CBCS SCHEME

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17CV42

Fourth Semester B.E. Degree Examination, Jan./Feb. 2023
Analysis of Determinate Structures

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Explain the different types of trusses, with neat sketches. **(04 Marks)**

b. Distinguish between determinate and indeterminate structures with examples. **(04 Marks)**

c. Determine the forces in the numbered members of the loaded truss shown in Fig.Q1(c) using method of sections.

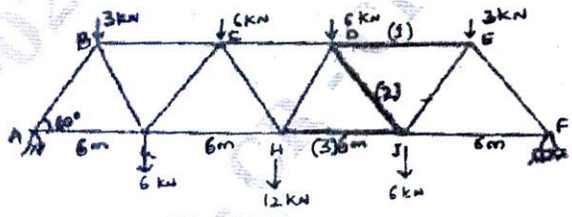

Fig.Q1(c) **(12 Marks)**

OR

2 a. List the assumptions made in the analysis of pin jointed plane truss. **(04 Marks)**

b. Find the degree of static indeterminancy and kinetic indeterminancy for the structure shown in Fig.Q2(b)(i) and Fig.Q2(b)(ii).

Fig.Q2(b)(i)

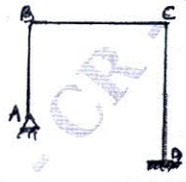

Fig.Q2(b)(ii) **(06 Marks)**

c. Determine the force in the members CD, DF, EF and CF for the pin jointed plane truss as shown Fig.Q2(c) by the method of sections.

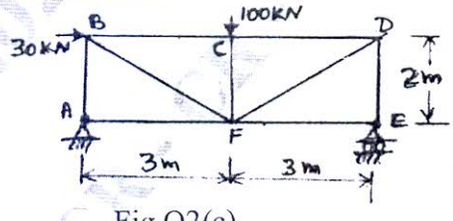

Fig.Q2(c) **(10 Marks)**

Module-2

3 a. State the first and second moment area theorems. **(04 Marks)**

b. Derive the moment curvature equation for deflection. **(06 Marks)**

c. Find deflection at 'C' and slope at A and B for the beam shown in Fig.Q3(c) using moment area method.

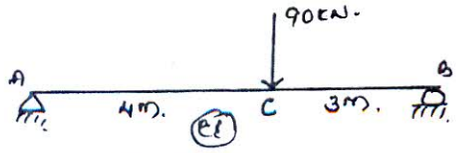

Fig.Q3(c) **(10 Marks)**

OR

4 a. Find the maximum slope and deflection at free end for the loaded beam shown in Fig.Q4(a) by Moment Area method.

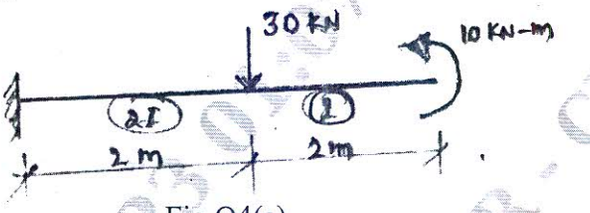

Fig.Q4(a) **(10 Marks)**

b. Find deflection at the load points C and D for the simply supported beam shown in Fig.Q4(b) using Macaulay's method. Take EI = 12000 kN-m^2.

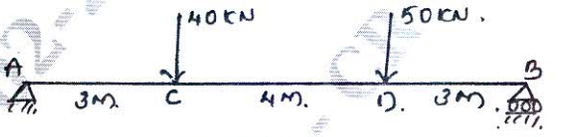

Fig.Q4(b) **(10 Marks)**

Module-3

5 a. Derive the expression for strain energy stored in an prismatic element subjected to pure bending moment. **(05 Marks)**

b. Explain briefly what is complimentary strain energy. **(02 Marks)**

c. Determine the deflection at 'C' of the beam shown in Fig.Q5(c) using strain energy method.

