file-2

Hall Ticket Number:

CE224(R20)

B.TECH. DEGREE EXAMINATION, OCTOBER-2022

Semester IV [Second Year] (Regular)

STRUCTURAL ANALYSIS

Time: Three hours | Maximum Marks: 70

Answer Question No.1 compulsorily. (14 x 1 = 14)
Answer One Question from each unit. (4 x 14 = 56)

1. Answer the following in brief:

(a)	Demonstrate the nature of force in the cables.	CO1
(b)	Examine the true shape of cable structures.	CO1
(c)	What is an arch? Explain.	CO1
(d)	State Eddy's theorem as applicable to arches.	CO1
(e)	Distinguish between two hinged and three hinged arches.	CO1
(f)	What is meant by a perfect frame?	CO2
(g)	Show the positions of a moving point load for maximum negative and positive bending moments in a three hinged arch.	CO2
(h)	Name any four methods used for computation of deflections in structures.	CO2
(i)	Write the uses of an influence line diagram.	CO2
(j)	Determine the degree of indeterminacy for (i) fixed beam (ii) continuous beam.	CO3
(k)	Explain the advantages and disadvantages of the fixed beam.	CO3
(l)	Illustrate the advantages of continuous beam. Also draw its deflected shape.	CO3
(m)	Write the assumptions in the portal method for the analysis of frames subjected to horizontal loads.	CO4
(n)	What are assumptions made in the cantilever method?	CO4

UNIT – I

2. A suspension cable is supported at 2 points 30 m apart. The left support is 3 m above the right support. The cable is loaded with a uniformly distributed load of 40 kN/m throughout the span. The maximum dip in the cable from the left support is 5 m. Quote the maximum and minimum tensions in the cable. CO1

(OR)

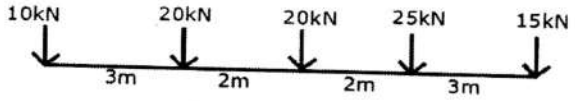
3. A three hinged circular arch of span 16 m and rise 4 m is subjected to two point loads of 100 kN and 80 kN at the left and right quarter span points respectively. Examine and find the reaction at the supports. Find also the bending moment, radial shear and normal thrust at 6 m from left support. CO1

UNIT – II

4. Using the method of virtual work, examine the deflection at the free end of the cantilever beam carrying uniformly distributed load 25 kN/m throughout the length of 12 m. Take E = 2 x 10^5 MPa, I = 825 x 10^7 mm^4. CO2

(OR)

5. A train of 5 wheel loads as shown in figure crosses a simply supported beam of span 24 m from left to right. Determine maximum end shear force, maximum positive and negative shear force values at centre of the span and the absolute maximum bending moment anywhere in the span. CO2



UNIT – III

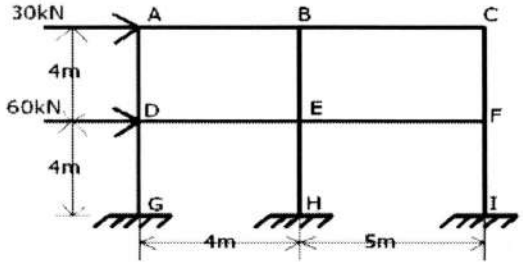
6. Construct a continuous beam ABC by three moment equation, fixed at its ends A and C and simply supported at support B. Span AB of length 10 m carries a point load of 115 kN at the left of support B. Span BC of length 10 m carries UDL of 20 kN/m of its full length. Draw its SFD and BMD. CO3

(OR)

7. A fixed beam of AB, length 6 m carries point loads of 160 kN and 120 kN at a distance of 2 m and 4 m from the left end. Predict the following: CO3
   (i) FEM
   (ii) Support Reactions
   (iii) Draw SFD and BMD

UNIT – IV

8. Analyze the frame shown in figure, by cantilever method. Calculate the beam moments and column moments. Draw the bending moment diagrams. CO4



(OR)

