Code :R7420108 **1**

IV B.Tech II Semester(R07) Regular Examinations, April 2011
ADVANCED STRUCTURAL ANALYSIS
(Civil Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE questions
All questions carry equal marks

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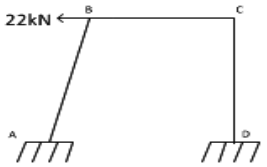
1. Analyze the portal frame ABCD shown in figure below by moment distribution method and draw the bending moment diagram. Take span AD=7.5m and height of the portal CD=6.5m. Length BC=4.5m. The frame is subjected to a horizontal load of 22 kN at B.



2. A two span continuous beam ABC is fixed at A and C and simply supported over the support B. The span AB=6.3m and span BC=7m. The span AB carries a UDL of 77 kN/m. and span BC carries a central point load of 40 kN. EI is constant for the whole beam. Find the moments and reactions at all the supports and draw the bending moment diagram using strain energy method.

3. A load of 50 kN crosses a simply supported bridge of 26m span. Draw influence lines for positive shear force, negative shear force and the bending moment at a section 10m from the left end. Using the influence lines, find the values of maximum shear force and bending moment at this section.

4. A two hinged parabolic arch has a span of 36m and a central rise of 6m. Draw the influence line diagrams for the positive and negative bending moments at a section 17m from the left support due to a rolling point load of 55 kN. Using this, calculate the maximum positive and negative bending moments at the section.

5. A two span continuous beam ABC is fixed at A and C and simply supported over the support B. the span AB=4m and span BC=5m. the span AB carries a UDL of 12 kN/m and span BC carries a central point load of 100 kN. EI is constant for the whole beam. Find the moments at all the supports using flexibility method.

6. A two span continuous beam ABC is fixed at A and simply supported over the support C. The beam is continuous over support B. The span AB=4.5m and span BC=5.2m. the span AB carries a UDL of 33 kN/m and span BC carries a central point load of 125 kN. EI is constant for the whole beam. Find the moments at all the supports using stiffness matrix method.

7. A fixed beam of span L has to carry a point load at a distance of 0.3L from the right support. Find the collapse load if the plastic moment of resistance of the half of the span is M_p and that of the right half of the span is 2.5 M_p.

8. A portal frame ABCD is fixed at A and hinged at D. The span AD=5m and height AB=CD=3m. A point load of 21kN is acting at the mid point of BC. A horizontal load of 20 kN is acting at B (left to right). Analyze the portal frame by flexibility method and draw the bending moment diagram. Take EI=1 for members AB and CD and EI=2 for BC.

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Code :R7420108 **2**

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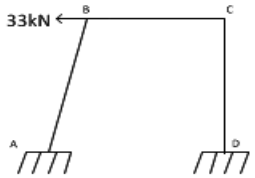
ADVANCED STRUCTURAL ANALYSIS
(Civil Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE questions
All questions carry equal marks
⋆ ⋆ ⋆ ⋆ ⋆

1. Analyze the portal frame ABCD shown in figure below by moment distribution method and draw the bending moment diagram. Take span AD=8.5m and height of the portal CD=7.5m. Length BC=5.5m. The frame is subjected to a horizontal load of 33 kN at B.



2. A two span continuous beam ABC is fixed at A and C and is continuous over B. The span AB=7m span BC=8m. The span AB carries a UDL of 10 kN/m and span BC carries a central point load of 110 kN. EI is constant for the whole beam. Find the moments and reactions at all the supports and draw the bending moment diagram using strain energy method.

3. A uniformly distributed load of 50 kN/m and 6m long, rolls over a simply supporter beam of span 30m. Draw influence lines for positive shear force, negative shear force and the bending moment at section 10m from the left end. Using the influence lines, calculate the maximum positive and negative shear force and bending moment that can occur on the span and the position of the load for the absolute maximum bending moment.

4. A two hinged parabolic arch has a span of 20m and a central rise of 4m. Draw the influence line diagrams for the positive and negative bending moments at a section 6m from the left support due to a rolling point load of 77 kN. Using this, calculate the maximum positive and negative bending moments at the section.

5. A two span continuous beam ABC is fixed at A and C and continuous over the support B. The span AB=4.6m and span BC=5.7m. The span AB carries a UDL of 14 kN/m and span BC carries an eccentric point load of 90 kN acting at 2m from support B. EI is constant for the whole beam. Find the moments at all the supports using flexibility method.

6. A two span continuous beam ABC is fixed at C and is simply supported over the support A. The beam is continuous over support B. The span AB=5.8m and span BC=4.7m. The span AB carries a UDL of 140 kN/m and span BC carries a central point load of 135kN. EI is constant for the whole beam. Find the rotations at all the supports using stiffness matrix method.

7. A fixed beam of span L has to carry a point load at a distance of 0.4L form the left support. Find the collapse load if the plastic moment of resistance of the left half of the span is $2M_p$ and that of the right half of the span is $1.3M_p$.

8. A portal frame ABCD is fixed at A and D. The span AD=4.4m and height AB=CD=3.3m. A point load of 111 kN is acting at the mid point of BC. A horizontal load of 100kN is acting at B (left to right). Analyze the portal frame by flexibility method and draw the bending moment diagram. Take EI=1 for members AB and CD and EI=2 for BC.

