	WINTER-2023		
	Exam Seat No.:		
	Academic Year:2023-2024	Semester: II	
	Name of Programme: M.Tech	Pattern:2022	
	Name of Course: Finite Element Method	Course Code:CIV225108	
	Max. Marks:60	Duration: 2.50 Hrs	

	Instructions: Candidates should read carefully the instructions printed on the Question Paper and on the cover page of the Answer Book, which is provided for their use. 1. This question paper contains 02 pages. 2. Answer to each new question is to be started on a new page. 3. Assume suitable data wherever required, but justify it. 4. Draw the neat labelled diagrams, wherever necessary. 5. The last columns indicates the Course Outcome and level of Blooms Taxonomy of the Question/sub-question.	

Question No. 1 Attempt following Question

1a)	State and explain the convergence requirements of polynomial functions.	(6)	CO1

Question No. 2 Attempt following Question

2a)	Explain in detail - a) Rayleigh-Ritz method (3 marks) b) Principle of minimum potential energy (3 marks)	(6)	CO2

Question No. 3 Attempt following Question

3a)	Using Lagrange polynomial find shape functions five noded bar element	(8)	CO3

OR

3b)	Derive shape function for a four noded rectangular element using Natural co-ordinates.	(8)	CO3

3c)	Obtain the shape functions for a nine noded two dimensional Lagrange rectangular element.	(8)	CO3

OR

3d)	Derive shape functions of eight noded rectangular serendipity element. Use natural coordinate system.	(8)	CO3

Question No. 4 Attempt following Question

4a) Explain Jacobian matrix in case of four noded isoparametric quadrilateral element. (8) CO5

OR

4b) Obtain shape function for three noded triangular axisymmetric element. (8) CO5

4c) State and explain three theorems of Isoparametric concept. (8) CO5

OR

4d) For an axisymmetric element state relation between Strain and Displacement. (8) CO5

Question No. 5 Attempt following Question

5a) What do you understand by C^0, C^1 and C^2 continuity? Explain with suitable examples. (8) CO4

OR

5b) Write minimum eight displacement functions for BFS element. (8) CO4

5c) Explain Mindlin's theory of plate element. (8) CO4

OR

5d) Explain the concept of degenerated solid elements by
suitable examples. (8) CO4