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23125

M.Tech 3rd Semester (M.E) (Manufacturing and Automation) Examination–May, 2014

SIMULATION AND ANALYSIS

Paper 953

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

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard will be entertained after the examination.

Note : Attempt any **five** questions.

1. What is FEM ? Explain the process involved in FEM for solution of flow problem. 20

2. A two steps bar subjected to loading conditions as shown in fig 1. It is fixed at one end and free end is at a distance 3.5 mm from supports. Determine : 20

(a) Displacement at the nodes

(b) Stresses in the element

(c) Reaction at the supports

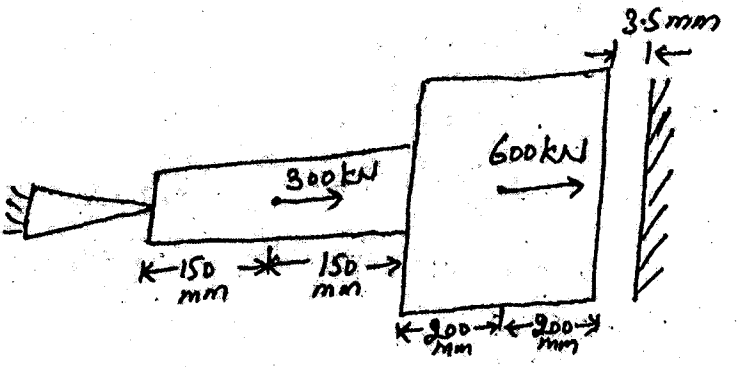

Fig. 1

$E_1 = 200 \times 10^3$ N/mm^2

$A_1 = 250$mm^2

$E_2 = 200 \times 10^3$ N/mm^2

$A_2 = 400$ mm^2

3. (a) Explain explicit and implicit methods for two dimensional heat conduction equation. 10

(b) Explain shape function in detail. 10

4. Evaluate shape function of triangular element as shown in fig 2. At the interior point P, x coordinate is 3.3 and $N_1 = 0.3$ Determine N_2, N_3 and y co-ordinate at point P. 20

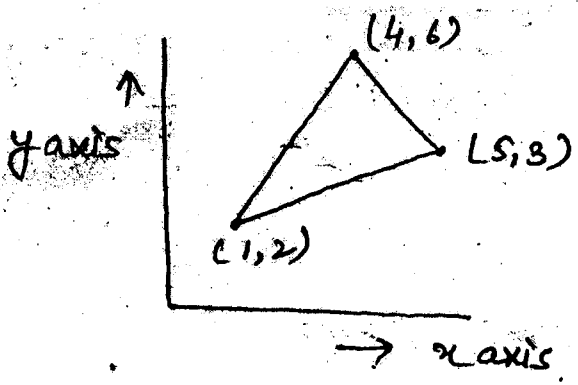

Fig. 2

5. What do you understand by CFD ? Explain its strategy and important application in automobile engineering. 20

6. (a) What is Lagrangian and Eularian approaches in CFD ? 10

(b) Explain different types of governing equation for motion. 10

7. Explain the role of Navier-Stoke equation in CFD. Also explain its application. 20

8. Write short notes on : 20

(a) Mesh generation

(b) Stiffness matrix

(c) Vorticity-stream function