

22318

23124

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) State any four applications of computer graphics.
- (b) Define scan conversion.
- (c) Give matrix representation for 2D translation.
- (d) Define convex and concave polygons.
- (e) State different type of text clipping.
- (f) Define virtual reality and augmented reality.
- (g) Give the transformation matrix for X-shear.

2. Attempt any THREE of the following :

12

- (a) Differentiate between random scan and raster scan. (Any four points)
- (b) Write DDA Arc generation algorithm.
- (c) Explain midpoint subdivision line clipping algorithm.
- (d) Use DDA line drawing algorithm to rasterize line from (1, 1) to (5, 6).



- 3. Attempt any THREE of the following :** **12**
- (a) Explain Sutherland – Hodgeman polygon clipping algorithm.
 - (b) Write procedure to fill polygon with boundary fill.
 - (c) Differentiate between bitmap and vector based graphics. (Write any four points)
 - (d) Explain Hilbert’s curve with diagram.
- 4. Attempt any THREE of the following :** **12**
- (a) Explain inside and outside test for polygon.
 - (b) Explain stroke method and bitmap method with example.
 - (c) Use the Cohen Sutherland algorithm to clip two lines $P_1 (10, 30) - P_2 (80, 90)$ and $P_3 (10, 10) - P_4 (70, 60)$ against a window $A(20, 20), B(90, 20), C(90, 70), D(20, 70)$.
 - (d) Explain interpolation technique in curve generation.
 - (e) Explain parallel projection with example.
- 5. Attempt any TWO of the following :** **12**
- (a) Explain 3D transformation for scaling and rotation.
 - (b) Consider the square $A(1, 0), B(0, 0), C(0, 1), D(1, 1)$. Rotate the square ABCD by 45° anticlockwise about point $A(1, 0)$.
 - (c) Obtain the curve parameters for drawing a smooth Bezier curve for the following points $A(0, 10), B(10, 50), C(70, 40), D(70, -20)$.
- 6. Attempt any TWO of the following :** **12**
- (a) Consider the line from $(4, 9)$ to $(7, 7)$. Use 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) Explain Liang Barsky clipping algorithm.
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