A **Reg. No. :** | | | | | | | | | | | | |

Question Paper Code: U5101

B.E./B.Tech. DEGREE EXAMINATION, NOV 2023

Fifth Semester

Civil Engineering

21UCE501 – STRUCTURAL ANALYSIS – II

(Regulations 2021)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (5 x 1 = 5 Marks)

1. The value of shape factor for a circular section is CO1- U

   (a) 1.4 (b) 1.697 (c) 1.5 (d) 1.7

2. Equilibrium method is also known as CO1- U

   (a) Displacement Method (b) Force Method

   (c) Compatibility Method (d) Kani's Method

3. The inverse of flexibility matrix is CO1- U

   (a) Flexibility matrix (b) Adjacent of flexibility matrix

   c) Transformation matrix (d) Stiffness matrix

4. Beams curved in plan are mainly subjected to ……. CO1- U

   (a) Shear (b) Bending moment

   (c) Twisting Moment (d) Shear, Bending & Twisting Moment

5. What is the degree of indeterminacy of a simply supported portal frames? CO2- App

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

PART – B (5 x 3 = 15 Marks)

6. List out the assumptions made for plastic analysis. CO1 -U

7. Why stiffness method is also called equilibrium method? Explain. CO1- U

8. Draw the free bending moment diagram for the beam as shown in fig1. CO3 -App

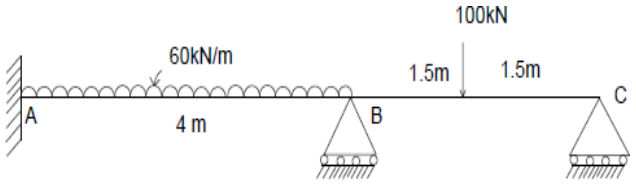

Fig:1

9. A suspension cable of horizontal span 200m is supported at the same level and has a central dip of 20m.Find the increase in dip of the cable if the cable is subjected to a rise in temperature 28^0c.Take thermal coefficient $=12x10^{-6}$ per ^{0}C. CO4-Ana

10. List out the various forces are acting in a portal frames. CO1-U

PART – C (5 x 16= 80 Marks)

11. (a) Determine the shape factor of the I section as shown in figure 2. CO2-App (16)

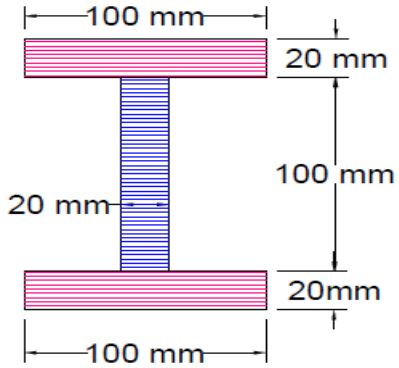

Fig 2

Or

(b) Establish the collapse mechanism and calculate the collapse moment for the portal frame ABCD with hinged feet has stanchions 4m high and a beam of 6m span. There is a horizontal point load of 40kN at B while the beam carries a point load of 120kN at mid span. Using a load factor of 1.75. Assume same plastic moment capacity for all the members. CO2-App (16)

12. (a) Analyze the continuous beam loaded as shown in fig 3. by displacement method. Assume EI is not uniform throughout. CO4-Ana (16)

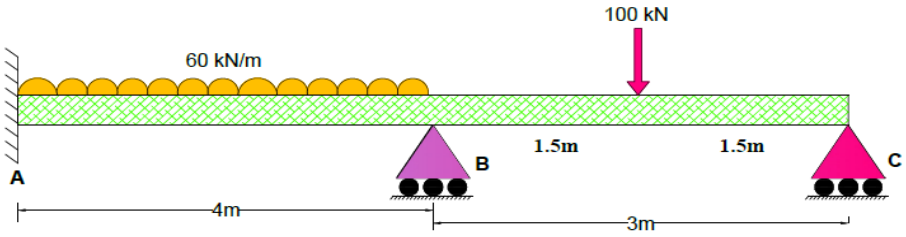

Fig 3

Or

(b) Analyze the bending moments for the two span continuous beam loaded as shown in fig 4 by Equilibrium method. Assume EI is not uniform throughout. CO4-Ana (16)

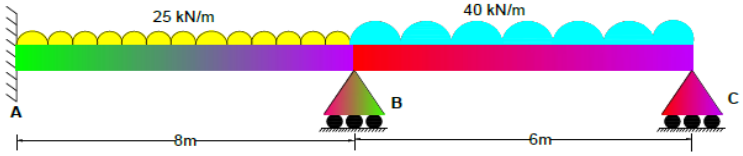

Fig 4

13. (a) Analyze the continuous beam shown in fig 5 using matrix flexibility method. Assume EI value. CO4-Ana (16)

