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Question Paper Code: U5101

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

Fifth Semester

Civil Engineering

21UCE501 STRUCTURAL ANALYSIS II

(Regulations 2021)

Duration: Three hours   Maximum: 100 Marks

PART A - (5 x 1 = 5Marks)

1. Shape factor for a rhombus section is   CO1- U

    (a) 1.5   (b) 2.346   (c) 1.697   (d) 2

2. The basic unknowns of matrix stiffness method is   CO1- U

    (a) Redundant forces   (b) Displacements   (c) Real forces   (d) Moments

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. The lateral deflection of a frame is called as……..   CO1- U

    (a) Buckling   (b) Sinking   (c) Sway   (d) Bending

PART – B (5 x 3= 15Marks)

6. Find the depth of actual neutral axis of the T section having the following   CO2-App
    dimensions

    Top flange : 100mm x 10mm;   Web   : 10mm x 120mm

7. List out the properties of the Stiffness matrix.   CO1-U

8. Determine the fixed end moments for the continuous beam loaded as shown in   CO3-App
   fig.

40 kN
80 kN/m
2m   2m   6m
A   B   C
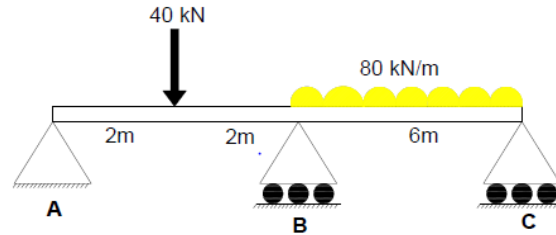
9. Calculate the vertical & horizontal reactions in a cable carrying a load of 10   CO4-Ana
   kN/m of horizontal span of 80m.The supports are at the same level and the
   central dip is 4m.

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

PART – C (5 x 16= 80Marks)

11. (a) Establish the collapse mechanism and calculate the collapse CO2-App   (16)
       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.

Or

   (b) Find plastic moment ofcapacity of beam shown in fig.   CO2-App   (16)

40kN/m   100kN   150kN   80kN/m
2m   2m   2m
A   D
2Mp   B   1.5Mp   C   Mp
8m   6m
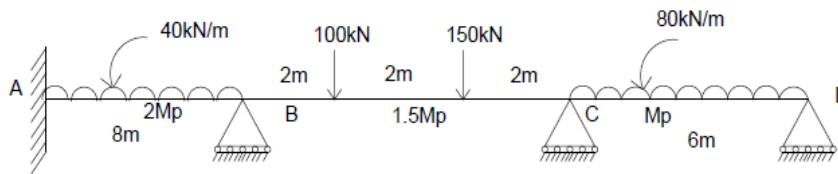
12. (a) Analyze the continuous beam loaded as shown in fig. by CO4-Ana   (16)
       displacement method. Assume EI isnot uniform throughout.

100 kN
60 kN/m
A   B   1.5m   1.5m   C
4m   3m
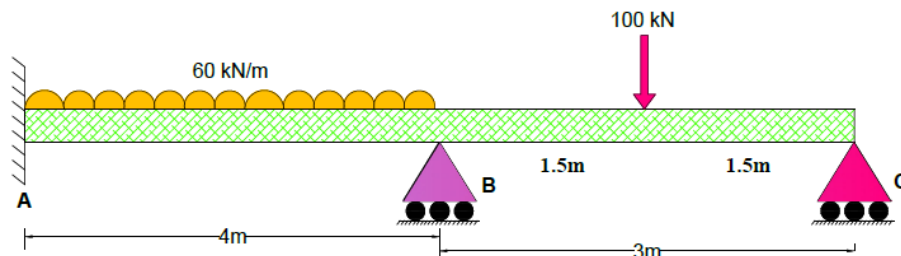
Or

(b) Analyse the pin jointed truss as shown in fig using matrix CO5-Ana   (16)
stiffness method. Take area of cross section for all members is
$1000mm^2$ and modulus of elasticity is $200kN/mm^2$.
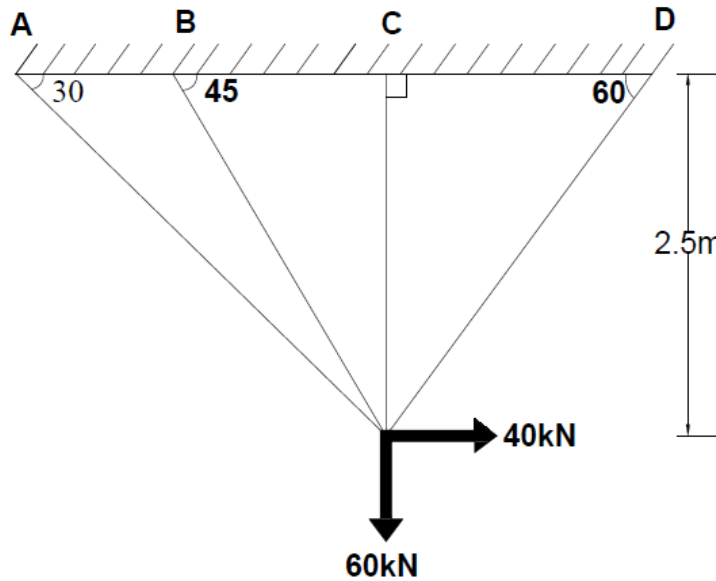
13. (a) Determine bending moments& support reactions for the two CO3-App   (16)
spans continuous beam of section is fixed at A hinged at B and C.
Span AB is 4m and BC is 3m long. Span AB is loaded with
uniformly distributed load of intensity 60kN/m Span BC is loaded
with mid span point load of 100kN. Sketch the bending moment
diagram using matrix flexibility method.

Or

(b) A three span continuous beam of span AB is 12m, BC is 12m & CO3-App   (16)
CD is 12m. The following loads are acting in the spans are

1.Span AB is 40kN/m UDL

2.Span BC is 120kN point load at distance 4m from B

3. Span CD is 20kN/m UDL

Determine the moments of the continuous beam and sketch the
BMD.

14. (a) Analyse the suspension cable, having same level at supports has a CO4-Ana   (16)
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

Or

(b) Analyse the central dip for the suspension cable of 130 m   CO4-Ana   (16)
horizontal span is supported at the same level. It is subjected to a
uniformly distributed load of 28.5 kN per horizontal metre. If the
maximum tension in the cable is limited to 5000 kN,

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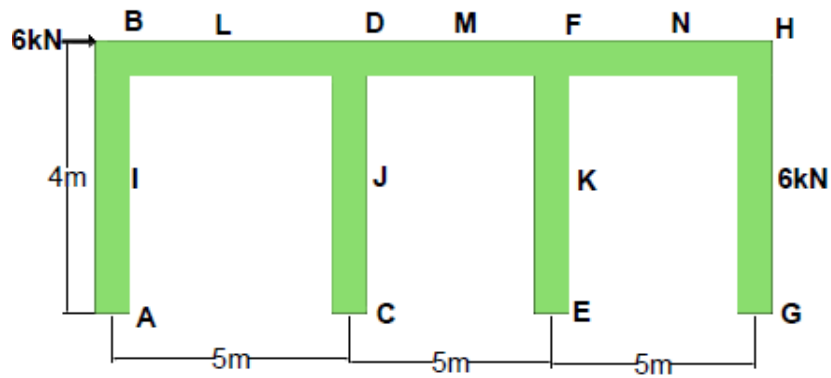
Or

(b) Analyse the frame by portal methods and also estimate the forces   CO5-Ana   (16)
acting in the members of the Warren portal shown in Fig.