Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Seventh semester B.Tech examinations (S), September 2020

Course Code: AO405

Course Name: FINITE ELEMENT METHODS

Max. Marks: 100 Duration: 3 Hours

PART A

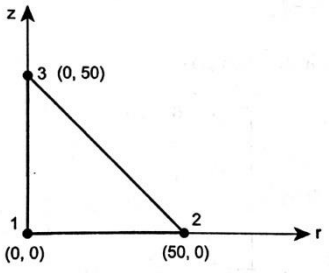
Answer any three full questions, each carries 10 marks.

			Marks
1	a)	Name any four FEA softwares.	(2)
	b)	State the three procedure of finite element method.	(2)
	c)	What is meant by discretization and numbering of nodes?	(3)
	d)	Write the examples of structural and non-structural problems.	(3)
2	a)	List the general steps of the finite element method.	(5)
	b)	List the advantages and disadvantages of finite element methods.	(3)
	c)	Give any two examples of finite element modelling.	(2)
3	a)	List and describe the types of boundary conditions with examples.	(5)
	b)	Derive the element stiffness matrix for spring element.	(5)
4		Derive the element stiffness matrix for bar element by using potential energy approach.	(10)

PART B

Answer any three full questions, each carries 10 marks.

5		Derive the shape function for 8-node rectangular Serendipity Elements.	(10)
6		Derive the shape function for 4 noded isoparamertric element.	(10)
7	a)	Write down the expression for the stress-strain relationship matrix for a CST element.	(2)
	b)	Derive the stress-strain relationship matrix for plane stress and plane strain condition by using above expression.	(8)
8		For the axisymmetric elements shown in figure. Determine the [D] and [B] matrix. Let E = 2.1×10^5 N/mm^2 and v=0.25. The co-ordinates shown in figure are in millimetres.	(10)



PART C

Answer any four full questions, each carries 10 marks.

9		Calculate moments and shear forces in thick plate.	(10)
10		What is Degenerated Shell? Formulate Finite Element equation of Degenerated Shell.	(10)
11		Derive the stiffness matrix for skew plate.	(10)
12	a)	Write down the expression of longitudinal vibration of bar element.	(3)
	b)	Write down the expression of traverse vibration of beam element.	(3)
	c)	What is meant by longitudinal vibration?	(2)
	d)	What is meant by transverse vibration?	(2)
13	a)	State the properties of fluids.	(4)
	b)	Write down the expression of shape function for 2D fluid mechanics.	(3)
	c)	Write down the expression of stiffness matrix for 2D fluid mechanics	(3)
14		Derive the force-displacement relationship for Buckling of Beam-Column Members.	(10)

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