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10CV751

Seventh Semester B.E. Degree Examination, Dec.2017/Jan.2018

Matrix Methods of Structural Analysis

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions, selecting at least TWO questions from each part.***

PART – A

1 a. Distinguish flexibility from stiffness method. **(04 Marks)**

b. Explain briefly principle of contragradience. **(04 Marks)**

c. Prove that the product of flexibility and stiffness matrices is a unit matrix. **(04 Marks)**

d. Explain axial, bending and rotational flexibility coefficients with example. **(08 Marks)**

2 Analyze the continuous beam shown in Fig.Q2 by flexibility method. Also draw the BMD.

Fig.Q2 **(20 Marks)**

3 Using force transformation matrix, analyze the frame shown in Fig.Q3. Draw BMD.

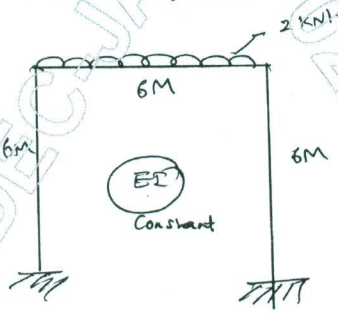

Fig.Q3 **(20 Marks)**

4 Developing element flexibility matrix, determine element forces for the truss shown in Fig.Q4. AE is constant for all members.

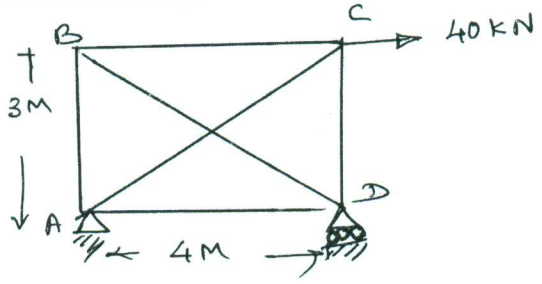

Fig.Q4 **(20 Marks)**

PART – B

5 a. Mention the properties of stiffness matrix (any four only). **(04 Marks)**

b. Analyze the truss shown in Fig.Q5(b) by stiffness method.
"A" = hinge support, "D" = Roller support

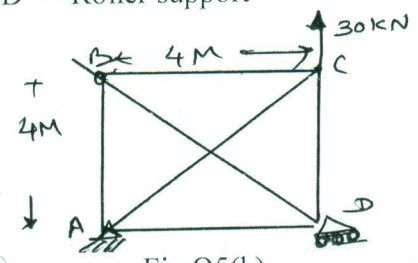

Fig.Q5(b) **(16 Marks)**

6 Analyze the beam shown in Fig.Q6 by stiffness method. Generate transformation matrix, system stiffness matrix, system deformation for the same.

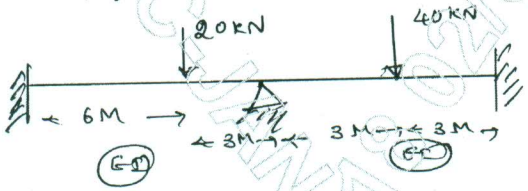

Fig.Q6 **(20 Marks)**

7 Write short notes on:

a. Direct stiffness method

b. Transformation of member fine matrix

c. System stiffness matrix

d. Static and kinematic indeterminacy. **(20 Marks)**

8 Analyze the frame shown in Fig.Q8 by direct stiffness method. Assume E = 200 GPa, $I_{zz} = 1.33 \times 10^{-5}$ m^4, A = 0.01 m^2. Flexural rigidity and axial rigidity are same for all members.

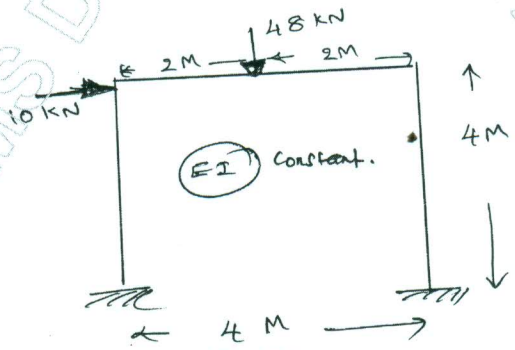

Fig.Q8 **(20 Marks)**

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