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Question Paper Code: 95101

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

Fifth Semester

Civil Engineering

19UCE501 – STRUCTURAL ANALYSIS – I

(Regulations 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

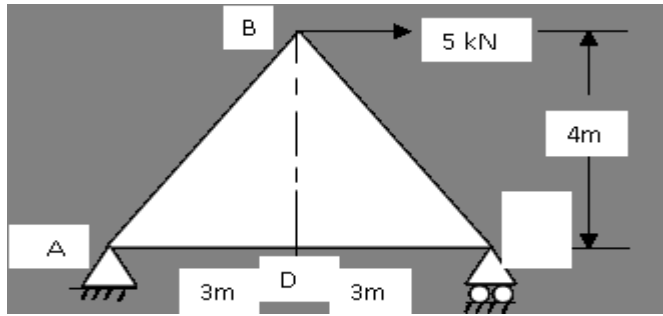
7. A single point load crosses a simply supported girder. The absolute maximum bending moment will occur at centre when CO1- R
- (a) The load is at left support (b) The load is at centre
(c) The entire span is loaded (d) The load is at right support
8. A simply supported girder subjected to UDL longer 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) $V_A = 40\text{kN} \ \& \ H_A = 80\text{kN}$ (b) $V_A = 80\text{kN} \ \& \ H_A = 50\text{kN}$
(c) $V_A = 120\text{kN} \ \& \ H_A = 75\text{kN}$ (d) $V_A = 70\text{kN} \ \& \ H_A = 80\text{kN}$

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

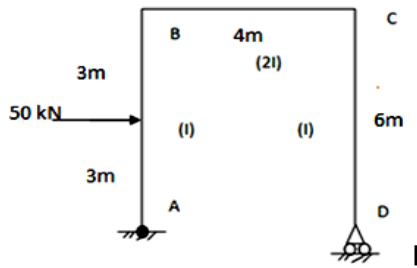
PART – C (5 x 16= 80 Marks)

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

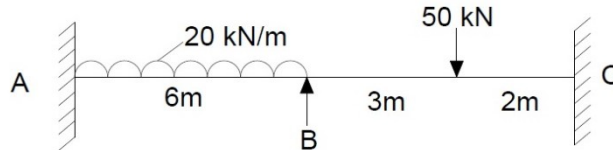


Or

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

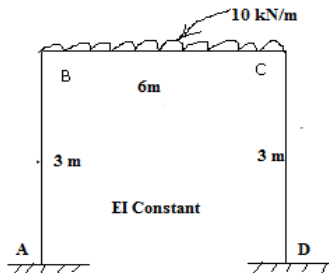


17. (a) Analyze the continuous beam as shown in figure and sketch the bending moment diagram using slope deflection method. CO4-Ana (16)

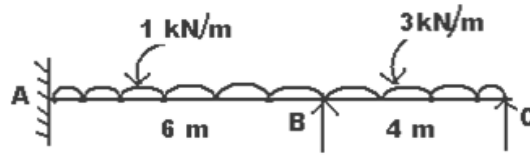


Or

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

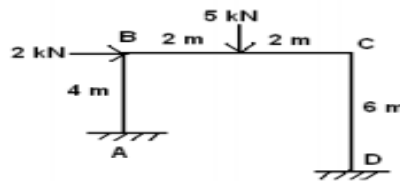


18. (a) Analyze the continuous beam ABC shown in figure by moment distribution method and sketch the bending moment diagram. Take $EI = \text{constant}$. CO4- Ana (16)



Or

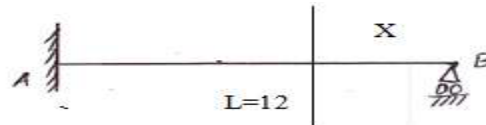
- (b) Analyze the portal frame loaded as shown in fig. by moment distribution method and sketch the bending moment and shear force diagrams CO4- Ana (16)



19. (a) Draw the ILD shear force & BM for a section at 6m from the left 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. CO4- Ana (16)

Or

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



20. (a) Analyze the 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. CO5- Ana (16)

Or

- (b) A three hinged parabolic arch has supports at different levels 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. CO5- Ana (16)