

(i) Printed Pages : 3

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(ii) Questions : 9

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M.Sc. Information Technology 3<sup>rd</sup> Semester  
(2122)

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 each from Section–A to Section–D.

### SECTION—A

1. (a) How does a raster scan system work ? How is it different from random scan systems ?  
(b) A raster system has a resolution of 640-by-480. How many pixels could be accessed per second in this system by a display controller that refreshes the screen at 60Hz ? 8,8
2. How does Bresenham's straight-line algorithm differ from the DDA ? What efficiencies are achieved by this difference ? You may use a diagram to aid your answer. Using Bresenham's algorithm, draw a line from (20,20) to (100,10).

16

## SECTION—B

3. 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. 16
4. (a) What are the various 2-dimensional transformations? Explain with the help of suitable sketches. Give their matrix representations.  
(b) Explain the working of the Liang-Barsky algorithm for line clipping with the help of suitable example. 8,8

## SECTION—C

5. What is animation? Explain the C/C++ graphics programming features to develop animated algorithm for Towers of Hanoi. 16
6. Write short notes on :  
(a) Mouse Programming  
(b) OpenGL for color, lighting and animation. 8,8

## SECTION—D

7. (a) What is a three-dimensional display? Give the mathematical description of Perspective projection by taking suitable example.  
(b) What is back-face elimination for hidden surface removal? Describe how it works in principle. 8,8

8. (a) What are the differences between flat shading, gouraud shading and phong shading of polygons ?
- (b) Explain the importance of B-Spline Curves in Computer Graphics. 8,8

### SECTION—E

#### (Compulsory Question)

9. (a) Differentiate between inking and panning as interactive graphical techniques with examples.
- (b) What are Homogeneous co-ordinates ? Explain its significance with examples.
- (c) How do we load graphics images from disk ? Explain the algorithm.
- (d) Give the transformation steps for obtaining a composite matrix for rotation about an arbitrary axis with the rotation axis projected on to the z axis. 4,4,4,4