Code No: R31015 **R10** **Set No: 1**

III B.Tech. I Semester Supplementary Examinations, May 2013
STRUCTURAL ANALYSIS-II
(Civil Engineering)

Time: 3 Hours **Max Marks: 75**

Answer any FIVE Questions
All Questions carry equal marks
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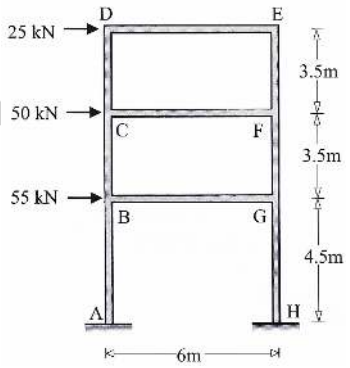
1. A parabolic arch rib, 20 m span and 3 m rise is hinged at the abutments and the crown and carries a point load of 10 kN at 7.5 m from the left hand hinge. Calculate the horizontal thrust and the bending moment at a section 7.5 m from right hand hinge. What is the value of the greatest bending moment in the arch, and where does it occurs?

2. A concentrated load of 100 kN is to be suspended from a point B at a height of 3 m above the ground, using a suitable funicular arch arrangement. Assume that two hinged supports, A and C, are available at ground level, separated by a distance of 7 m, in the same vertical plane as B. The vertical projection of point B intercepts AC at B□□, which is 4 am away from A. Sketch the appropriate funicular profile of the arch. Determine the horizontal thrust and axial compressive forces in the arch.

3. Consider a 3-storeyed three-bay symmetric multi-storey frame, with beams and columns generally having a length of 3 m, except for columns in the ground storey which has a height of 4.5 m and beams in the middle bay which have a span of 5 m. The frame is subject to lateral loads of 30 kN at the lower two floor levels and 15 kN at the roof level. Assume the columns to be fixed at the base. Applying the Portal Method, analyse the frame and draw approximate bending moment, shear force and axial force diagrams.



4. Consider a cable suspended between two level supports A and E, separated by a horizontal span of 40 m. Three equal concentrated loads of 50 kN each, hang symmetrically from cable at B, C, and D, spaced at 10 m intervals horizontally, with C located exactly in the middle of A and E. Sketch the cable profile, and show how the sag at B and D ($h_B = h_D$) is related to the maximum sag h_C at C. If the value of h_C is given as 4 m, find the support reactions and tensions in the various cable segments. Also find the total length S of the cable.

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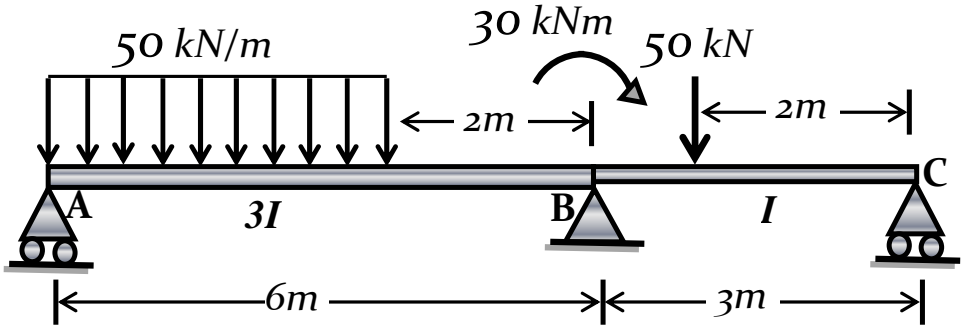
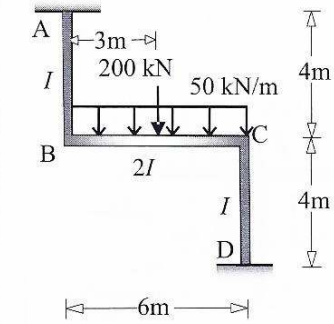
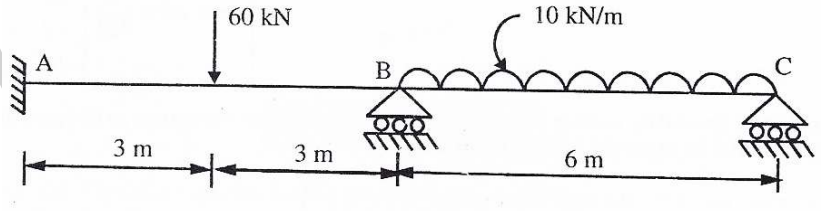
5. Analyse the two-span continuous beam ABC shown in figure below by Moment Distribution Method. Draw the free-body diagrams and shear force and bending moments. Also sketch the deflected shape. Assume EI = 75,000 kN-m^2.



