

Roll No .....

**MMIP-205****M.E./M.Tech., II Semester**

Examination, June 2016

**Finite Element and Computer Aided Engineering***Time : Three Hours**Maximum Marks : 70*

- Note:* i) Attempt any five questions.  
ii) All questions carry equal marks.  
iii) Assume suitable data if necessary.

1. a) If a displacement field is described by  
 $u = (-x^2 + 2y^2 + 6xy) \cdot 10^{-4}$   
 $v = (3x + 6y - y^2) \cdot 10^{-4}$   
Determine  $\epsilon_x$ ,  $\epsilon_y$  and  $\gamma_{xy}$  at the point  $x = 1, y = 0$  7  
b) Write the general description of the FEM. 7
2. a) What do you understand by degenerated elements. 7  
b) Write short notes on features of FE package and list out commonly used FE package. 7
3. a) Describe different methods of applying boundary conditions in FEM. 7  
b) Derive stiffness matrix for a 1-D bar element under axial loading. 7

4. a) What is an 'Isoparametric elements'? What are its advantages and how for the requirement of the finite element procedure are satisfied? 7
- b) The cantilevered beam depicted in figure 1 is subjected to two-plane bending. The loads are applied such that the planes of bending correspond to the principal moments of inertia. Model the beam as a single element and compute the deflections of the free end, node 2. Determine the exact location and magnitude of the maximum bending stress. (Use  $E = 207 \text{ GPa}$ ). 7

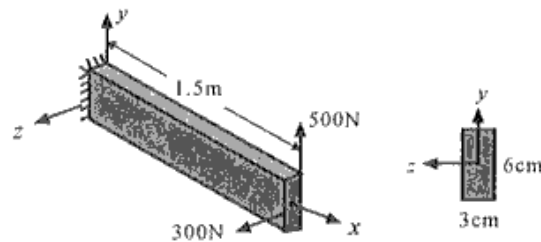


Figure 1

<http://www.rgpvonline.com>

5. a) Determine the displacements and support reactions for the uniform bar shown in figure 2.  $P = 300 \text{ kN}$ . 7

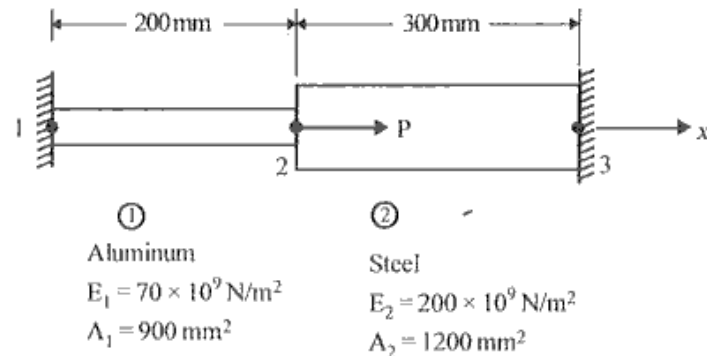


Figure 2

7. a) What is CAE? What is its importance in product development? 7
- b) Give a brief description of different product data exchange formats. 7
8. Write short notes on following: (any two) 7×2=14
- Pascal's Triangle
  - Patch test
  - Element connectivity
  - Concurrent Engineering

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