

**R15**

Code No: 124DQ

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**

**B.Tech II Year II Semester Examinations, May - 2017**

**STRUCTURAL ANALYSIS - I**

(Common to CE, CEE)

Time: 3 Hours

Max. Marks: 75

**Note:** This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A.

Part B consists of 5 Units. Answer any one full question from each unit.

Each question carries 10 marks and may have a, b, c as sub questions.

**PART-A**

(25 Marks)

- 1.a) Explain what you understand by perfect frame, deficient frame and redundant frame. [2]
- b) Give the relation between number of joints (j) and number of members (m) in a perfect frame in plane and for space structures. [3]
- c) Write down few advantages and disadvantages of arches over beams. [2]
- d) Distinguish between a true arch and a corbelled arch. [3]
- e) Write the fixed end moments in a fixed beam, with left support rotated by  $\theta_A$  in anti clock wise direction. Explain each term mentioned in fixed end moments with sketch. [2]
- f) Explain different types of props with sketches. [3]
- g) Write down the slope deflection equation for a beam element and also explain this method is preferable. [2]
- h) In a member AB, if a moment of 10 kN-m is applied at A, what is the moment carried over to the fixed end B? [3]
- i) Define terms: absolute maximum bending moment and shear force. [2]
- j) Draw the ILD for shear force and bending moment at any section of a simply supported beam. [3]

**PART-B**

(50 Marks)

2. Determine the forces in the members of the Truss shown in Figure 1. [10]

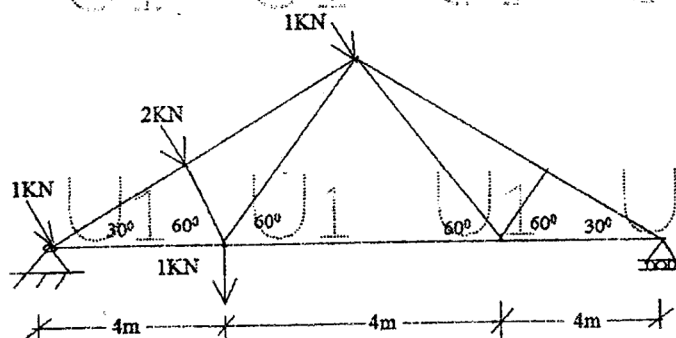


Figure: 1

OR

3. Determine the forces in the members 1(horizontal), 2(vertical) and 3(inclined) of the truss shown in Figure 2 by method of sections. [10]

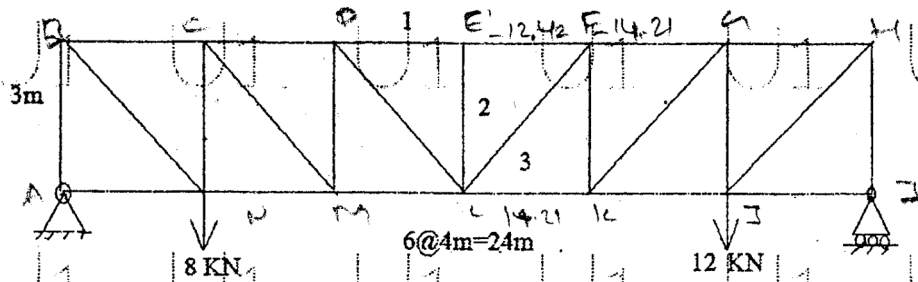


Figure: 2

4. Find the horizontal movement of the roller end of the portal frame shown in Figure 3. Take  $E=2 \times 10^5 \text{ N/mm}^2$  and  $I=3 \times 10^4 \text{ mm}^4$ . [10]

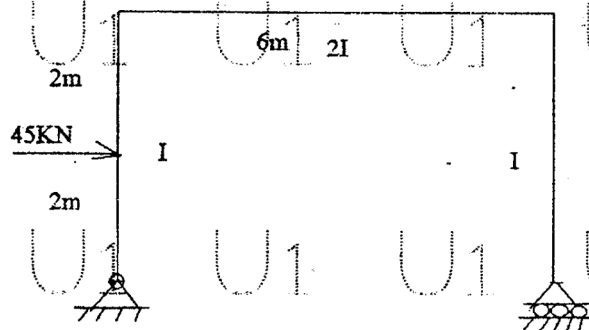


Figure: 3

OR

5. A three hinged parabolic arch of span 'L' has its abutments A and B at depths  $h_1$  and  $h_2$  below the crown C. The arch carries a concentrated load W at the crown. Determine the horizontal thrust, vertical reactions. Draw BMD. [10]
6. Analyse the propped cantilever shown in Figure 4. During loading the fixed end support is rotated 0.002 radians in anti-clockwise direction. Draw BMD. [10]

