Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY ME - SEMESTER- I (OLD course)• EXAMINATION – SUMMER 2015

Subject Code: 711501 Date: 11/0		5/2015	
Sut Tim	e: 10	Name: Matrix Analysis of Framed Structures0:30 am to 1:00 pmTotal Marks: 70	
Inst	ruction 1. 2. 3.	is: Attempt all questions. Make suitable assumptions wherever necessary. Figures to the right indicate full marks.	
Q.1	(a) (b)	Derive flexibility matrix for a grid member. Derive rotation transformation matrix for a plane frame member.	07 07
Q.2	(a) (b)	Generate S_M matrix for plane frame member. Explain various methods by which inclined roller support conditions can be included in the analysis of pin jointed frame structures by stiffness method.	07 07
	(b)	Illustrate the method that can include beam with elastic support conditions within the scope of the stiffness method of analysis.	07
Q.3	(a)	Formulate B_{MS} and B_{RS} for the beam shown in fig. 1 by taking reactive moment at support A and the bending moment just to the left of support B as the redundant A_{Q1} and A_{Q2} , respectively. Assume that these moments are positive when they produce compression on the top of the beam.	07
	(b)	Determine redundant and member end actions for the Q-3(a). OR	07
Q.3	(a)	Determine redundant for the plane truss shown in fig. 2 by taking the forces in the members AC and BD as the redundant A_{Q1} and A_{Q2} , respectively. Assume that the tension in a member is positive. All members have the same EA.	07
	(b)	Determine displacements and member end actions for the Q-3(a) OR.	07
Q.4	(a)	Determine displacements for the beam shown in fig. 1 using stiffness member approach.	07
	(D)	OR OR	07
Q.4	(a)	Determine displacements for the plane truss shown in fig. 3 using stiffness member approach.	07
	(b)	Determine displacements for the plane frame shown in fig. 4 using stiffness member approach. All members have the same EI & EA. Take $EA = 120 EI$.	07
Q.5	(a)	Determine displacements for the grid shown in fig. 5 using stiffness member approach. Take $GJ = 0.8 EI$.	07
	(b)	Derive S_M matrix for space truss member.	07
Q.5	(a)	Using stiffness member approach, calculate displacements for the beam shown in fig. 6, if the beam is subjected to following secondary effects: (i) 0.001 radian clockwise rotation of support A. (ii) 5 mm downward settlement of support B. Take $EI = 20 \times 10^3 \text{ kNm}^2$.	07
	(b)	Considering flexural effects only and reactions at support B as redundant, formulate B_{MS} matrix for the plane frame shown in fig. 4.	07

