Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME – SEMESTER-1 (NEW) EXAMINATION – WINTER 2016

Subject Code: 2712001 **Date:04/01/2017**

Subject Name: Matrix Methods of Structural Analysis

Time: 2:30 pm to 5:00 pm **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Draw neat and clean figures with pencil only.**

Q.1	**(a)**	Compute the load vector for the beam shown in Figure 1.	**07**
	(b)	Compute the transformation matrix for all the members for portal frame shown in Figure 2.	**07**
Q.2	**(a)**	Derive the transformation matrix for a member for a portal frame.	**07**
	(b)	How non-linear analysis will be carried out? Explain with example.	**07**
		OR	
	(b)	Compute the load vector for the portal frame as shown in figure 2.	**07**
Q.3	**(a)**	Find the nodal unknowns at joints for the beam shown in figure 1 by stiffness matrix method.	**07**
	(b)	Compute the stiffness matrix for a portal frame for the figure 2.	**07**
		OR	
Q.3		Analyze the beam shown in figure 1 by flexibility matrix method and plot bending moment diagram.	**14**
Q.4		Analyze the truss shown in figure 3 by stiffness matrix method. Find the unknown joint displacement and forces in the members.	**14**
		OR	
Q.4		Compute the support reactions and unknown joint displacements for the truss as shown in figure 3 by stiffness matrix method. Here joint B settles down by 2.5 mm downward. AE = 7500 kN.	**14**
Q.5		Analyze the portal frame as shown in figure 4 by flexibility matrix method and plot bending moment diagram.	**14**
		OR	
Q.5		Compute the unknown joint displacement of the grid is shown in figure 5 by any matrix method.	**14**

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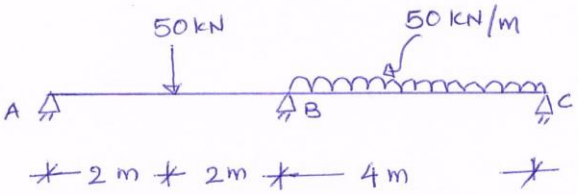
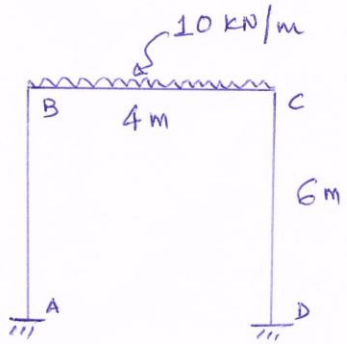


EI = constant

Figure 1

(Q.1 (a) and Q.3 (a)) OR Q.3)



EI = Constant

Figure 2

(Q.1 (b), OR Q.2 (b), Q.3 (b))

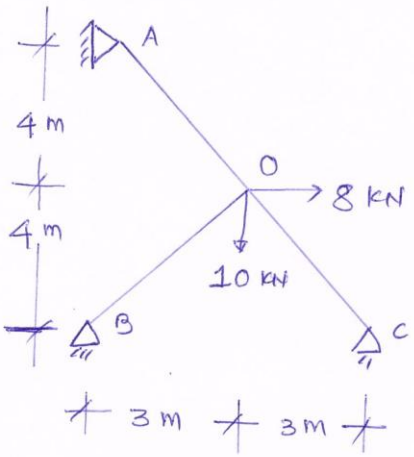
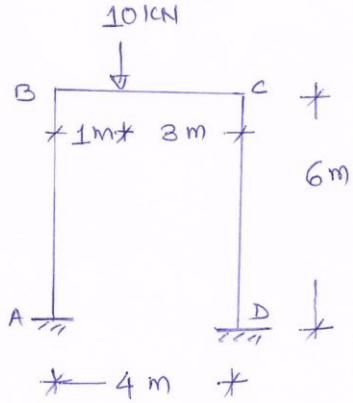
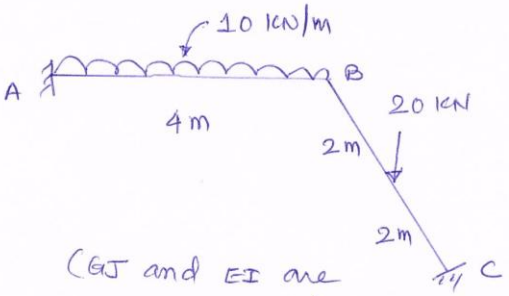


Figure 3 (Q.4, OR Q.4)



EI = constant

Figure 4 (Q.5)



(GJ and EI are constant)

Figure 5 (OR Q.5)