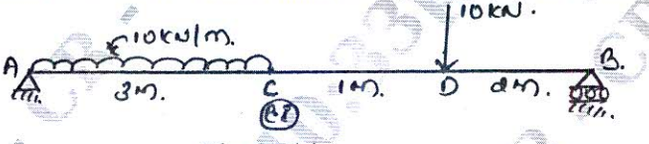

Fig.Q5(c) **(13 Marks)**

OR

6 a. State Castigliano's theorems I and II. **(04 Marks)**

b. Determine the vertical deflection at the free end of the truss shown in Fig.Q6(b) using unit load method. The cross sectioned areas of member AD and DE are 1500 mm^2. While those of other members are 1000mm^2. Take E = 200 kN/mm^2.

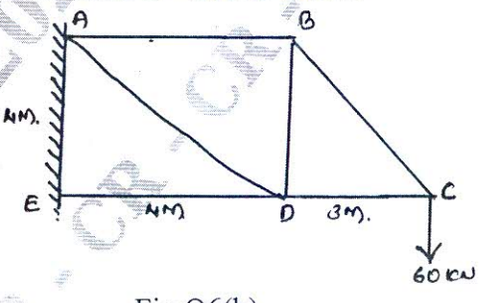

Fig.Q6(b) **(16 Marks)**

Module-4

7 a. Show that $L_C = L + \frac{8h^2}{3L}$ for a cable of span L and UDL of intensity W kN-m. **(08 Marks)**

b. A three hinged parabolic arch of span 24 m and a central rise of 4 m. It carries concentrated loads of 75 kN at 18m from the left support and UDL of 45 kN/m over the left half of the portion. Determine the moment, normal thrust and radial shear at a distance 6m from the left support. **(12 Marks)**

OR

8 A cable is suspended between two points 'A' and 'B' 80m apart horizontally and a central dip of 8m. It supports a UDL of intensity 30 kN/m throughout its length. Calculate the maximum tension in the cable and length of the cable. Also determine the vertical force in the cable, if the back stay is inclined at 30° to the horizontal and the cable passes over smooth pulley. Supports are at the same level. **(20 Marks)**

Module-5

9 a. What are the uses of influence line diagram? **(04 Marks)**

b. Determine the shear force at a section located 3m from left support by constructing influence line diagram for the beam with loading as shown in the Fig.Q9(b).

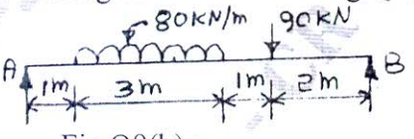

Fig.Q9(b) **(08 Marks)**

c. A System of wheel loads move from left end to right end as shown in Fig.Q9(c) on a beam simply supported and having a span of 10m. Calculate the maximum bending moment which can occur at a section located 4m from the left end.

Fig.Q9(c) **(08 Marks)**

OR

10 a. Explain the procedure for generating influence line diagrams. **(04 Marks)**

b. Determine the influence line diagrams for the forces in the members U_1U_2 , U_2U_3 , L_2L_3 , U_2L_2 and U_2L_3 for the part truss as shown in Fig.Q10(b).

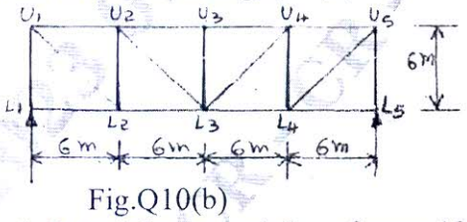

Fig.Q10(b) **(10 Marks)**

c. A moving load travels from left to right on a girder of span 10m as shown in Fig.Q10(c). Determine the absolute maximum bending moment acting in the girder.

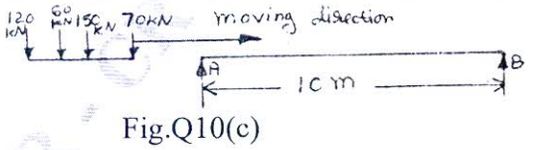

Fig.Q10(c) **(06 Marks)**

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