

22318

21819

3 Hours / 70 Marks

Seat No.

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- Instructions :**
- (1) All Questions are *compulsory*.
 - (2) Answer each next main Question on a new page.
 - (3) Illustrate your answers with neat sketches wherever necessary.
 - (4) Figures to the right indicate full marks.
 - (5) Assume suitable data, if necessary.

Marks

1. Attempt any FIVE of the following :

10

- (a) Define aspect ratio. Give one example of an aspect ratio.
- (b) List any four applications of computer graphics.
- (c) Define virtual reality. List any two advantages of virtual reality.
- (d) List any two line drawing algorithms. Also, list two merits of any line drawing algorithm.
- (e) Define convex and concave polygons.
- (f) What is homogeneous co-ordinate ? Why is it required ?
- (g) Write the transformation matrix for y-shear.

- 2. Attempt any THREE of the following :** **12**
- (a) Compare Vector scan display and raster scan display. (Write any 4 points.)
 - (b) Rephrase the Bresenham's algorithm to plot $1/8^{\text{th}}$ of the circle and write the algorithm required to plot the same.
 - (c) Translate the polygon with co-ordinates A(3, 6), B(8, 11) & C(11, 3) by 2 units in X direction and 3 units in Y direction.
 - (d) Write the midpoint subdivision algorithm for line clipping.
- 3. Attempt any THREE of the following :** **12**
- (a) State the different character generation methods. Describe any one with diagram.
 - (b) Obtain a transformation matrix for rotating an object about a specified pivot point.
 - (c) Describe Sutherland-Hodgeman algorithm for polygon clipping.
 - (d) Given the vertices of Bezier polygon as $P_0(1, 1)$, $P_1(2, 3)$, $P_2(4, 3)$ & $P_3(3, 1)$, determine five points on Bezier curves.
- 4. Attempt any THREE of the following :** **12**
- (a) Describe the vector scan display technique with neat diagram.
 - (b) Consider the line from (0, 0) to (4, 6). Use the simple DDA algorithm to rasterize this line.
 - (c) Consider a square A(1, 0), B(0, 0), C(0, 1), D(1, 1). Rotate the square by 45° anti-clockwise direction followed by reflection about X-axis.
 - (d) Use the Cohen-Sutherland outcode algorithm to clip line $P_1(40, 15) - P_2(75, 45)$ against a window A(50, 10), B(80, 10), C(80, 40), D(50, 40).
 - (e) What is interpolation ? Describe the Lagrangian interpolation method.

5. Attempt any TWO of the following :**12**

- (a) Consider the line from (5, 5) to (13, 9). Use the Bresenham's algorithm to rasterize the line.
- (b) Apply the shearing transformation to square with A(0, 0), B(1, 0), C(1, 1), D(0, 1) as given below :
 - (i) Shear Parameter value of 0.5 relative to the line $y_{\text{ref}} = -1$.
 - (ii) Shear Parameter value of 0.5 relative to the line $x_{\text{ref}} = -1$
- (c) Write a program in 'C' to generate Hilbert's curve.

6. Attempt any TWO of the following :**12**

- (a) Write a program in 'C' for DDA circle drawing algorithm.
 - (b) Perform a 45° rotation of a triangle A(0, 0), B(1, 1), C(5, 2)
 - (i) About the origin
 - (ii) About P(-1, -1)
 - (c) Apply the Liang-Barsky algorithm to the line with co-ordinates (30, 60) & (60, 25) against the window :
 $(X_{\text{min}}, Y_{\text{min}}) = (10, 10)$ & $(X_{\text{max}}, Y_{\text{max}}) = (50, 50)$
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