Code No: R05320501 **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. (a) How much time is spent in scanning across each row of pixels during screen refresh on a raster system with a resolution of 1280 by 1024 and a refresh rate of 60 frames per second. Assume horizontal and vertical retrace times are negligible.
   (b) Discuss about the applications of computer graphics in the area of image processing. [10+6]

2. (a) Write an algorithm for generating the intermediate points using Bresenham?s algorithm when two-end points are given as input.
   (b) Write an algorithm for polyline function which calls the above algorithm, given any number (n) of input points. A single point to be plotted when n=1. [8+8]

3. (a) Describe the transformation that rotates an object point Q(x,y), θ^0 about a fixed center of rotation p(h,k).
   (b) Magnify the triangle with vertices A(0,0), B(1,1) and C(5,2) to twice its size, while keeping C(5,2) fixed. [8+8]

4. (a) Explain why the Sutherland-Hodgeman polygon-clipping algorithm works for only convex clipping regions.
   (b) Derive the transformation matrix for window to viewport mapping. [16]

5. (a) Analyse the effect on a B-spline of having in sequence four collinear control points.
   (b) Find the conditions under which two joined Hermite curves have C^1 continuity. [8+8]

6. Prove that the multiplication of three-dimensional transformation matrices for each of the following sequence of operations is commutative.
   (a) Any two successive translations
   (b) Any two successive saling operations
   (c) Any two successive rotations about any one of the coordinate axes. [16]

7. (a) Distinguish between object-space and image space methods of visible surface detection algorithms. Give examples for each.
   (b) Given points P (1, 2, 0), P (3, 6, 20) P (2, 4, 6) and a view point C (0, 0, -10), determine which points obscure the others when viewed from C. [8+8]

8. What are the steps in design of animation sequence? Describe about each step briefly. [16]

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Code No: R05320501 **Set No. 2**

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. (a) Consider a non interlaced raster monitor with a resolution of n by m (m scan lines and n pixels per scan line), a refresh rate of r frames per second, a horizontal retrace time of t horiz and vertical retrace time of tvert. What is the fraction of total refresh time per frame spent in retrace of the electron beam.
   (b) Explain the applications for large-screen displays. What graphical output devices support it? [12+4]
2. (a) Explain the DDA scan conversion algorithm for generating the points on line segment, when two end-points are given as input.
   (b) Digitize the line with end-points (20,10) and (30,18) using DDA algorithm. [8+8]
3. (a) Perform a 45^0 rotation of a triangle A(0,0), B(1,1) and C(5,2) about P(-1,-1).
   (b) Magnify the triangle with vertices A(0,0), B(1,1) and C(5,2) to thrice its size while keeping B(1,1) fixed. [8+8]
4. (a) Draw the flow diagram or a brief step-wise procedure for implementing Sutherland-Hodgeman algorithm.
   (b) Consider a convex polygon with n vertices being clipping against a clip rectangle. What is the maximum number of vertices is the resulting clipped window? What is the minimum number. [8+8]
5. (a) Describe the phong illumination model. Explain the parameters used in phong's model.
   (b) List and explain the problems with interpolated shading methods. [8+8]
6. (a) Derive the quaternion rotation matrix for rotation about an arbitrary axis in three-dimensional domain.
   (b) Classify the perspective projections and explain about each. [8+8]
7. Write an algorithm for generating a quad tree representation for the visible surfaces of an object by applying the area subdivision tests to determine the values of the quad tree elements. [16]
8. (a) How the morphing effects are implemented in key frame system bared animation languages?

(b) Explain how the kinematic description are simulated in key frame systems. [8+8]

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Code No: R05320501 **Set No. 3**

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. (a) List and explain the applications of Computer Graphics.
   (b) With a neat cross- sectional view explain the functioning of CRT devices. [8+8]

2. (a) Explain the DDA scan conversion algorithm for generating the points on line segment, when two end-points are given as input.
   (b) Digitize the line with end-points (20,10) and (30,18) using DDA algorithm. [8+8]

3. (a) Prove that a uniform scaling ($s_x = s_y$) and a rotation form a commutative pair of operations, but that, in general, scaling and rotation are not commutative.
   (b) Derive the transformation matrix for rotation about origin. [8+8]

4. (a) What are the stages involved in Window-to-viewport coordinate transformation. Explain about each stage.
   (b) What is the procedure followed in point clipping with respect to a rectangular window. [10+6]

5. (a) Explain about different representation of polygon meshes in surface modeling.
   (b) What are the characteristics of parametric cubic curves? What are its advantages? [8+8]

6. Derive the transformation matrix for aligning an arbitrary vector V=a_1I + b_1J + C_1K with another arbitrary vector N= a_2I + b_2J + C_3K. [16]

7. (a) Distinguish between object-space and image space methods of visible surface detection algorithms. Give examples for each.
   (b) Given points P (1, 2, 0), P (3, 6, 20) P (2, 4, 6) and a view point C (0, 0, -10), determine which points obscure the others when viewed from C. [8+8]

8. (a) Explain how the linear interpolation is implemented when the key-frame positions of an object are given.
   (b) Describe linear list notation of animation languages. [16]

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Code No: R05320501 **Set No. 4**

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 characterstics of
   (a) Raster refresh systems
   (b) Vector refresh systems
   (c) Plasma panel
   (d) LCDs. [4×4=16]

2. (a) Explain the mathematical procedure in deciding the points on the periphery of the ellipse using mid-point ellipse algorithm.
   (b) Illustrate the properties of ellipse which are considered in efficient generation of ellipse using mid-point method. [8+8]

3. (a) Derive the transformation matrix for rotation about origin.
   (b) Explain the terms: [8+8]
      i. Homogeneous Coordinates
      ii. Rigid-body transformations
      iii. Composite transformations.

4. (a) What are the stages involved in Window-to-viewport coordinate transformation. Explain about each stage.
   (b) What is the procedure followed in point clipping with respect to a rectangular window. [10+6]

5. If the equation for a plane surface is expressed in the form Ax+By+Cz+D=0. Explain the procedure to calculate the parameters A, B, C and D using Cramer's rule if the three successive polygon vertices are given as input. [16]

6. (a) What is the procedure for reflecting an about an arbitrarily selected plane.
   (b) What are the characterstics of perspective projections? [8+8]

7. (a) Distinguish between object-space and image space methods of visible surface detection algorithms. Give examples for each.
   (b) Given points P (1, 2, 0), P (3, 6, 20) P (2, 4, 6) and a view point C (0, 0, -10), determine which points obscure the others when viewed from C. [8+8]

8. (a) List and explain about the steps of animation.
   (b) What are the various types of interpolation used in animation. [8+8]

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