GANPAT UNIVERSITY

U. V. Patel College of Engineering

M. Tech. Semester I Examination
– JAN 2012

PGIT-103 Interactive Computer Graphics

Time: 3 Hrs]   [Total Marks: 70

Instructions:
1. Assume data if not given
2. Be precise and to the point in your answer
3. Write each sections in separate answer book

SECTION - I

Q:1 Explain the significance of decision parameter in Bresenham's line drawing algorithm. Simulate the algorithm for endpoints $P_1(10, 20)$ and $P_2(-2, 8)$. **[6]**

Explain loading of frame buffer. If (Xmin, Ymin) = (100, 100) and (Xmax, Ymax) = (800,600) then calculate the address of (260,170). Assume uni-level buffer storage **[2]**

How to turn point light source into a spot light? **[3]**

Q:2 Attempt ANY **THREE** **[12]**

1) Discuss properties of circles and simulate midpoint circle algorithm for center C(-5, -12) and radius R = 8.

2) Discuss properties of ellipse and simulate midpoint circle algorithm for center C(0, -10) and radius $R_X = 6$, $R_Y = 8$.

3) Prove that the multiplication of transformation matrices of each of the following sequence of operations is commutative:
- Two successive rotation
- Two successive translation
- Two successive scaling

4) Perform 60° rotation of a triangle with points $P_1(10, 20)$, $P_2(40, 20)$, $P_3(25, 40)$ about center as a pivot point. Find coordinates of transformed object *(sin60 = 0.87 and cos60 = 0.5)*

Q:3 Attempt Any **TWO**   **[12]**

1) Find the new coordinates of a unit cube 90º-rotated about an axis defined by its endpoints $P_1(1,1,4)$ and $P_2(4,5,2)$.

2) Determine a sequence of basic transformations (i.e. Translation, Rotation and Scaling) that are equivalent to the X-direction shearing matrix.

3) Differentiate image space method and object space method for visual surface detection. Explain any object space method with suitable example.

SECTION - II

Q:4 Derive total specular reflection equation for single point monochrome light source using Phong model.   **[6]**

What is dominant wavelength in energy spectrum? Explain how Chromaticity diagram helps to determine color gamuts using three primary colors, complementary colors, dominant wavelength and purity.   **[5]**

Q:5 Attempt ANY **THREE**   **[12]**

1) What is coherence? Explain the application of coherence in visible surface detection methods.

2) Describe following surfaces with Cartesian representation and parametric representation. (i) Superellipse (ii) Superellipsoid

3) Explain CMY color model. Explain how it is different from RGB color model. How to achieve pure black color using CMY color model?

4) Discuss the procedure of transformation from world to viewing coordinates.

Q:6 Attempt ANY **TWO**   **[12]**

1) Define Projection. Derive the procedure for parallel projection.

2) Explain basic radiosity model.

3) Write brief short note on (i) β Spline (ii) Rational β Spline

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