

**GANPAT UNIVERSITY**  
**B. TECH. VII SEM. MECHANICAL ENGINEERING**  
**REGULAR EXAMINATION DEC 2014**  
**2ME704 - COMPUTER AIDED DESIGN**

Time: 3 Hours

Total Marks: 70

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

## Section I

- Q-1** **12**
- (a) A triangle formed by three points A, B and C whose coordinates are A (50, 40), B (100, 60), C (70, 80). Calculate the new coordinates of the rectangle in reduced size using scaling factors  $S_x = 0.5$  and  $S_y = 0.8$  and base point is A.
  - (b) Write a Matlab program for  $45^\circ$  anticlockwise rotation of triangle with respect to some base point.
  - (c) Write a short note on transformation matrix for perspective projections.
- OR**
- Q-1** **12**
- (a) What are homogeneous coordinates systems? Write the matrix transformation in homogenous form for rotation and reflection.
  - (b) Find out new position of rectangle ABCD for reflection with respect to X axis by using Matlab program. The coordinates of rectangle ABCD are A (10, 10), B (10, 30), C (40, 30), D (40, 10).
  - (c) A triangle ABC has vertices as A (5, 4), B (7, 7) and C (9, 4). It is desired to reflect through an arbitrary line  $y = 0.7x + 4$ . Calculate the new vertices of triangle.
- Q-2** **6**
- (a) Find out the pixel position on graphical display to draw circle which having center end (1, 1), and radius 10 unit by using Bresamham's algorithm.
- Q-2** **5**
- (b) Derive decision parameter for generation of line by Bresamham's algorithm.
- OR**
- Q-2** **6**
- (a) Write a C program to draw a line between points P (1, 1) and Q (10, 6) by using DDA algorithm.
- Q-2** **5**
- (b) Explain the Mid-point circle algorithm for draw circle in raster display.
- Q-3** **12**
- Attempt any three**
- (a) Explain the working of Cathode Ray tube.
  - (b) Explain the terms persistence and resolution in computer graphics.
  - (c) Prove that a uniform scaling and a rotation form a commutative pair of operation, but that in general scaling and rotation are not commutative.
  - (d) Write a Matlab Program for rotation about point p (1, 2).



## Section II

Q-4

- (a) Determine the displacements of nodes and elemental stresses for the bar as shown in fig.1 Take:  $A_1 = 400 \text{ mm}^2$ ,  $A_2 = 500 \text{ mm}^2$ ,  $l_1 = l_2 = 200 \text{ mm}$ ,  $l_3 = 250 \text{ mm}$ ,  $P_1 = P_2 = 10 \text{ kN}$  and  $E = 200 \text{ GPa}$ . 8

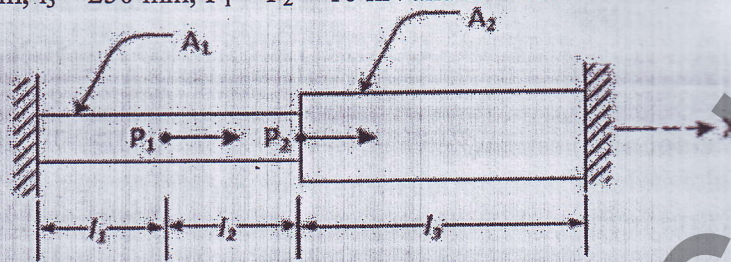


Fig.1

- (b) Explain the elimination approach used in FEA. 4

OR

Q-4

- (a) A two member truss is as shown in fig. 2. The cross-sectional area of each member is  $200 \text{ mm}^2$  and the modulus of elasticity is  $200 \text{ GPa}$ . Determine the deflection and stresses in each of the members. 8

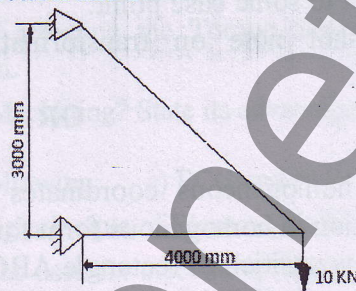


Fig.2

- (b) What is natural coordinate system? Derive the relation to map the natural system with the global coordinate system for a 1D element. 4

Q-5

- (a) What are the different types of 1D and 2D elements used? Explain briefly with application. 5
- (b) Develop the parametric equations for 1) line 2) Circle and 3) Ellipse 6

OR

Q-5

- (a) Explain the steps involved in the solution of static structural problem using finite element method 5
- (b) Explain the following surfaces 6
- 1) Offset 2) Ruled 3) Coons

Q-6

- Attempt any three** 12
- (a) Write a short note on Boundary representation (B-rep).
- (b) Explain in brief the following features used in solid modeling of components:  
Filleting 2) Chamfering 3) Shell 4) Lofting
- (c) Explain the Bezier curve with neat sketch.
- (d) Explain the Zero order continuity and First order continuity in curves drawing.

END OF PAPER