(i) Printed Pages : 4] Roll No. .....

(ii) Questions : 9] **Sub. Code :** 3 6 2 0

Exam. Code : 0 4 6 1

M.Sc. Information Technology 3rd Semester Examination

1127

COMPUTER GRAPHICS

Paper : MS–39

Time : 3 Hours] **[Max. Marks : 80**

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

Section–A

1. Describe the Bresenham's Circle drawing algorithm. How does it differ from the midpoint circle-drawing algorithm ? What efficiencies are achieved by this difference ? You may use a diagram to aid your answer. Using the mid-point circle-drawing algorithm, draw a circle with centre as (2, 5) and radius as 6. 16

2. (a) Consider two raster systems with resolutions of 640 by 480 and 1280 by 1024. How many pixels could be accessed per second in each of these systems by a display controller that refreshes the screen at a rate of 60 frames per second ? What is the access time per pixel in each system ?

(b) Develop an algorithm that allows a designer to create a picture by sketching straight lines with a rubber-band algorithm. 8,8

Section–B

3. (a) Discuss the process of rotating an object in 2D about an arbitrary axis.

(b) Compute the transformation matrix of a triangle A (1, 0), B (0, 1) and C (1, 1) after rotating about vertex B, 45 degrees anti-clockwise direction. 8,8

4. (a) Define the terms window, viewport, clipping and viewing transformation in your own words, and indicate with sketches the process of applying viewing transformation to a 2D scene. Derive a window-to-viewport transformation for rectangular shapes.

(b) Describe the line-clipping algorithm proposed by Liang-Barsky. 8,8

Section–C

5. (a) What is OpenGL ? List and explain the use of various graphics primitives and Graphical functions in OpenGL related to Color, Lighting and Animation.

   (b) What kind of geometry is best described using the following Open GL primitive types ? Be specific about the relation between vertices and edges in your answer :

   (i) GL_TRIANGLE_STRIP

   (ii) GL_QUAD_STRIP

   (iii) GL_TRIANGLE_FAN 8,8

6. Explain the following :

   (a) Animated algorithm for any sorting algorithm

   (b) Mouse Programming in C/C++ 8,8

Section–D

7. (a) Explain the back face culling algorithm for hidden surface removal.

   (b) Describe how shading is done in computer graphics. What are the differences between gouraud shading and phong shading of Polygons ? Explain with examples. 8,8

8. (a) Describe 3-D rotation about x, y and z axes and write the corresponding transformation matrices.

(b) What is Bezier Curve ? Define properties of Bezier Curve. Explain the condition for smoothly joining two Bezier curve segments. 8,8

Section–E

(Compulsory Question)

9. (a) What is interlaced scanning ? How is it different from non-interlaced scanning ?

(b) What is the purpose of a display processor in a graphics computer system ?

(c) What are homogenous coordinates and why are they used in Computer Graphics ?

(d) What is polygon clipping ?

(e) How do you interface OpenGL with C/C++ compiler ?

(f) What are the attributed of a graphics image ?

(g) What is a Bezier Surface ?

(h) What is wire-frame rendering ? 8×2=16