Pokhara University

Everest Engineering College

Sanepa-2 Lalitpur Nepal

Assignment for Internal Evaluation

Chapter-1: Introduction

1. What do you mean by Computer graphics? Describe the evolution of computer graphics briefly.
2. Describe the use of Computer Graphics by emphasizing the role Computer Graphics in Simulation.
3. Differentiate between Image processing and Computer Graphics in brief.

Chapter-2: Graphics Hardware

1. List out the Interactive input devices available in Computer Graphics describe Light pen and Touch panel in details.
2. Describe Beam Penetration and shadow musk method in Cathode Ray tube.
3. Describe Cathode ray tube and working mechanism including neat diagram.
4. Differentiate between raster and Vector model in CG along with their architecture.
5. Discuss about the different display available in Computer Graphics.
6. If 10^5 bits can be transferred per second , how long would it take to load
   i. 640*480 frame buffer with 12 bits per pixel?
   ii. 1280 by 1024 frame buffer with 24 bits per second?
7. If we use direct loading of RGB values with 2 bits per primary color, how many possible colors do we have for each pixel?
8. Consider two raster system having 640*480 and 1280*1024 resolution.
   i. How many pixel should be accessed per second by a display controller that refreshes the screen at the rate of 60 frames per second?
   ii. What is the access time per pixel in each system?
9. For a Raster system, average access time to access a pixel value from refresh buffer is 200 Nano second, number of pixel towards X and Y direction are 1024, Check the flickering effect? Define and describe it.

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10. Suppose a RGB Raster system to be designed using on 8*10 inch screen with a resolution of 100 pixel per inch in both direction. If you want to store 6 buts per pixel in the frame buffer, calculate buffer size in bytes.

Chapter-3: Two Dimensional Algorithms

1. Describe DDA Line drawing Algorithm for both slope condition.
2. Derive initial decision parameter of Bresenham's Line Drawing Algorithm for both slope condition.
3. Derive mid-point circle drawing algorithm in computer graphics by using symmetry of the circle.
4. Derive Ellipse Drawing Algorithm to calculate initial decision parameter in Computer graphics for both region.
5. State the advantages of Bresenham's Line drawing algorithm over DDA.
6. Differentiate and Describe boundary fill and flood fill Algorithms in Computer graphics.
7. Consider the Ellipse having $R_x = 8$ and $R_y = 6$ to determine raster positions along the ellipse path in first quadrant using mid-point ellipse algorithm.
8. Digitize the line with end points M (2, 10) to P (5, 18) using Bresenham's Line Drawing Algorithm.
9. Digitize the line with end points A (-2, -4) to B (-6, -9) using Bresenham's Line Drawing Algorithm.
10. Digitize the line with end points X (-3, 0) to P (4, 4) using Bresenham's Line Drawing Algorithm.
11. Digitize the line with end points K (0, 0) to L (5, 5) using DDA Line Drawing Algorithm.
12. Digitize the circle with radius 10.
13. Digitize one octant of circle having radius 10 and center (10, 20) by using mid-point circle drawing algorithm in Computer Graphics.

Chapter-4: Two Dimensional Transformation

1. Derive the rotational matrix for 2-D rotation of a point about any arbitrary position.
2. State the expression only for the Translation Rotation and Scaling for 2-D in computer Graphics with simple examples.
3. What is the basic purpose of composite transformation? Describe the reflection on an arbitrary axis with rotation angle 45 degree in clockwise direction.
4. Scale the triangle with vertices M (1, 1) N (2, 2) O (6, 3) to half of its size while keeping P (1, 1) fixed.
5. Rotate the Triangle A (0, 0) B (2, 2) C (4, 2) about the origin by angle of 45 degree.
6. Rotate the Triangle A (5, 5) B (7, 3) C (3, 3) about the fixed point (5, 4) by angle of 90 degree in CCW.
7. Show that two successive translation and rotation are additive.

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8. A mirror is placed such that it passes through (0, 10) (10, 0). Find the mirror image of an object (6, 7) (7, 6) (9, 9).
9. Define window and viewport. What are the different steps of 2-D world in screening viewing transformation? Describe the matrix representation at each steps.
10. Clip the line from (-2, 3) to (18, 13) against the window dimension where lower left corner (0, 0) and upper right corner is at (20, 100). Use Cohen-Sutherland Algorithm.
11. Calculate viewing transformation matrix with following information.
    i. Triangle of (5, 5) (15, 5) (10, 10)
    ii. Window coordinate (7, 4) (13, 4) (13, 8) (7, 8)
    iii. Viewport location (17, 7) (18, 8) (17, 8)

Chapter-5: 3D Graphics System

1. What is 3D graphics? Why 3D representation is more complex than 2D?
2. Explain Translation, scaling (fixed point too), reflection and shearing in 3D Graphics system with homogeneous coordinate representation.
3. Describe the rotation about an axis parallel to one of the coordinate axis in 3D Graphics system.
4. Scale a triangle A (0, 0) B (1, 1) and C (3, 2) by twice its original size, about origin and about pivot (-1, -2).
5. What do you mean by 3D representation in CG? Describe the representation of the polygon surface in 3D with the help of polygon table.
6. Define and describe control points and convex hull in cubic spline.
7. What is Bezier curve? States its important two properties and describe its application.
8. Determine the parametric equation for the cubic Bezier curve.
9. Write short notes on following:
    i. Fractals
    ii. Z-clipping
10. What do you mean by 3D viewing? Describe the 3D viewing pipeline with is diagram.
11. What do you mean by projection? Derive a transformation matrix for the Parallel Projection (orthographic and oblique).
12. Derive the transformation matrix for the perspective projection in 3D graphics system.

Chapter-6: Visible Surface Detection

1. How hidden surface is eliminated in Graphical content? Differentiate between OSM and ISM of visible surface detection.
2. Explain the Back Face Detection Algorithm with suitable example.
3. Explain the depth buffer method of hidden surface elimination with algorithm and also calculate the depth value.
4. Write short notes on any TWO

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i. Scan Line method
ii. A-Buffer Method
iii. Area Sub Division
iv. Depth Sorting Method

Chapter-7 Illumination and Shading

1. Define the term illumination shading and surface rendering. Discuss about the different light source.
2. What do you mean by ambient light? Explain and derive the intensity of ambient light.
3. Write short notes on any TWO.
   i. Diffuse reflection
   ii. Specular reflection
   iii. Mach Bands and Depth Cueing
4. Explain Gouraud and phong shading method for surface rendering in details.
5. Explain Color Models in Computer Graphics : CMYK and RBG

Chapter-8: Graphical Language

1. Justify the need of machine independent graphics language.
2. Discuss the Graphics software standards GKS and PHIGS in details.
3. What are the different file format available in Graphics? Explain all in brief.
4. What do you mean by OPENGL? Describe its purpose with rendering pipeline.
5. What are the graphics libraries? Explain any four OPENGL libraries that you are familiar with.

End of the Document

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