(i) **Printed Pages : 3** **Roll No. .....**

(ii) **Questions : 9** **Sub. Code : 3 1 2 5**

Exam. Code : 4 5 9

M.Sc. IT Ist Semester

1125

INFORMATION TECHNOLOGY

Paper–MS-39 : Computer Graphics

Time Allowed : Three Hours] **[Maximum Marks : 80**

Note : Attempt **five** questions in all, including question No. **9** in Section E which is compulsory and taking **one** question each from Section A to Section D.

SECTION–A

1. (a) What are the Refreshing Display Devices ? Describe the working principle of CRT displays with the help of suitable diagram. Differentiate between Random and Raster Scan display devices.

   (b) What is Frame Buffer ? How can you use frame buffer for putting color and controlling intensity on the display device ? Explain. 8,8

2. (a) Write Pseudo code for Bresenham circle generation algorithm. Use this algorithm to produce a circle of radius r = 4 units, in the first quadrant from x = 0 to x = y.

   (b) Compute the intermediate points on the line drawn from (0, 0) to (5, 10) using Bresenham's line drawing algorithm. 8,8

SECTION–B

3. (a) Derive the 2D-transformation matrix for reflection about the line $y = mx$, where m is a constant. Use this transformation matrix to reflect the triangle A (0, 0), B (1, 1), C (2, 0) about the line $y = 2x$.

   (b) Explain Cohen-Sutherland algorithm for clipping a line segment. What are the limitations of Cohen-Sutherland algorithm ? How did Cyrus-Beck algorithm overtake these limitations ? 8,8

4. (a) Derive a general 2D transformation matrix for rotation about the origin. Perform a 45 degree rotation of a square having vertices A (0, 0), B (0, 2), C (2, 2), D (2, 0), about the origin.

   (b) Explain the concept of window to view port transformation with the help of suitable diagram. 8,8

SECTION–C

5. (a) Give and explain the action of various OpenGL output primitives and attributes of these output primitives.

   (b) What is Mouse Programming ? Give C-functions to implement various operations of mouse such as :

   (i) Show mouse

   (ii) Hide mouse

   (iii) Position of a mouse

   (iv) Click of a mouse. 8,8

6. Explain Bubble sort algorithm. Develop an animated algorithm for Bubble sort using built-in graphics functions in C/C++ compiler. 16

SECTION–D

7. (a) Define "Shading" in Computer Graphics. Explain the difference between Gouraud shading and Phong shading.

   (b) Write the three main properties of Bezier curve. Explain the condition for smoothly joining two Bezier curve segments. 8,8

8. (a) What is the difference between parallel and perspective projection ? Categorize the various types of parallel projections.

   (b) Write Z-Buffer algorithm for hidden surface detection. Explain how this algorithm is applied to determine the hidden surfaces. 8,8

SECTION–E (Compulsory Question)

9. (a) What is the difference between inking and panning ?

   (b) Define pixel and pixel depth.

   (c) Define shear transformation.

   (d) What is the advantage of using homogenous coordinate system ?.

   (e) What is polygon clipping ? Explain.

   (f) What is graphics programming ?

   (g) Define back-face culling.

   (h) What is a B-spline curve ? 8×2=16