



K. K. Wagh Institute of Engineering Education & Research, Nashik
(An Autonomous Institute From A.Y. 2022-23)

	SUMMER-2023		
	Exam Seat No.:		
	Academic Year:2022-2023	Semester:II	
	Name of Programme:M.Tech	Pattern:2022	
	Name of Course:Finite Element Method	Course Code:CIV225108	
	Max. Marks:60	Duration:2.30	

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 page(s).
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

- 1 Give Three dimensional and three dimensional Pascal's triangle. (6) CO1
Explain its use in FEM analysis.

Question No. 2 Attempt following Question

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

Question No. 3 Attempt following Question

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

OR

3.b) Derive shape function for a four noded rectangular element with co-ordinates 1 (0, 0); 2 (6, 0); 3(6, 4) and 4 (0, 4) (8) CO3

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

OR

3.d) Derive shape function for LST element. (8) CO3

Question No. 4 Attempt following Question

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

OR

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

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

OR

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

Question No. 5 Attempt following Question

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

OR

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

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

OR

5.d) Explain with neat sketches the various three dimensional elements used in the analysis of shells. (8) CO4