Roll No. .....

23125

M. Tech. 3rd Semester (M.E.)
(Manufacturing & Automation)
Examination – January, 2016

SIMULATION & ANALYSIS

Paper : 953

Time : Three Hours] *[Maximum 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 examination.

Note : Attempt any *five* questions. All questions carry equal marks.

1. (a) Describe the finite element method for one dimensional problem. 10

(b) Find the shape functions of a linear element. 10

2. Evaluate the shape functions N and N_3 at the interior point P for the triangular ent as shown in Figure 1 :

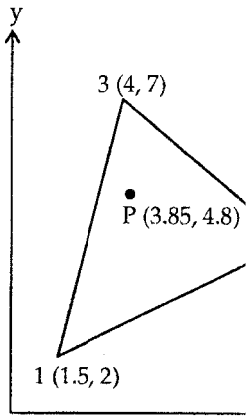

Fig. – 1

7, 3.5)

20

3. With suitable examples explai meaning and formulations of properties of ax etric elements. State their applications. 20

4. (a) Derive the elemental mass : and stiffness matrix for a quadratic eleme 10

(b) Derive the elemental ma atrix for 2-D triangular element. 10

5. Determine the natural freque of a simple supported beam of length 800 mr cross sectional area of 75 cm × 25 cm. Take E Gpa and the density of 7850 kg/m^3. 20

6. Describe CFD with its engin applications. Distinguish between conser and non-conservation forms of fluid flow. 20

7. (a) Explain the significance of the Burger equation with examples. 10

(b) How are Compressible flows treated ? Discuss the case of flow through converging-diverging nozzle. 10

8. Express the complete Navier-Stokes equations and derive Bernoulli's equation from it explaining the assumptions made in the process. 20