Code No: C3ME06 **05**

III B.Tech.(CCC) Supplimentary Examinations, June 2008
FINITE ELEMENT METHOD
(Mechanical Engineering)

Time: 3 hours **Max Marks: 100**

Answer any FIVE Questions
All Questions carry equal marks

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1. Determine the circumference of a circle of radius 'r' using the basic principles of finite element method. [20]

2. Derive the shape functions for a one dimensional linear line element in global Co-ordinate system. [20]

3. Determine the stiffness matrix, stresses and reactions in the truss structure shown in Figure 3:- [20]

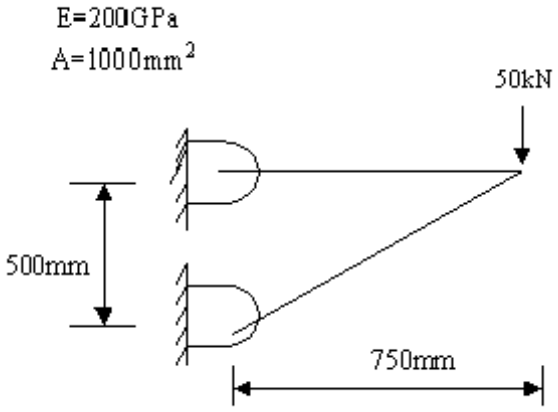


Figure 3

4. Calculate the deflection at the center of the beam as shown in figure 4. Take E = 220 Gpa; A = 40 mm × 40 mm. [20]

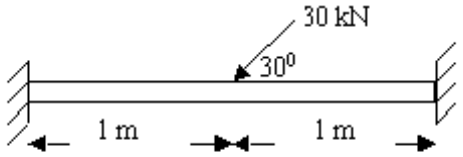


Figure 4

5. (a) Discuss the significance and applications of triangular elements.

   (b) 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 and Nk of the element. [12+8]

6. Consider a brick wall (0.7 W/m K) of thickness 30 cm. The inner surface is at 28^0C and the outer surface is exposed to cold air with heat transfer coefficient of 36 W/m^2 K at -15^0C. Determine the steady state temperature distribution and heat flux through the wall. [10+10]

7. Discuss the methodology to solve the Eigen value problem for the estimation of natural frequencies of a stepped bar? [20]

8. (a) What is the necessity of determining Von misses stresses in finite element static analysis?

   (b) Briefly explain about ANSYS software package. [10+10]

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