CODE NO: NR422105.SET NO. 1

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2005 JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY

IV B.TECH II SEMESTER SUPPLEMENTARY EXAMINATIONS
FINITE ELEMENT METHODS
(AERONAUTICAL ENGINEERING)

TIME: 3 HOURS

JULY- 2005

MAX MARKS: 80

Answer any FIVE Questions
All Questions carry equal marks

1. What are the different methods available for solving problems of structural mechanics? Name six different engineering applications of FEM.

2. Derive the stiffness matrix for a truss element with a varying cross section by using three nodes, the cross section varying from 2A to A through length L. Use static condensation procedure to condense out the internal degrees of freedom. Also use Gauss elimination procedure directly on internal degrees of freedom.

3. Derive the stiffness matrix for a plane frame member with three dof at each node using displacement model.

4. Describe a suitable displacement function for the simple three noded constant strain triangle, and examine the convergence criteria for this element

5. Construct shape functions for two noded and three noded axial element using Lagranges equation and polynomial method. Sketch various patterns

6. (a) Obtain the steady state heat transfer problems governing equation with con-vective boundary conditions.

(b) Explain briefly the following:

i. steady state problem

ii. propagation problem

7. From the basic principles obtain the equation of motion for axial flexural vibration of frame elements.

8. Write the subroutines to compute the shape functions at a given Gauss point for a four noded quadrilateral element. Using this subroutine develop a routine to compute the stress displacement matrix at a point in a quadrilateral element. Use the formulation for fast stiffness computation?