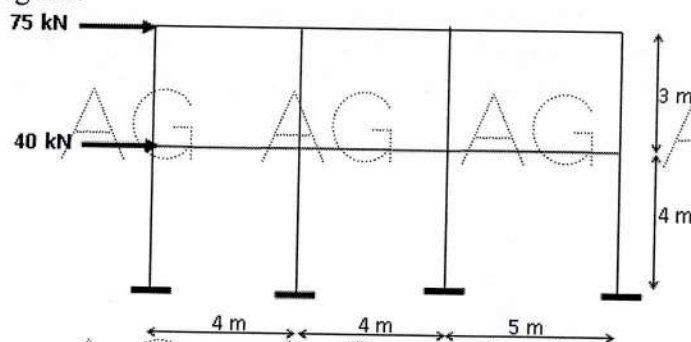
40 kN →

3 m

4 m

4 m   4 m   5 m

Figure 3

6. In a multi-storeyed building the frames, as shown in figure 4, are spaced at 3.6 m c/c. The dead and live loads carried by the slab are 1 kN/m² and 3 kN/m² respectively. Using substitute frame method, analyse an intermediate span of the first floor for maximum negative bending moment. [15]
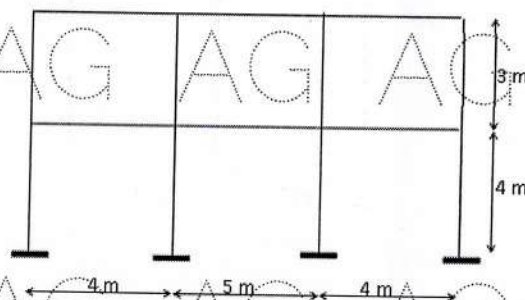
3 m

4 m

4 m   5 m   4 m

Figure 4

7. Using the stiffness method, analyze the frame supported and loaded as shown in figure 5. [15]

60 kN   100 kN

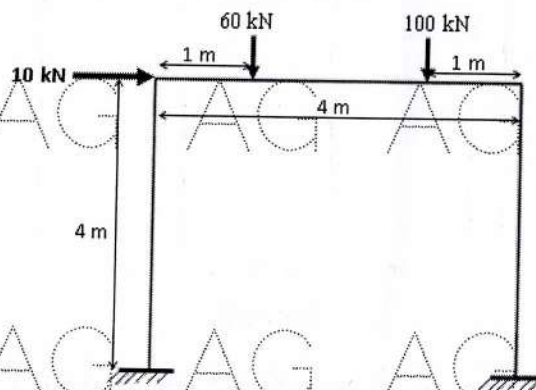1 m   1 m

10 kN →

4 m

4 m

Figure 5

8. Draw the influence line diagram for the reaction at the left support of a continuous beam shown in figure 6. [15]

4 m   3 m
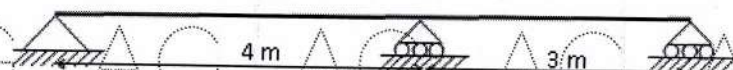
Figure 6

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