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

III B. Tech I Semester Regular Examinations, Dec/Jan -2022-23
STRUCTURAL ANALYSIS
(Civil Engineering)

Time: 3 hours Max. Marks: 70

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

UNIT-I

1. A propped cantilever beam 3 m long has 100 mm wide and 150 mm deep cross-section. If the allowable bending stress and the deflection at the centre is 45 MPa and 2.5 mm respectively. Determine the safe uniformly distributed load the cantilever can carry. Take E = 120 GPa. [14M]

(OR)

2. A fixed beam AB of span 6 m is carrying a uniformly distributed load of 4 kN/m over the left half of the span. Find the fixing moments and support reactions. [14M]

UNIT-II

3. Analyze the continuous beam shown in figure 1, by using slope deflection method for (i) unyielding supports and (ii) yielding supports which permit a downward settlement of 48/EI at B. [14M]

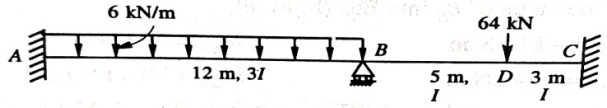

Figure 1.

(OR)

4. Analyze the continuous beam shown in figure 2, by using Moment Distribution Method. The yielding of supports permits a clockwise rotation of 4/EI at A and vertical downward settlements of 24/EI and 12/EI at B and C respectively. The flexural rigidity EI is constant. [14M]

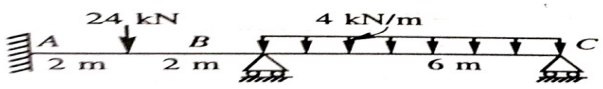

Figure 2.

UNIT-III

5. Determine the forces developed in the members of the truss shown in figure 3, by using method of joints. [14M]

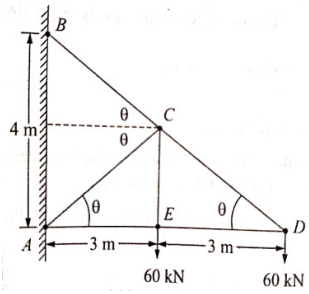

Figure 3.

(OR)

1 of 2

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

6. Determine the forces developed in all the members of the trusses shown in figure 4, by using method of tension coefficient. [14M]

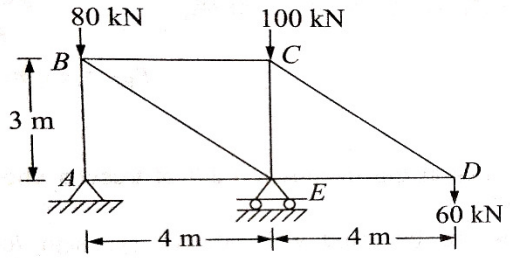

Figure 4.

UNIT-IV

7. A simply supported beam has a span of 15 m. Uniformly distributed load of 40 kN/m and 5 m long crosses the girder from left to right. Draw the influence line diagram for shear force and bending moment at a section 6 m from left end. Use these diagrams to calculate the maximum shear force and bending moment at this section. [14M]

(OR)

8. Four point loads, 8, 15, 15 and 10 kN have centre to centre spacing of 2 m between consecutive loads and they traverse a girder of 30 m span from left to right with 10 kN load leading. Calculate the maximum bending moment and shear force at 8 m from the left support. [14M]

UNIT-V

9. Analyze the continuous beam shown in figure 5, by stiffness matrix method. [14M]

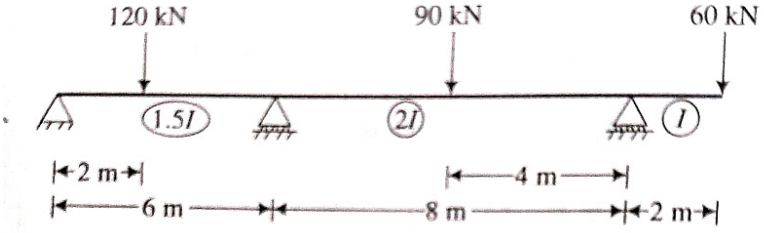

Figure 5.

(OR)

10. Analyze the continuous beam shown in figure 6, by using flexibility matrix method. [14M]

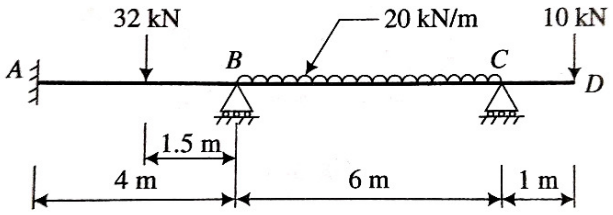

Figure 6.