9. Analyze a portal frame of two storeyed, two bay of 5 m bay length each and height 5 m each. A horizontal force of 120 kN is applied at top storey and 240 kN is applied at lower storey. Use the portal frame method. CO4

****

CE224(R20)

file-2

Hall Ticket Number:

CE224 (R20)

B.TECH. DEGREE EXAMINATION, JANUARY-2023

Semester IV [Second Year] (Supplementary)

STRUCTURAL ANALYSIS

Time: Three hours | Maximum Marks: 70

Answer Question No.1 compulsorily. (14 x 1 = 14)

Answer One Question from each unit. (4 x 14 = 56)

1. Answer the following:

(a)	List out the different types of cable structures.	CO1
(b)	Examine the true shape of cable structures.	CO1
(c)	Define radial shear and normal thrust.	CO1
(d)	Classify the arches according to their shapes	CO1
(e)	Discuss the degree of static indeterminacy of a three hinged parabolic arch.	CO1
(f)	State Castigliano's first theorem.	CO2
(g)	Draw the influence line for radial shear at a section of a three hinged arch.	CO2
(h)	When a series of wheel loads move along a girder, what is the condition for getting maximum bending moment under any one point load?	CO2
(i)	Define Influence line & draw shear force diagrams at a section of a beam.	CO2
(j)	What is a continuous beam and classify its types?	CO3
(k)	Define a fixed beam.	CO3
(l)	Describe statically determinate and statically indeterminate with an example.	CO3
(m)	Write the assumptions in the cantilever method for the analysis of frames subjected to horizontal loads.	CO4
(n)	What are assumptions made in the portal method?	CO4

UNIT – I

2. A suspension cable is supported at 2 points 25 m apart. The left support is 2.5 m above the right support. The cable is loaded with a uniformly distributed load of 10 kN/m throughout the span.The maximum dip in the cable from the left support is 4 m. Quote the maximum and minimum tensions in the cable. CO1

(OR)

3. Formulate the expression for horizontal thrust in a two hinged semi-circular arch of radius R, carrying a point load W at the crown. CO1

UNIT – II

4. State and prove CO2
   (i) Castigliano's theorem
   (ii) Maxwell Reciprocal theorem

(OR)

5. A beam has a span of 24 m, draw the influence line diagram for the bending moment and shear force at a section 8 m from the left and section due to two point loads of 10 kN and 6 kN at a fixed distance of 2 m apart rolling from left to right with 6 kN load leading. CO2

UNIT – III

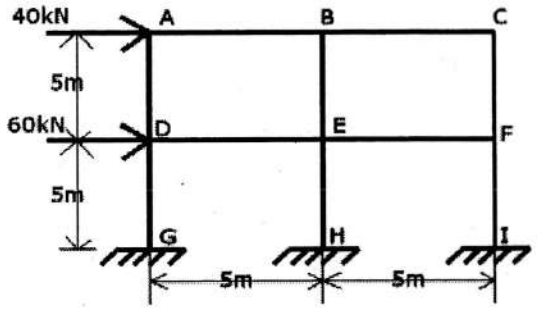
6. A continuous beam ABCD simply supported at all its end. Span AB of length 6 m carries a central point load of 40 kN. Span BC of 7 m length carries 50 kN to the right of 3 m from support B. Span CD of length 6 m carries a UDL of 10 kN/m throughout its length. If the support B sinks by 10 mm, Calculate CO3
   (i) Moment at the supports
   (ii) Reactions at the supports
   (iii) Draw SFD and BMD

(OR)

7. A fixed beam of 6 m span is loaded with point loads of 150 kN at a distance of 2 m from each support. Predict the shear force and bending moment diagram. Also find the maximum deflection. Take E = 200 GPa and $I = 8 \times 10^8$ mm^4. CO3

UNIT – IV

8. Analyze the frame shown in figure by portal method. Calculate the beam moments and column moments. Draw the bending moment diagrams. CO4

