Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

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

Subject Code: 711501N **Date:17/11/2016**

Subject Name: Matrix Analysis of Framed Structures

Time:10:30 Am to 1:00 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.**
5. **Assume AE = 9000 kN E = 22000 kN.m^2 and GJ = 15000 kN.m^2 until otherwise stated.**

Q.1		Analyze the beam (Figure 1) by stiffness matrix method and plot SF – BM diagram also.	**14**
Q.2	**(a)**	Derive the member transformation matrix for portal frame.	**07**
	(b)	Explain the nonlinear analysis for civil structures with examples.	**07**
		OR	
	(b)	Derive the member stiffness matrix for beam member.	**07**
Q.3		Analyze the beam (Figure 1) by Flexibility matrix method and plot SF – BM diagram also.	**14**
		OR	
Q.3		Analyze the portal frame (Figure 2) by Stiffness matrix method and plot bending moment diagram only.	**14**
Q.4		Analyze the plane truss (Figure 3) by Stiffness matrix method.	**14**
		OR	
Q.4		Analyze the portal frame (Figure 4) by Flexibility matrix method and plot bending moment diagram only.	**14**
Q.5		Analyze the Grid (Figure 5) by Stiffness matrix method.	**14**
		OR	
Q.5	**(a)**	Derive the transformation matrix for plane truss member.	**07**
	(b)	Derive the member stiffness matrix for a portal frame.	**07**

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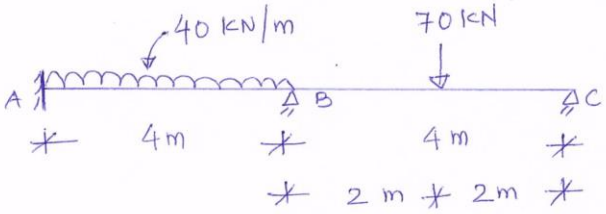
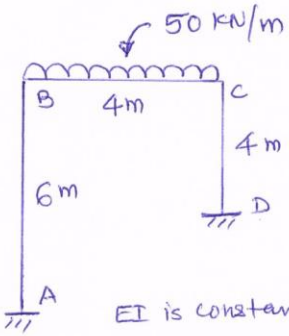


EI is constant

Figure: 1

(Q:1 and Q:3)



EI is constant

Figure: 2 (OR Q:3)

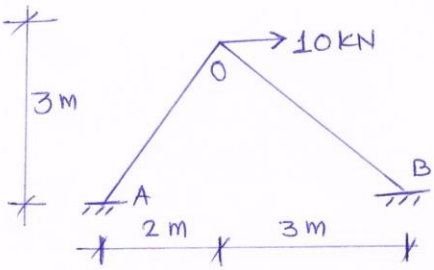
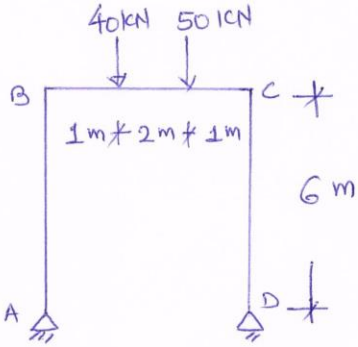


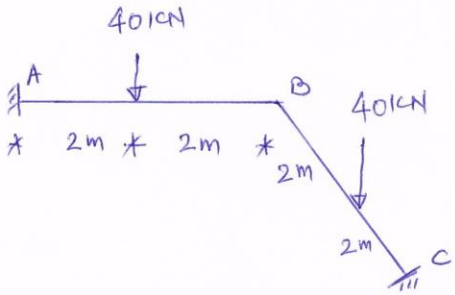
Figure: 3 (Q:4)

(Joint A and B are treated as Hinge joint)



(EI is constant)

Figure: 4 (OR Q:4)



(GJ and EI are constant)

Figure: 5 (Q:5)