Code No: R2031011 **R20** SET - 2

III B. Tech I Semester Regular Examinations, Dec/Jan -2022-23
STRUCTURAL ANALYSIS
(Civil Engineering)

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

UNIT-I

1. A cantilever of length L carries a point load W at its free end. It is propped at a distance of ¼ from the free end. Find out the prop reaction. [14M]

(OR)

2. A beam AB of uniform section and 6 m span is built at the ends. A uniformly distributed load of 3 kN/m runs over the left half of the span and there is in addition a concentrated load of 4 kN at right quarter as shown in figure 1. Determine the fixing moments at the ends and the reactions. [14M]

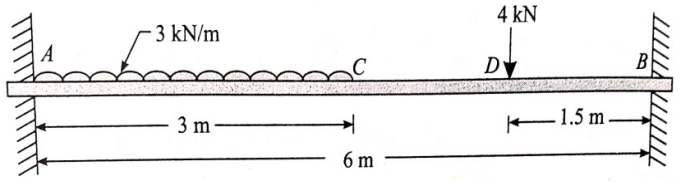

Figure 1.

UNIT-II

3. Analyze a continuous beam shown in figure 2, by using Slope deflection method for (i) unyielding supports and (ii) yielding supports which permit a clockwise rotation of 4/EI at A and downward settlements of 24/EI at B and 12/EI at C. The flexural rigidity EI is constant. [14M]

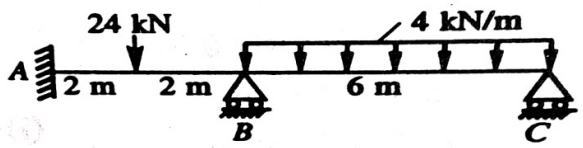

Figure 2.

(OR)

4. A portal frame is uniformly loaded with 3 kN/m as shown in figure 3. The frame is fixed at A and D and has rigid joints at B and C. Moment of inertia of the members of the frame are same. Draw bending moment diagram and sketch the deflected shape of the portal frame. [14M]

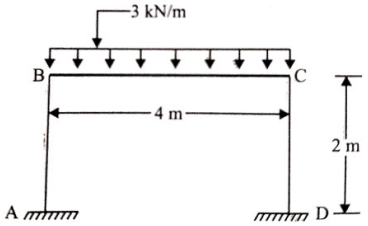

Figure 3.

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

UNIT-III

5. Determine the forces in all members of the truss shown in figure 4, by using method of joints. Indicate them on the sketch of the truss. [14M]

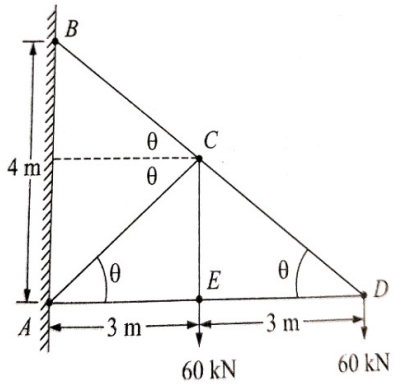

Figure 4.

(OR)

6. Analyze the truss shown in figure 5, by the method of tension coefficient. Determine the forces in all the members. [14M]

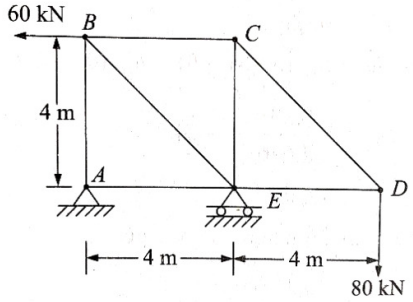

Figure 5.

UNIT-IV

7. The simply supported beam shown in figure 6, is subjected to a set of four concentrated loads which move from left to right. Determine (a) absolute maximum shear (b) absolute maximum moment in the beam. [14M]

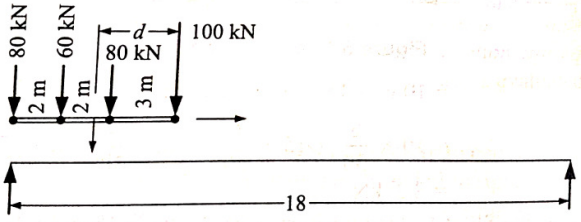

Figure 6.

