Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII EXAMINATION – SUMMER 2016

Subject Code:170605 **Date:05/05/2016**

Subject Name:Advanced Structural Analysis (Department Elective-I)

Time:02:30 PM to 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.**

Q.1		Analyze the beam shown in Fig. 1 by stiffness matrix method and plot only bending moment diagram.	**14**
Q.2	**(a)**	Derive the member stiffness matrix for a typical beam using usual notations.	**07**
	(b)	Explain the terms: Null Matrix, Transpose of matrix and band matrix.	**07**
		OR	
	(b)	Write short note on "Process of Discretization"	**07**
Q.3		Analyze the portal frame shown in Fig. 2 by stiffness matrix and plot only bending moment diagram.	**14**
		OR	
Q.3		Analyze the portal frame shown in Fig. 3 by stiffness matrix and plot bending moment diagram and shear force diagram.	**14**
Q.4	**(a)**	Derive the shape functions for three noded beam using usual notations.	**07**
	(b)	Explain preprocessing and post processing stage in finite element package.	**07**
		OR	
Q.4	**(a)**	Derive the shape functions for constrain triangle with polynomial function.	**07**
	(b)	Derive the member stiffness matrix for truss member with usual notations.	**07**
Q.5		Analyze the truss as shown in Fig. 4 by stiffness matrix method, find joint displacement and member forces. Support B settles down by 2.5 mm and temperature in BD increased by 20^0c. $\alpha=12\times10^{-6}$ ^{0}c AE = 8000 kN	**14**
		OR	
Q.5	**(a)**	What are the various methods available for the solution of linear simultaneous equations using matrices? Write C/C++ program for one of those methods.	**07**
	(b)	Derive the member stiffness matrix for grid member with usual notations.	**07**

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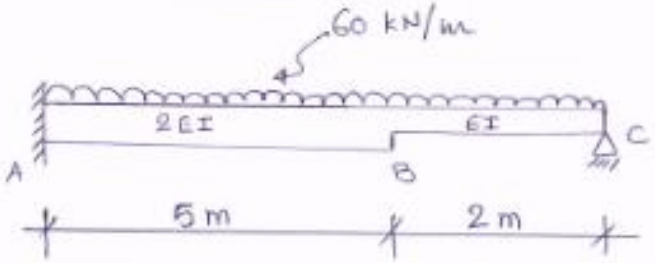

Fig. 1 (Q. 1)

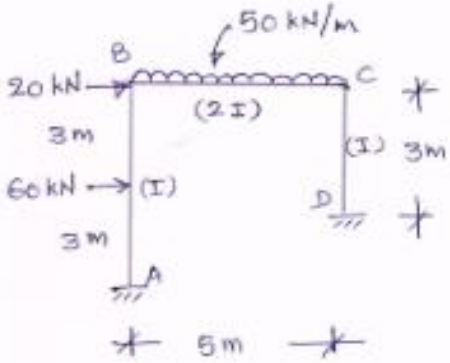

Fig. 2 (Q. 3)

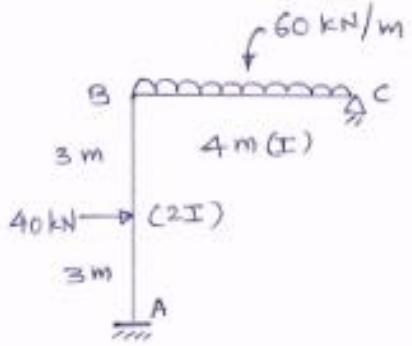

Fig. 3 (OR Q. 3)

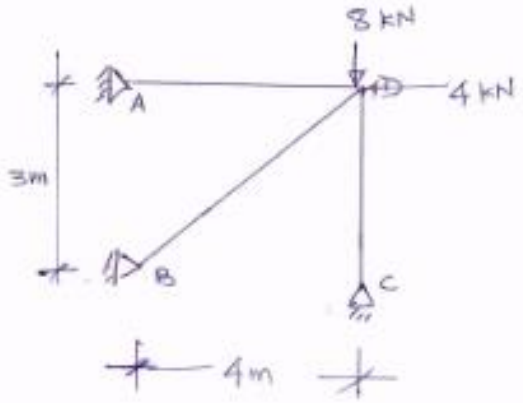

Fig. 4 (Q. 5)