Code No: **RT4103B** **R13** **Set No. 1**

IV B.Tech I Semester Supplementary Examinations, February/March - 2018

ADVANCED COMPUTER AIDED ENGINEERING (MOOCS)

(Mechanical Engineering)

Time: 3 hours **Max. Marks: 70**

Question paper consists of Part-A and Part-B

Answer ALL sub questions from Part-A

Answer any THEE questions from Part-B

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PART–A *(22 Marks)*

1. a) Explain with a sketch plane stress and plane strain. [4]
   b) What is FEM? Sketch the different types of elements used based on geometry in Finite Element Analysis. [4]
   c) List the importance of two dimensional plane stress and plane strain analysis. [4]
   d) Derive the mass matrix for a two noded linear element. [4]
   e) Write about Solution techniques for static loads. [3]
   f) State the significance of modal analysis. [3]

PART–B *(3x16 = 48 Marks)*

2. a) With the help of a neat diagram, describe the various components of stress and strains. [8]
   b) Derive the stress-strain relationship and strain displacement elevation. [8]

3. a) Distinguish between natural coordinate and volume coordinates also write their mathematical analysis [8]
   b) List and briefly describe the general steps of the finite difference method. [8]

4. What do you understand by finite element modeling of axi-symmetric triangular element using iso parametric representation? [16]

5. a) Derive shape functions for one dimensional two noded bar element. Hence explain the conditions for the shape function has to satisfy. [8]
   b) Distinguish between lower and higher order elements. [8]

6. a) Explain the different types of loads used in FEM. [8]
   b) State the different types of constraints to be considered for finite element analysis. [8]

7. Consider the bar in below figure 7 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.

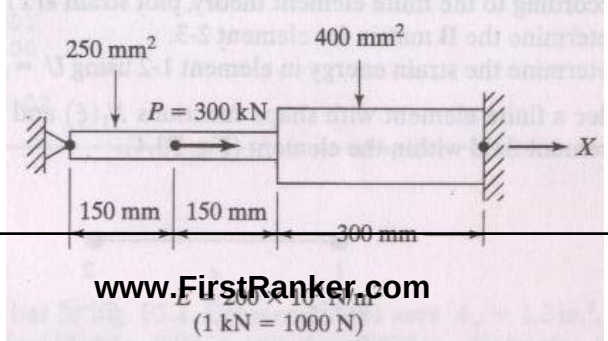

Figure 7 [16]