Seat No.: _____ Enrolment No._____

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

Q.1	**(a)**	Write down assumptions made and principles used in matrix analysis of framed structures.	**07**
	(b)	Explain S_{SMS}, 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**

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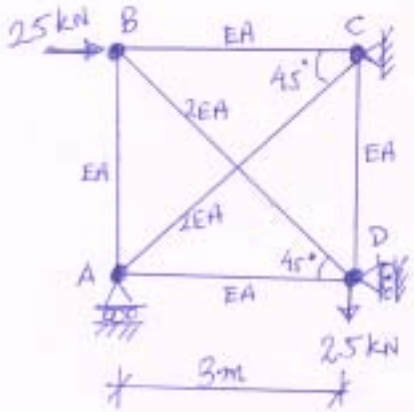

fig.1

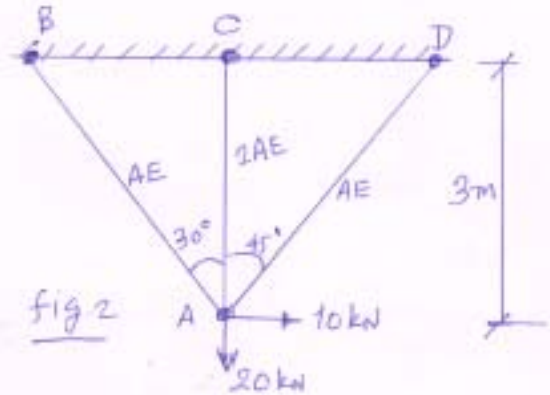

fig 2

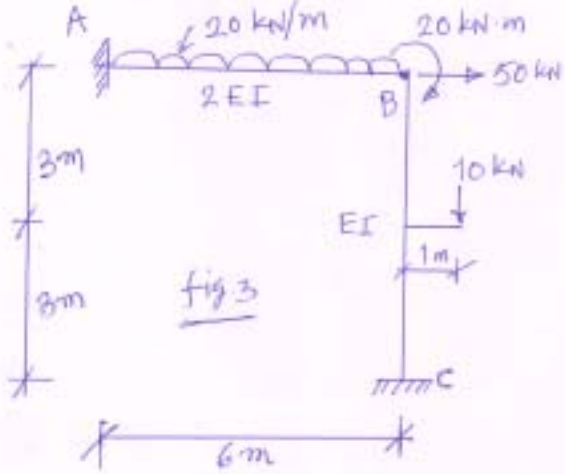

fig 3

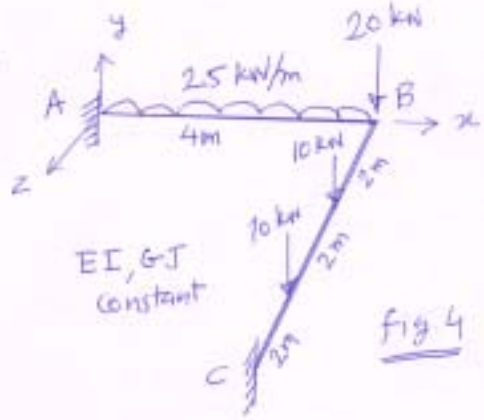

fig 4

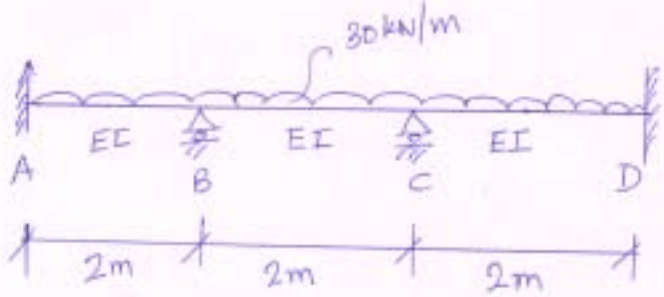

fig 5