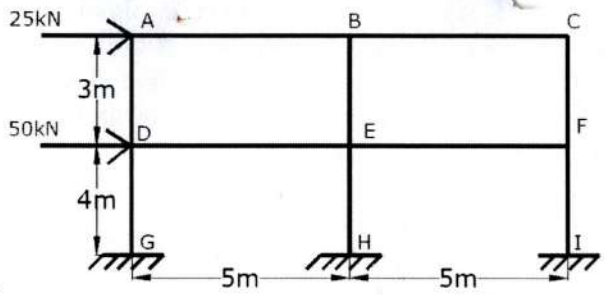


(OR)

9. (a) Explain the cantilever method for analyzing a building frame subjected to horizontal forces. (7M) CO4
   (b) What are the different types of substitute frames? Explain. (7M) CO4

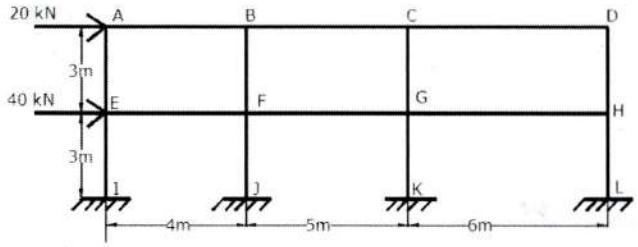
****

CE224 (R20)



(OR)

9. Analyse the frame shown in figure by Portal method. Draw column bending moment diagram and beam bending moment diagram. CO4



****

Hall Ticket Number:

Fil-2

CE224 (R20)

B.TECH. DEGREE EXAMINATION, JULY-2023

Semester IV [Second Year] (Regular & Supplementary)

STRUCTURAL ANALYSIS

Time: Three hours Maximum Marks: 70

Answer Question No.1 compulsorily. (14 x 1 = 14)
Answer One Question from each unit. (4 x 14 = 56)

1. Answer the following:
   (a) A three hinged parabolic arch span 'L' and rise 'h' carries a uniformly distributed load 'W' kN at the crown. Find the horizontal reaction at supports. CO1
   (b) What is the shape of cable, if the cable suspended between two supports is subjected to uniformly distributed load? CO1
   (c) A cable suspended between two supports, the supports are at same level. Dip at middle of the cable is 8 m, length between two supports is 30 m is subjected to a uniformly distributed load 20 kN/m . Find the maximum tension in the cable. CO1
   (d) Define Betti's theorem. CO1
   (e) State Castigliano's theorem –I. CO1
   (f) Define virtual work. CO1
   (g) Draw the influence line diagram for bending moment at 5 m from left support for a simply supported beam of span 20 m. CO2
   (h) Compute fixed end moments for a fixed beam span 8 m is subjected to uniformly distributed load of 40 kN/m on whole span. CO2
   (i) Write the Clapeyron's theorem of three moments equation. CO2
   (j) Define Muller-Breslau's principle. CO2
   (k) Write the horizontal thrust for a two hinged semi circular arch subjected to point load at its crown. CO3
   (l) Define point of contraflexure. CO4

(m) State the assumptions made in cantilever method method. CO4

(n) Write the assumptions made in portal method. CO4

UNIT – I

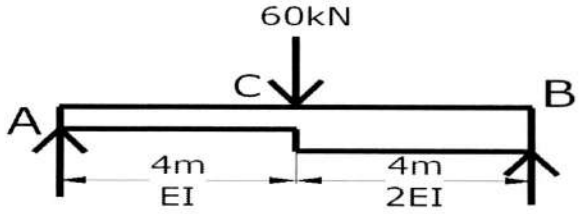
2. A three hinged parabolic arch of span of 40 m has abutments at un-equal levels. The highest point of the arch is 4 m above left support and 9 m above the right abutment. The arch is subjected to u.d.l of 15 kN/m over its entire horizontal span. Determine the horizontal thrust, reactions at supports and bending moment at a point 8 m from the left support. CO1

(OR)

3. A suspension bridge is of 50 m span with a 16 m wide road way. It is subjected to a load of 25 kN/m^2 including dead loads. The bridge is supported by a pair of cables having a central dip of 4.2 m. Determine the cross sectional area of the cable necessary if the maximum permissible stress in the cable material not to exceed 600 N/mm^2. CO1

