

2022

(July)

MCA

Paper Code: MCA-0803

(Computer Graphics)

Full Marks: 75

Time: 3 Hours

Answer any one Question from each UNIT

(Full marks for each question are indicated in bracket)

UNIT-I

1. (a) Explain the terms resolution and aspect ratio. (1.5 + 1.5 = 3)
(b) Derive Line DDA drawing algorithm. Write down the algorithm.
Indicate which raster locations would be chosen by the line DDA algorithm when scan converting a line from pixel coordinate (0,0) to pixel co-ordinate (8, 4). (9 + 3 + 5 = 17)
2. (a) Considering a circle with radius $r=10$ and centered at (0,0), determine the points that would be on to draw the first octant of the circle using Bresenham's circle drawing algorithm. (7)
(b) Describe the flood fill algorithm. How is it different from boundary fill algorithm? Discuss the limitations of the boundary fill algorithm. (8 + 3 + 2 = 13)

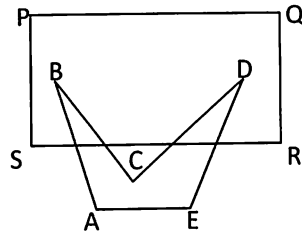
UNIT-II

3. (a) Write short notes on: (i) 2D Translation, (ii) 2D Rotation. (4 × 2 = 8)
(b) Rotate a triangle ABC by an angle 90° about a point (-1,1) where the vertices of the triangle have the co-ordinates A (5,0), B (10,2) and C(7,4). Find the co-ordinate of vertices of the rotated triangle. (7)
4. (a) Write short notes on (i) 2D Scaling, (ii) 2D Shearing (4 × 2 = 8)
(b) Prove that shearing transformation can be expressed in terms of rotation and scaling operations. (7)

UNIT-III

5. (a) Describe Cohen-Sutherland line clipping algorithm. (10)
(b) Given a square clipping window (-1,-1), (-1,1), (1, -1), (1,1), determine whether the following line segments joining the points will be completely visible, completely invisible, or partially visible:
(i) P1 (-3/2, 1/6) and P2 (1/2, 1/2) (ii) P3 (1/2, 1/2) and P4 (1, 1/2). (5 + 5 = 10)

6. (a) Describe the Sutherland-Hodgeman polygon clipping algorithm. Discuss its limitations (10 + 2 = 12)
 (b) Apply Wiler-Atherton Polygon clipping algorithm on the following subject polygon ABCDE with respect to clipping polygon PQRS to determine the visible portion. (8)



UNIT-IV

7. (a) Write down the classification taxonomy of the 3D projections. Explain the terms *center of projection (COP)* and *Projector*. (6 + 2 + 2 = 10)
 (b) Write short notes on
 (i) Multiview projections (ii) Axonometric projections (4 + 4 = 8)
 (c) Differentiate between perspective projection and parallel projection (2)
8. (a) Derive the expressions for Position Vectors for the Cubic Bezier curve. Construct the Cubic Bezier curve with four control points $P_0(0,0)$, $P_1(1,3)$, $P_2(4,2)$, $P_3(2,1)$. Generate at least 5 position vectors on the curve. (10 + 6 = 16)
 (b) Write short note on *depth cueing*. (4)