(OR)

8. A uniformly distributed load of 50 kN/m of 6 m length crosses a girder of span 40 m from left to right. With the help of influence lines, determine the values of shear force and bending moment at a point 12 m from the left support, when the head of the load is 16 m from the left support. [14M]

UNIT-V

9. Analyze the continuous beam shown in figure 7, by using stiffness matrix method. [14M]

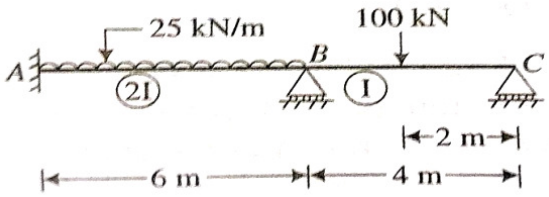

Figure 7.

(OR)

10. Analyze the continuous beam shown in figure 8, by using flexibility matrix method. [14M]

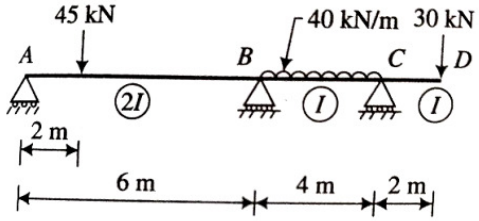

Figure 8.

Code No: R2031011 **R20** SET - 3

III B. Tech I Semester Regular Examinations, Dec/Jan -2022-23
STRUCTURAL ANALYSIS
(Civil Engineering)

Time: 3 hours Max. Marks: 70

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

UNIT-I

1. A beam AB 2 m long and carrying a uniformly distributed load of 15 kN/m is resting over a similar beam CD 1 m long as shown in figure 1. Draw the shear force and Bending moment diagrams. [14M]

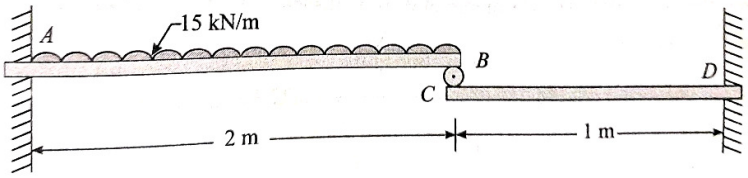

Figure 1.

(OR)

2. A fixed beam of 2 m span is carrying a point load of 50 kN at its mid-point. Find the bending moments and deflections of the beam under the load. [14M]

UNIT-II

3. Analyze the continuous beam shown in figure 2, by using Slope deflection method. [14M]

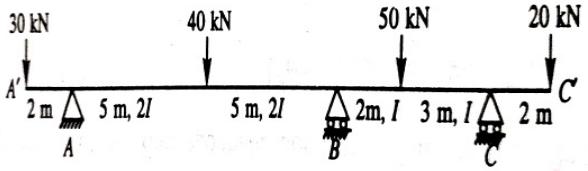

Figure 2.

(OR)

4. A simple portal frame ABCD, shown in figure 3, is loaded with uniformly distributed load of 1 kN/m as shown. Beam BC is 6 m long and columns AB and CD are 4 m long. The moment of inertia of the beam is twice the moment of inertia of columns. Find the support moments and bending moments by the moment distribution method. Draw the bending moment diagram also. [14M]

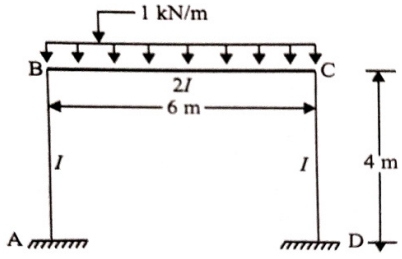

Figure 3.

UNIT-III

5. Determine the forces in all the members of the truss shown in figure 4 and sketch the member forces diagram. [14M]

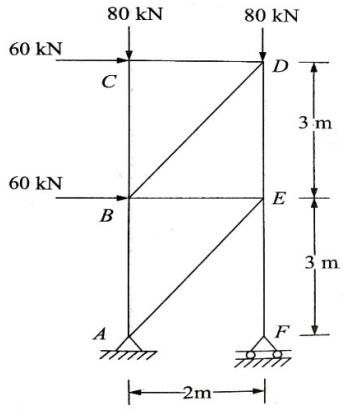

Figure 4.

