Code No: R2031011 **R20** SET - 1

III B. Tech I Semester Supplementary Examinations, JULY - 2023
STRUCTURAL ANALYSIS
(Civil Engineering)

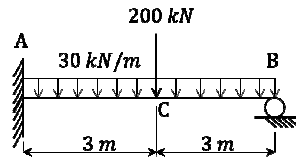Time: 3 hours   Max. Marks: 70

Answer any **FIVE** Questions **ONE** Question from **Each unit**
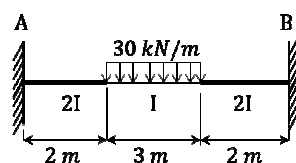All Questions Carry Equal Marks
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UNIT-I

1.   Determine the reactions and the fixing moments at the supports and draw their shear force and bending moment diagrams indicating the points of contra-flexure for the beams shown in the figures below:

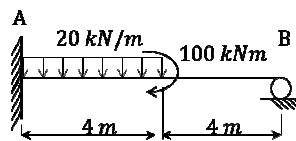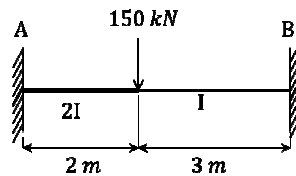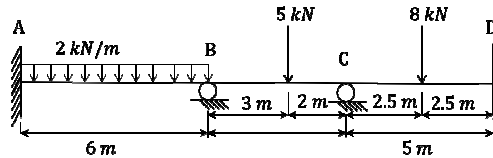   a)   [7M]

   b)   [7M]

(OR)

2. a)   [7M]


   b)   [7M]

UNIT-II

3. a) A continuous beam ABCD having three spans is fixed at ends A and D and is loaded as shown in the figure given below. Find the bending moments at the supports using slope-deflection method and draw the bending moments of the spans. Assume uniform flexural rigidity in all the spans.   [7M]
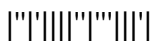

   b) Determine the support reactions of the continuous beam shown in the figure using moment-distribution method and draw its shear force and bending moment diagrams.   [7M]
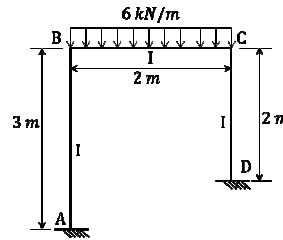

(OR)

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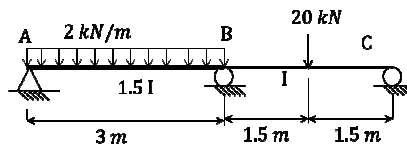
4. a) Analyze the rigid frame shown in the figure using slope-deflection method and find the support reactions and moments. Also draw their bending moment diagram and deflected shape.   [7M]


6 kN/m

B   C
    I
    2 m

3 m   I   2 m

    I   D

    A

    b) Using moment-distribution method, determine the support reactions and end moments of the beam shown in the figure. Draw the shear force and bending moment diagrams. Assume uniform flexural rigidity in all the spans.   [7M]
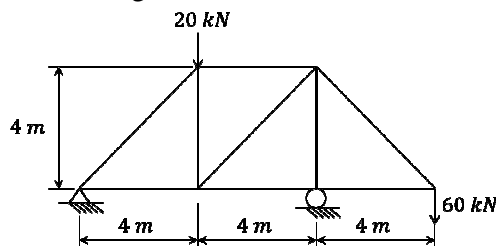

A   C
        16 kN/m
            B
    3 m   6 m
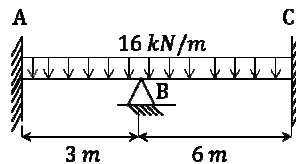
UNIT-III

5. a) A pin-jointed truss is loaded as shown in the figure. Find the axial forces in members (1) and (2) using the method of sections.   [7M]


            2 kN   3 kN
F   (1)   D   B   A
                                1.5 m
2 m   (2)
        E
    2 m   2 m   2 m
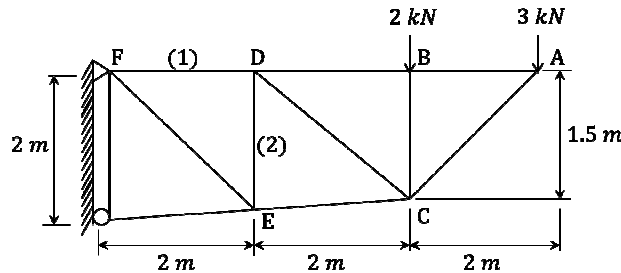
    b) Using the method of joints determine the member forces of the simply supported truss shown in the figure.   [7M]

            20 kN

4 m

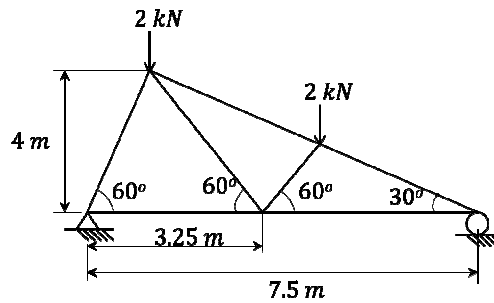   60 kN
    4 m   4 m   4 m

(OR)