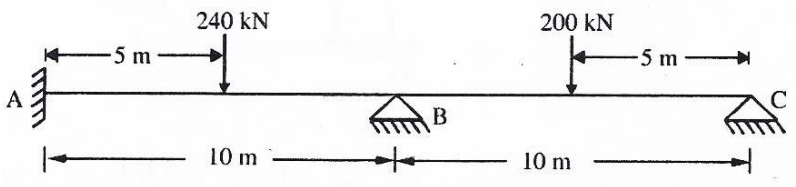
6. Analyse the anti-symmetric frame shown in figure below by Kani's method, and draw the axial force, shear force and bending moment diagrams. Also sketch the probable deflected shape.



7. Using the flexibility method analyse the continuous beam shown in figure below. Assume EI as uniform. Draw the shear force and bending moment diagrams. Also sketch the probable deflected shape.



8. A continuous beam ABC shown in figure below has two equal spans of 10 m each with A as fixed and support C as hinged. Spans AB and BC carry central concentrated loads of 240 kN and 200 kN respectively. Supports B and C settle by 2000/EI and 1000/EI respectively. Calculate the slopes at B and C in terms of EI and hence find the end moment at B using displacement method of analysis (stiffness matrix method).



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Code No: R31015 **R10** **Set No: 2**

III B.Tech. I Semester Supplementary Examinations, May 2013
STRUCTURAL ANALYSIS-II
(Civil Engineering)

Time: 3 Hours **Max Marks: 75**

Answer any FIVE Questions
All Questions carry equal marks
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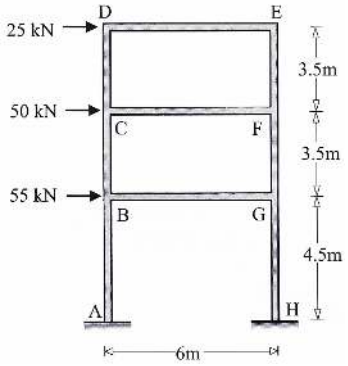
1. A three hinged parabolic arch has a span of 24 m and a rise to the central hinge of 4 m. The arch is loaded with two vertical 20 kN loads symmetrically situated on either side of the central hinge at 3 m horizontally from the hinge. Calculate the locations and values of the maximum positive and negative bending moments in the arch.

2. A concentrated load of 100 kN is to be suspended from a point B at a height of 3 m above the ground, using a suitable funicular arch arrangement. Assume that two hinged supports, A and C, are such that the support C is 1 m below A (and 4 m below B), separated by a distance of 7 m, in the same vertical plane as B. The vertical projection of point B intercepts AC at B□□, which is 4 am away from A. Sketch the appropriate funicular profile of the arch. Determine the horizontal thrust and axial compressive forces in the arch.

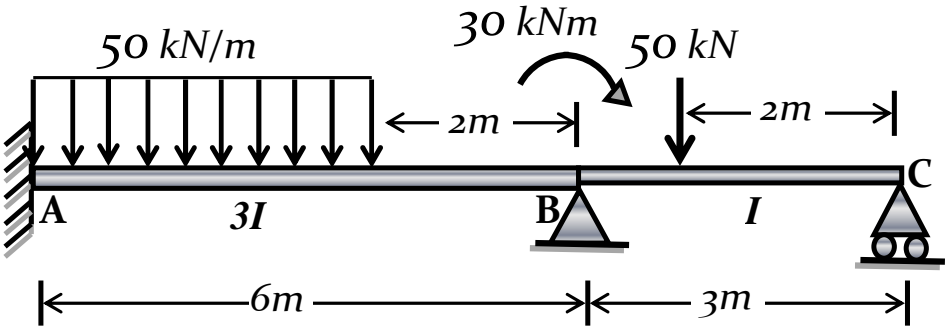
3. Consider a 3-storeyed three-bay symmetric multi-storey frame, with beams and columns generally having a length of 3 m, except for columns in the ground storey which has a height of 4.5 m and beams in the middle bay which have a span of 5 m. The frame is subject to lateral loads of 30 kN at the lower two floor levels and 15 kN at the roof level. Assume the columns to be fixed at the base. Applying the Cantilever Method, analyse the frame and draw approximate bending moment, shear force and axial force diagrams. Assume the interior columns to have twice as much area as exterior columns.



