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

III B.Tech I Semester Supplementary Examinations, May/June - 2015

STRUCTURAL ANALYSIS-II

(Civil Engineering)

Time: 3 hours **Max. Marks: 75**

Answer any FIVE Questions

All Questions carry equal marks

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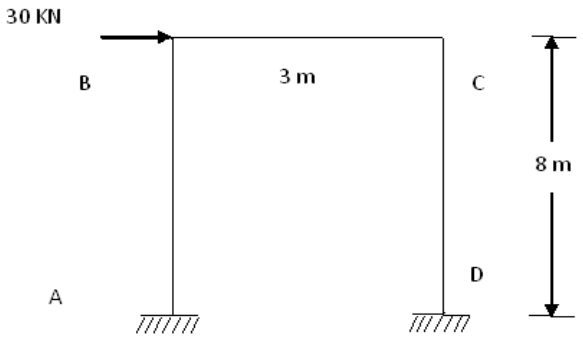
1 A three hinged parabolic arch of span 34m and rises 7 m carries a uniformly distributed load of 20 kN per m on the whole span and a point load of 140 kN at a distance of 8 m from the right end. Find the horizontal thrust. Find also bending moment, Normal thrust and radial shear at a section 5 m from the left end. [15]

2 A two hinged parabolic arch at span l and rise h carries a uniformly distributed load of w per unit run over the left half of span. The moment of inertia of the arch rib varies as the secant of the slope of the rib axis. Obtain the expression for the horizontal thrust H at the supports. If l = 25 m and h = 5 m and w = 25 kN/m, calculate (i) H at the supports and (ii) B.M at the quarter span point on the right half of the arch. [15]

3 Analyse the portal frame by using Portal Method. [15]



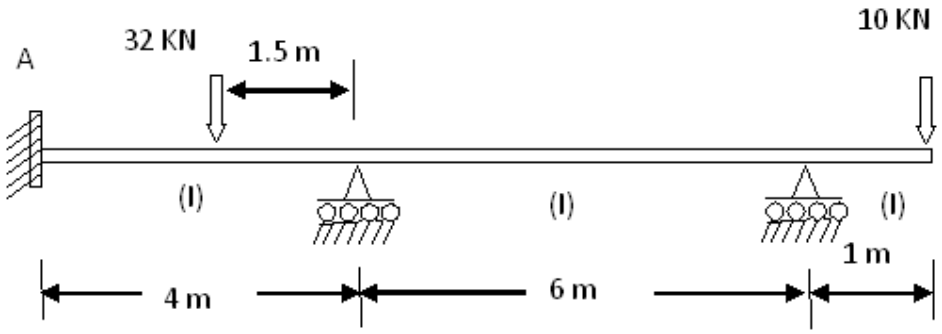
4 A cable of span 15 m and dip 4 m carries a uniformly distributed load of 25 kN/m over the whole span. Find (i) Maximum tension in the cable (ii) Minimum tension in the cable (iii) The length of the cable. [15]

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

5 A continuous beam ABCD is simply supported at A, B and C, and is fixed at D. The spans AB, BC and CD are 3 m, 4 m and 6 m long. The beam carries a point load of 15 kN on AB at 2 m from A, a point load of 25 kN at the middle of BC and a point load of 8 kN at the middle of CD. If $I_{ab} : I_{bc} : I_{cd} = 1 : 1 : 2$, find the support moments and reactions using moment distribution method. [15]

6 A continuous beam ABCD simply supported over each support consists of spans AB, BC and CD of lengths 3 m, 4 m and 3 m respectively. The beam carries a uniformly distributed load of 12 kN/m over the whole length. The supports B and C sink by 2 mm and 7 mm respectively. Determine the moments over each support using Kani's method. Take $E = 200$ kN/mm^2 and $I = 4 \times 10^7$ mm^4. [15]

7 Analyse the continuous beam by using Flexibility method if the downward settlements of supports B and C by 150/EI and 80/EI respectively. [15]



8 A continuous beam ABCD consists of spans AB, BC and CD of length 4 m each. Both ends of the beam are fixed. The span CD carries a point load of 20 kN at its middle point. Analyse the beam using Stiffness method. Assume the beam is of uniform section. [15]