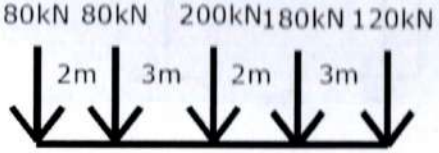
UNIT – II

4. Determine deflection under 60 kN in the beam shown in figure. CO2



(OR)

5. A train of 5 wheel loads as shown in figure crosses a simply supported beam of span 24 m from left to right. Determine maximum positive and negative shear force at center of the span and the absolute maximum bending moment anywhere in the span. CO2

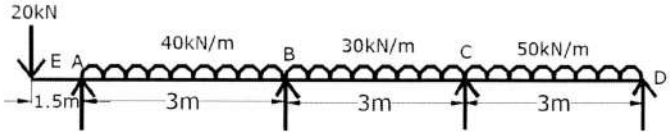


UNIT – III

6. A fixed beam AB of span 5 m carries uniformly distributed load of 20 kN/m run on the entire beam. The level of right support sinks by 10 mm below that left end. If E = 2.08 x 10^8 kN/m^2 and I = 4.52 x 10^{-5} m^4. Determine (i) Moments at supports (ii) Reactions at the supports (iii) Draw the bending moment diagram. CO3

(OR)

7. Analyse the beam shown in figure by theorem of three moment's method. Draw the shear force and bending moment diagram. CO3

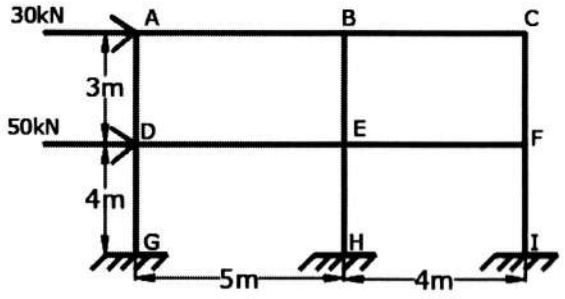


UNIT – IV

8. Analyse the frame shown in figure by cantilever method. Draw column bending moment diagram and beam bending moment diagram. CO4

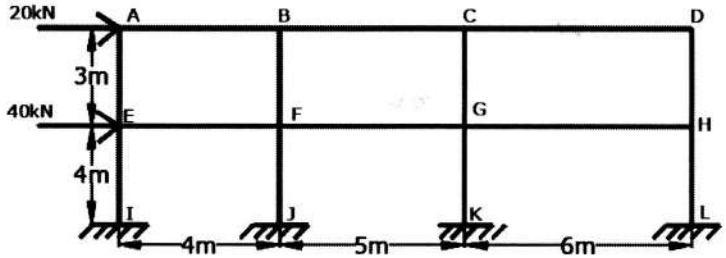
UNIT – IV

8. Analyse the frame shown in figure by Portal method. Draw column bending moment diagram and beam bending moment diagram. CO4



(OR)

9. Analyse the frame shown in figure by Cantilever method. Draw column bending moment diagram and beam bending moment diagram. CO4



****

Hall Ticket Number:

F-2

CE224 (R20)

B.TECH. DEGREE EXAMINATION, NOVEMBER-2023

Semester IV [Second Year] (Supplementary)

STRUCTURAL ANALYSIS

Time: Three hours Maximum Marks: 70

Answer Question No.1 compulsorily. (14 x 1 = 14)
Answer One Question from each unit. (4 x 14 = 56)

