

GUJARAT TECHNOLOGICAL UNIVERSITY
M. E. - SEMESTER – I • EXAMINATION – WINTER 2012

Subject code: 711501N**Date: 08-01-2013****Subject Name: Matrix Analysis of Framed Structures****Time: 02.30 pm – 05.00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Take $EI = 30 \times 10^3 \text{ kN.m}^2$, $GJ = 10 \times 10^3 \text{ kN.m}^2$, $AE = 25 \times 10^3 \text{ kN}$ unless given.

Q.1 (a) Write down assumptions made and principles used in matrix analysis of framed structures. **07**

(b) Explain S_{MS} , S_J , A_C , A_E of stiffness member approach. **07**

Q.2 (a) Explain B_{MS} , B_{MQ} , F_M , B_{RQ} of flexibility member approach. **07**

(b) Derive B_{MS} matrix for a truss shown in fig.1. **07**

OR

(b) Derive B_{RS} matrix for a truss shown in fig.1. **07**

Q.3 (a) Derive relation between structure axis and member axis for Action Vectors of space truss. **07**

(b) Generate S_M matrix for plane frame and grid member. **07**

OR

Q.3 (a) Write rotation matrix for plane truss and Grid member. **07**

(b) How various secondary effects are incorporated in analysis of structures? Explain with suitable illustration. **07**

Q.4 (a) Explain with suitable illustrations concepts of symmetry and anti-symmetry for structures. **04**

(b) Analyse a truss shown in fig.2 using flexibility member approach. **10**

OR

Q.4 (a) Compute displacements in a plane frame shown in fig.3 using stiffness member approach. **07**

Q.4 (b) Compute reactions in a plane frame shown in fig.3 using stiffness member approach. **07**

Q.5 (a) Explain the concept of non-linear analysis of structures with illustration. **04**

(b) Compute the displacements of a grid shown in fig.4 using stiffness member approach. **10**

OR

Q.5 (a) Compute the reactions of a grid shown in fig.4 using stiffness member approach. **07**

(b) Analyse a continuous beam shown in fig.5 using stiffness member approach. Draw all possible internal forces diagrams. **07**

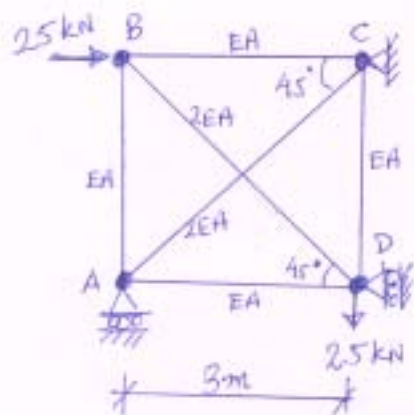


fig.1

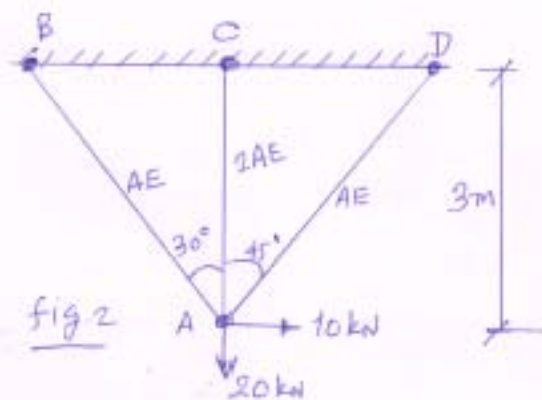


fig 2

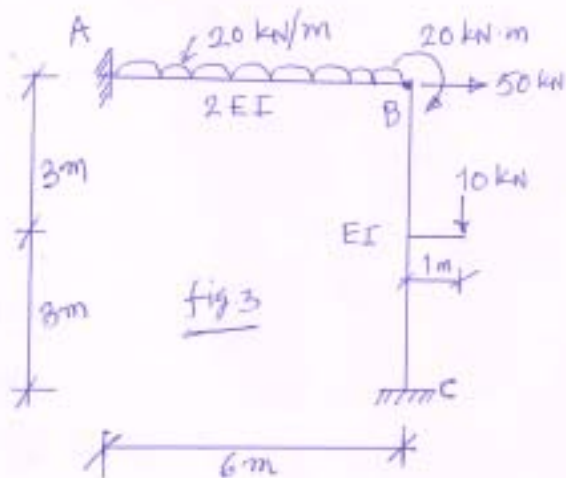


fig 3

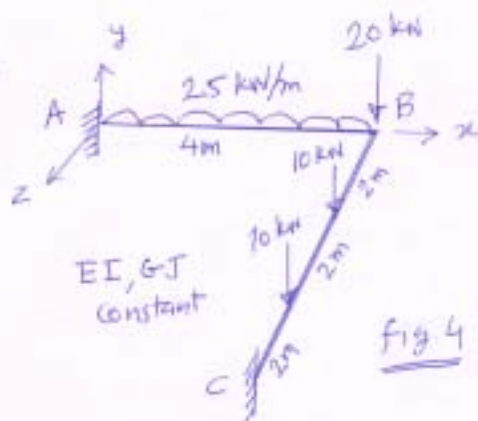


fig 4

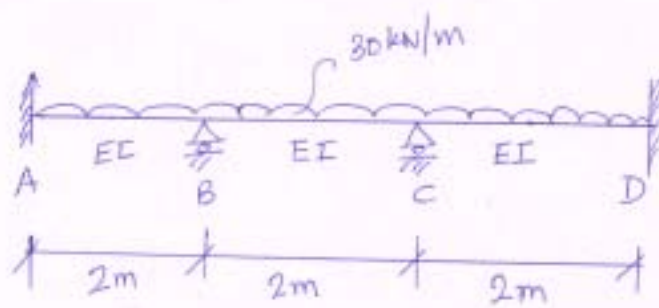


fig 5