Reg. No. : | | | | | | | | | | |

Question Paper Code: 95101

B.E./B.Tech. DEGREE EXAMINATION, MAY 2022

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. Number of reactions in hinged support is CO1- R

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

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 independent equations to be satisfied for static equilibrium of a plane structure is CO1- R

   (a) 1 (b) 2 (c) 3 (d) 6

5. If the far end is continuous then stiffness (K) is CO1- R

   (a) 3EI/L (b) EI/L (c) 4EI/L (d) 6EI/L

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. A single point load crosses a three hinge parabolic arch of span L, the maximum sagging moment will occur at CO1- R

(a) 0.211L (b) 0.25L (c) 0.35L (d) 0.3L

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. Differentiate external and internal indeterminacy of structures. CO1- U

12. Explain the use of slope deflection method. CO1-U

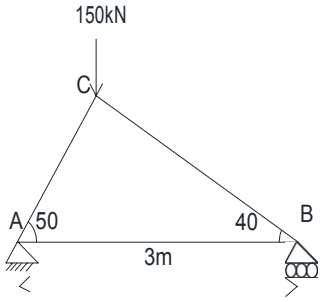
13. Say true or false. Justify your answer "AE is Flexural Rigidity". CO1-U

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

15. Draw the influence line for radial shear at a section of a three hinged arch. CO1-U

PART – C (5 x 16= 80 Marks)

16. (a) Using principle of virtual work determine the vertical displacement at the joint C of the truss as shown in figure E = $200*10^6 kN/m^2$ and A = $150 *10^{-6} m^2$. CO2-Ana (16)



Or

(b) Using method of sections find the vertical displacement of the truss as shown in fi CO2-Ana (16)

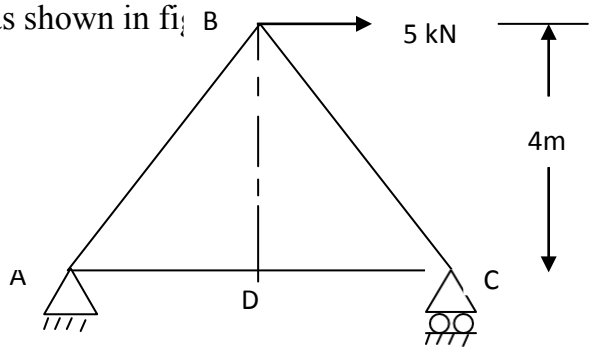
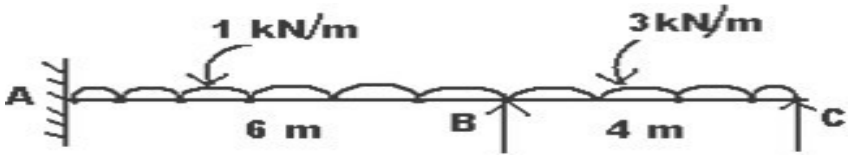


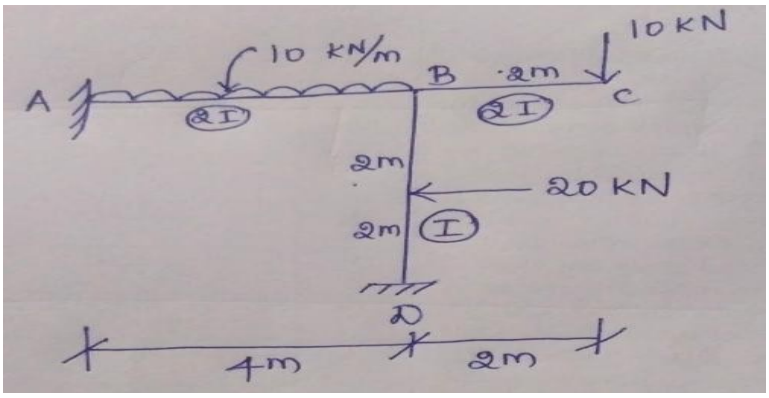
Fig. 1

17. (a) Determine the bending moments for the continuous beam as shown in fig by solving the slope deflection method and also draw the shear force and bending moment diagram EI is constant. CO3-Ana (16)



