Set No. 1

III B.Tech Supplimentary Examinations, Aug/Sep 2008
COMPUTER GRAPHICS
(Computer Science & Engineering)

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks
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1. List the operating characteristic of the following display technologies:

   (a) Raster refreshes systems

   (b) Vector refresh systems

   (c) Plasma panels and

   (d) LCD.   [4×4]

2. (a) Distinguish the merits and demerits of scan line algorithm and flood fill algorithm.

   (b) Discuss about the super sampling approach followed for antialiasing.   [10+6]

3. (a) Show that the composition of two rotations is additive that is, $R(\varphi_1).\,R(\varphi_2) = R(\varphi_1 + \varphi_2)$.

   (b) Characterize the transformation with suitable matrix formulation, for the following operations: $x^{'} = x + a.y, \quad y^{'} = bx + y$.   [8 + 8]

4. (a) Using steps followed in Sutherland-Hodgeman algorithm, determine the intersection point of the line segment $P_1\,P_2$ against a clipping window P_3P_4 where coordinate of end points are $P_1(0,0)\ P_2(3,2)\ P_3(3,0)$ and $P_4(0,2)$.

   (b) Why the Sutherland-Hodgeman algorithm is called as re-entrant algorithm.
                                                                                                              [8+8]

5. (a) Distinguish between isometric, diametric and trimetric projections.

   (b) Explain with a neat sketch, how the view plane is defined with respect to centre of projections and the object defined is 3-D space.   [8+8]

6. (a) Discuss about 3-dimensional viewing pipe line.

   (b) Write a brief note about the following:

      i. View plane
      ii. View reference
      iii. View plane normal.   [7+9]

7. (a) What is the blending function used in Bezier's method for curve generation? Explain the terms involved in it?

   (b) What are the properties of Bezier curve?   [10+6]

8. Discuss about the problems peculiar to animation and propose suitable solutions.
[16]

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Set No. 2

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1. List the operating characteristic of the following display technologies:

   (a) Raster refreshes systems

   (b) Vector refresh systems

   (c) Plasma panels and

   (d) LCD.   [4×4]

2. Derive and explain the Bresenham's line algorithm with the help of a suitable example.   [4+8+4]

3. (a) List the basic transformations which cause the physical distortion in the transformed object.

   (b) An object point P(x,y) is translated in the direction U = aI + bJ and simultaneously an observer moves in the direction U. Show that there is no apparent motion of the object point from the point of view of obsever.   [8+8]

4. (a) Find the general form of the transformation N which maps a rectangular window with x extent xw_{min} to xw_{max} in the x-direction and y extent y_{wmin} to y_{max} in the y-direction on to a rectangular view port with x extent x_{vmax} to x_{vmax} and y extent y_{vmin} to y_{vmax}.

   (b) Distinguish between Cohen-Sutherland outcode and Sutherland-Hodgeman algorithm.   [8+8]

5. Classify the parallel projections and describe the characteristics of each kind. [16]

6. (a) Explain how the depth values are computed in scan-lines?

   (b) What are the merits and demerits of z-buffer?   [8+8]

7. (a) Distinguish zero-order, first-order and second-order continuity.

   (b) What is the organization of control points followed in Bezier's method to ensure second order continuity?

   (c) What are the properties of Bezier's curve?   [5+5+6]

8. Discuss about the techniques to achieve the simple animation effects.   [16]

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1. (a) Explain the design issues in color CRT monitors.

   (b) Distinguish between CRT monitors and direct view storage tube (DVST) devices.   [8+8]

2. (a) What is inside-outside test? What is its significance in polygon filling? [4+4]

   (b) Develop a flood-fill algorithm to fill interior of any specified polygon.   [8]

3. (a) What is meant by composite transformations?

   (b) Write the general form of a scaling matrix with respect to a fixed point P(h,k) where the scaling factors in x and y directions are a and b respectively.
                                                                              [6+10]

4. Compute the transformation matrix that maps a window with (wx_{min}, wx_{max})=(2,2)and (wx_{max}, wy_{max}) =(4,6) onto a normalize device coordinated which has lower left corner at (0,0) and upper right corner at (1,1).   [16]

5. Drive the matrix form for the geometric transformations in 3-D graphics for the following operations.

   (a) Translation

   (b) Scaling

   (c) Mirror reflections.   [5+5+6]

6. (a) Discuss about the characteristics of the following illumination parameters.

        i. Diffuse refection

       ii. Specular reflection and

      iii. Refraction.

   (b) At a surface point p, if the surface normal, light vector and sight vectors are given by n = j, L = -I + 2j-k and s = I + 1.5j + 05k respectively, find the vector of reflected ray and the angle it is making with surface normal. [9+7]

7. (a) Distinguish zero-order, first-order and second-order continuity.

   (b) What is the organization of control points followed in Bezier's method to ensure second order continuity?

   (c) What are the properties of Bezier's curve?   [5+5+6]

8. Give a detailed note of the following rules of animation.

(a) Slow-in and Slow-out

(b) Stage the action. [8+8]

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1. (a) What is the role of digital to analog converter (DAC)? Where is it placed in video display devices?

   (b) Explain the mechanism of increasing the colors/gray levels without increasing the frame buffer memory.   [8+8]

2. (a) Draw the flow chart for Bresenham's incremental circle algorithm in the first octant.

   (b) Discuss about the reflections required for generating the complete circle using the first octant of the origin centered circle.   [8+8]

3. (a) List the basic transformations which cause the physical distortion in the transformed object.

   (b) An object point P(x,y) is translated in the direction U = aI + bJ and simultaneously an observer moves in the direction U. Show that there is no apparent motion of the object point from the point of view of observer.   [8+8]

4. Explain the approaches followed in different line clipping algorithms: compare and contrast the characteristics.   [8+8]

5. (a) Distinguish between isometric, diametric and trimetric projections.

   (b) Explain with a neat sketch, how the view plane is defined with respect to centre of projections and the object defined is 3-D space.   [8+8]

6. Implement the depth-buffer method to display the visible surfaces of a given polyhedron. How can the storage requirements for the depth buffer be determined from the definition of the objects to be displayed?   [16]

7. (a) State the blending function suitable for Bezier surface and explain the terms involved in it.

   (b) Demonstrate that Bezier curve is axis independent.   [8+8]

8. Describe the following rules of animation in detail:

   (a) Squash and stretch
   (b) Slow-in and Slow out.   [8+8]

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