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

III B.Tech I Semester Supplementary Examinations, May/June - 2015

STRUCTURAL ANALYSIS-II

(Civil Engineering)

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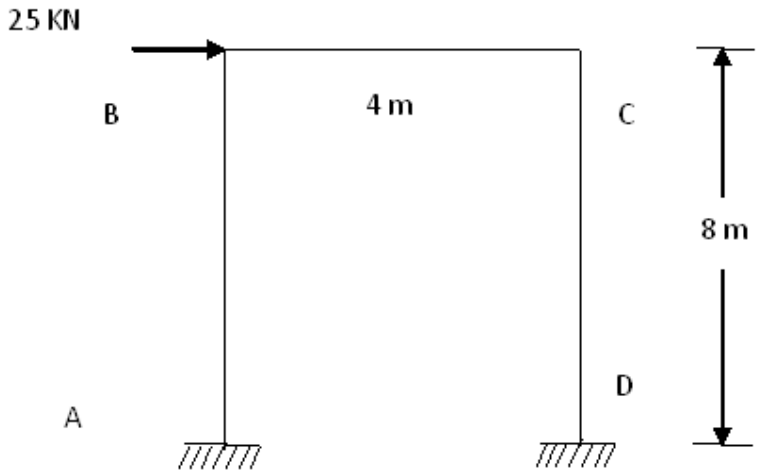
1 A three hinged circular arch consists of two quadrilateral parts of radii r1 and r2 and carries a uniformly distributed load of w per unit run over the whole span. Show that the horizontal thrust is given by w (r1 + r2) / 4. [15]

2 A two hinged parabolic arch at span 'l' and rise 'h' carries a triangular load covering a distance 'a' from the left end, the intensity varying uniformly from zero to 'w'. Obtain an expression for the horizontal thrust. [15]

3 Analyse the portal frame by using Cantilever Method. [15]



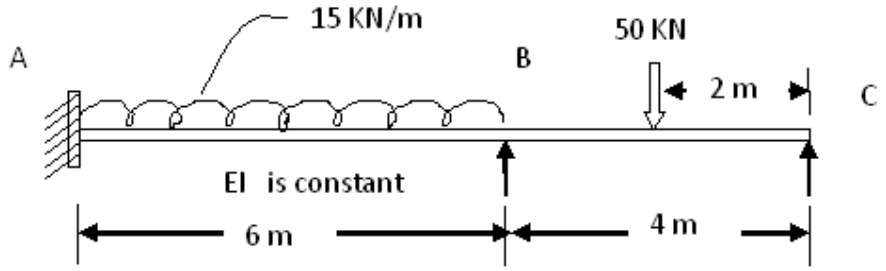
4 The three hinged stiffening girder of a suspension bridge of a span 160 m is subjected to two point loads of 220 kN and 340 kN at distances of 40 m and 120 m from the left end. Find the shear force and bending moment for the girder at a distance of 55 m from the left end. The supporting cable has a central dip of 22 m. Find also the maximum tension in the cable. [15]

5 A continuous beam ABCD is fixed at A and simply supported at B, C and D. The beam consists of spans AB = 5 m, BC = 6 m, CD = 4 m and overhang DE = 1.8 m. It carries a uniformly distributed load of 10 kN per metre on AB, a point load of 6 kN at the middle of BC, a point load of 8 kN on CD at 1 m from C and a uniformly distributed load of 2 kN per metre on the overhang DE. If $I_{ab} : I_{bc} : I_{cd} = 2 : 2 : 1$, Calculate the maximum bending stress caused by settlement of supports A by 6 mm, B by 12 mm and C by 6 mm using moment distribution method. [15]

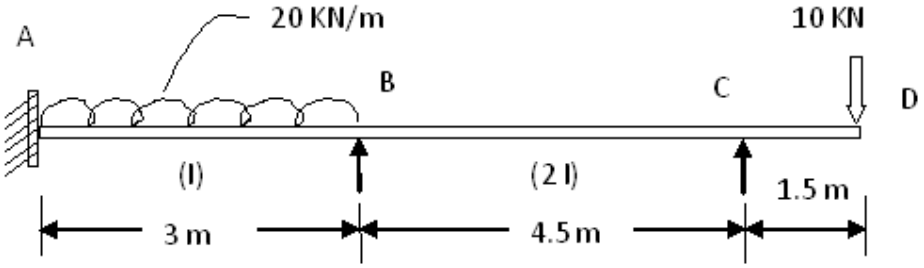
Code No: **R31015** **R10** **Set No. 2**

