USN | | | | | | | | | |

10CV751

Seventh Semester B.E. Degree Examination, June/July 2019
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. Develop the element flexibility matrix for the member shown in Fig.Q1(a) with respect to the coordinates shown in Fig.Q1(a).

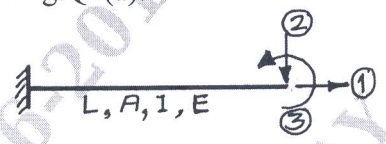

Fig.Q1(a) **(10 Marks)**

b. Develop the relationship between structure flexibility matrix and member flexibility matrix through force transformation matrix. **(05 Marks)**

c. Briefly explain with sketches "equivalent joint loads" as applied to matrix methods. **(05 Marks)**

2 Analyze the continuous beam shown in Fig.Q2 by flexibility matrix method using force transformation matrix. Take moment at B as redundant. Draw BM diagram.

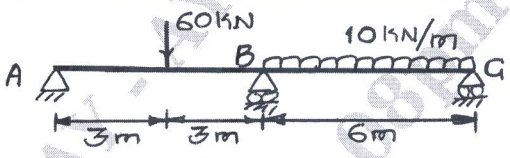

Fig.Q2 **(20 Marks)**

3 Synthesize the structure flexibility matrix for the portal frame shown in Fig.Q3 by transformation matrix approach. Take moments at B, C and D as redundant R_1, R_2 and R_3 as shown in Fig.Q3.

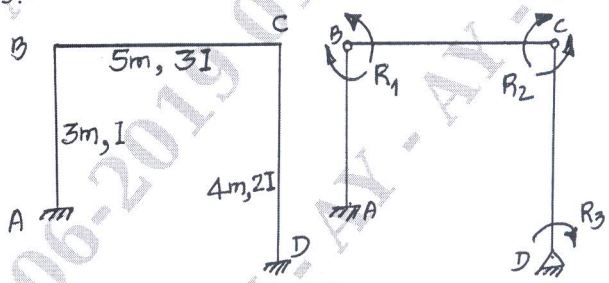

Fig.Q3 **(20 Marks)**

4 Analyze the pin jointed plane truss by flexibility matrix method using force transformation concept. Take the members 2 and 3 as redundants R_1 and R_2. Cross sectional area and E are same for all members. Refer Fig.Q4.

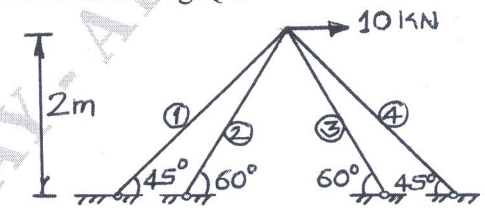

Fig.Q4 **(20 Marks)**

PART – B

5 Synthesize the structure stiffness matrix for the pin jointed plane truss adopting displacement transformation approach. Refer Fig.5. Global coordinated are indicated from ① to ④.

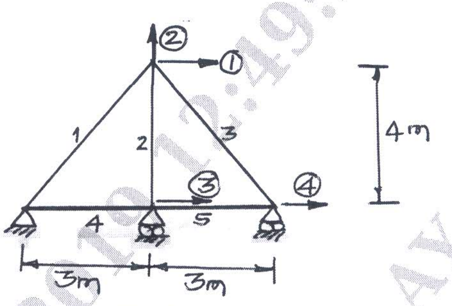

Fig.5 **(20 Marks)**

6 Analyze the continuous beam shown in Fig.Q6 by stiffness matrix method. Adopt displacement transformation approach.

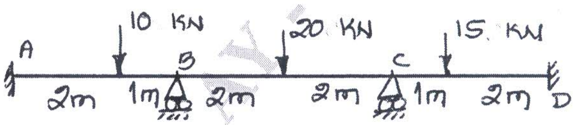

Fig.Q6 **(20 Marks)**

7 Analyze the portal frame by stiffness matrix method transformation approach. Refer Fig.Q7.

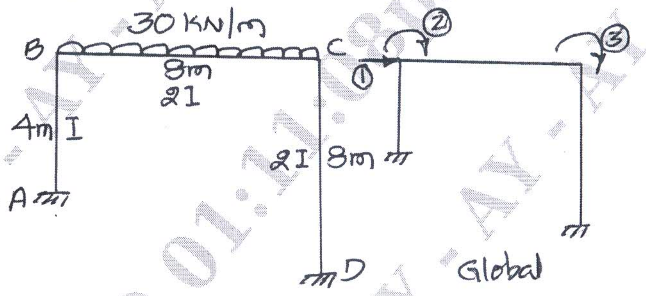

Fig.Q7 **(20 Marks)**

8 a. Briefly explain "principle of contragradience". **(05 Marks)**

b. Synthesize the overall stiffness matrix for the continuous beam by direct stiffness method. Refer Fig.Q8(b). EI = 333.3 kN-m^2, spring stiffness = 1000 kN/m.

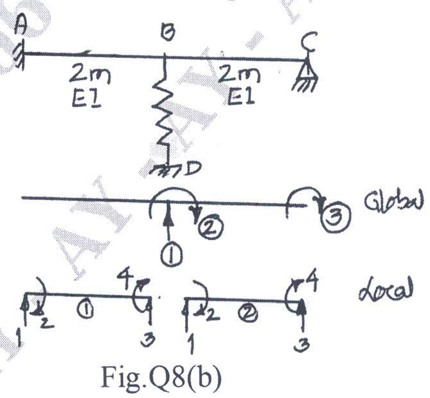

Fig.Q8(b) **(15 Marks)**

* * * * *