



Name :
Roll No. :
Invigilator's Signature :

CS/B.TECH(CE-OLD)/SEM-5/CE-504/2012-13

2012

STRUCTURAL ANALYSIS – II

Time Allotted : 3 Hours

Full Marks : 70

The figures in the margin indicate full marks.

*Candidates are required to give their answers in their own words
as far as practicable.*

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives of the following : $10 \times 1 = 10$
 - i) A parabolic two hinged arch subjected to uniform distributed loading per unit horizontal loading length over the entire span has
 - a) zero BM at all section
 - b) maximum normal thrust at the crown
 - c) has varying radial shear over its length
 - d) a parabolic variation of BM over the entire span.
 - ii) Shape of the influence line diagram for horizontal thrust in a symmetric three hinged parabolic arch is :
 - a) rectangle
 - b) triangle
 - c) trapezoidal
 - d) parabolic
 - iii) Moment distribution method is
 - a) interactive
 - b) finite difference
 - c) finite element
 - d) None of these.



- iv) Carry-over factor is defined as
 - a) modulus of elasticity
 - b) flexural rigidity EI
 - c) the ratio of moment produced at far end to the applied moment at the end
 - d) the value of moment to be applied to an end to cause slope of 1 radian.
- v) When far end of a beam member is hinged, carry over factor at the far end is
 - a) 0.05
 - b) 0.0
 - c) 1.0
 - d) none of these.
- vi) The slope-deflection method of structural analysis is a
 - a) Displacement method
 - b) force method
 - c) hybrid method
 - d) none of these.
- vii) In Kani's method, the sum of the rotation factors of all the members meeting at a joint is
 - a) 1
 - b) - 1
 - c) 1/2
 - d) - 1/2.
- viii) The shape of the cable under horizontal uniform distributed load is
 - a) parabolic
 - b) catenary
 - c) circular
 - d) triangular.
- ix) A beam which is curved in plan, is subjected to vertical load, then any section of the beam is subjected to
 - a) BM only
 - b) BM and SF only
 - c) BM, torsional moment and SF only
 - d) torsional moment and SF only
- x) In a suspension cable supported at different level and subjected to UDL per horizontal run
 - a) the tension anywhere in the cable is constant
 - b) the tension is minimum at the lower support
 - c) the tension is minimum at the mid span section
 - d) the tension is minimum at the lowest section.

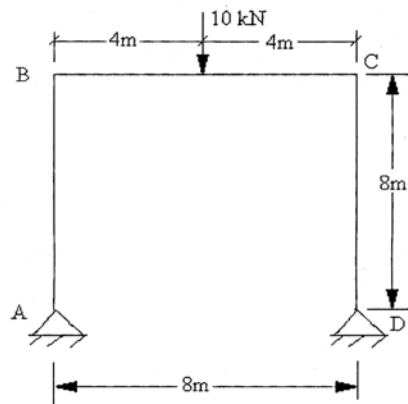


GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. $3 \times 5 = 15$

2. A two hinged parabolic arch has a span of 20m and a rise of 4m. Draw influence line diagram for the following :
 - i) Horizontal thrust
 - ii) Bending moment, Normal thrust and radial shear at a section 5m from the left support.
3. In the frame ABCD shown below in fig., end A and end D are hinged. Analyse the frame by unit load method.



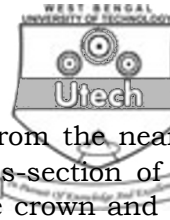
4. Derive the slope deflection equation.
5. A fixed beam AB of span 6m carries point loads 120 kN and 90 kN at distances 2m and 4m from the left end A. Determine the fixing moments at the ends by Column Analogy Method.
6. Using Column Analogy method, determine the fixing moments for a fixed beam of span 'L' subjected to UDL over entire beam span.

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

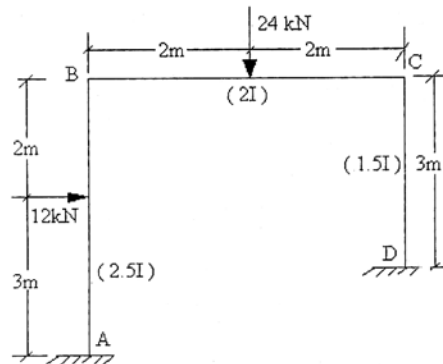
7. A three hinged parabolic arch of span 42 m and rise 14 m carries two vertical concentrated loads of values 160 kN each



acting symmetrically at a distance of 14m from the nearest support. The moment of inertia of any cross-section of the arch is $I = I_c \sec\theta$ where I_c is the M.I. at the crown and θ is the slope of the arch rib axis. Draw the BM diagrams, showing values of maximum BM and location of point of contra flexure. Also find SF and normal thrust at the load point.

8. Analyse the portal frame shown in Fig. Apply 'Moment distribution method'.

$EI = \text{constant}$



9. The three-hinged stiffening girder of a suspension bridge of span 120 metres is subjected to two point loads of 240 kN and 300 kN at distances 25 metres and 80 metres from the left end. Find the shear force and bending moment for the girder at a distance of 40 metres from the left end. The supporting cable has a central dip of 12 metres. Find also the maximum tension in the cable and draw the B.M. diagram for the girder.
10. A semicircular beam ABC is supported at the left end A, right end B and at the middle length at crown C. The radius of the arch is R. Considering w to be the load per unit length of the beam, find out maximum bending moment and twisting moment.

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