Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M.E –Ist SEMESTER–EXAMINATION – JULY- 2012

Subject code: 711501N Date: 05/07/2012

Subject Name: Matrix Analysis of Framed Structures

Time: 2:30 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 = 25 x 10^3 kN.m^2, GJ=20 x 10^3 kN.m^2 , AE=20 x 10^3 kN unless given.**

Q.1	**(a)**	Enlist 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_{MJ}, B_{MQ}, B_{RJ}, 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 plane frame.	**07**
	(b)	Generate S_M matrix for beam and grid member.	**07**
		OR	
Q.3	**(a)**	Write rotation matrix for plane frame and Grid member.	**07**
	(b)	Enlist various secondary effects. Explain procedure to incorporate these effects in analysis.	**07**
Q.4	**(a)**	Explain with suitable illustrations concepts of symmetry and anti-symmetry for structures.	**04**
	(b)	Compute redundants of 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**
	(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.	**04**
	(b)	Analyse a continuous beam shown in fig.4 using stiffness member approach.	**10**
		OR	
Q.5	**(a)**	Compute the displacements of a grid shown in fig.5 using stiffness member approach.	**07**
	(b)	Compute the reactions of a grid shown in fig.5 using stiffness member approach.	**07**

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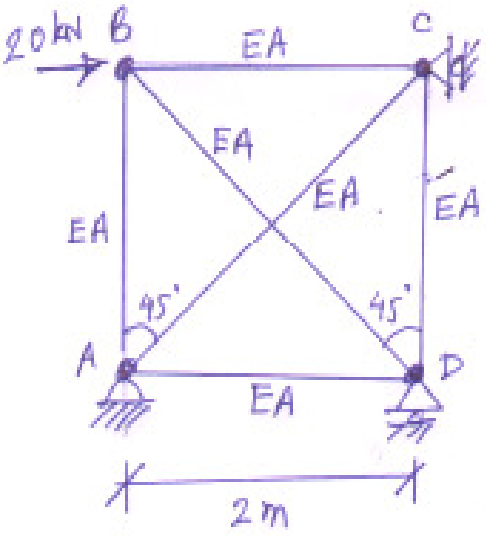


fig. 1

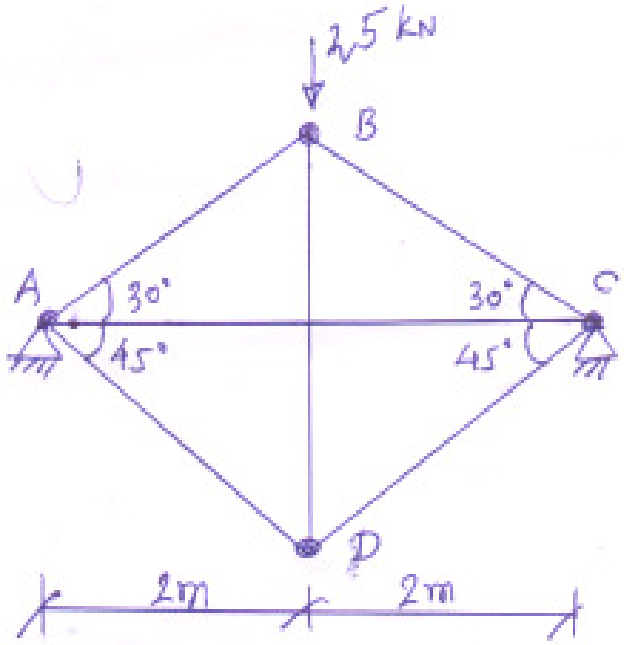


fig. 2

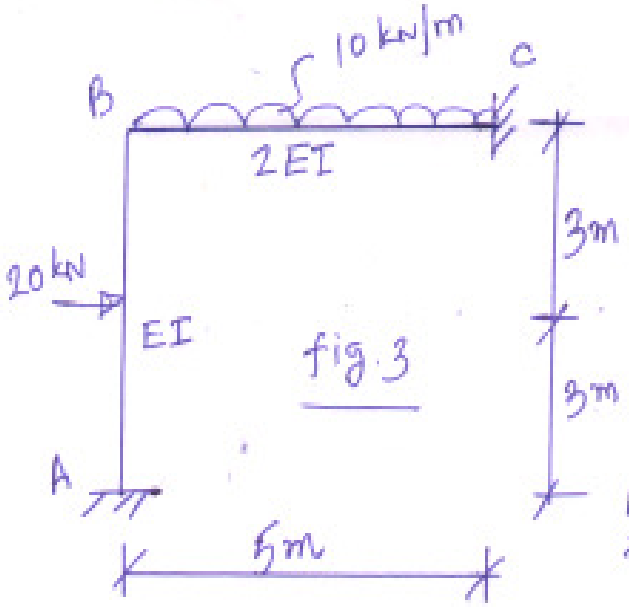
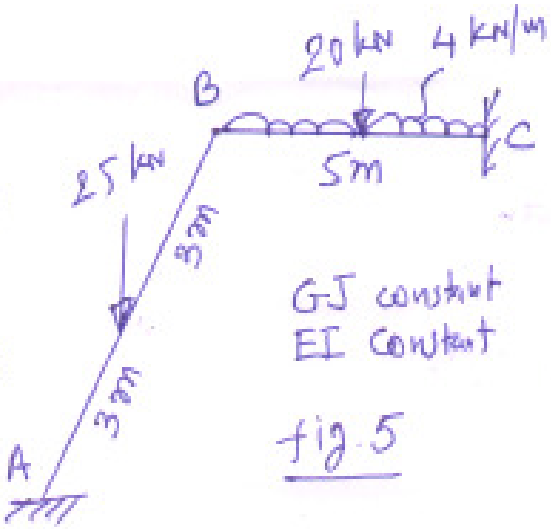


fig. 3



GJ constant
EI Constant

fig. 5

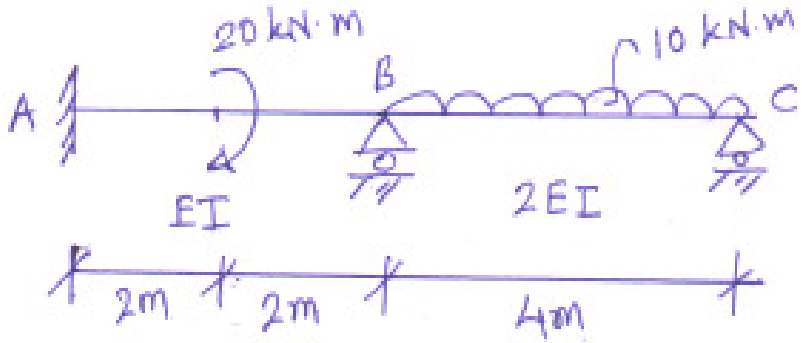


fig. 4