USN | | | | | | | | | | |

15CV42

Fourth Semester B.E. Degree Examination, Aug./Sept.2020
Analysis of Determinate Structures

Time: 3 hrs. Max. Marks: 80

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

Module-1

1 a. Define degree of freedom, give an example. **(03 Marks)**

b. Find the degree of static indeterminacy and kinematic indeterminacy for the structure shown in Fig.Q.1(b) (i) (ii) and (iii).

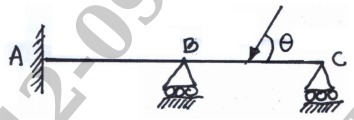


Fig.Q.1(b)(i)

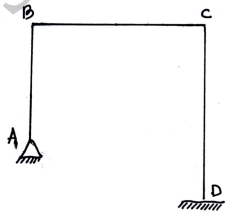


Fig.Q.1(b)(ii)

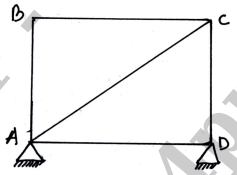
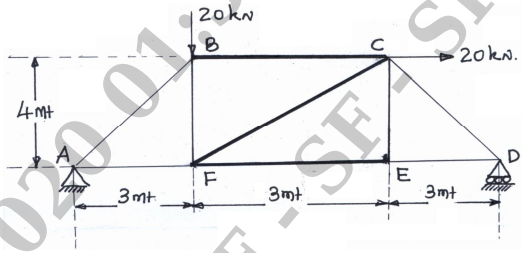


Fig.Q.1(b)(iii)

(06 Marks)

c. Determine the forces in the members BC, CF, FE by the method of sections as shown in Fig.Q.1(c). **(07 Marks)**

Fig.Q.1(c)

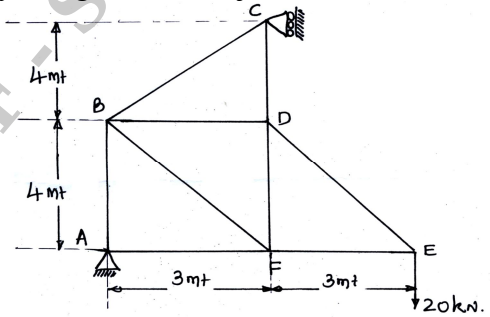


OR

2 a. What are the Assumptions made in the Analysis of trusses? **(04 Marks)**

b. Determine the magnitude and nature of forces in all the members of the pin-jointed plane truss shown in Fig.Q.2(b) by using method of joints. **(12 Marks)**

Fig.Q.2(b)



Module-2

3 a. Determine the slope at the supports and deflection at mid span of simply supported beam AB of length 'l' as shown in Fig.Q.3(a) by using double integration method. **(08 Marks)**

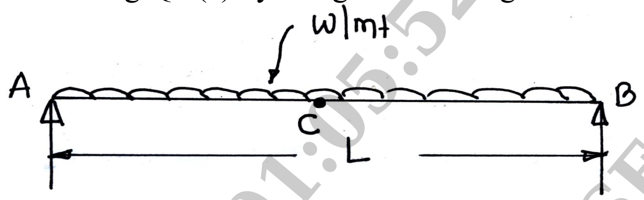


Fig.Q.3(a)

b. Determine the slope at supports and deflection at point load as shown in Fig.Q.3(b) by using Macaulay's method. **(08 Marks)**

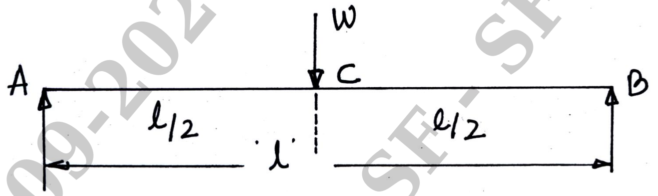


Fig.Q.3(b)

OR

4 a. Using the moment area method to determine the slope at its ends and deflection at point 'D' of simply supported beam as shown in Fig.Q.4(a). Take EI is 2×10^5 kN-m^2. **(08 Marks)**

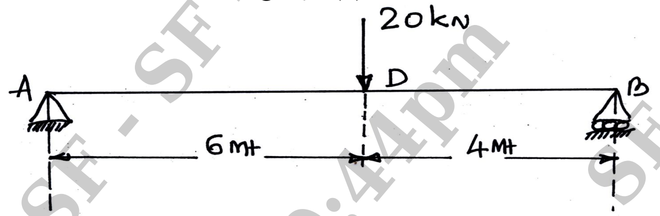


Fig.Q.4(a)

b. Find the slope at the supports and deflection under the load for the beam shown in Fig.Q.4(b). Take $E = 2 \times 10^5 \text{N/mm}^2$ and $I = 5.13 \times 10^8 \text{mm}^4$, by using conjugate beam method. **(08 Marks)**

