USN

2005 JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY

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

JULY- 2005

TIME: 3 HOURS

MAX MARKS: 80

Answer any FIVE Questions
All Questions carry equal marks

1. Explain how a cycle frame can be descritized in to number of elements. With the help of a neat sketch, identify the different types of elements involved.

2. For an axially loaded member of length L, the cross sectional area of the member varies linearly with values A1 and A2 at the ends. Using a suitable interpolation function compute stiffness matrix of the element.

3. Write short notes on plain frames. Distinguish between axial element and beam element bring out two nodal d.o.f in each case.

4. Derive the expressions for the mass and stiffness matrices of a plate using triangular elements.

5. Prove how an isotropic axisymmetric solid element subjected to axisymmetric loading has effectively a 2-Dimensional state of stress.

6. Two dimensional simplex elements are used to find the pressure distribution in a fluid medium. The (X,Y) coordinates of nodes i,j and k of an element are given by (2,4), (4,0) and (2,6) respectively. Find the shape functions N_i, N_j, N_k of the element.

7. Derive the stiffness and mass matrices for free vibrations in both lumped mass and consistent mass formulations for a bar element.

8. Write the subroutines to compute the shape functions. Using these routines develop a sub routine to compute the [B] matrix at a given Gauss point for a three nodded triangular element.