

Seat No. : _____

DA-126

December-2017

**T. Y. M.Sc. (CA & IT) Integrated
Computer Graphics**

Time : 3 Hours]

[Max. Marks : 100

Instruction : Draw figure wherever necessary.

1. Answer the following :

4 × 5 = 20

- (1) Explain color CRTs.
- (2) Write short note on Raster scan and Random scan display.
- (3) Write Bresenham's algorithm for gentle and steep positive slope lines.
- (4) Answer in brief :
 - (a) What is the refresh rate of CRT ?
 - (b) Define : Emissive displays
 - (c) Define : Vertical retrace
 - (d) What does an aspect ratio of $\frac{3}{4}$ mean ?
 - (e) Which are the different types of joins ?

2. (A) Write the polygon relative algorithm to draw a polygon. Illustrate the algorithm for the following co-ordinates :

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move_abs(0, 0)

polygons_relative(ax, ay, n)

n = 4

ax	0.1	0.1	0.1	-0.1
ay	0.2	-0.1	0.1	0.1

(B) Answer the following :

3 × 4 = 12

- (1) What do you mean by char up direction? Write the formula to find default step, true step, xcharsp and ycharsp.
- (2) Write the fill_in method to perform solid and pattern filling inside the polygon.
- (3) Explain the role of display file interpreter. Write the interpret routine to fetch instruction from display file and execute the instructions.

3. Answer any **four** : **$4 \times 5 = 20$**
- (1) Write the formula and matrix for 2D scaling. Write the steps for performing fixed point scaling.
 - (2) Explain in detail 2D rotations with co-ordinate origin as the pivot point.
 - (3) Consider a square having co-ordinates A (0.5, 0.5), B (1, 0.5), C (1, 1), D (0.5, 1). Scale the square to make it half of its original size and translate by 0.2 units in x-direction and 0.3 units in y-direction. Find the new co-ordinates of the square.
 - (4) Write the formula for X-shearing and Y-shearing. Convert square into a shifted parallelogram with $shx = 1/2$ and $yref = -1$. (Co-ordinates of square A (0, 0), B (1, 0), C (1, 1), D (0, 1)).
 - (5) Define: Reflection. Write the steps for reflection about line $y = mx + c$.
4. (A) Write Cohen Sutherland line clipping algorithm. Write its disadvantages. **10**
- (B) Answer the following : **$5 \times 2 = 10$**
- (1) Write the formula to convert window to viewport co-ordinates.
 - (2) What are the attributes of segment table? Define: Double Buffering.
 - (3) Write the algorithm to display current picture on the screen considering segments.
 - (4) Write the rules for Weiler Atherton Polygon Clipping for clockwise direction.
 - (5) Briefly describe text clipping.
5. (A) Derive the equation and transformation matrix for producing parallel projection on a 2D viewing plane. Explain cavalier and cabinet projections. **10**
- (B) Answer the following : (any **two**) **$2 \times 5 = 10$**
- (1) Explain Parallel and Perspective projection.
 - (2) Explain surface rendering, three dimensional and stereoscopic views.
 - (3) Write the steps for general 3D rotations when rotation axis is not parallel to any coordinate axis.
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