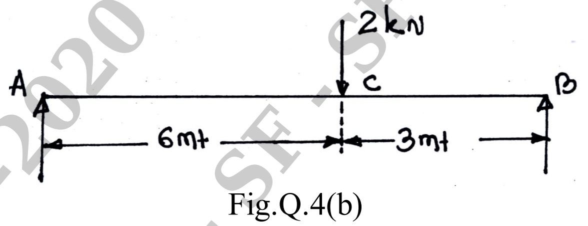


Fig.Q.4(b)

Module-3

5 a. Derive an expression for strain energy stored due to bending. **(08 Marks)**

b. Determine the deflection at the load point 'C' for the beam shown in Fig.Q.5(b) by using strain energy method. **(08 Marks)**

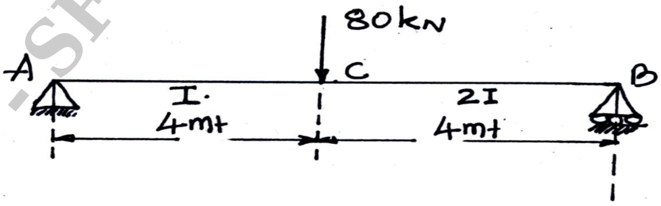


Fig.Q.5(b)

OR

6 a. State Castigliano's first and second theorems. **(04 Marks)**

b. Find the deflection under the concentrated load for the beam shown in Fig.Q.6(b). Using Castigliono's theorem and take $E = 2 \times 10^8 kN/m^2$ and $I = 14 \times 10^{-6} m^4$. **(12 Marks)**

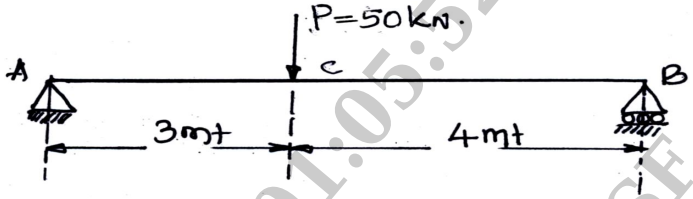


Fig.Q.6(b)

Module-4

7 A three hinged parabolic arch has a span of 30mt and central rise of 6mt. The arch carries a UDL of intensity 30kN/mt, over left half portion and a concentrated load of 60kN at 9mt from right hand support. Determine the bending moment, normal thrust, radial shear at 9mt from left hand support. **(16 Marks)**

OR

8 A cable is suspended between two points 'A' and 'B' 80mt apart horizontally and a central dip of 8mt. It supports a UDL of intensity 30kN/mt 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. **(16 Marks)**

Module-5

9 a. What is an influence line? And explain its importance in structural analysis. **(06 Marks)**

b. Determine the maximum bending moment at a section 5mt from the left support as shown in Fig.Q.9(b). **(10 Marks)**

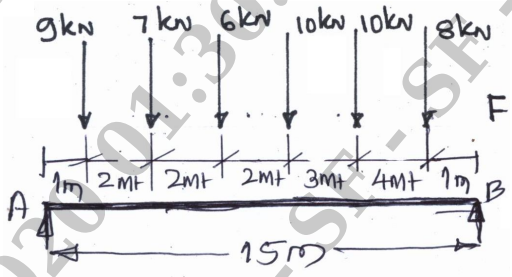


Fig.Q.9(b)

OR

10 Fig.Q.10 shows two wheel loads of 16kN and 18kN at a fixed distance apart of 2mt, cross a beam of 10mt span. Draw the influence line for bending moment and shear force for a point 4mt from the left abutment and find the maximum bending moment and shear force at that point. **(16 Marks)**

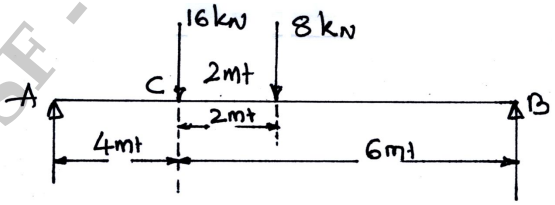


Fig.Q.10

* * * * *