USN | | | | | | | | | |

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.

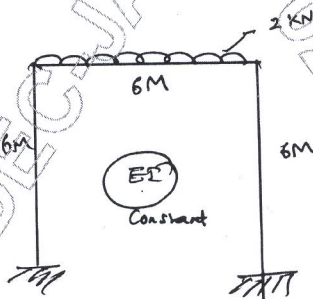Fig.Q3   **(20 Marks)**

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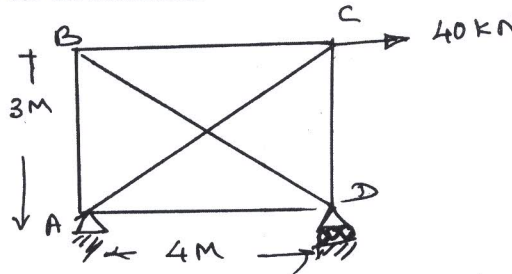

Fig.Q4   **(20 Marks)**

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

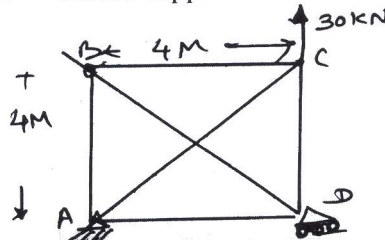Fig.Q5(b)   **(16 Marks)**

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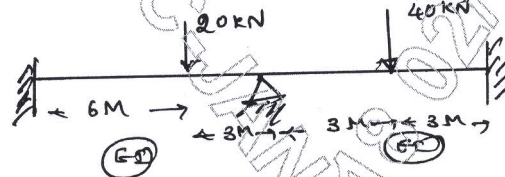

Fig.Q6   **(20 Marks)**

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.
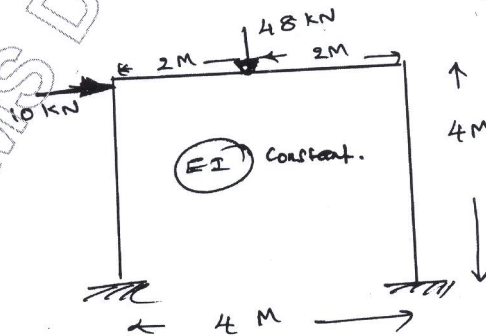

Fig.Q8   **(20 Marks)**

* * * * *