6 A rectangular portal frame ABCD consists of legs AB and DC of height 4 m and 6m respectively, and beam BC of length 8 m. The beam carries a uniformly distributed load of 14 kN/m and a point load at the centre. The legs are fixed at their bottom. $I_{ab} : I_{bc} : I_{cd} = 1 : 2 : 1$ Determine the moments at A, B, C and D using rotation contribution method. [15]

7 Analyse the continuous beam by using Force method. [15]



8 Analyse the continuous beam using Equilibrium method if the downward settlements of supports B and C by 120/EI and 60/EI respectively. [15]



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

III B.Tech I Semester Supplementary Examinations, May/June - 2015
STRUCTURAL ANALYSIS-II
(Civil Engineering)

Time: 3 hours **Max. Marks: 75**

Answer any FIVE Questions
All Questions carry equal marks
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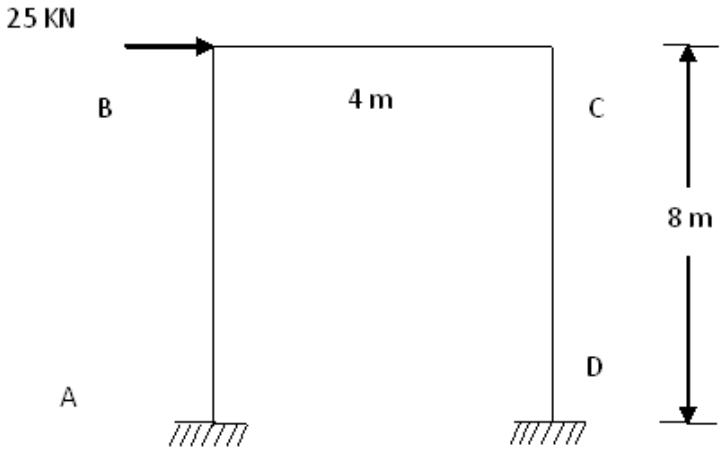
1 A three-hinged parabolic arch ACB of span 50 m. Its abutments A and B are at depths 14 m and 22 m below the crown C. The arch carries a concentrated load of 100 kN on AC at a distance of 10 m from C and a concentrated load of 220 kN on BC at a distance of 20 m from C. Calculate the vertical and horizontal reactions at the supports A and B. [15]

2 A two-hinged parabolic arch of span 14 m and rise 2.2 m carries two concentrated loads of 30 kN each placed at the crown at the right quarter span section. Find the horizontal thrust and the bending moment at the loaded points. [15]

3 Analyse the portal frame by using Cantilever Method. [15]

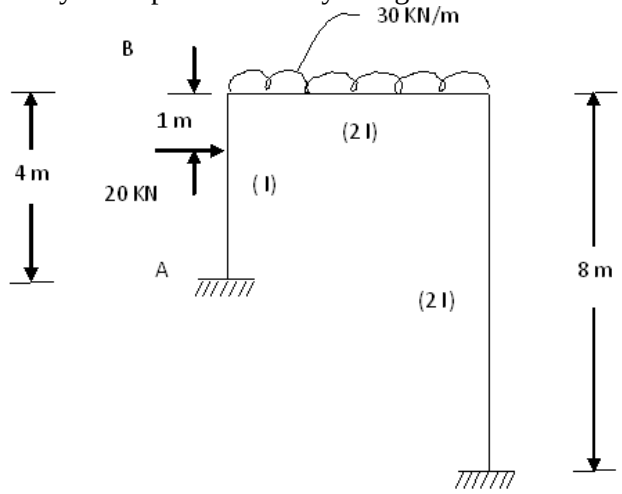


4 a) A flexible cable of span 35 m carries a uniformly distributed load of 15 kN/m over whole span. The left and right ends of the cable are 6 m and 18 m above the lowest point of the cable. Find the minimum and the maximum tension in the cable. [8]

