Seat No.: _____ *Enrolment No._____*

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – I • EXAMINATION – WINTER • 2013

Subject code: 711501N Date: 23-12-2013

Subject Name: Matrix Analysis of Framed Structures

Time: 10.30 am – 01.00 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 = $20*10^3$ kN.m^2 and AE=$20*10^3$ kN unless given.**

Q.1	**(a)**	State rotation transformation matrix for plane truss and plane frame.	**07**
	(b)	Construct $[B_{MS}]$ matrix for beam shown in fig.1 .Consider R_c and M_c as redundant.	**07**
Q.2	**(a)**	Explain following matrix with illustrations. $[S_M],[A_{FC}],[B_{MS}],[F_M],[R_T],[S_{RF}],[A_{MQ}]$	**07**
	(b)	Generate Sm matrix for plane truss.	**07**
		OR	
	(b)	Generate Sm matrix for grid.	**07**
Q.3	**(a)**	Calculate displacements for the beam shown in fig.2 using stiffness member approach.	**07**
	(b)	For a steel beam shown in the fig.3 show the slopes at 'B' and 'C' are 9.311 * 10^{-3} and 0.345 * 10^{-3} rad., using any matrix method.	**07**
		OR	
Q.3	**(a)**	Knowing displacements for the beam shown in fig.3 as per above Q.3.(b), compute reactions and member end actions, using any matrix method.	**07**
	(b)	Find the value of M_A and M_B for the beam shown in fig.4 using flexibility member approach. EI=constant	**07**
Q.4		Calculate displacements for the plane frame shown in fig.5 using stiffness member approach. EI=constant	**14**
		OR	
Q.4		Find displacements, reactions and member end actions for a plane truss shown in fig.6.AE=constant.	**14**
Q.5	**(a)**	What do you mean by stability of structures? Explain with suitable example.	**07**
	(b)	For beam shown in fig.2, compute displacements. If it is subjected to downward settlement of B by 5 mm. Take EI=$20*10^3$ kN.m^2.	**07**
		OR	
Q.5	**(a)**	State and explain member end actions for following cases: (1)Support rotation (2)Uniform temperature increase	**07**
	(b)	Generate load vector for plane frame shown in fig.7.	**07**

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M.E. Sem II (Civil- (ASAD)

Subject: Matrix Analysis of Framed structure

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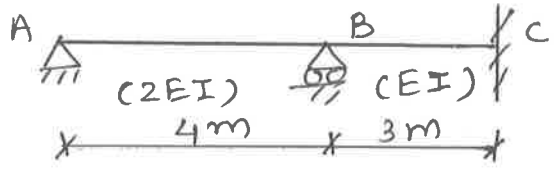

Fig. 1

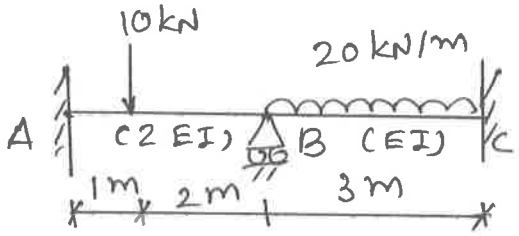

Fig. 2.

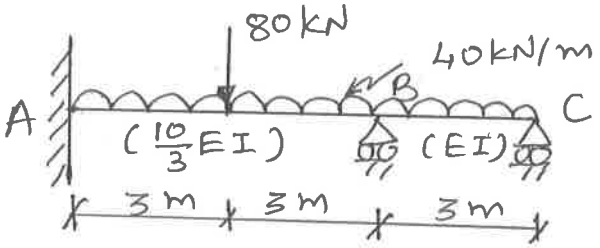

Fig. 3

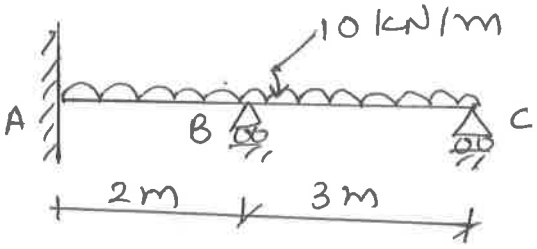

Fig. 4

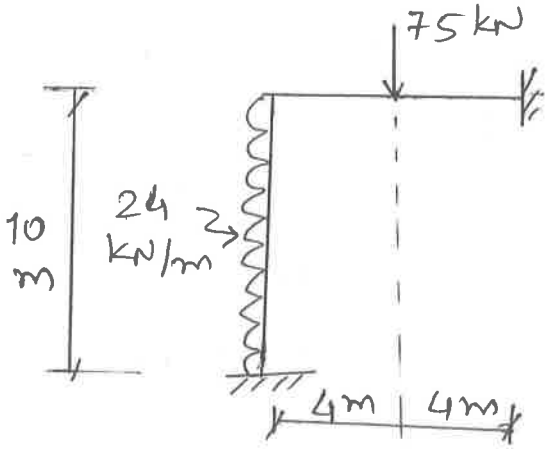

Fig. 5

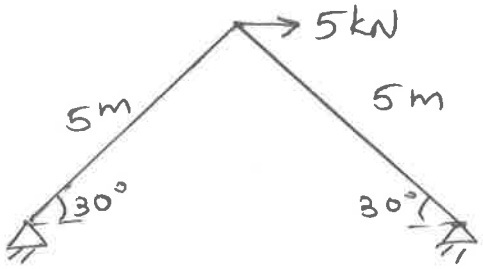

Fig. 7

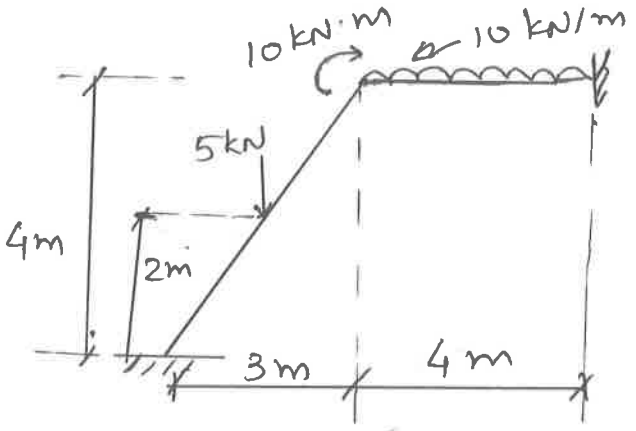

Fig. 7