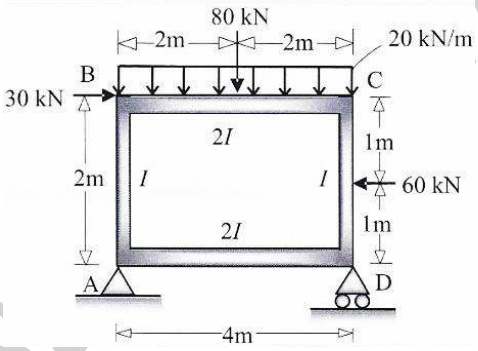
4. Consider a cable suspended between two level supports A and E, separated by a horizontal span of 40 m. Three concentrated loads of 75 kN, 50 kN, and 75 kN, hang symmetrically from cable at B, C, and D respectively, spaced at 10 m intervals horizontally, with C located exactly in the middle of A and E. Sketch the cable profile, and show how the sag at B and D ($h_B = h_D$) is related to the maximum sag h_C at C. If the value of h_C is given as 4 m, find the support reactions and tensions in the various cable segments. Also find the total length S of the cable.

Code No: R31015 **R10** **Set No: 2**

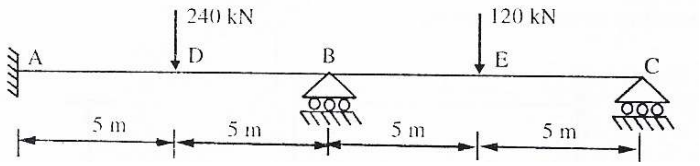
5. Analyse the two-span continuous beam ABC shown in figure below by Moment Distribution Method. Draw the free-body diagrams and shear force and bending moments. Also sketch the deflected shape.



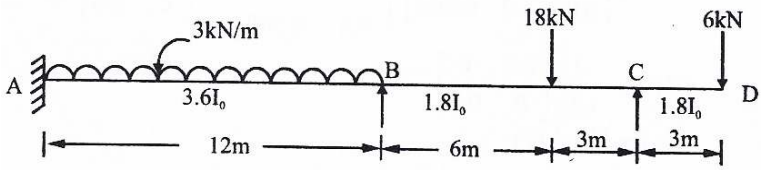
6. Analyse the box frame shown in figure below by Kani's method, and draw the axial force, shear force and bending moment diagrams. Also sketch the probable deflected shape.



7. Using the flexibility method analyse the continuous beam shown in figure below. Assume *EI* as uniform. Draw the shear force and bending moment diagrams. Also sketch the probable deflected shape.



8. Find end moments of the beam shown in figure below by stiffness matrix method and sketch the bending moment diagram.



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Code No: R31015 **R10** **Set No: 3**

III B.Tech. I Semester Supplementary Examinations, May 2013
STRUCTURAL ANALYSIS-II
(Civil Engineering)

Time: 3 Hours **Max Marks: 75**

Answer any FIVE Questions
All Questions carry equal marks
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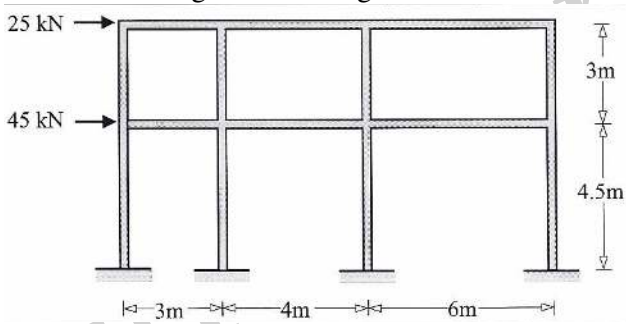
1. A three hinged parabolic arch of 30 m span and 6 m central rise carries a point load of 6 kN at 8 m horizontally from the left hand hinge. Calculate the normal thrust and shear force at the section under the load. Also calculate the maximum positive and negative bending moment.