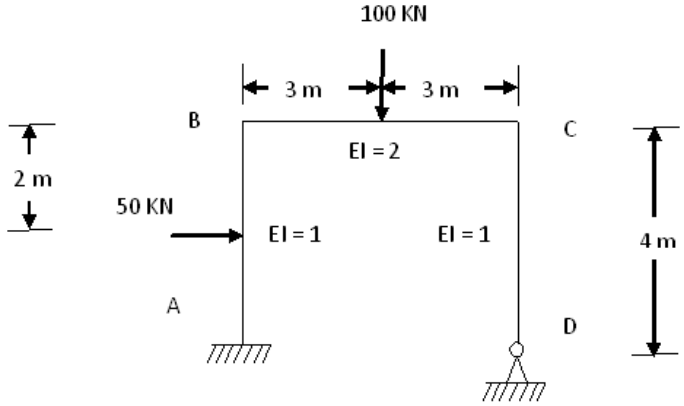
b) A cable of span 70 m and a dip of 4 m is subjected to a rise of temperature of 16^{o} C. Find the increase in the dip due to rise of temperature. Take $\alpha = 12 \times 10^{-6}$ per ^{o} C. [7]

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

5 Analyse the portal frame by using moment distribution method. [15]

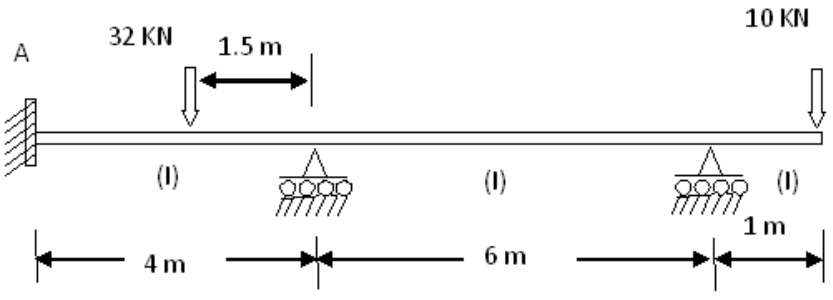


6 Analyse the portal frame by using rotation contribution method. [15]



7 A continuous beam ABCD consists of spans AB, BC and CD of length 4 m each. Both ends of the beam are fixed. The span CD carries a point load of 20 kN at its middle point. Analyse the beam using Flexibility method. Assume the beam is of uniform section. [15]

8 Analyse the continuous beam by using Stiffness method if the downward settlements of supports B and C by 140/EI and 70/EI respectively. [15]



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

III B.Tech I Semester Supplementary Examinations, May/June - 2015
STRUCTURAL ANALYSIS-II
(Civil Engineering)

Time: 3 hours **Max. Marks: 75**

Answer any FIVE Questions
All Questions carry equal marks
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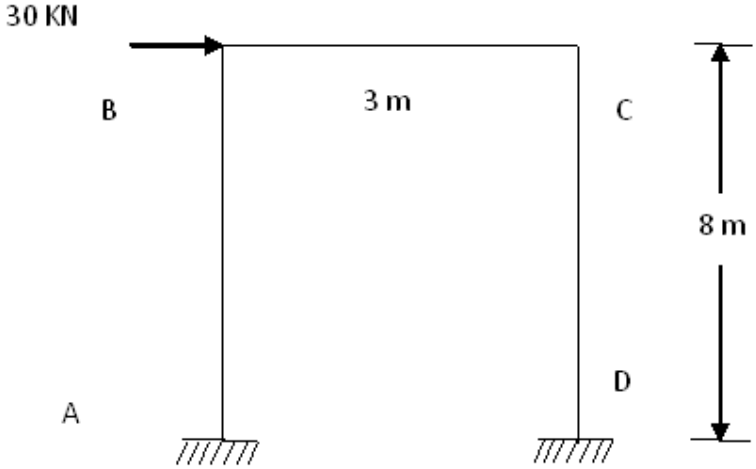
1 A three-hinged parabolic arch ACB of span 40 m and rise 14 m carries a uniformly distributed load of 75 kN per m on AC and two concentrated loads of 150 kN each at distances 7.5 m and 15 m from B. Find the horizontal thrust, bending moments, normal thrust and radial shear at a section D 12 m from A. [15]

