

A

Reg. No. :

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Question Paper Code: U4103

.E./B.Tech. DEGREE EXAMINATION, NOV 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)

- The unit load applied at the joint of the truss in the direction of designed displacement is CO1-U
(a) 1 (b) 2 (c) 3 (d) 0
- 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
- 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
- The frame structures may sway due to CO2 - App
(a) Horizontal force & unsymmetrical (b) Horizontal force only
(c) Unsymmetrical of columns (d) 18.50 kN-m
- 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)

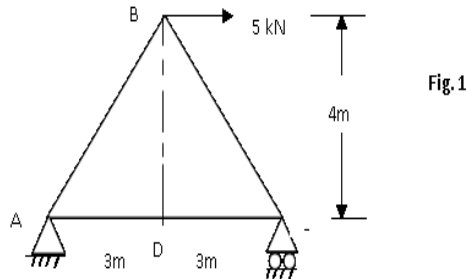
- Define the terms: Perfect Truss & Deficient Truss. CO1-U
- Say true or false. Justify your answer “slope deflection method is a force method”. CO1-U
- Differentiate between distribution factors and carry over factor. CO1-U

14. Write the short notes on Influence Line Diagram and its uses. CO1-U

15. How will you calculate the horizontal thrust in a two hinged parabolic arch if there is a rise in temperature? CO1-U

PART – C (5 x 16= 80 Marks)

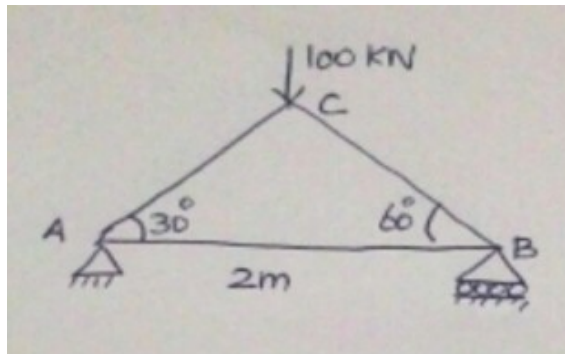
16. (a) Using method of sections find the vertical displacement of the truss as CO2-App (16)



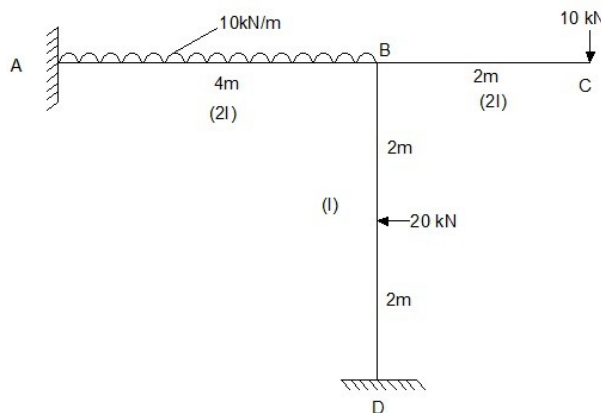
shown in fig

Or

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



17. (a) Determine the bending moments for structure as shown in figure by slope deflection method. Sketch the super imposed bending moment diagram. CO4-Ana (16)



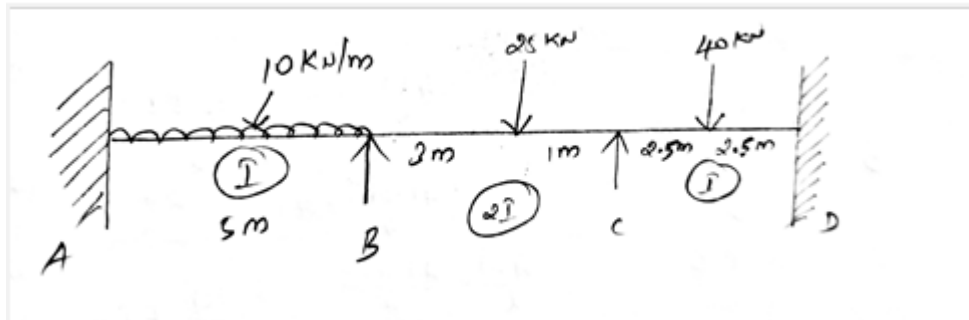
Or

- (b) A continuous Beam ABC consists of span AB & BC of 6m & 5m length in each member. CO4-Ana (16)
 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.

18. (a) A continuous beam ABC consists of spans AB and BC of 5 & 8 m 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. CO4-Ana (16)

Or

- (b) Analyse the continuous beam loaded as shown in fig. by moment distribution method and sketch the bending moment diagram. Which member will possess Maximum Deflection, Justify your answer CO4-Ana (16)



19. (a) Two point loads of 100 kN and 50 kN at a fixed distance apart of 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. CO2-App (16)

Or

- (b) Draw the ILD shear force & BM for a section at 6m from the left 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. CO2-App (16)

20. (a) A three hinged parabolic arch has supports at different levels CO5-Ana (16) having span 20m and carries a UDL of 30kN/m over the left half of the span. The left support is 5m below the crown and the right support is 4m below the crown. Draw the BMD. Also analyze the normal thrust and radial shear at a section 4m from the left support.

Or

- (b) A symmetric three hinged parabolic arch has a span of 30m and a CO5-Ana (16) central rise of 6m. The arch carries a distributed load which varies uniformly from 40kN/m at each abutment to zero at mid span .

Determine

- a) The horizontal thrust at the abutments
- b) maximum positive bending moment in the arch