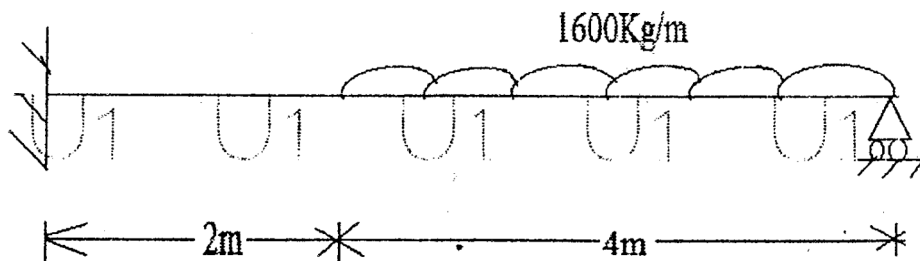


Figure: 4

OR

7. Determine the fixed end moments, reactions and, Draw BMD for the fixed beam shown in Figure 5. [10]

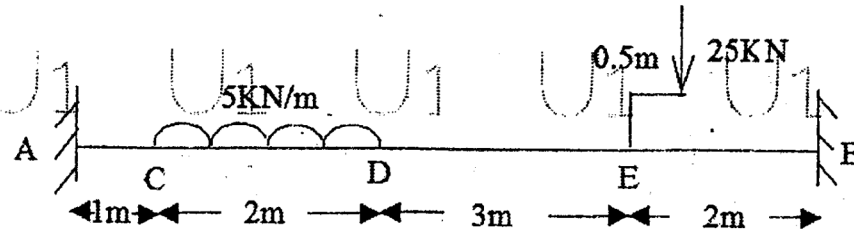


Figure: 5

8. Analyse the portal frame loaded as shown in the Figure 6 and Draw the BMD. The frame is fixed at 'A' and hinged at 'D'. Adopt Moment distribution Method. [10]

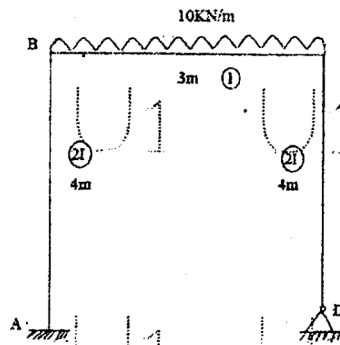


Figure: 6  
OR

9. Analyse the portal frame ABCD as shown in Figure 7. The ends A and D are hinged.  $EI = \text{constant}$  for the entire frame. Draw the BMD. (Use Slope Deflection Method). [10]

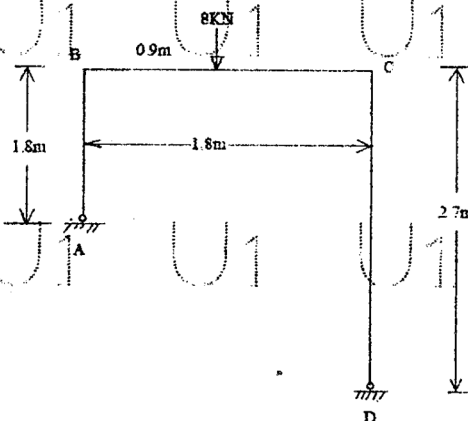


Figure: 7

10. For the beam shown in Figure 8. Draw the ILD for the following:

- Reaction  $V_b$  at B
- Reaction  $V_a$  at A
- Shear force at D
- Bending moment at D, find also maximum values of these quantities due to LL of 20 kN/m. [10]

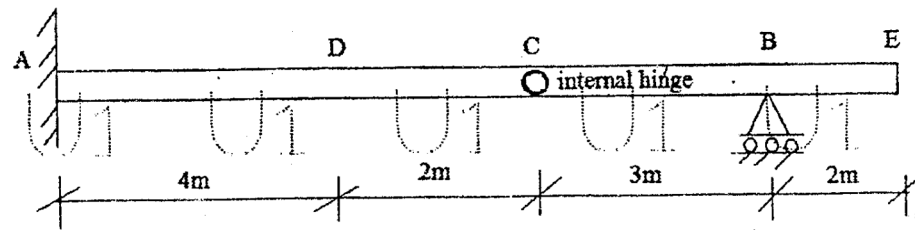


Figure: 8  
OR

11. Draw ILD, for top and bottom chords of the warren type truss shown in Figure 9. [10]

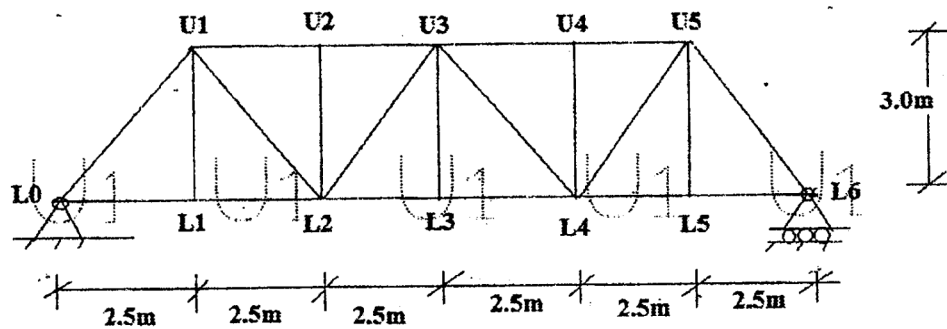


Figure: 9