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10CV751

Seventh Semester B.E. Degree Examination, Aug./Sept. 2020
Matrix Methods of Structural Analysis

Time: 3 hrs. Max. Marks:100

Note: ***Answer FIVE full questions, selecting atleast TWO questions from each part.***

PART – A

1 a. Obtain the relationship between system flexibility matrix and member flexibility matrix (f_c) in the form $[F] = [A]^T[f_c][A]$ where [A] is force transformation matrix. **(10 Marks)**

b. Develop the flexibility matrix of the members shown with reference to the coordinates shown in Fig.Q1(b). **(10 Marks)**

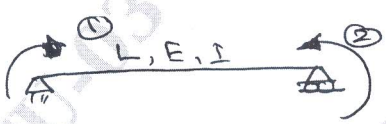

Fig.Q1(b)(i)

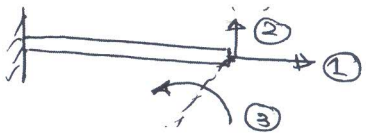

Fig.Q1(b)(ii)

2 Analyse the continuous beam shown in Fig.Q2 by flexibility method. Draw BMD. Assume element coordinates.

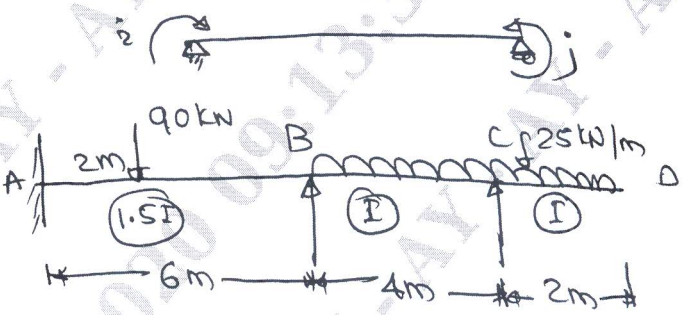

Fig.Q2 **(20 Marks)**

3 Analyse the rigid frame shown in Fig.Q3 by flexibility matrix method. Draw BMD select reactions at D as redundant.

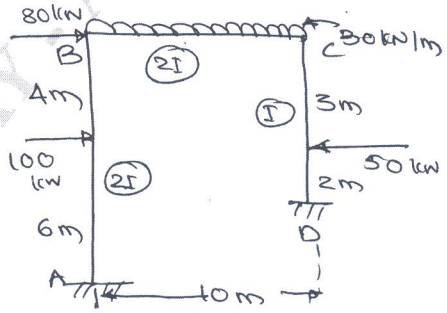

Fig.Q3 **(20 Marks)**

4 Determine the member forces in the plane truss shown in Fig.Q4 by flexibility matrix method., Assume $\frac{L}{AE} = 0.025\text{mm/kN}$.

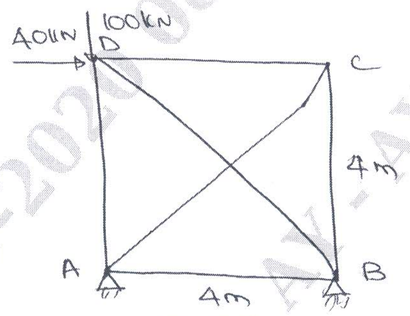

Fig.Q4 **(20 Marks)**

PART – B

5 Analyse the continuous beam shown in Fig.Q5 by displacement transformation matrix method. Draw BMD EI constant.

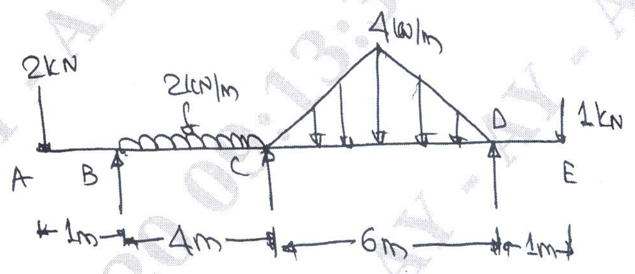

Fig.Q5 **(20 Marks)**

6 Analyse the frame shown in Fig.Q6 by stiffness matrix method. Use element approach. Draw BMD, EI constant.

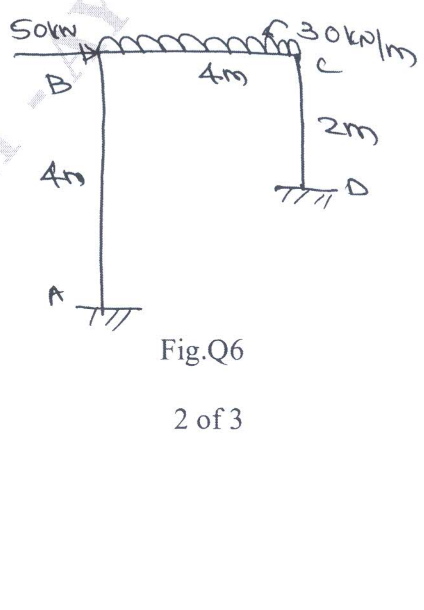

Fig.Q6 **(20 Marks)**

7 Analyse the pin jointed truss show in FigQ7 by direct stiffness method. Assume $\frac{AE}{L}$ of member 1 is 1 and $\frac{AE}{L}$ of member 2 is 2.

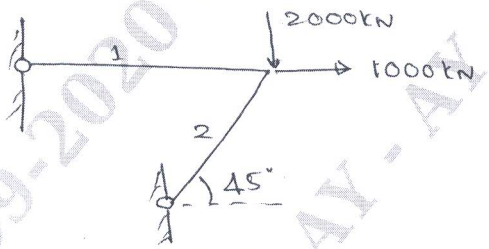

Fig.7

(20 Marks)

8 Explain :

a. Degree of freedom
b. Force transformation matrix
c. Global axis and local axis
d. Boundary conditions
e. Properties of stiffness matrix.

(20 Marks)

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