(OR)

6. Analyze the truss shown in figure 5, by the method of tension coefficient and determine the forces in all the members. [14M]

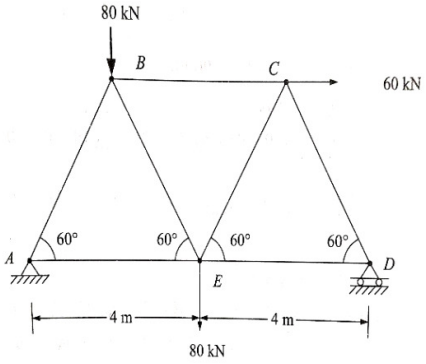

Figure 5.

UNIT-IV

7. A train of concentrated loads shown in figure 6, moves from left to right on a simply supported girder of span 16 m. Determine the absolute maximum shear force and bending moment developed in the beam. [14M]

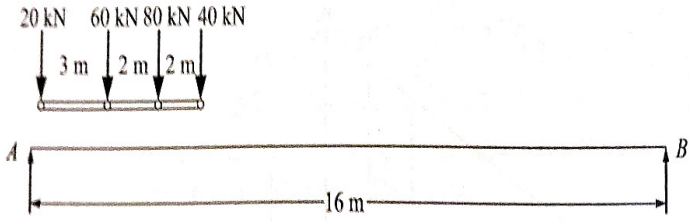

Figure 6.

(OR)

8. A simply supported beam has a span of 20 meters. A uniformly distributed load of 20 kN/m and 5 meters long crosses the span. Find the maximum bending moment produced at a point 8 meters from the left support. [14M]

UNIT-V

9. Analyze the portal frame shown in figure 7, by using stiffness matrix method. [14M]

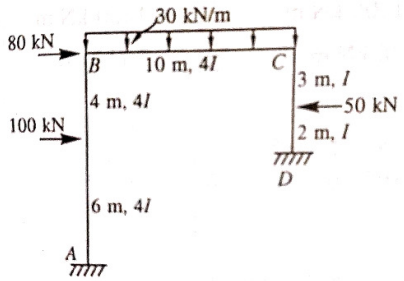

Figure 7.

(OR)

10. Analyze the continuous beam shown in figure 8, by using the flexibility matrix method. Flexural rigidity is constant throughout. [14M]

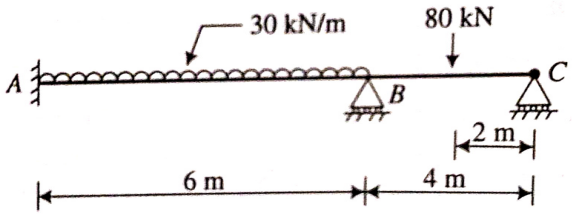

Figure 8.

Code No: R2031011 **R20** SET - 4

III B. Tech I Semester Regular Examinations, Dec/Jan -2022-23
STRUCTURAL ANALYSIS
(Civil Engineering)

Time: 3 hours Max. Marks: 70

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

UNIT-I

1. A cantilever ABC is fixed at A and propped at C is loaded as shown in figure 1. Find the reaction at C. [14M]

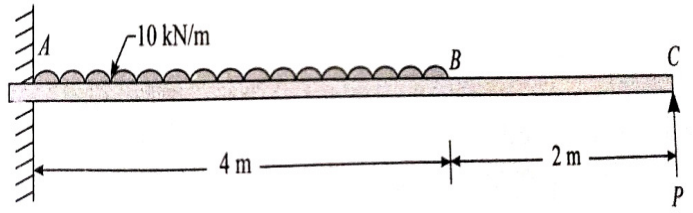

Figure 1.

(OR)

2. A fixed beam AB of span 3 m is subjected to a point load of 15 kN at a distance of 1 m from A. Determine the fixing moments of A and B. Sketch the fixing moments diagram. [14M]

UNIT-II

3. Analyze the continuous beam having an internal hinge at B as shown in figure 2, by using slope deflection method. Flexural rigidity EI is same for all members. [14M]

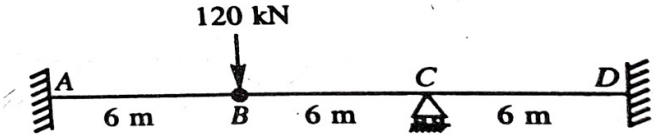

Figure 2.