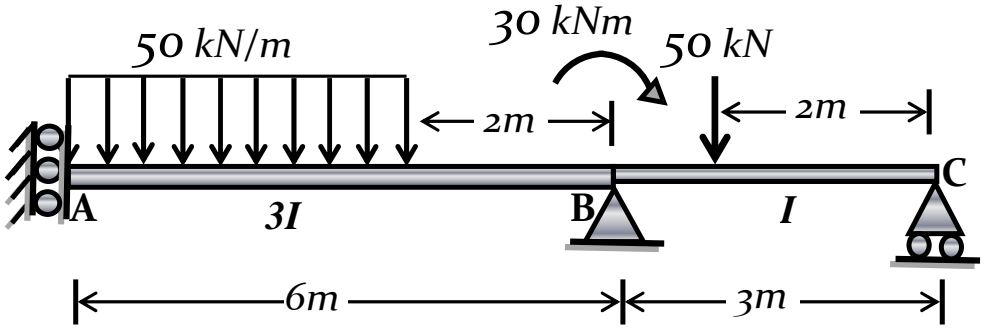
2. A parabolic two hinged arch has a span of 80 m and a rise of 10 m. A uniformly distributed load of 2.5 kN/m covers half of the span. If $I = I_0 \sec\theta$, find out the horizontal thrust at the hinges and radial shear at this section.

3. Analyse the two-storeyed laterally loaded frame shown in figure below by the Portal Method and draw the bending moment diagram.



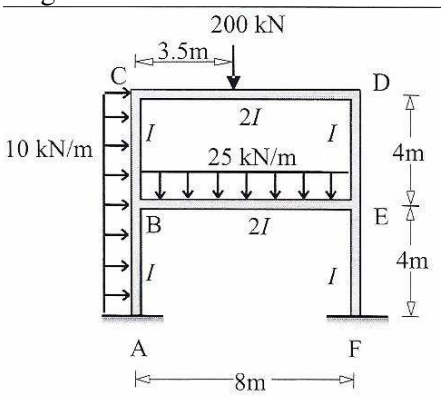
4. Consider a cable suspended between two level supports A and E, separated by a horizontal span of 40 m. Three equal concentrated loads of 50 kN each, hang symmetrically from cable at B, C, and D, spaced at 10 m intervals horizontally, with C located exactly in the middle of A and E. Sketch the cable profile, and show how the sag at B and D ($h_B = h_D$) is related to the maximum sag h_C at C. If the length of cable is specified as 48 m. Find the value of h_C and the tensions in the various cable segments.

5. Analyse the two-span continuous beam ABC shown in figure below by Moment Distribution Method. Draw the free-body diagrams and shear force and bending moments. Also sketch the deflected shape.

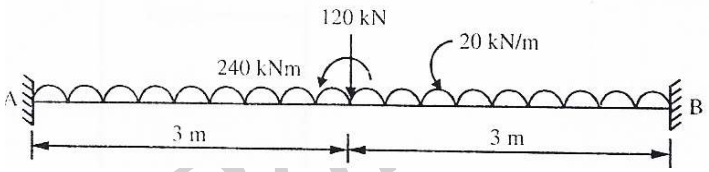


Code No: R31015 **R10** **Set No: 3**

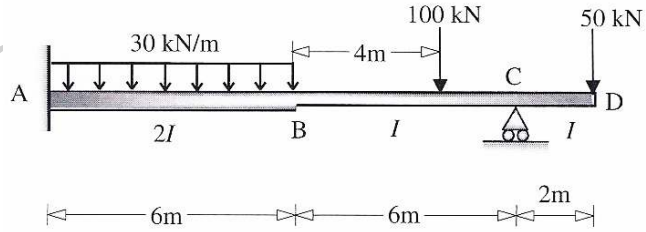
6. Analyse the two-storeyed portal frame in figure below using Kani's method and draw the bending moment diagram.



7. Using the flexibility method analyse the continuous beam shown in figure below. Assume *EI* as uniform. Draw the shear force and bending moment diagrams. Also sketch the probable deflected shape.



8. Analyse the non-prismatic fixed beam with overhang as shown in figure below by the stiffness method. Assume $EI = 80000$ kNm^2. Find the support reactions and draw the shear force and bending moment diagrams.



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Code No: R31015 **R10** **Set No: 4**

III B.Tech. I Semester Supplementary Examinations, May 2013
STRUCTURAL ANALYSIS-II
(Civil Engineering)

Time: 3 Hours **Max Marks: 75**

Answer any FIVE Questions
All Questions carry equal marks
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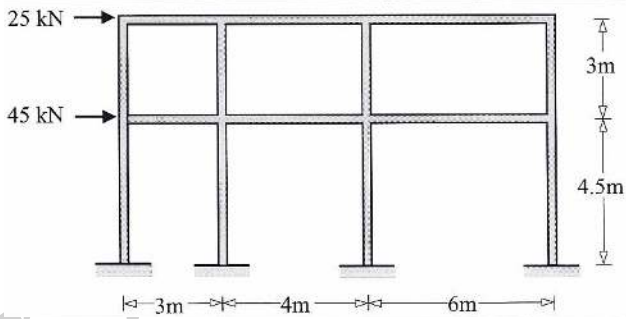
1. A three hinged parabolic arch has a span of 84 m and a rise of 18 m to the central pin at the crown. The rib carries load of intensity 2 kN per m uniformly distributed horizontally over a length of 1/3rd of the span from the left hand springing. Calculate the bending moments in the rib at the quarter span points.

