APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
THIRD SEMESTER M. TECH DEGREE EXAMINATION
Civil Engineering
(Geomechanics and Structures)
04CE7309—Finite Element Analysis

Max. Marks : 60   Duration: 3 Hours

PART A
Answer All Questions
Each question carries 3 marks

1. How idealization is done in the case of analytical problems, explain with an example?
2. Discuss the minimization concept of total potential. Comment on stable and unstable equilibriums.
3. What are shape functions? What are the characteristics of Shape Function?
4. Derive Shape Function for a 3 noded bar element.
5. What do you mean by geometric invariance?
6. Evaluate using Gaussian 3 point formula. $\int_3^8 (1/x)dx$
7. What are spurious modes?
8. Explain assumptions made in the formulation of Mindlin's Plate Element.

PART B
Each question carries 6 marks

9. Explain the procedure involved in Finite Element Analysis using displacement approach

<div align="center">OR</div>

10. Discuss the History of Finite Element Analysis

11. Derive differential equation and associated boundary conditions for a beam bending problem- beam supporting UDL- using the principle of stationary potential energy.

<div align="center">OR</div>

12. A simply supported beam is subjected to uniformly distributed load over entire span. Using Rayleigh- Ritz method, solve for mid span deflection and compare it with the theoretical.

13. Derive shape functions for a CST Element.

<div align="center">OR</div>

14. Derive shape functions for a 4 noded bar element.

15. Derive stiffness matrix for a 2 noded beam element.

<div align="center">OR</div>

16. Derive stiffness matrix for a 4 noded rectangular element.

17. How isoparametric elements could be used to define irregular boundaries?

<div align="center">OR</div>

18. Explain patch test? What is its use?

19. Discuss Finite Element formulation of Mindlin's Plate Element

<div align="center">OR</div>

20. Discuss Finite Element formulation of Kirchhoff's Plate element.