No. of Printed Pages : **2**

Sl. No.

B2.4-R5 : COMPUTER GRAPHICS AND MULTIMEDIA SYSTEMS

NOTE :

1. **Answer question 1 and any FOUR from questions 2 to 7.**
2. **Parts of the same question should be answered together and in the same sequence.**

Time : 3 Hours **Total Marks : 100**

1. (a) Define the following :

(i) Aspect ratio

(ii) Frame buffer

(iii) Resolution

(iv) Rasterization

(b) Explain Shear Transformation in brief.

(c) Explain the concept of Phong Shading in brief.

(d) Differentiate between uniform and non-uniform scaling.

(e) How much time is spent scanning across each row of pixels during screen refresh on a raster system with resolution of 1280×1024 and a refresh rate of 60 frames per second ?

(f) Differentiate between Bezier and B-Spline curves.

(g) Discuss local and global illumination with suitable examples.

(7x4)

2. (a) Explain Mid-point Circle drawing algorithm.

(b) List different video formats and describe any three types of video formats in detail.

(c) Describe Reflection and Shear in 2D transformation.

(6+8+4)

3. (a) Explain boundary fill procedure to fill 8-connected region with Example.

(b) Draw the interactive graphics architecture for raster scan display and discuss its various components. Also, mention its drawbacks over random scan display.

(9+9)

4. (a) Define affine transformations with example. Perform a 45-degree rotation of a triangle

A (0, 0), B (1, 1), C (5, 2) about its center.

(b) Explain the basic design of CRT.

(c) Discuss the problems with Interpolated Shading Techniques.

(8+5+5)

5. (a) Explain JPEG file format. Discuss some of its disadvantages as compared to other file formats.

(b) Explain different types of coherences used in Hidden Surface Removal algorithms. Differentiate between Object space and Image space method.

(9+9)

6. (a) A convex polygon and a convex clipping area are given. The task is to clip polygon edges using the Sutherland-Hodgman Algorithm. Input is in the form of vertices of the polygon in clockwise order. Write output coordinates.

Input :

Polygon : (50, 100), (150, 200), (250, 150)

Clipping Area : (100, 100), (100, 150), (150, 150), (150, 100) i.e. a Square

(b) A rectangular parallelepiped is given having length on x- axis, y- axis, z- axis as 3, 2, 1 respectively. Perform rotation by an angle - 90 degrees about x- axis and an angle 90 degree about y-axis.

(9+9)

7. (a) Explain the operating characteristics of following display technologies with one advantage and one disadvantage :

(i) Raster refresh system

(ii) Vector refresh system

(b) Find the inverse of the matrix :

$$\begin{pmatrix} 4 & 7 \\ 2 & 6 \end{pmatrix}$$

(c) How long does it take to load a 640×480 frame buffer with 12 bits per pixel, if 10^5 bits can be transferred per second ?

(9+4+5)

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