Or

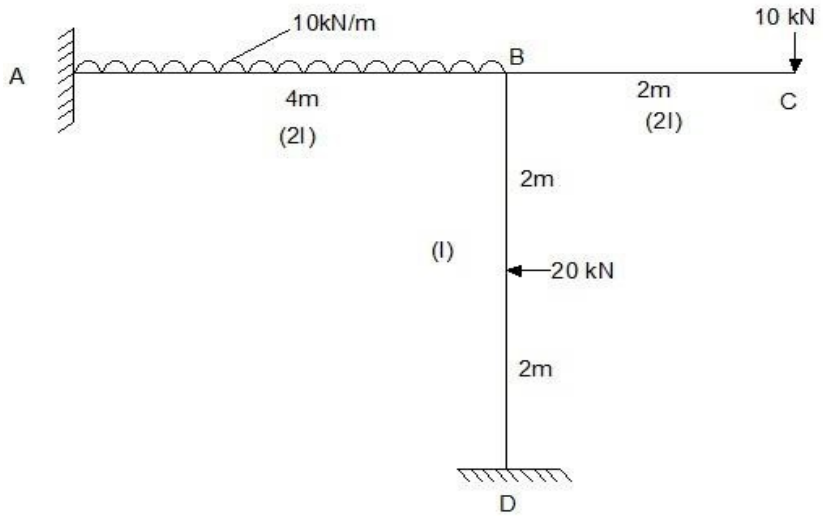
(b) Determine the bending moments for structure as shown in figure by slope deflection method. Sketch the super imposed bending moment diagram. CO3-Ana (16)



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 a udl 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. CO3- Ana (16)

Or

(b) Find the moments for the structure as shown in figure by moment distribution method. Sketch the bending moment diagram and shear force diagram. CO3- Ana (16)



19. (a) Analyse the two span continuous beam of spans AB and BC of 6 & 8 m length in each. Both ends of the beam are fixed. The span AB carries a udl of 10 kN/m. The span BC carries a point load of 30 kN at its middle point. Analyse the moments at the support and draw the bending moment diagram by using moment distribution method. CO4- Ana (16)

Take: IAB=2IBC=2I

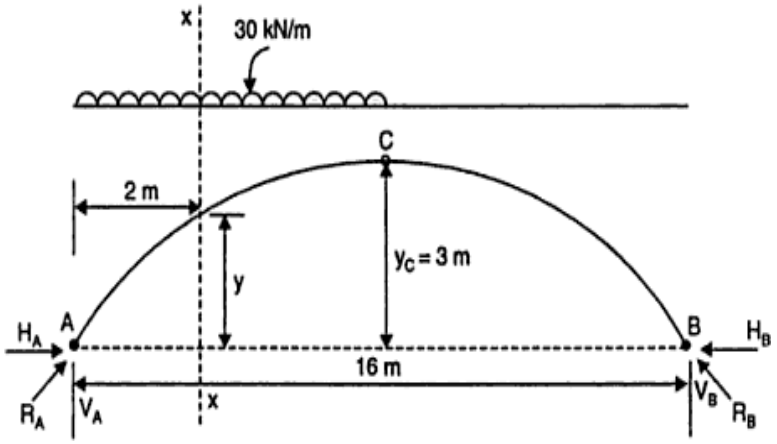
Or

(b) A continuous beam ABC of 6m span each portion hinged at B and rollers at A & C. Draw ILD for reaction at B with interval 1m. CO4- Ana (16)

20. (a) A Three hinged parabolic arch of span 90m and rise 12m carries a udl of 2.5kN/m length on the right half of its span. Evaluate the maximum bending moment in the arch. CO2- Ana (16)

Or

(b) A parabolic 3 hinged arch carries a UDL of 30kN/m on the left half of the span. It has a span of 16m and a central rise of 3 m. Determine the resultant reactions at supports. Find the bending moment, normal thrust and radial shear at a section 2 m from left support. CO2- Ana (16)


x
30 kN/m
C
2 m
y
$y_C = 3$ m
H_A
A
B
H_B
16 m
R_A
V_A
x
V_B
R_B