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

(ii) Questions : 9 Sub. Code : 3620

Exam. Code : 0461

M.Sc. Information Technology 3rd Semester

(2123)

COMPUTER GRAPHICS

Paper—MS-39

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

Note :—Attempt **FIVE** questions in all, including Question-9 in Section-E, which is compulsory and taking **ONE** from each Section-A to Section-D.

SECTION-A

1. (a) Describe the various techniques for producing color displays with a CRT.

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

2. What are the characteristics of a good line drawing algorithm ? Give the Bresenham's algorithm for drawing sharp slope lines (Use diagram). The end points of a given line are (0, 0) and (6, 18). Compute each value of y as x steps from 0 to 6 using Bresenham's algorithm and plot the resultant line. 16

SECTION-B

3. (a) "The Liang-Barsky algorithm is more efficient than the Sutherland-Cohen algorithm when many lines need clipping". Comment.

   (b) Derive a window-to-viewport coordinate transformation for rectangular shapes with the help of a diagram. 8,8

4. (a) Explain with suitable examples different 2-dimensional transformation techniques. Derive their respective matrix representations.

   (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

SECTION-C

5. What is OpenGL ? What is OpenGL Utility Toolkit (GLUT) library ? Explain the seven major groups of OpenGL API functions, with examples for each function. 16

6. Write short notes on :

   (a) Animated algorithm for selection sort

   (b) Graphics programming using C/C++ graphics library routines. 8,8

SECTION-D

7. (a) What are the advantages of B-splines over Bezier curves ? How are these useful in computer graphics ? List the properties of Bezier Curves.

(b) Derive 3-D transformation matrices for :

(i) Parallel projection

(ii) Perspective projection. 8,8

8. Outline the z-buffer algorithm for detecting a visible surface. List the advantages and disadvantages of the z-buffer algorithm in comparison to back-face elimination algorithm. Explain with an example. 16

SECTION-E

(Compulsory Question)

9. (a) What is the difference between generation of character by stroke and bitmap method ?

(b) What are Homogeneous co-ordinates ? How are these used in Computer Graphics ?

(c) What are the features of a Graphics Language (GL) ?

(d) What is the difference between phong shading and gouraud shading ? 4,4,4,4