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Code :R7420108 **3**

IV B.Tech II Semester(R07) Regular Examinations, April 2011
ADVANCED STRUCTURAL ANALYSIS
(Civil Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE questions
All questions carry equal marks
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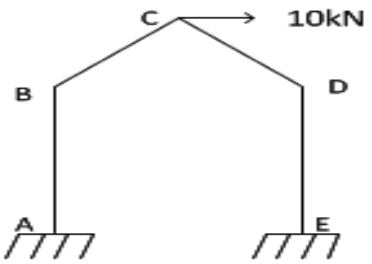
1. Analyze the Gable portal frame ABCDE shown in figure below by moment distribution method and draw the bending moment diagram. Take the lengths AB=BC=CD=DE=AE=5m. The frame is subjected to a horizontal load of 10 kN at C as shown in the figure.



2. A portal frame ABCD is fixed at supports A and hinged at D. The span AD=5.8m and the height AB=CD=4.9m. It carries a UDL of 79kN/m on BC. Analyze the frame by strain energy method and draw bending moment diagram. Take EI=1.

3. A uniformly distributed load of 52kN/m and 5.5m long, rolls over a simply supported beam of span 25m. Draw influence lines for positive shear force, negative shear force and the bending moment at a section 14m from the left end. Using the influence lines, calculate the maximum positive and negative shear force and bending moment at a section 14m from the left end support.

4. A three hinged parabolic arch has a span of 31m and a central rise of 5.1m. Draw the influence line diagrams for the positive and negative bending moments at a section 7.2m from the left hinge due to a rolling point load of 29 kN. Using this, calculate the maximum positive and negative bending moments at the section. Also calculate the position and magnitude of absolute maximum bending moment.

5. A two span continuous beam ABC is fixed at A and C and continuous over the support B. The span AB=7.4m and span BC=8.7m. The span AB carries a UDL of 25 kN/m and span BC carries an eccentric point load of 30 kN acting at 5.7m from support B.EI is constant for the whole beam. Find the moments at all the supports using flexibility method.

6. A two span continuous beam ABC is fixed at C and is simply supported over the support A. The beam is continuous over support B. The span AB=6.6m and span BC=7.7m. The span AB carries a UDL of 130 k/N m and span BC carries a central point load of 145 kN. EI is constant for the whole beam. Find the rotations at all the supports using stiffness matrix method.

7. A three span continuous beam ABCD is fixed at A and D and simply supported at B and C. AB=0.6L; BC=1.25L; CD=1.5L. Spans AB, BC and CD are subjected to central point loads of W, 1.5W, and 2W respectively. Calculate the value of W at collapse if the beam has a uniform plastic moment of resistance M_p.

8. Explain the various steps involved in the analysis of portal frames by flexibility method and derive the corresponding equations.

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Code :R7420108 4

IV B.Tech II Semester(R07) Regular Examinations, April 2011
ADVANCED STRUCTURAL ANALYSIS
(Civil Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE questions
All questions carry equal marks
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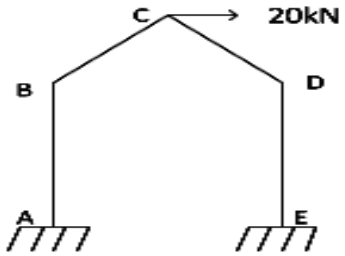
1. Analyze the Gable portal frame ABCDE shown in figure below by moment distribution method and draw the bending moment diagram. Take the lengths AB=BC=CD=DE=AE=6m. The frame is subjected to a horizontal load of 20 kN at C as shown in the figure.



2. A portal frame ABCD is fixed at support A and hinged at D. The span AD=5.3m and the height AB=CD=4.1m. It carries a point load of 150 kN in span BC at a distance of 2.3m from B. Analyze the frame by strain energy method and draw bending moment diagram. Take EI=1

3. A uniformly distributed load of 88kN/m intensity and 3.9m long rolls across a beam of 14.7m long and simply supported at both ends. Draw influence lines for positive shear force, negative shear force and the bending moment at a section 5.3m from the left end. Using the influence lines, Calculate the maximum positive and negative shear force and bending moment at a section 5.3m from the left end support. Also find the absolute maximum bending moment that can occur on the span and the position of the load for the absolute maximum bending moment.

4. A three hinged parabolic arch has a span of 28m and a central rise of 4m. Draw the influence line diagrams for the positive and negative bending moment at a section 7.8m from the left hinge due to a rolling point load of 115kN. Using this, calculate the maximum positive and negative bending moments at the section. Also calculate the position and magnitude of absolute maximum bending moment.

5. A two span continuous beam ABC is fixed at A and C and continuous over the support B. The span AB=9m and span BC=8m. The span AB carries a UDL of 125kN/m and span BC carries an eccentric point load of 130kN acting at 5m from support B. EI is constant for the whole beam. Find the moments at all the supports using flexibility method.

6. A two span continuous beam ABC is fixed at C and is simply supported over the support A. The beam is continuous over support B. The span AB=8.7m and span BC=9.7m. The span AB carries a UDL 0f 160kN/m and span BC carries a central point load of 175kN. EI is constant for the whole beam. Find the rotations at all the supports using stiffness matrix method.

7. A three span continuous beam ABCD is fixed at A and D and is continuous over B and C. AB=1.7L; BC=1.60L; CD=0.90L. Spans AB, BC and CD are subjected to central point loads of 3W, 1.9W and 0.75W respectively. Calculate the value of W at collapse if the beam has a uniform plastic moment of resistance $1.8M_p$.

8. Explain the various steps involved in the analysis of portal frames by stiffness method and derive the corresponding equations.

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