

IV B.Tech I Semester Supplementary Examinations, April/May 2005
FINITE ELEMENT METHODS

(Common to Mechanical Engineering and Production Engineering)

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. With a help of a neat block diagram, explain the model based simulation process of finite element method.
2. Explain the mathematical interpretation of finite element method for one dimensional field problems.
3. Derive the element stiffness matrix and stress in a 2 noded plane truss element from the first principles?
4. Define and derive the Hermite shape functions for a two noded beam element?
5. Explain the concept of triangular elements and explain the functional relationship in terms of co-ordinate values and shape functions.
6. Derive the element conductivity matrix and load vector for solving 1- D heat conduction problems, if one of the surfaces is exposed to a heat transfer coefficient of h and ambient temperature of T_{∞} ?
7. Derive the elemental mass matrix for 1-D bar element and 1-D plane truss element?
8. Give three dimensional finite element formulation of solid and structural mechanics using principle of minimum potential energy.
