C 28757 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION JUNE 2012

ME 04 604—FINITE ELEMENT METHOD

Time : Three Hours Maximum : 100 Marks

Part A

I. (a) What is Direct approach method ? List advantages of it.

(b) Discuss advantages and disadvantage of finite element method over classical method.

(c) Define global co-ordinate system.

(d) Write about conforming and non-conforming equation.

(e) Explain global stiffness matrix.

(f) Express shape function of CST element.

(g) Briefly describe Rayleigh-Ritz method.

(h) Explain variational approach and its advantages.

(8 × 5 = 40 marks)

Part B

II. (a) Derive expression for stiffness matrix of 1 D bar element.

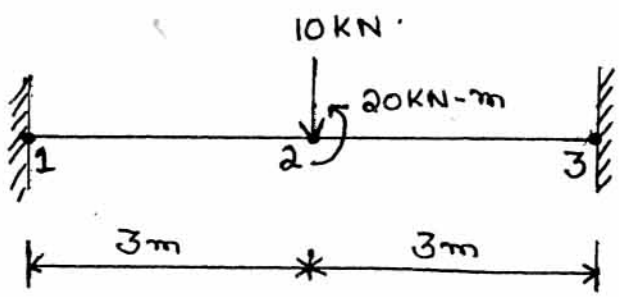
Or

(b) Explain with suitable example, the basic steps involved in finite element analysis of a structural problem.

III. (a) Explain C° and C′ continuity element in FEM give example. Also write about area co-ordinates and its application in detail.

Or

(b) Determine the displacement and rotation under the force and moment located at the center of the beam show in figure. The beam is fixed at each end. A downward force of 10 kN and applied moment of 20 kN.m act at the center of the beam. Let E = 210 GPa and I = 4×10^{-4} m^4 throughout the beam length.

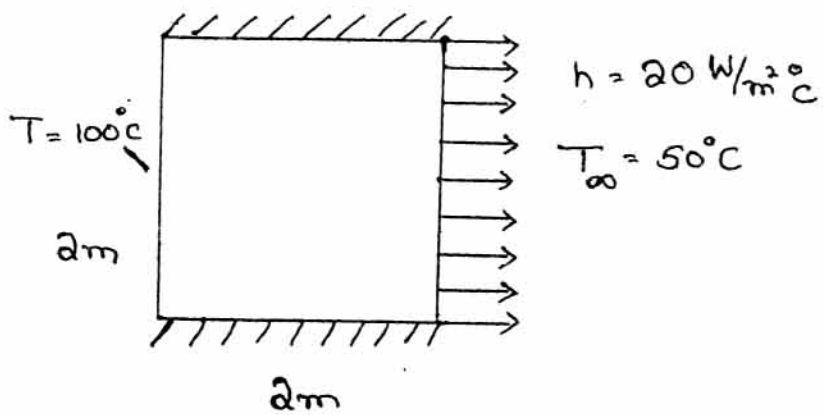


Turn over

IV. (a) Obtain shape function and area co-ordinates for a 3 noded triangular element.

Or

(b) For the 2-D body shown, determine the temperature distribution. The temperature at the left side of body is maintained at 100°C. The edges on top and bottom of the body are insulated. There is heat connection from the right side with connection coefficient h = 20 W/m^2°C. The free stream temperature is 50°C. The coefficient of thermal conductivity is 25 W/m°C. Assume thickness to be 1m.



V. (a) Describe weighted residue method. Write derivation of finite element equation using galerbin approach.

Or

(b) Using steps in FEM, derive an expression for linear isoparametric quadrilateral.

(4 × 15 = 60 marks)