Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME – SEMESTER I (NEW) – • EXAMINATION – SUMMER 2016

Subject Code: 2712001 Date:17/05/2016

Subject Name: MATRIX METHODS OF STRUCTURAL ANALYSIS

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.**
4. **Solve all the questions by member stiffness matrix method or member flexibility matrix method**

Q.1	**(a)**	Derive the relationship between member stiffness matrix along member axis and structural axis. Also give the rotational matrix for plane truss and space truss.	**07**
	(b)	Explain term non linearity. Discuss the various non linearity present in the structure. Also explain the method for analyzing the same.	**07**
Q.2	**(a)**	Explain sub-structure method of analysis giving examples. Also give advantages of the method.	**07**
	(b)	A two span beam ABC is fixed at A while B and C are supported on rollers. The span of AB is 6m and that of BC is 4m. If AB is loaded by a udl of 10kN/m over entire span, analyze the beam by flexibility matrix method. Assume determinate beam as cantilever beam.	**07**
		OR	
	(b)	A fixed beam AB has span of 8m and loaded by a point load 80kN at 3m form A. Analyze the beam by flexibility matrix method and draw the bending moment diagram. Assume determinate beam as cantilever beam.	**07**
Q.3		Analyze the portal frame as shown in figure. 1 by stiffness matrix method and draw the bending moment diagram. (Neglect axial deformations).	**14**
		OR	
Q.3		Analyze the truss as shown in the figure.2 by stiffness matrix method. And tabulate forces in the member. All the supports at top are hinged supports.	**14**
Q.4		Analyze the truss as shown in the figure.2 by flexibility matrix method and tabulate the forces in the members. All the supports at top are hinged supports.	**14**
		OR	
Q.4		Analyze the portal frame as shown in the figure.3 by flexibility matrix method and draw bending moment diagram. The support at A is fixed while that at D is hinged. Assume determinate beam as cantilever frame.	**14**
Q.5		A continuous beam ABCD has AB = 3m, BC = 4m and CD = 5m. Both A and D are fixed supports while both B and C are roller supports. The beam is loaded by udl of 60kN/m over entire length ABCD. If support a yields by 0.002 radians and support C settles by 0.02m, analyze the beam by stiffness matrix method and draw the bending moment and shear force diagram.	**14**
		OR	
Q.5		A four span continuous beam ABCDE has AB = BC = CD = DE = 6m. Supports A and E are fixed and B, C and D are supported by a spring of spring stiffness 10000kN/m. The spans AB and DE are loaded by udl of 50kN/m and spans BC and CD are loaded by centre point load of 240 kN. If the flexural rigidity of the beam is 36000kn-m^2, analyze the beam and plot bending moment and shear force diagram.	**14**

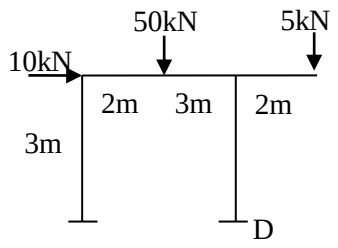

Figure.1

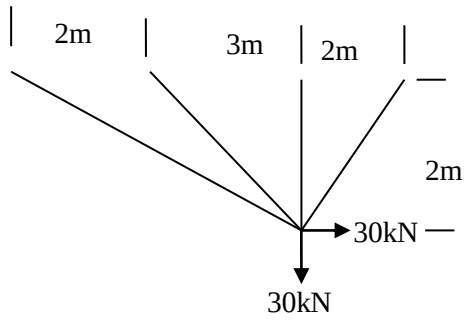

Figure.2

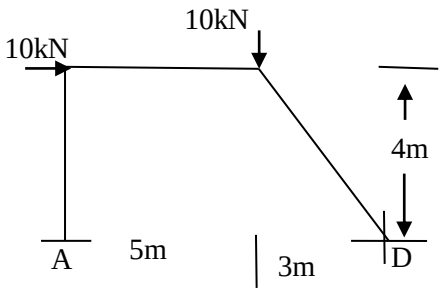

Figure.3

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