1. Answer the following:
   (a) A three hinged parabolic arch span 'L' and rise 'h' carries a uniformly distributed a point load W kN at the crown. Find the horizontal reaction at supports. CO1
   (b) Determine the maximum tension in the cable suspended between two supports. The supports are at same level and supports are 40 m apart is subjected to point load 40 kN at middle and dip is 6 m from its support. CO1
   (c) A cable suspended between two supports, the supports are at same level. Dip at middle of the cable is 6 m, length between two supports is 30 m is subjected to a uniformly distributed load 30 kN/m . Determine the length of the cable. CO1
   (d) Define Maxwell's reciprocal theorem. CO1
   (e) Define Castigliano's theorem –II. CO1
   (f) Write the formula for deflection of a joint of pin jointed plane frame. CO1
   (g) Draw the influence line diagram for shear force at a section 6 m from left support for a simply supported beam of span 20 m. CO2
   (h) Compute fixed end moments for a fixed beam span 6 m is subjected to point load of 50 kN at a distance 3 m from left support. Draw its bending moment diagram. CO2
   (i) Write the Clapeyron's theorem of three moment's equation. CO2

(j) Find the radius of two hinged segmental arch of span 25 m and rise 5 m. CO2

(k) Find the degree of static indeterminacy for two hinged arch. CO3

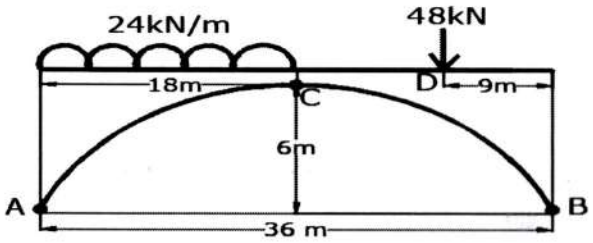
(l) Find the point of contraflexure for fixed beam subjected to point load W kN at middle. CO4

(m) Write the assumptions made in cantilever method method. CO4

(n) State the assumptions made in portal method. CO4

UNIT – I

2. A three hinged circular arch is loaded is loaded as shown in figure. Determine the bending moment, normal thrust and radial shear at 9 m from the left support. CO1

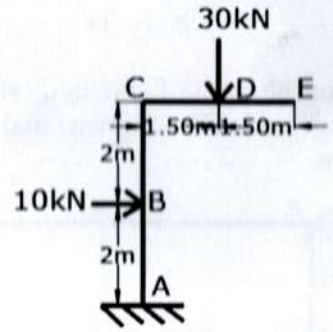


(OR)

3. A light cable is supported at two points 20 m apart which are at the same level. The cable supports three concentrated loads 40 kN, 30 kN and 20 kN are at 5 m, 10 m and 15 m from left supports. The dip at first point is found to be 0.8 m. Determine the tension in the different segments and find the total length of the cable. CO1

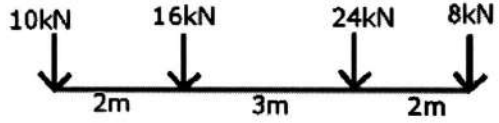
UNIT – II

4. Determine the vertical and horizontal deflection at the free end of frame shown in figure. Assume uniform flexural rigidity throughout. CO2



(OR)

5. The load system shown in figure crosses a plate girder bridge of span 30 m from left to right. Determine the maximum bending moment and shear force at section 8 m from left support. Also find the absolute maximum bending moment. CO2

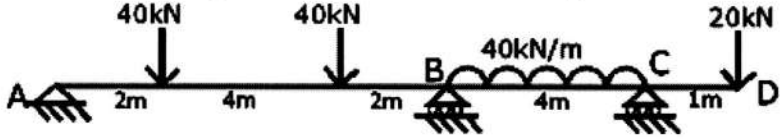


UNIT – III

6. A fixed beam of span 6 m carries a point loads 60 kN at 2 m from the left end in addition to a uniformly distributed load of 20 kN/m over the whole span. Determine the fixed end moments and support reactions. Draw the shear force and bending moment diagrams. CO3

(OR)

7. Analyse the continuous beam loaded as shown in figure, using Clapeyron's theorem of three moment's method and draw the bending moment and shear force diagrams. CO3



F-2

Hall Ticket Number:

CE224 (R20)

B.TECH. DEGREE EXAMINATION, MAY-2024

Semester IV [Second Year] (Regular & Supplementary)

STRUCTURAL ANALYSIS

Time: Three hours | Maximum Marks: 70

Answer Question No.1 compulsorily. (14 x 1 = 14)
Answer One Question from each unit. (4 x 14 = 56)

