GUJARAT TECHNOLOGICAL UNIVERSITYME - SEMESTER- II (Old course)• REMEDIAL EXAMINATION - SUMMERSubject Code: 1721501Date:12/05Subject Name: Finite Element MethodTime: 02:30 pm to 5:00 pmTotal MarInstructions:		2015 /2015 ks: 70	
	1. 2. 3.	Attempt all questions. Make suitable assumptions wherever necessary. Figures to the right indicate full marks.	
Q.1	(a) (b)	Explain on principles of discretization and convergence criteria. Determine the shape function for two noded truss element using polynomial function.	07 07
Q.2	(a)	Determine the shape functions for constant strain triangle using generalized	07
	(b)	Determine the shape for three noded bar element adopting natural coordinate varying from -1 to 1.	07
	(b)	OR Enlist the software packages, based on FEM used in structures. Explain the pre processors for FEA modeling.	07
Q.3	(a)	Define the plane stress and plane strain problems with illustrations. Also mention different parameters differ in both types of problem	07
	(b)	What is Jacobian matrix? Give a procedure to find out Jacobian matrix.	07
Q.3		A two noded truss element, having length $\frac{1}{2}$ ø, obtain the shape function. Using the displacement function formulate the stiffness matrix.	14
Q.4	(a)	Explain Pascal triangle and its use in selection of displacement function and	07
	(b)	Using natural coordinate system & Lagrangeøs function, obtain shape function for eight noded rectangular element having four corner nodes and four nodes at the centre of the edges.	07
0 4		OR	14
Q.4		Compute axial displacement of a steel tapered rod of 2.5 m length, 18 mm diameter at free end and 36 mm diameter at fixed end. The rod is subjected to axial tensile force of 80 kN. Take $E=210$ GPa. Discretize the rod in to three parts of two noded element.	14
Q.5		Derive the coefficient K_{22} of the stiffness matrix of a 4 noded isoparametric quadrilateral element whose nodal coordinates are (0, 0), (120, 60), (90, 90) & (0, 90) in mm. Take thickness of element is 12 mm. Take 2 x 2 point Gauss quadrature.	14
05	(-)	OR	07
Q.5	(a)	Explain the free vibration analysis of truss bar with two degree of freedom	07

considering lump mass.(b) Explain on flexural vibration on beam elements.

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