Code No: RR320502 **Set No.1**

III B.Tech. II Semester Regular Examinations, January -2005
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) What is meant by gray level. If 10 bits of frame buffer memory id allocated to each pixel. How many gray levels are possible per pixel.
   (b) Explain how the frame buffer is logically organized to display color images on video display unit.
2. (a) Discuss the steps involved in the ordered edge list algorithm.
   (b) What arte the advantages of edge flag algorithm.
3. (a) Describe the transformation M_L which reflects an object about a line L; where the line equation is y=mx+c.
   (b) Reflect the diamond shaped polygon whose vertices are A (-1,0), B(0,-2), C(1,0) and D(0,2) about the horizontal line y=2.
4. (a) Explain the terms: world coordinate system, normalized device coordinate system and physical device coordinate system.
   (b) Explain the procedure followed to determine whither a line segment is intersection a given vector or not.
5. Distinguish the transformations performed in 2-D graphics and 3-D graphics. Explain how many matrices are needed to define each of the basic transformations.
6. (a) Show how the calculations of the intersection of an edge with a scan line can be made incremental as opposed to absolute.
   (b) What difficulties are encountered in implementing the painters algorithm?
7. (a) State blending function used in B-spline curve generation. Explain the terms involved in it.
   (b) What are the properties of B-spline curves?
8. Give a detailed note of the following rules of animation.
   (a) Slow-in and Slow-out
   (b) Stage the action.

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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.
2. What is meant by aliasing? Discuss about the two antialiasing methods.
3. (a) Derive the transformation matrix for reflection about y=x line.
   (b) Reflect the object with verticals A(5,5), B(5,0) and C(7,7) about the vertical line x=2.
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 yw_{min} 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.
5. List the matrix forms for different basic geometric transformations in 3-D graphics. Discuss whether the reference is pint or axis or plane for each of the operation.
6. (a) How does scan-line coherence help to reduce computation in Z-buffer algorithm?
   (b) Assuming that one allows 256 depth value levels to be used, approximately how much memory would a 512 512 pixel display require to store the Z-buffer?
7. (a) Demonstrate with the help of blending functions that B-spline method follow local control.
   (b) Distinguish the properties of B-spline and Bezier curves.
8. Discuss about the problems peculiar to animation and propose suitable solutions.

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Code No: RR320502 **Set No.3**

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Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Design a frame buffer for the color graphics display where 3 bits of memory is allocated per color per pixel.
   (b) If the resolution of the video display unit is 540x480, how much frame buffer memory is needed to design the above frame buffer.
2. (a) Explain how the area antialiasing technique is implemented?
   (b) Distinguish between antialiasing and halftoning.
3. (a) Derive the transformation matrix for reflection about y=x + 2 line.
   (b) Find the reflection of the point A(10,10) about the line y= x + 2.
4. Find the viewing transformation that maps a window whose left corner is at (1,1) and upper right corner is at (3,5) on to a view port that has lower corner at (0,0) and upper right corner at $\left(\frac{1}{2}, \frac{1}{2}\right)$.
5. (a) Derive the matrices for rotations about three principle axis in 3-D graphics.
   (b) What is meant by homogeneous co-ordinates? What is its significance?
6. (a) How is the depth of a polygon determined by the painters algorithm?
   (b) Assuming that one allows 128 depth value levels to be used, how much memory would a 512 x 512 pixel display require to store the Z-buffer? If the seence consists of 14 objects what is the frame buffer memory requirement.
7. (a) State the blending function for B-spline surface. Explain the terms involved in it.
   (b) Prove with suitable demonstration that the B-spline surface follows local control.
8. Discuss the implementation of a two-pass object-precision shadow algorithm?

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Code No: RR320502 **Set No.4**

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(Computer Science & Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) What is "look-up table" mechanism in frame buffers of video display units.
   (b) If 8 bits of frame buffer memory is allocated per each primary color, how many different colors are possible per pixel, in a color graphics display unit.
2. (a) What is patterning? List the 2 × 2, 3 × 3 and 3 × 2 bilevel pattern cells.
   (b) Discuss about the method of thresholding and error distribution followed in halftoning.
3. (a) Derive the transformation matrix for shear transformation.
   (b) Demonstrate with suitable examples, how the deformation in the object takes place, when the shearing is applied in
      i. x-direction,
      ii. y-direction and
      iii. both x and y directions.
4. Explain the approaches followed in different line clipping algorithms: compare and contrast the characteristics.
5. (a) If tilting is defined as a rotation about a axis followed by a rotation about y-axis in 3-D space, find the tilting matrix.
   (b) Demonstrate that order of performing the rotation matrix for the above problem.
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.
7. (a) Discuss the properties of natural cubic splines.
   (b) Discuss about the parametric function followed in Hermite spline.
8. (a) Distinguish specular and diffuse reflection.
   (b) Discuss about non-refractive transparency modeling.

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