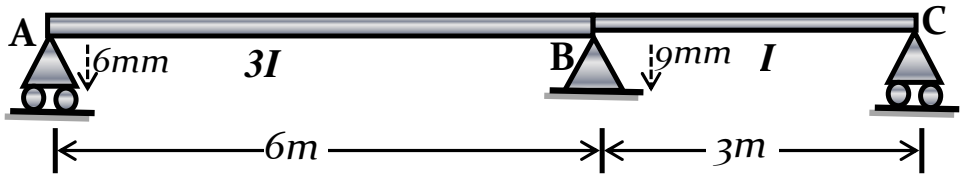
2. A two hinged semicircular arch of radius 10 m is subjected to a load of 10 kN acting on the section subtending an angle of 45^O with the central line of thrust of the arch at its center. Determine (a) the horizontal thrust at the hinges, (b) the vertical reactions at the hinges, and (c) maximum positive and negative bending moments.

3. Analyse the two-storeyed laterally loaded frame shown in figure below by the Cantilever Method and draw the bending moment diagram. Assume the interior columns to have twice as much area as exterior columns.



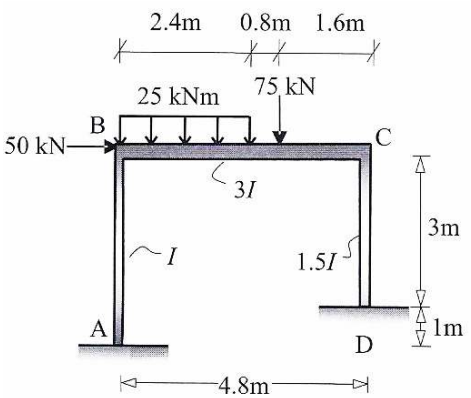
4. Consider a cable suspended between two supports A and E, separated by a horizontal span of 40 m. The level difference between supports A and E is 1 m. Three equal concentrated loads of 50 kN each, hang symmetrically from cable at B, C, and D, spaced at 10 m intervals horizontally, with C located exactly in the middle of A and E. Sketch the cable profile, and show how the sag at B and D ($h_B = h_D$) is related to the maximum sag h_C at C. If the value of h_C is given as 4 m, find the support reactions and tensions in the various cable segments. Also find the total length S of the cable.

5. Analyse the two-span continuous beam ABC shown in figure below, considering supports A and B to settle by 6 mm and 9 mm respectively by Moment Distribution Method. Draw the free-body diagrams and shear force and bending moments. Also sketch the deflected shape.

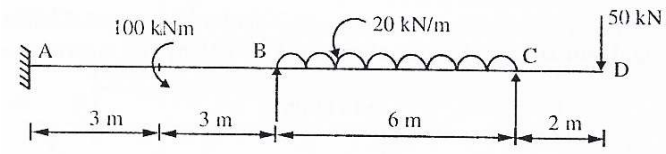


Code No: R31015 **R10** **Set No: 4**

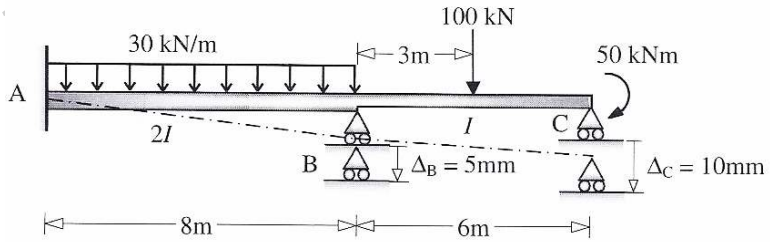
6. Analyse the portal frame shown in figure below by Kani's method. Assume constant flexural rigidity *EI*. Draw the bending moment diagram.



7. Using the flexibility method analyse the continuous beam shown in figure below. Assume *EI* as uniform. Draw the shear force and bending moment diagrams. Also sketch the probable deflected shape.



8. Analyse the continuous beam shown in figure below subject to the external loading and support settlements as indicated, by the stiffness method. Assume *EI* = 80000 kNm^2. Find the support reactions and draw the shear force and bending moment diagrams.



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