Roll. No.										

B.E. /B.Tech. (Full Time)DEGREE END SEMESTER EXAMINATION, April/May 2011

Mechanical Engineering Branch

Seventh Semester- (Regulations 2004)

(4)

ME 473 – FINITE ELEMENT ANALYSIS

Time: 3 hr Max. Marks: 100

Answer ALL Questions

PART - A (10x 2= 20 Mark)

1. Differentiate between the Ritz Technique and Galerkin Method.
2. What are the advantages and limitations of FEM?
3. What are Natural co-ordinates? What are the advantages of the same?
4. What is meant by Pascal's triangle? What is its use?
5. What are h and p elements?
6. Distinguish between essential and non-essential boundary condition.
7. Using lagrangian polynomials drive the shape functions for a 1D quadratic element. Plot the variation of shape function of a quadratic element.
8. What are the characteristics of the stiffness matrix?
9. What are benefits of using higher order elements?
10. What are the three main modules of any finite element analysis package?

PART - B (5 x16 = 80 Mark)

11. Find the stresses induced in the axially loaded stepped bar shown in figure 11. E = 200 GPa 16

12.a Using any numerical technique calculate the temperature distribution in the fine of constant cross section 'A' shown in figure 12.a.Assume that the free end of the fine is insulated. 16

Or

12.b A bar is loaded as shown in figure12.b. Determine the displacement field and support reactions in the bar if E-200x10^4 N/mm^2 16

13.a Determine the shape function for the constant strain triangle using Polynomial function. 16

Or

13.b Determine the displacement and the reaction forces at nodes in the spring system shown in figure.13.b Use minimum of potential energy principal to assemble equations of equilibrium. 16

14.a Derive the assembled stiffness matrix for the domain given in figure14.a taking advantage of symmetry and triangular elements. 16

Or

14.b Determine the shape function for 9 noded quadratic rectangular elements. 16

15.a Write short notes on (i)Serendepity and (ii)Nonlinear solution Techniques. (iii) C_o,C_1 continuity elements.(iv)Isoparametric elements. 16

Or

15.b Find the natural frequencies of longitudinal vibration of the constrained stepped bar shown figure15.b. 16

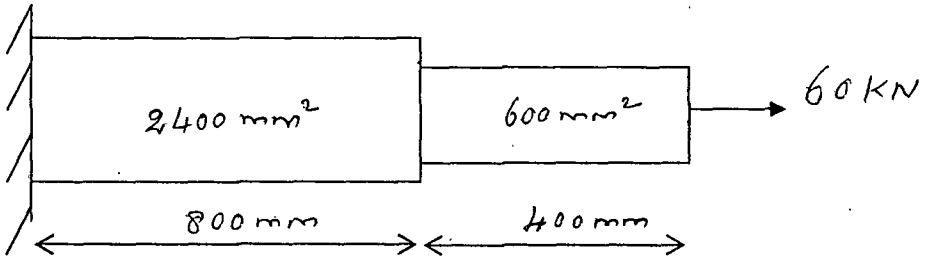


Figure.11

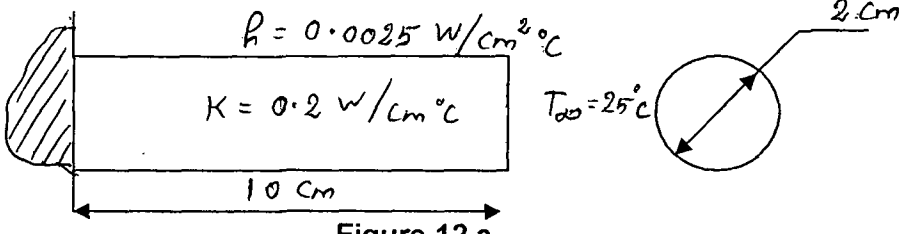


Figure.12.a

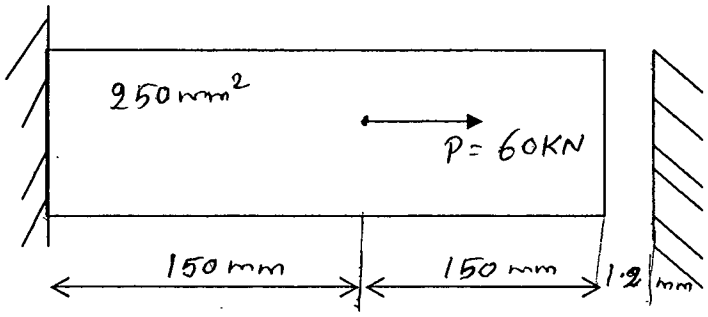


Figure.12.b

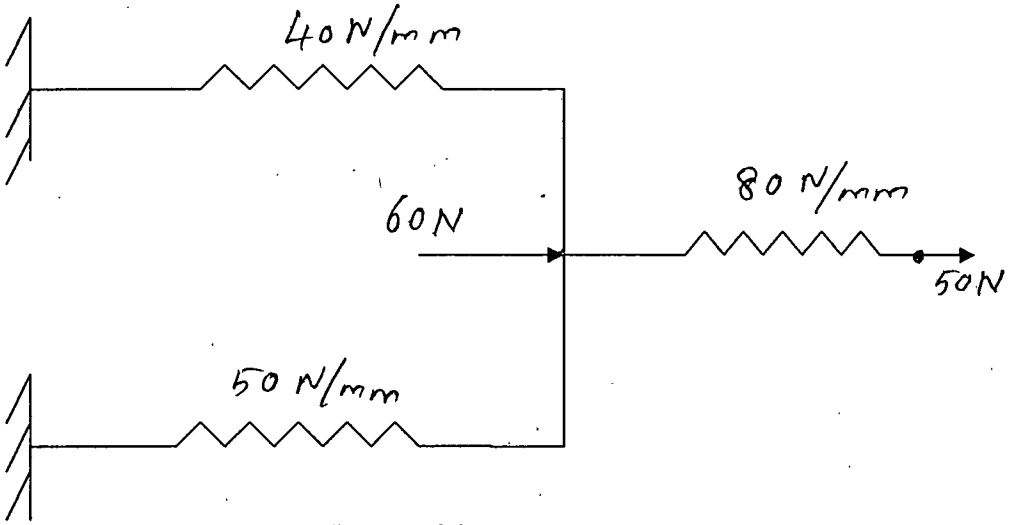
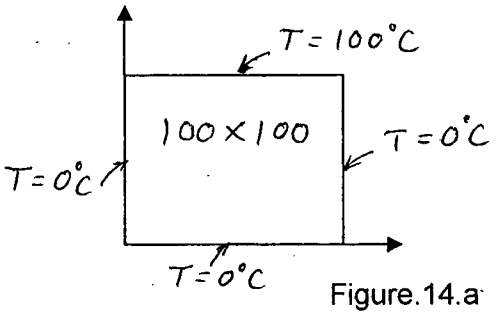


Figure.13.b



Dim. in mm

Figure.14.a

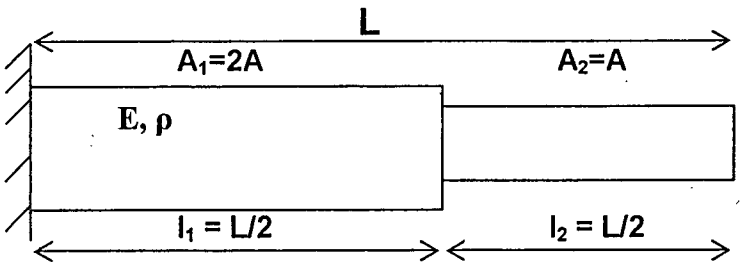


Figure.15.a