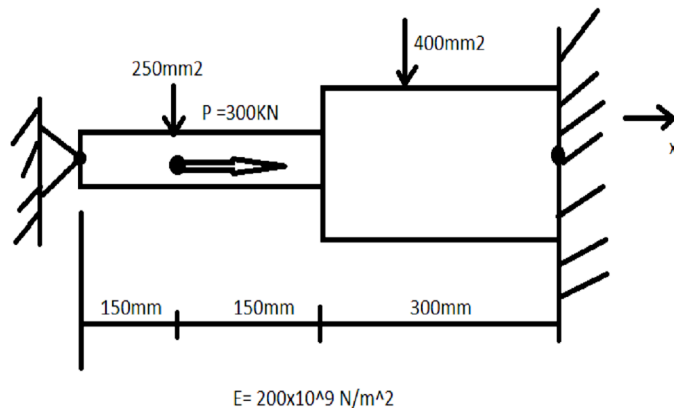


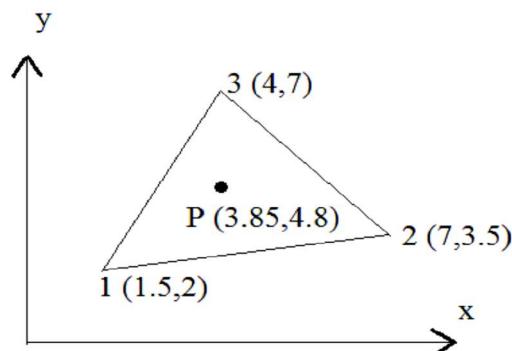
GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VI • EXAMINATION – SUMMER 2013****Subject Code: 163401****Date: 24-05-2013****Subject Name: Finite Element Analysis in Manufacturing Engineering****Time: 10.30 am - 01.00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

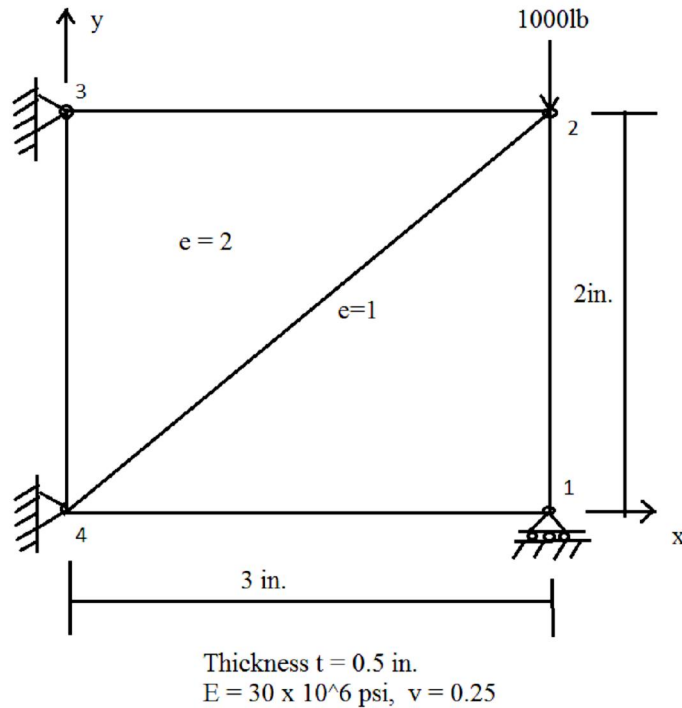
- Q.1** (a) What are the Field problems in FEA? What is advantage and disadvantage of FEA? **07**
 (b) Explain Gaussian Elimination method with example. **07**
- Q.2** (a) How will you discretise the FEA model in 1D, 2D and 3D. **07**
 (b) What is Rayleigh Ritz method? Explain with formulation. **07**
- OR**
- (b) Explain stress- strain relations in linear elastic material for FEA? **07**
- Q.3** (a) What is general procedure of FEA with block diagram? **07**
 (b) Consider a bar in fig. Loaded as shown. Determine the nodal displacements, element stresses and support reactions. Solve this problem by hand calculation, adopting the elimination method for handling boundary conditions. **07**

**OR**

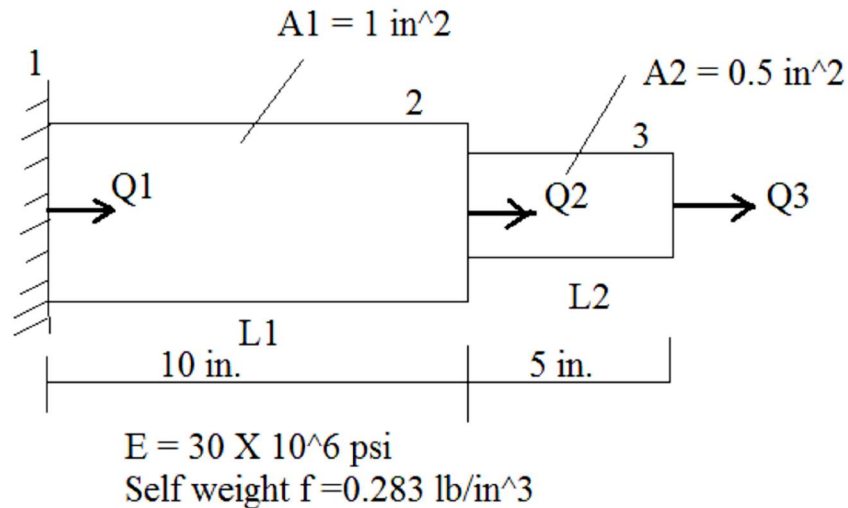
- Q.3** (a) Evaluate the shape functions N_1 , N_2 and N_3 at the interior point P for the triangular element as shown in figure. **07**



- (b) For the two dimensional loaded plate shown in figure. Determine the displacement of nodes 1 and 2 and the element stresses using plane stress conditions. Body forces may be neglected in comparison with the external forces. 07



- Q.4 (a) Explain Consistent and Lumped mass matrices 07
 (b) Drive an Stiffness matrix for Eight-node quadrilateral isometric element 07
OR
 Q.4 (a) Write the formulation of FE equations for vibration problems. 07
 (b) Determine the eigenvalues and eigen vectors for the stepped bar as shown in figure.



- Q.5 (a) Derive and explain equations of motion using Lagrange's approach. 07
 (b) Create axis symmetry formulation for pressure vessel. 07
OR
 Q.5 (a) Explain applications of FEM in various metal forming processes. 07

- (b) In figure, a long cylinder of inside diameter 80mm and out side diameter 120mm snugly fits in hole over its full length. The cylinder is then subjected to an internal pressure of 2Mpa. Using two elements on the 10mm length shown, find the displacement at the inner radius. 07

