A   **Reg. No. :** ☐☐☐☐☐☐☐☐☐☐☐☐

Question Paper Code: U4103

.E./B.Tech. DEGREE EXAMINATION, APRIL 2024

Fourth Semester

Civil Engineering

21UCE403- STRUCTURAL ANALYSIS – I

(Regulations 2021)

Duration: Three hours   Maximum: 100 Marks

Answer All Questions

PART A - (5 x 1 = 5Marks)

1. How many equilibrium equations do we need to solve generally on each joint of a truss?   CO1-U

    (a) 1   (b) 2   (c) 3   (d) 4

2. The tension coefficient (t) for the member is   CO1-U

    (a) Pull in the member/length   (b) Push in the member/length

    (c) Compression in the member/length   (d) Torsion in the member/length

3. If a beam has 4 external supports, then how many parts would it be divided in case of using slope deflection equations?   CO1-U

    (a)0   (b)1   (c) 2   (d) 3

4. A continuous beam AB subjected to UDL of 20 kN/m and span 4m, then fixed end moment M_{FAB} is   CO2 - App

    (a) – 25.50 kN-m   (b) -26.67 kN-m   (c) 32.60 kN-m   (d) 18.50 kN-m

5. The carryover factor in a prismatic member whose far end is continuous is   CO1-U

    (a) 0   (b) 1   (c) 3/4   (d) 1/2

PART – B (5 x 3= 15 Marks)

11. List the assumptions made in the analysis of pin jointed frames.   CO1-U

12. Write down the slope deflection equation for analyzing beams and frames for member AB   CO1-U

13. Differentiate between distribution factors and carry over factor.   CO1-U

14. Write the short notes on Influence Line Diagram and its uses. CO1-U
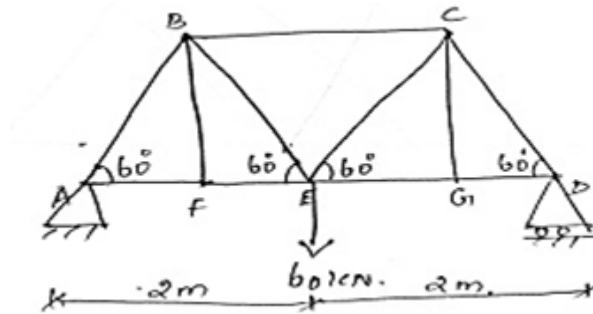
15. Define: Linear arch. CO1-U

PART – C (5 x 16= 80 Marks)

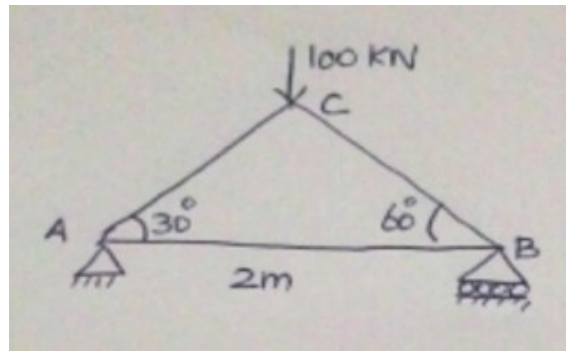16. (a) Determine the Member Forces of the Truss as shown in fig CO2-App (16)

Or

(b) Using the principle of virtual work, analyse the vertical deflection CO2-App (16) of joint C of the truss in Figure. Take E= 200 x 10^6 kN/m^2 and Cross sectional area of each bar = 100x 10^{-6} m

17. (a) Determine the bending moments for the continuous beam as CO4-Ana (16) shown in fig by solving the slope deflection method and also draw the shear force and bending moment diagram EI is constant.
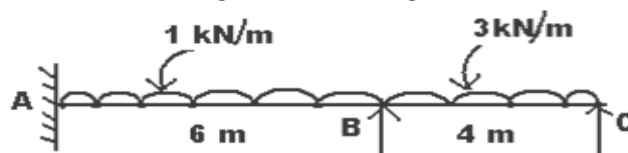
Or

(b) A continuous Beam ABC consists of span AB & BC of 6m & 5m CO4-Ana (16) length in each member.
Support A is fixed; B & C are simply supported.
Span AB carries udl of 3 kN/m; Span BC carries point load of 10 kN act at a distance of 1m from support B.
Analyze the continuous beam and Draw the BM.

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18. (a) A continuous beam ABC consists of spans AB and BC of 5 & 8 m   CO4-Ana   (16)
        length in each. Both ends of the beam are fixed. The span AB
        carries audl of 15 kN/m. The span BC carries a point load of 25
        kN at its middle point. Analyse the moments at the support and
        draw the bending moment diagram by using moment distribution
        method. Assume the beam is of uniform section.

                                        Or

    (b) Determine the support moments for the portal frame shown in fig   CO4-Ana   (16)
   by moment distribution method and draw the Bending Moment
        Diagram
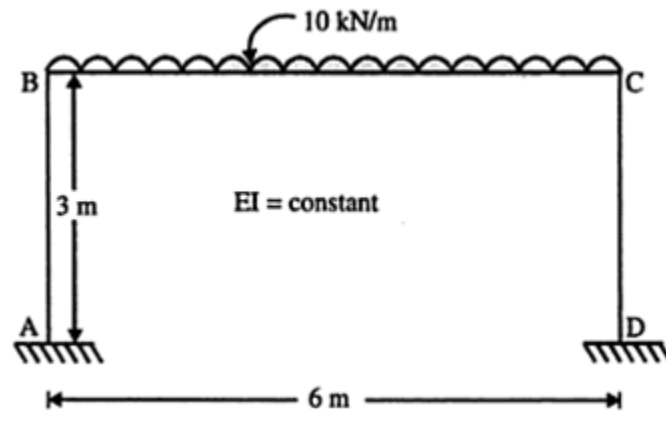
19. (a) Two point loads of 100 kN and 50 kN at a fixed distance apart of   CO2-App   (16)
        2m, cross a beam of 24 m span from left to right with the 50kN
        leading, Draw the influence line for bending moment and shear
        force for a point of 8m from the left support, and also evaluate the
        maximum bending moment and shear force at that point.

                                        Or

    (b) Draw the ILD shear force & BM for a section at 6m from the left   CO2-App   (16)
        support of a simply supported beam 25m long. Analyse and
        evaluate the maximum BM and SF at the section due to uniformly
        distributed rolling load of length 10m of intensity 10kN/ run.

20. (a) A parabolic 3 hinged arch carries a UDL of 30kN/m on the left   CO5-Ana   (16)
        half of the span. It has a span of 16m and a central rise of 3 m.
        Determine the resultant reactions at supports. Evaluate the bending
        moment, normal thrust and radial shear at a section 2 m from left
        support

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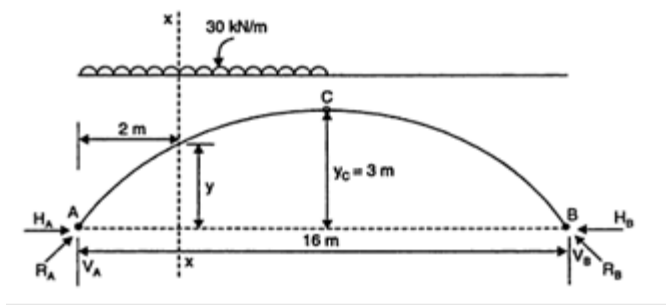
(b) A two hinged parabolic arch is loaded as shown in fig. Determine   CO5-Ana   (16)
(i) horizontal thrust (ii) Maximum positive and negative B.M.
assume $I=I_o sec\theta$

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