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Roll No .....

**MMMD-202****M.E./M.Tech. II Semester**

Examination, December 2015

**Finite Element Method***Time : Three Hours**Maximum Marks : 70*

**Note:** i) Attempt Any Five questions. All questions carry equal marks.

ii) Assume missing data suitably, if any.

iii) Draw neat and clean sketches/diagrams/figures wherever required.

1. a) Discuss the minimization concept of total potential. Comment on stable and unstable equilibriums.  
b) Discuss the importance of idealization and mathematical modeling in finite element analysis.
2. a) Write short notes on Numerical Integration.  
b) Explain the advantages of iso-parametric formulation. Explain sub parametric and super parametric elements.
3. a) Compare finite element method over conventional methods.  
b) What is stiffness matrix? Discuss the stiffness formulation of any one nonconforming plate bending element.

4. a) Explain boundary conditions of FEM.  
b) Can FEM be applied to heat conduction problems? Discuss giving suitable example.
5. a) Define the following with examples :  
i) Unsteady State Problems  
ii) Axisymmetric Problems (3-Dimensional)  
iii) Tetrahedron Element  
iv) Hexahedron Element  
b) Discuss Meshing Methods used in Finite Element Discretization.

6. Evaluate the following integral :

$$I = \int_{-1}^1 (a_0 + a_1x + a_2x^2 + a_3x^3 + a_4x^4) dx$$

Using the following methods and compare the results :

- a) Two-point Gauss integration
- b) Analytical integration
7. Derive the shape functions for four noded bar element using Lagrangian interpolation function. Nodes are equally spaced.
8. Write short note on following : (Any Two)  
a) GUI Layout in ANSYS.  
b) Rayleigh-Ritz Method.  
c) Applications of FEM in Fluid Flow.  
d) Differential Equation Formulation Methods.