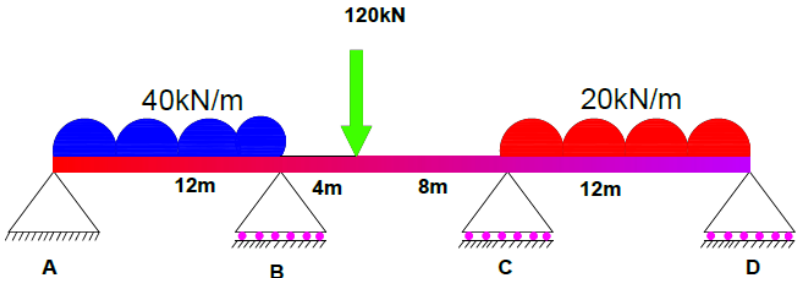

Fig 5

Or

(b) Analyze the two span continuous beam loaded as shown in fig 6 using matrix flexibility method. Assume EI value. CO4-Ana (16)

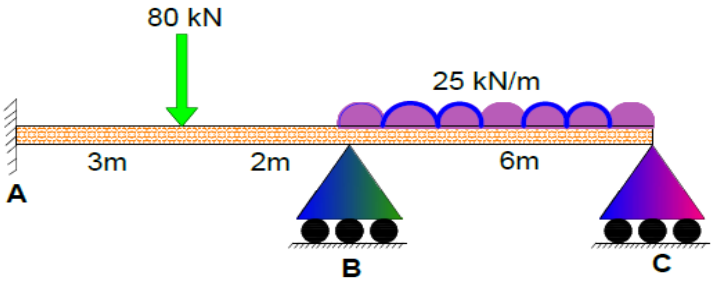

Fig 6

14 (a) Analyse the suspension cable, having same level at supports has a span of 50 m and the maximum dip is 4 m. The cable is loaded with a UDL of 15 kN/m run over the whole span and two point loads 35 kN each at middle third points. Analyse the Maximum tension in the cable and the length of the cable CO4-Ana (16)

Or

(b) A three hinged stiffening girder of a suspension bridge of 350 m span and sag of 35 m is subjected to three point loads 25 kN, 45 kN and 35 kN placed at 60 m, 150 m and 280 m respectively from the left hand hinge. Analyse the structure & draw the BMD CO4-Ana (16)

15 (a) Analyze (approximately) the forces in the members of the truss shown in Fig 7. The diagonals are to be designed to support both tensile and compressive forces, and therefore each is assumed to carry half the panel shear. The support reactions have been computed. CO5-Ana (16)

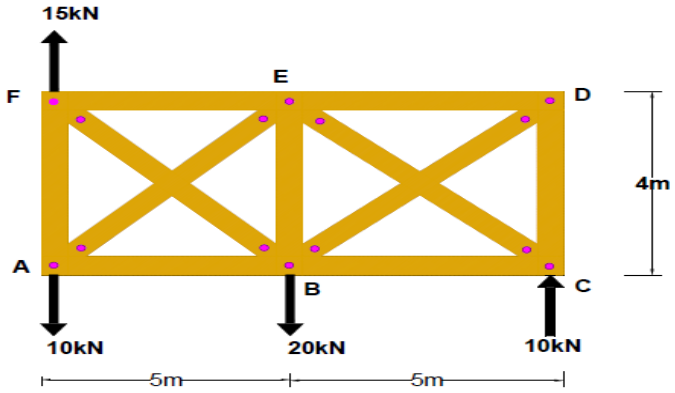

Fig 7

Or

(b) Analyze (approximately) the forces in the members of this truss. Cross bracing is used to provide lateral support for this bridge deck due to the wind and unbalanced traffic loads. Assume the diagonals are slender and therefore will not support a compressive force. The loads and support reactions are shown in Fig 8. CO5-Ana (16)

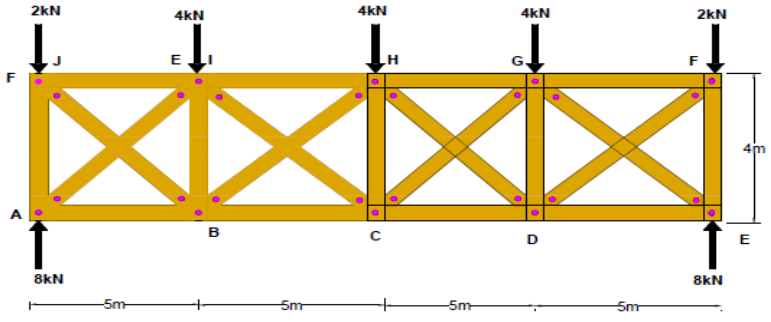

Fig 8