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

Question Paper Code: U5101

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

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. For a rectangular section of breadth b and depth d, the value of elastic section modulus Z_e is CO2- App

   (a) $bd^3/12$ (b) $bd^3/36$ (c) $bd^3/6$ (d) $bd^3/9$

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

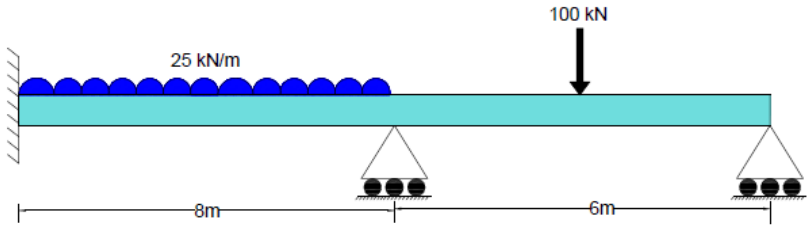
5. How does axial stress vary from neutral axis? CO2- App

   (a) Parabolically (b) Hyperbolically (c) Linearly (d) Arbitrarily

PART – B (5 x 3 = 15 Marks)

6. Calculate the shape factor of a circular section of diameter 'd' CO1 -U

7. Determine the fixed end moments for the continuous beam loaded as shown in fig. CO2- App



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

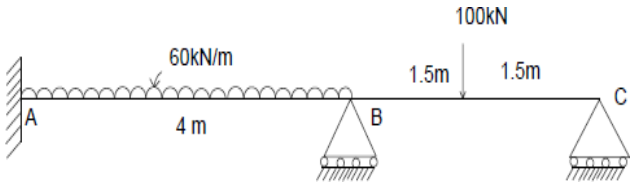


Fig:1

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

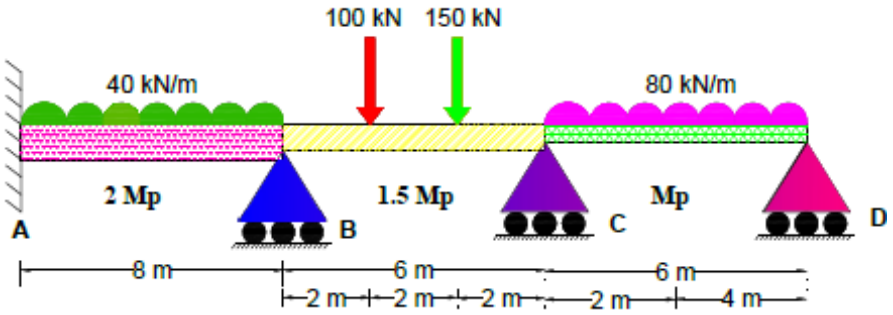
PART – C (5 x 16= 80 Marks)

11. (a) Calculate the shape factor of the I section having the following dimensions as per provisions: CO2-App (16)

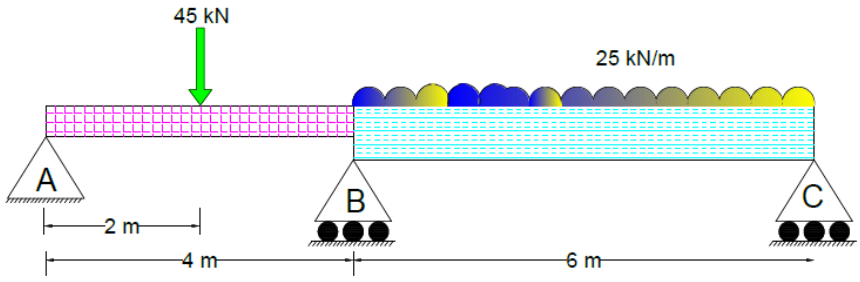
Top flange: 150 mm x 10 mm, Web : 10mm x 150mm & Bottom flange: 150mm x 10 mm

Or

(b) Determine the plastic moment of resistance for the three span continuous beam loaded as shown in figure. CO2-App (16)

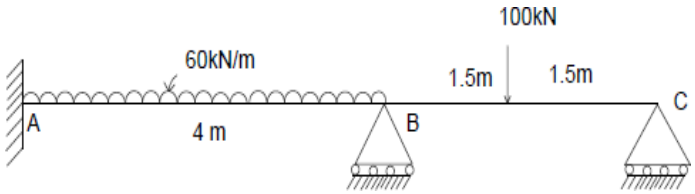


12. (a) Analyze the continuous beam loaded as shown in fig. by matrix stiffness method. Assume EI is not uniform throughout. Sketch the BMD. CO4-Ana (16)



