Reg. No. :

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|

## Question Paper Code: 95101

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

Fifth Semester

Civil Engineering

19UCE501 – STRUCTURAL ANALYSIS – I

(Regulation 2019)

Duration: Three hours                                        Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. The deflection at any point of a perfect frame can be obtained by applying a unit load at the joint in                                                                                                                    CO1- R
   (a) Vertical direction                    (b) Horizontal direction
   (c) Inclined direction                    (d) the direction in which the displacement is required

2. The unit load applied at the joint of the truss in the direction of designed displacement is                                                                                                                              CO1- R

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

3. The frame structures may sway due to                                                                          CO1- R

   (a) Horizontal force and unsymmetrical          (b) Horizontal force only

   (c) Unsymmetrical of columns                    (d) All the above

4. The number of joints rotation and independent joint translation in a structure is called                                                                                                                                  CO1- R

   (a) Degree of Joints                    (b) Degree of freedom

   (c) Degree of redundancy                    (d) None of these

5. In a member AB, if moment of -10kNm is applied at A and the moment carried over to B is 0. Analyse the beam and suggest which type of support to be used in B?                                                            CO3- Ana

   (a) Fixed                    (b) Continuous                    (c) Intermediate                    (d) Hinged

6. The carryover factor in a prismatic member whose far end is fixed is                                          CO1- R

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

7. A single point load crosses a simply supported girder. The absolute maximum bending moment will occur at centre when     CO1- R

    (a) The load is at left support                 (b) The load is at centre

    (c) The entire span is loaded                (d) The load is at right support

8. A simply supported girder subjected to UDL longer than the span. The maximum positive shear force at a section occurs if the     CO1- R

    (a) Tail of the load is on section             (b) Head of the load is at left support

    (c) Entire span is loaded                    (d) Head of the load is on section

9. An UDL of intensity of 5kN/m and length 2m passing through a simply supported beam of span of 10m. find the absolute maximum shear force at a section 4m from the left support     CO2- A

    (a) 5 kN                 (b) 10 kN        (c) 15 kN          (d) 20 kN

10. A three hinged parabolic arch of span 20m and rise 4m carries a concentrated load of 150 kN at 4m from left support A. calculate the vertical reaction and horizontal thrust at support A respectively     CO2- A

    (a) $V_A$ = 40kN & $H_A$ = 80kN         (b) $V_A$ = 80kN & $H_A$ = 50kN

    (c) $V_A$ = 120kN & $H_A$ = 75kN       (a) $V_A$ = 70kN & $H_A$ = 80kN

## PART – B (5 x 2= 10Marks)

11. Name any four methods used for computation of deflection in structures.     CO1- U

12. How many slope deflection equations are available for a two span continuous beam and write the equations?     CO2-App

13. In a member AB, if moment of -10kNm is applied at A, Estimate the moment carried over to B.     CO4-Ana

    (i) If B is Fixed

    (ii) If B is Hinged

14. State Muller Breslau's principle.     CO1-U

15. In a parabolic arch with two hinges how will you calculate the slope of the arch at any point?     CO1-U
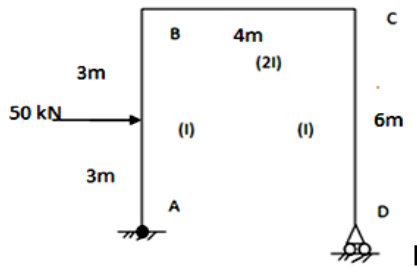
## PART – C (5 x 16= 80 Marks)

16. (a) Determine the Vertical displacement at joint 'B' for the Pin jointed frame as shown in Fig. If A = 1500 mm$^2$ , E = 2 x 10$^5$ N /mm$^2$     CO2-Ana     (16)
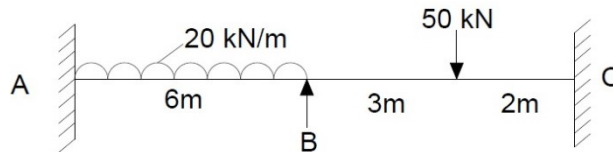
**95101**
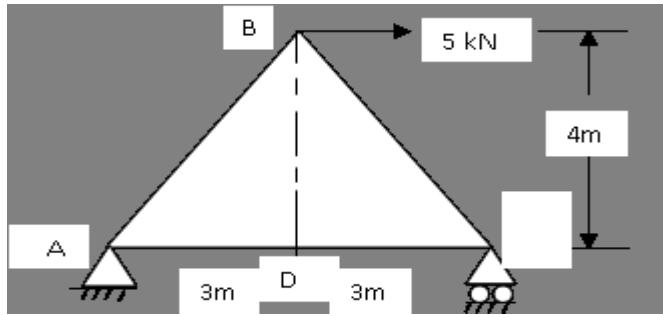
Or

(b) Determine the horizontal displacement at support D of the frame   CO2-Ana   (16)
shown in Fig. Take I = 300 x $10^{-6}$ $m^4$ and E = 200 x $10^6$ $kN/m^2$.
Use Principle of Virtual work.


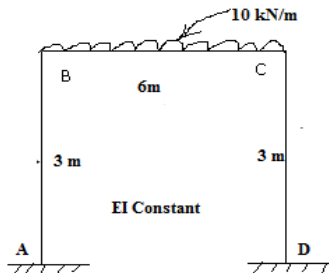
17. (a) Analyze the continuous beam as shown in figure and sketch the   CO4-Ana   (16)
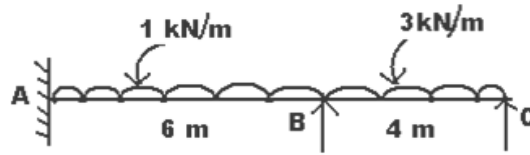bending moment diagram using slope deflection method.



Or

(b) Analyze the portal frame loaded as shown in fig by slope   CO4-Ana   (16)
deflection method and sketch the bending moment and shear
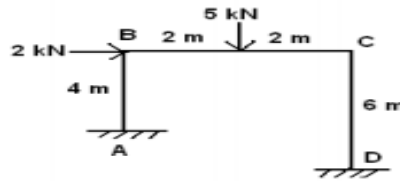force diagrams.



3

**95101**

18. (a) Analyze the continuous beam ABC shown in figure by moment   CO4- Ana   (16)
distribution method and sketch the bending moment diagram.
Take EI = constant.

1 kN/m        3kN/m

A                 B           C
6 m          4 m

Or

(b) Analyze the portal frame loaded as shown in fig. by moment   CO4- Ana   (16)
distribution method and sketch the bending moment and shear
force diagrams

5 kN
2 kN  B  2 m   2 m  C
4 m           6 m
A             D

19. (a) Draw the ILD shear force & BM for a section at 6m from the left   CO4- Ana   (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.

Or

(b) Draw the IL for reaction at B and for the support moment MA at   CO4- Ana   (16)
A for the propped cantilever AB of 12m as shown in fig.
Compute influence line coordinates at 1.5 m intervals.

X
A                   B
L=12
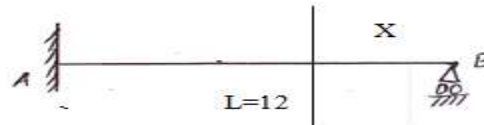
20. (a) Analyze the three hinged parabolic arch of span 90m and rise   CO5- Ana   (16)
12m carries a udl of 2.5kN/m length on the right half of its span.
Evaluate the maximum bending moment in the arch.

Or

(b) 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.

4

**95101**