2 A two-hinged parabolic arch of span 35 m and rise 5 m carries a uniformly distributed load of 40 kN/m on the left half the span. Determine the horizontal thrust and the bending moment at the crown. [15]

3 Analyse the portal frame by using Portal Method. [15]

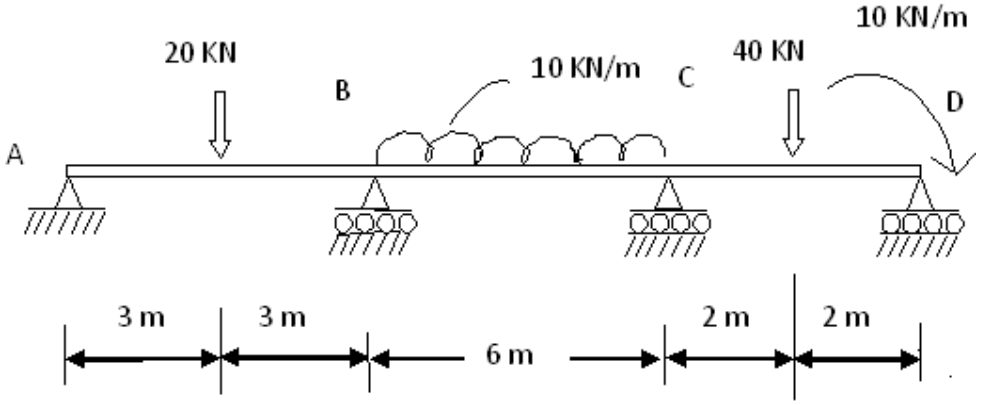


4 The two-hinged girders of suspension bridge haves a span of 140 m, the dip of the supporting cables being 14 m. If the girder is subjected to two point loads 170 kN and 320 kN at a distance 24 m and 116 m from the left end, find the shear force and bending moment for the girder at 30 m from the left end. Find also the maximum tension in the cable. [15]

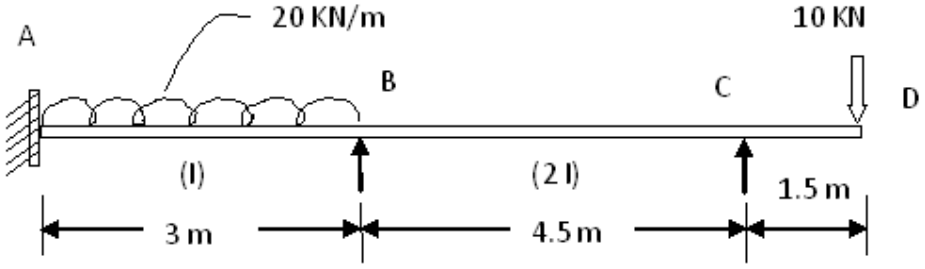
5 A symmetrical portal frame ABCD consists of columns AB and DC of height 5 m and beam BC of length 5 m. The beam carries a uniformly distributed load of 10 kN/m. If $I_{ab} = I_{bc} = 0.5\ I_{cd}$. Find the moments at A, B, C and D and the reaction at the supports using moment distribution method. Both the supports A and D are fixed. [15]

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

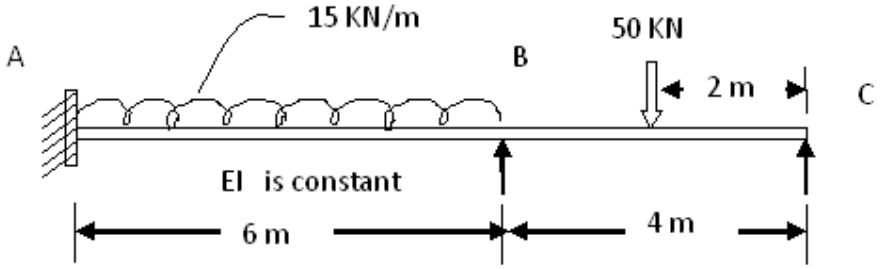
6 Find the support moments for the continuous beam using Kani's method. [15]



7 Analyse the continuous beam using Compatibility method if the downward settlements of supports B and C by 100/EI and 50/EI respectively. [15]



8 Analyse the continuous beam by using Displacement method. [15]



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