1. Answer the following:
   (a) Describe catenary. CO1
   (b) List out the different types of cable structures. CO1
   (c) Classify the arches according to their shapes CO1
   (d) Distinguish between two hinged and three hinged arches. CO1
   (e) Explain Maxwell-Betti's theorem. CO2
   (f) What is meant by a perfect frame? CO2
   (g) Show the positions of a moving point load for maximum negative and positive bending moments in a three hinged arch. CO2
   (h) Draw influence lines for support reactions in a simply supported beam. CO2
   (i) Determine the degree of indeterminacy for (i) fixed beam (ii) continuous beam. CO3
   (j) Explain the advantages and disadvantages of the fixed beam. CO3
   (k) Illustrate the advantages of continuous beam. Also draw its deflected shape. CO3
   (l) Differentiate between 'determinate' and 'indeterminate' structures. CO4
   (m) Write the assumptions in the portal method for the analysis of frames subjected to horizontal loads. CO4
   (n) What are assumptions made in the cantilever method? CO4

UNIT – I

2. A suspension cable of 75 m horizontal span and central dip 6 m has a stiffening girder hinged at both ends. The dead load transmitted to the cable including its own weight is 1500 kN. The girder carries a live load of 30 kN/m uniformly distributed over the left half of the span. Assuming the girder to be rigid, assess the shear force and bending moment in the girder at 20 m from the left support. Also assess the maximum tension in the cable. CO1

(OR)

3. A three hinged parabolic arch has supports at different levels having span 20 m and carries a UDL of 30 kN/m over the left half of the span. The left support is 5 m below the crown and the right support is 4 m below the crown. Draw the BMD. Also analyze and find the normal thrust and radial shear at a section 4 m from the left support. CO1

UNIT – II

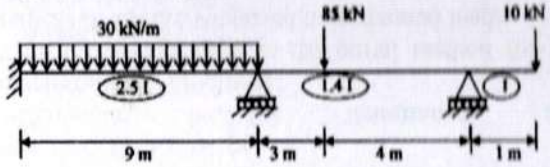
4. Using the method of virtual work, examine the deflection at the free end of the cantilever beam carrying uniformly distributed load 25 kN/m throughout the length of 12 m. Take $E = 2 \times 10^5$ MPa, $I = 8.25 \times 10^9$ mm^4. CO2

(OR)

5. A simply supported beam has a span of 16 m, is subjected to a UDL (dead load) of 5 kN/m and a UDL (live load) of 8 kN/m (longer than the span) traveling from left to right. CO2
   (i) Draw the ILD for shear force and bending moment at a section 4 m from left end.
   (ii) Use these diagrams to determine the maximum shear force and bending moment at this section.

UNIT – III

6. Analyze the continuous beam shown in figure, using the theorem of three moments and draw shear force and bending moment diagrams. CO3

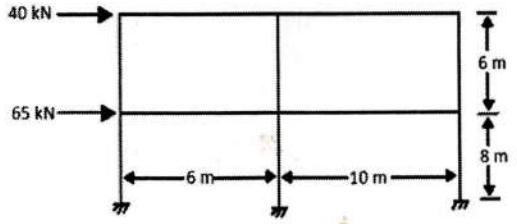


(OR)

7. A fixed beam of 6 m span is loaded with point loads of 150 kN at a distance of 2 m from each support. Predict the shear force and bending moment diagram. Also find the maximum deflection. Take E = 200 GPa and $I = 8 \times 10^8$ mm^4. CO3

UNIT – IV

8. Analyze the frame shown in figure by Portal method. Calculate the beam moments and column moments. Draw the bending moment diagrams. CO4



(OR)

9. Write the steps involved in the Portal method and Cantilever method. CO4

****

CE224 (R20)

F-2

Hall Ticket Number:

CE224 (R20)

B.TECH. DEGREE EXAMINATION, SEPTEMBER-2024

Semester IV [Second Year] (Supplementary)

STRUCTURAL ANALYSIS

Time: Three hours | Maximum Marks: 70

Answer Question No.1 compulsorily. (14 x 1 = 14)

