

IV B.Tech. II Semester Regular Examinations, April/May -2005
COMPUTER GRAPHICS
(Common to Mechanical Engineering and Production Engineering)
Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

1. (a) Define:
 - i. Aspect ratio
 - ii. Resolutions(b) What is the aspect ratio of 12-inchX16 inch display?
(c) Explain the functioning of the vector refresh display system.
2. (a) Explain and demonstrate with suitable examples“ the even-odd method”of determining the polygon interior points.
(b) Explain the flood-fill algorithm for filling polygons.
3. Give the homogeneous co-ordinate transformation matrices for the following transformations:
 - (a) Entire picture three times as large
 - (b) Counter clock-wise rotation about the origin, by 90 degrees.
4. What are the various operations to be performed on the segments? Discuss various data structures that can be used for storing segments in the display files.
5. What is line segment clipping? Describe the various clipping categories into which the line segments are categorized. What is the significance of each category?
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
7. Write an 3D clipping algorithms for Parallel and Perspective projections.
8. (a) Explain display processor system.
(b) Write about B-splines.

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1. (a) What is the difference between simple DDA and Bresenham's line generation algorithm?
(b) Explain how dotted lines can be drawn.
(c) What is the method of producing a thick line segment?
2. Write an algorithm for interpreting the display file.
3. Give the homogeneous co-ordinate transformation matrices for the following transformations:
(a) Scale x direction four times as large and the y-direction un-changed.
(b) Clock-wise rotation about the origin, by 60 degrees.
4. (a) Write procedure copy-segment (old-segment, new-segment) which copies old segment to new segment.
(b) Distinguish between window and view port.
5. What is line segment clipping? Describe the various clipping categories into which the line segments are categorized. What is the significance of each category?
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
7. Explain the following:
(a) Painter's algorithm
(b) Warnock's algorithm.
8. Describe Bezier surface generation technique with examples.

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1. (a) Illustrate the applications of computer graphics.
(b) What is the stair-case effect in line generation?
2. (a) Using the syntax of display file structure, write the algorithm to put an instruction into the display file.
(b) Explain the role of display file in the graphical image generation.
3. Give 3x3 homogeneous-coordinate transformation matrix which will have the same effect as each of the following transformation techniques:
(a) Translate down 1 unit and right 1 unit , and then rotate counter-clockwise by 45 degrees.
(b) Scale the y coordinate to make the image twice as tall, shift it down 1 unit rotate clockwise by 30 degrees.
4. Write procedures for creating and closing segments.
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.
6. (a) Write the transformation matrix to rotate a point (x,y,z) about Z axis through an angle q in the clockwise direction.
(b) Explain about different projection in 3-D .
7. Write an 3D clipping algorithms for Parallel and Perspective projections.
8. Explain about the following:
(a) B-spline method
(b) Raster graphics architecture.

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1. (a) Define:
 - i. Aspect ratio
 - ii. Resolutions(b) What is the aspect ratio of 12-inchX16 inch display?
(c) Explain the functioning of the vector refresh display system.
2. (a) Briefly explain the steps involved in scan-line algorithm for polygon filling.
(b) What are the merits and demerits of flood-fill and scan-line algorithms?
3. (a) Compute the transformation matrix of a triangle A (1,0), B (0,1) and C (1,1) after rotating about vertex B, 45 degrees anti-clockwise direction.
(b) Show that reflection about the line 'y = x' is attained by reversing the co-ordinates.
4. Write a procedure for deleting a segment.
5. Explain the following:
 - (a) Generalised clipping
 - (b) Multiple windowing.
6. Explain briefly the transformation steps for obtaining a composite matrix for rotation about an arbitrary axis with the rotation axis projected on to the z-axis
7. Outline the z-buffer algorithm. List the advantages and disadvantages of the z-buffer algorithm.
8. Explain about the following:
 - (a) B-spline method
 - (b) Raster graphics architecture.