6. a) A truss of span 8 m consisting of seven members each of 4 m length supported at its ends is loaded as shown in the figure. Determine the forces in the members by tension coefficient method.   [7M]

        3 kN   2 kN
            4 m
    4 m   4 m
        4 m   4 m
    60°   60°   60°   60°
        2 m   2 m
   4 m   4 m

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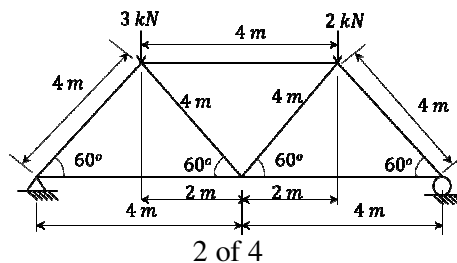
b) Determine the forces in the truss given below using the method of joints. [7M]

UNIT-IV

7. a) For the overhanging beam shown in the figure, determine the maximum [7M] positive and negative reactions at the supports A and B due to a uniform load of 6 kN/m that moves across the span from left to right. The length of the uniform load is more than the span of the beam. Also draw the influence line diagrams for the support reactions.
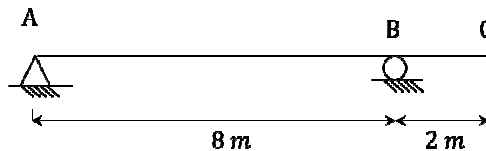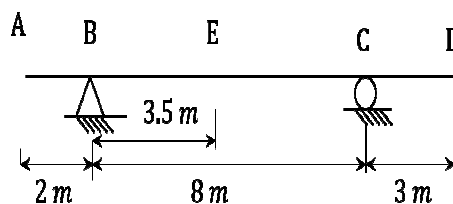

b) For the simply supported beam shown in the figure below, determine the [7M] maximum bending moment at C due to the passage of five wheel loads followed by an indefinite length of uniform loads.
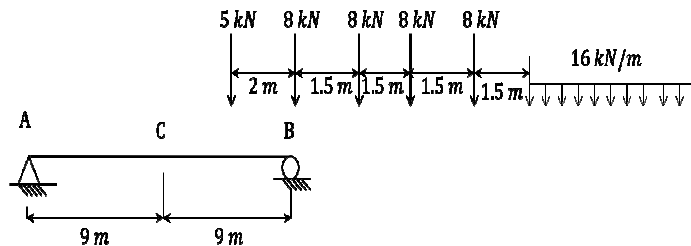

(OR)

8. a) For the statically determinate beam shown in the figure, draw the influence line [7M] diagrams for the reaction at support B and the shear force at section E when a unit load moves along the span of the beam.
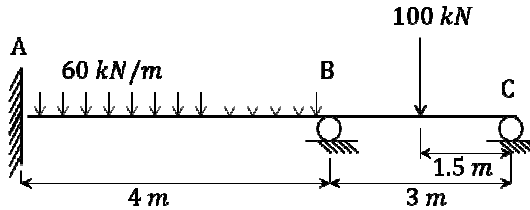

b) Determine the absolute maximum bending moment in a simply supported beam [7M] of span 12 m due to the passage of 4 equally spaced concentrated loads for 40 kN each placed 3 m apart from each other.
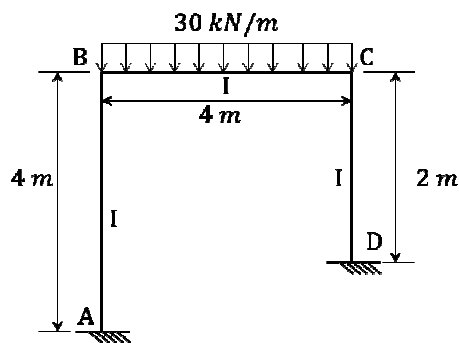
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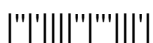
UNIT-V

9. a) Analyze the continuous beam shown in the figure using flexibility matrix [7M] method and draw the final bending moment diagram.
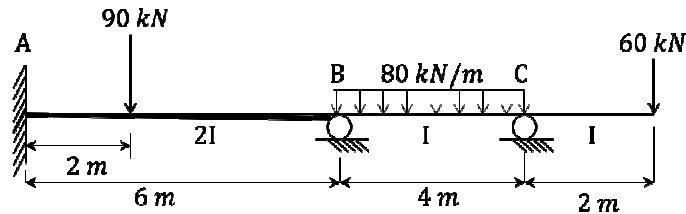

b) Analyze the portal frame ABCD using flexibility matrix method. Assume [7M] uniform flexural rigidity.

(OR)

10. a) Analyze the beam shown below using the stiffness matrix method. [7M]

b) Using the stiffness matrix method, analyze the portal frame shown in the [7M] figure.

|''|'|''|''|'''|''|'''|'|