

IV B.Tech II Semester Regular Examinations, Apr/May 2008
COMPUTER GRAPHICS
(Common to Mechanical Engineering, Production Engineering and
Automobile Engineering)

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. (a) Explain the 'stroke method' and the 'bitmap method' for generating characters.
(b) Discuss the antialiasing methods for lines. [8+8]
2. (a) Explain the role of display interpreter in graphical display, with a block diagram.
(b) What is meant by normalized device co-ordinate system? What are its advantages? [6+10]
3. (a) How the magnification and reduction of the graphical objects is done.
(b) Derive the composite transformation matrix which magnifies an object by 's' units in x and y directions about its center c(h,k). [8+8]
4. Derive the window-to-view port transformation equations by first scaling the window to the size of the view port and then translating the scaled window to the view port position. [16]
5. Explain the following:
(a) Generalised clipping
(b) Multiple windowing. [8+8]
6. Explain about the following 3D transformations:
(a) Scaling
(b) Translation
(c) Rotation about x-axis [16]
7. (a) Explain the basic concepts of hidden surfaces and line removal methods with suitable examples.
(b) Write about z-buffers. [10+6]
8. Explain about the following:
(a) B-spline method
(b) Raster graphics architecture. [8+8]

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1. Explain the following briefly
 - (a) Raster scan graphics display
 - (b) Vector refresh display [8+8]
2. (a) Explain the role of display interpreter in graphical display, with a block diagram.
(b) What is meant by normalized device co-ordinate system? What are its advantage? [6+10]
3. Is it possible to subject the following transformations on the characters, which are generated by a hardware character generator?
 - (a) a rotation
 - (b) a scaling
 - (c) a translation [5+5+6]
4. Find the normalization transformation that maps a window whose lower left corner is at (1,1) and upper right corner is at (3,5) onto
 - (a) a view port that is the entire normalized device screen and
 - (b) a view port that has the lower left corner at (0,0) and upper right corner at (1/2,1/2). [16]
5. Explain the following:
 - (a) Generalised clipping
 - (b) Multiple windowing. [8+8]
6. (a) Give a brief account on three-dimensional rotations.
(b) Show the sequence of transformations for rotating an object about an axis that is parallel to the x axis [6+10]
7. (a) Explain the basic concepts of hidden surfaces and line removal methods with suitable examples.
(b) Write about z-buffers. [10+6]
8. Describe Bezier surface generation technique with examples. [16]

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1. (a) Explain the working of a plasma panel.
(b) What is character generation? Explain. [8+8]
2. (a) Explain the winding-number method for determining whether a point is interior of a polygon. Demonstrate with suitable examples.
(b) Explain the flood-fill algorithm for filling polygons. [8+8]
3. Give 3x3 homogeneous-coordinate transformation matrix which will have the same effect as each of the following transformation techniques:
(a) Scale the image to be twice as large and then translate it 1 unit to the left.
(b) Rotate counter-clockwise about the origin by 90 degrees and then scale the x-direction to be one-half as large. [8+8]
4. Write procedures for creating and closing segments. [16]
5. Explain the logic of the Sutherland-Hodgman algorithm with the help of a neat flowchart. Illustrate the working of your flowchart with the help of a suitable example. [16]
6. Explain the method to derive the transformation matrix for rotating an object about any arbitrary axis. [16]
7. Write about the following:
(a) 3D clipping
(b) Shading algorithms. [8+8]
8. Explain the following:
(a) Simple raster display system
(b) Sweeping method of interpolation. [8+8]

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1. Explain the steps involved in Bresenham algorithm for line drawing. Demonstrate with an example. Discuss its merits and demerits. [16]
2. (a) Explain the winding-number method for determining whether a point is interior of a polygon. Demonstrate with suitable examples.
(b) Explain the flood-fill algorithm for filling polygons. [8+8]
3. Explain with suitable examples different 2-dimensional transformation techniques. Derive their respective matrix representations. [16]
4. Find the normalization transformation that maps a window whose lower left corner is at (1,1) and upper right corner is at (3,5) onto
 - (a) a view port that is the entire normalized device screen and
 - (b) a view port that has the lower left corner at (0,0) and upper right corner at (1/2,1/2). [16]
5. Explain the Cohen-Sutherland algorithm for finding the category of a line segment. Show clearly how each category is handled by the algorithm. [16]
6. (a) Write about 3D viewing transformations.
(b) Write the 3D homogeneous transformation matrix for each of the following transformation
 - i. shift 0.5 in X , 2.0 in Y and -0.2 in Z
 - ii. Rotate by $\pi/4$ about X axis [8+4+4]
7. (a) Explain the basic concepts of hidden surfaces and line removal methods with suitable examples.
(b) Write about z-buffers. [10+6]
8. Write about the following:
 - (a) Generation of curves and surfaces.
 - (b) Sweeping method of interpolation. [8+8]