(OR)

4. Evaluate bending moment at the joints of the continuous beam ABC shown in figure 3, by the Moment Distribution Method. Draw the bending moment diagram also. [14M]

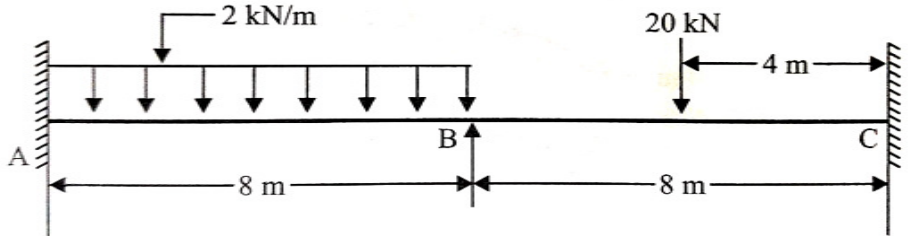

Figure 3.

UNIT-III

5. Determine the forces in all the members of the truss shown in figure 4. Draw a neat sketch of truss showing the member forces. [14M]

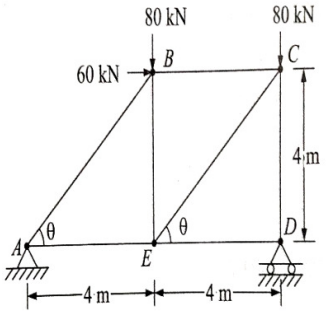

Figure 4.

(OR)

6. Evaluate the member forces of the truss shown in figure 5, by method of tension coefficient. [14M]

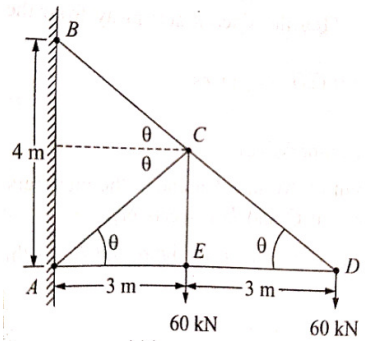

Figure 5.

UNIT-IV

7. A train of 5 wheel loads as shown in figure 6, crosses a simply supported beam of span 24 m from left to right. Calculate the maximum positive and negative shear force values at the centre of the span and the absolute maximum bending moment anywhere in the span. [14M]

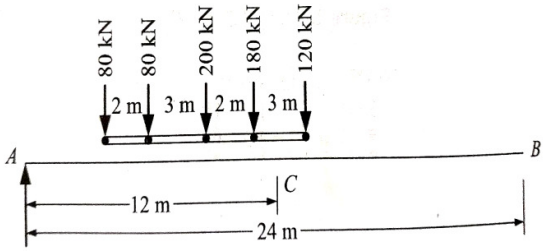

Figure 6.

(OR)

8. A uniformly distributed load of 50 kN/m, longer span, rolls over a beam of 25 m span. Using influence lines determine the maximum shear force and bending moment at a section 10 m from the left end support. [14M]

UNIT-V

9. Analyze the beam shown in figure 7, by using stiffness matrix method. [14M]

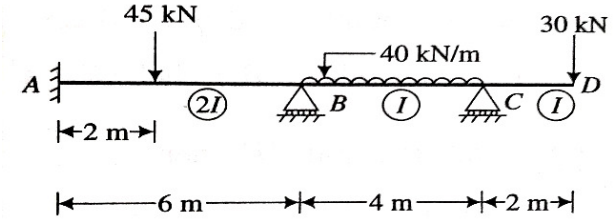

Figure 7.

(OR)

10. Analyze the continuous beam shown in figure 8, by using flexibility matrix method. If the downward settlement of supports B and C are 12 mm and 6 mm respectively. Given flexural rigidity EI = 20 X 10^{12} N-mm^2. [14M]

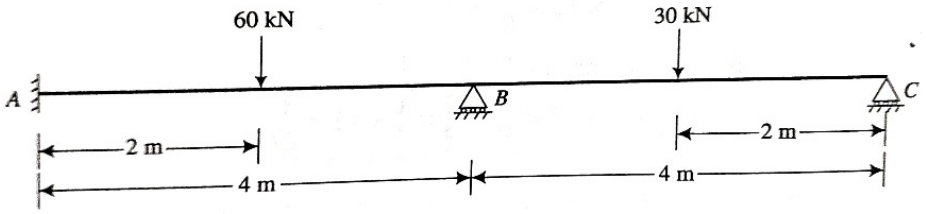

Figure 8.