Answer One Question from each unit. (4 x 14 = 56)

1. Answer the following:

(a)	Describe cable structures. Mention its needs.	CO1
(b)	Demonstrate the nature of force in the cables.	CO1
(c)	Define radial shear and normal thrust.	CO1
(d)	State Eddy's theorem as applicable to arches.	CO1
(e)	Discuss the degree of static indeterminacy of a three hinged parabolic arch.	CO1
(f)	State Castigliano's first theorem.	CO2
(g)	Define influence line diagram.	CO2
(h)	Define strain energy	CO2
(i)	Describe statically determinate and statically indeterminate with an example.	CO3
(j)	Define Muller Breslau's principle.	CO3
(k)	Define a fixed beam.	CO3
(l)	Differentiate external and internal indeterminacy of structures.	CO4
(m)	Write the assumptions in the cantilever method for the analysis of frames subjected to horizontal loads.	CO4
(n)	What are assumptions made in the portal method?	CO4

UNIT – I

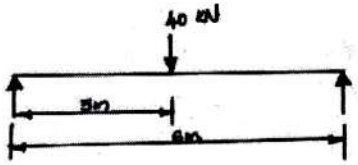
2. A suspension cable has a span of 120 m and a central dip of 10 m is suspended from the same level at both towers. The bridge is stiffened by a stiffening girder hinged at the end supports. The girder carries a single concentrated load of 100 kN at a point 30 m from left end. Assuming equal tension in the suspension hangers, find (i) The horizontal tension in the cable (ii) The maximum positive bending moment. CO1

(OR)

3. A three hinged parabolic arch of span 30 m and rise 5 m carries a uniformly distributed load of 40 kN per meter on the whole span and a point load of 200 kN at a distance of 5 m from the right end. Find and examine the horizontal thrust, resultant reaction, bending moment and normal thrust at a section 5 m from the left end. CO1

UNIT – II

4. Determine the deflection and slope under the load for the beam of rectangular cross section 150 mm x 100 mm as shown in the figure. Take E = 200 GPa. Use Castigliano's theorem. CO2

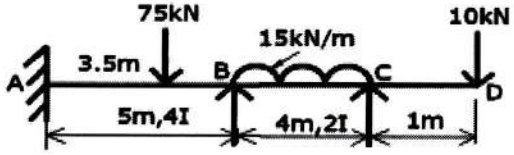


(OR)

5. A system of four loads 80, 160, 160 and 120 kN crosses a simply supported beam of span 25 m with the 120 kN load leading. The loads are equally spaced at 1 m. Determine the values of the following using influence lines.
   (i) Absolute Maximum bending moment and shear force.
   (ii) Maximum bending moment at 10 m from the left support. CO2

UNIT – III

6. Analyze the continuous beam shown below by Clapreyon's theorem of three moments. CO3

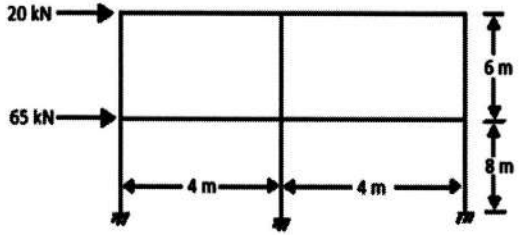


(OR)

7. A fixed beam of length 3 m carries a point load of 45 kN at a distance of 2 m from A. If the flexural rigidity of the Beam is 1 x 10^4 kN.m^2, Determine (i) Fixed end moments at A & B (ii) Deflection under the Load (iii) Maximum Deflection (iv) Position of maximum deflection. CO3

UNIT – IV

8. Analyze the frame shown in figure by cantilever method. Calculate the beam moments and column moments. Draw the bending moment diagrams. CO4



(OR)

9. Analyze a portal frame of two storeyed, two bay of 5 m bay length each and height 5 m each. A horizontal force of 120 kN is applied at top storey and 240 kN is applied at lower storey. Use the portal frame method. CO4

****

CE224 (R20)