Or

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



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

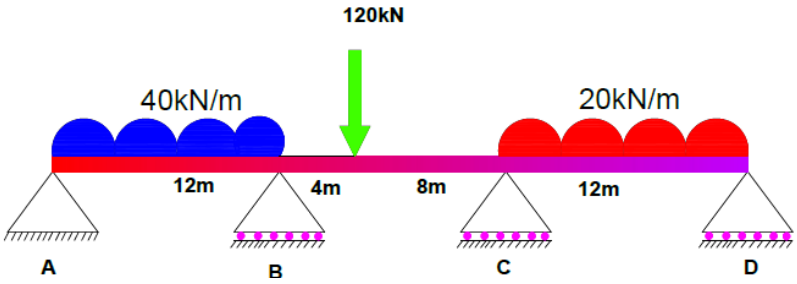


Fig 5

Or

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

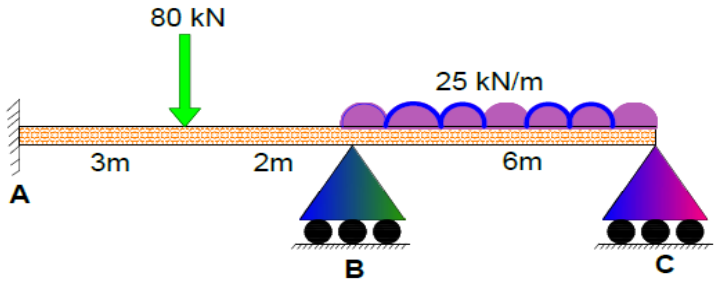
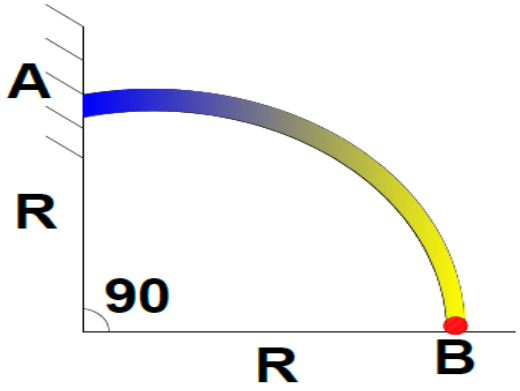


Fig 6

14 (a) A curved beam in the form of a quadrant of a circle of radius R and having a uniform cross section is in a horizontal plane. It is fixed at A and free at B as shown in Fig. It carries a vertical concentrated load W at the free end B. Compute the shear force, bending moment and twisting moment values and sketch variations of the above quantities. Also determine the vertical deflection of the free end B. CO4-Ana (16)



Or

(b) Analyse suspension cable has a span of 110 m and a central dip of 10 m and is suspended from the same level at both ends. The bridge is stiffened by a stiffening girder hinged at end supports. The girder carries a single concentrated load of 125 kN at 25 m from left end. Assume equal tension in the suspension hangers. Evaluate the horizontal tension in the cable and the maximum positive bending moment in the girder. 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)

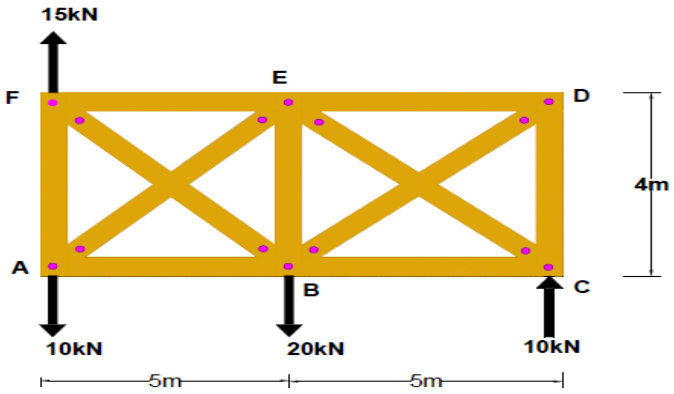


Fig 7

Or

(b) Analyse (approximately) the reactions at the base of the columns of the frame shown in Fig. Use the portal method of analysis. CO5-Ana (16)