

GANPAT UNIVERSITY

B. TECH. VIII SEM. MECHATRONICS ENGINEERING

REGULAR EXAMINATION MAY 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
- (a) Write a C program to draw lower half circle by using Bresamham's algorithm. 6
- (b) Find out the pixel position on graphical display to draw line which having one end (1, 1), length 8 and angle of inclination 60° with horizontal axis by using Bresamham's algorithm. 5

OR

- Q-1
- (a) Write a C program to draw an ellipse by using Mid-point algorithm. 6
- (b) Find out the pixel position on graphical display to draw circle which having center (5, 5) and radius 10 by using Bresamham's algorithm. 5

- Q-2
- (a) Determine the new vertex positions if a triangle ABC having coordinates A (15,15), B (18,12) and C (15,20), if it is mirrored about line $y=4x+12$. 12
- (b) A rectangle ABCD has vertices A(1,1), B(2,1), C(2,3) and D(1,3). It has to be rotated by 30° CCW about point P (3, 2). Determine (i) the composite transformations of matrix and (ii) the new coordinates of rectangle.
- (c) Prove that a uniform scaling and a rotation form a commutative pair of operations, but that in general scaling and rotation are not commutative.

OR

- Q-2
- (a) Triangle PQR has vertices as P(2, 4), Q(4, 6), and R(2, 6). It is desired to reflect through an arbitrary line L whose equation is $Y=0.5X+2$. Calculate the new vertices of triangle. 12
- (b) A rectangle is formed by the four point ABCD, whose co-ordinates are: A = (25,25), B = (25,125), C = (75, 125) and D = (75, 25) Calculate the new co-ordinates, if it is changed by scaling factors $S_x = 0.4$ and $S_y = 0.6$.
- (c) Write down the transformation matrix for orthographic and isometric projection.

- Q-3
- Attempt any three 12
- (a) What are different software packages used in CAD.
- (b) Write a difference Ink-jet printer and Dot matrix printer.
- (c) Write a Matlab program and gives output for 2D translation with suitable example.
- (d) Write a Matlab program and gives output for 2D Reflection of triangle with respect to $x=-y$ line.

Section II

Q-4

- (a) For three truss member as shown in figure 1, determine the displacements of node 1 and stress in element 3. 10

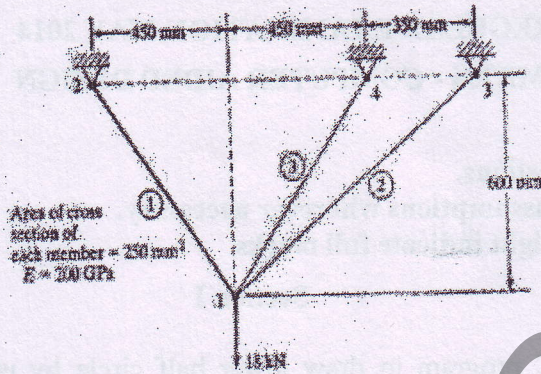


Figure 1

- (b) Justify that truss element is two dimensional element even it is same as bar element. 2

OR

Q-4

- (a) Derive element thermal load vector for truss element. 6
 (b) How to treat boundary conditions in FEM by penalty approach? Explain by simple example. 6

Q-5

- (a) Derive shape function used for bar element from strain energy principle. 6
 (b) Elaborate why finite element analysis is approximate method to solve engineering problems. 5

OR

Q-5

- (a) Determine stress and support reaction for problem of bar as shown in figure 2. 6

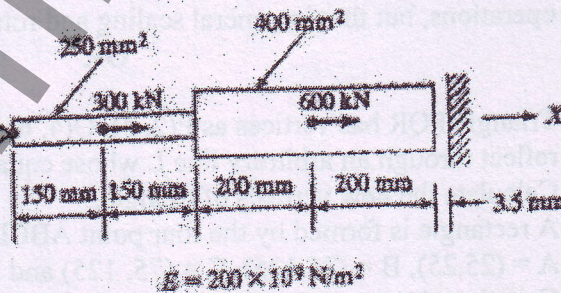


Figure 2

- (b) Explain each term in potential energy principle FEM equation. 5
 Attempt any three 12

Q-6

- (a) Explain the Bezier curves with neat sketch.
 (b) With neat sketches, explain the various Boolean operations used in CSG solid modeling.
 (c) Explain the following surfaces
 1. Patch 2. Ruled
 (d) Explain the Cubic curves with neat sketch.

END OF PAPER