Code No: C3ME06 **N5-05**

III B.Tech.(CCC) Regular Examinations, December 2008
FINITE ELEMENT METHOD
(Mechanical Engineering)

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

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Write short notes on plane stress problem with suitable examples.
   (b) Derive the material constitutive matrix for a plaine strain problem. [10+10]

2. Explain the mathematical interpretation of finite element method for one dimensional field problems. [20]

3. Estimate the displacement vector, stresses and reactions for the truss structure as shown below Figure 3:

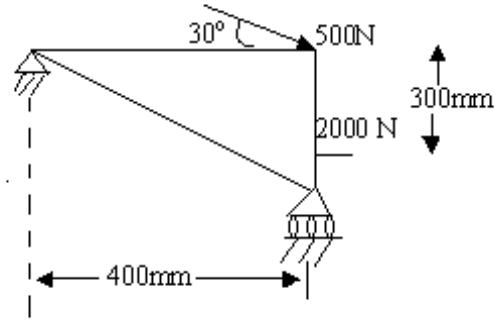


Figure 3

Note: - Area is not given and assumed as $A^{(e)} = 1mm^2$ 'E' is not given. Assumed as E=2×10^5 N/mm^2. [20]

4. Find the deflection at the point of the load of the steel shaft as shown in figure 4 : take E = 200 Gpa. [20]

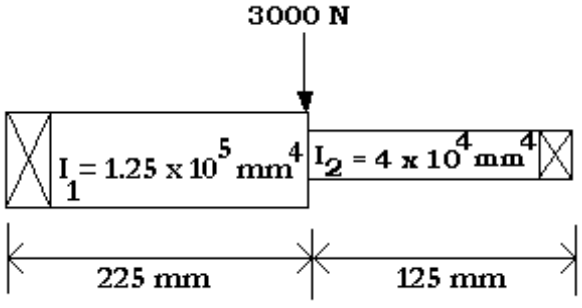


Figure 4

5. (a) Using three point Gaussian quadrature find $\int x\ y\ dA$ for a triangular element whose vertices are (1,1), (3,2), and (2, 3).

(b) Find the shape functions of a quadrilateral element in natural coordinates. [10+10]

6. Explain the methodology for the treatment of all three boundary conditions in a 1-D heat transfer element? [20]

7. Discuss the methodology to solve the Eigen value problem for the estimation of natural frequencies of a stepped bar? [20]

8. What are the basic steps for preparing mesh generation? Give an example. [20]

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