C 58392 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION JUNE 2009

ME 04 604—FINITE ELEMENT METHODS

(2004 Admissions)

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

Part A

I. (a) Describe assemblage of elementary equations in FEM to obtain overall equilibrium equation.

(b) Explain general procedure for FEA.

(c) What is elementary beam theory ? What are the assumptions made in it ?

(d) What is direct approach method ? List the advantages of it.

(e) Describe the various considerations to be taken in discretization process in FEM.

(f) Differentiate basic steps of FEM with Rayleigh-Ritz (variational) method.

(g) Explain variational approach and its advantages.

(h) Describe weighted residue approach.

(8 × 5 = 40 marks)

Part B

II. (a) Using generalized Hooke's law relations obtain the D-matrix. Mention the advantages and limitations of FEM.

Or

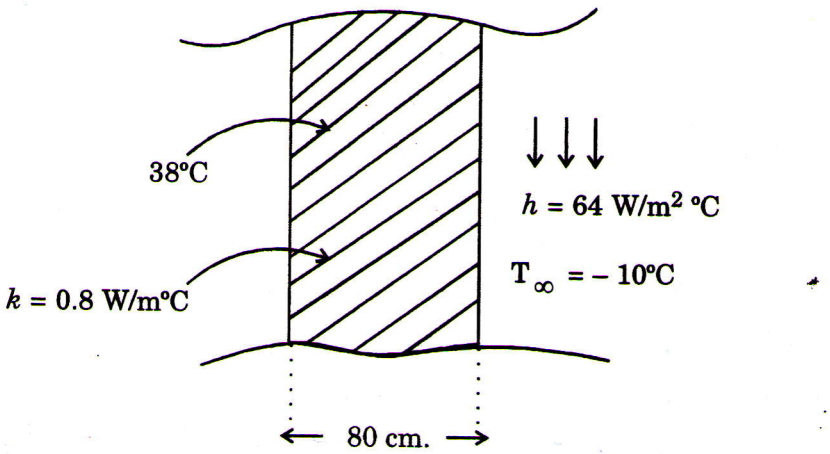
(b) Explain in detail the steps involved in static structural problem of FEM. Also describe the engineering application of FEM in various fields with examples.

III. (a) Obtain the element stiffness matrix of a plane truss with importance in properties of global stiffness matrix K.

Or

(b) Explain the effects of local and global co-ordinates of plane truss and derive the transformation matrix "L".

IV. (a) Brick wall of thickness L = 80 cm. k = 0.8 W/m°C. The inner surface is 38°C and outer surfce is exposed to cold air at –10°C. The heat transfer coefficient associated with outer surface is h = 64 W/m^2 °C. Determine the steady state temperature distribution within the wall and also heat flux through the wall.



Or

(b) For a three node linear triangular element obtain the shape function as well as its area co-ordinates.

V. (a) Using steps in FEM, derive an expression for Linear Isoparametric quadilateral.

Or

(b) Describe the derivation of F.E. equations using Variational (Rayleigh-Ritz) approach. Give the condition for convergence of results.

(4 × 15 = 60 marks)