B. E (IT), 4'" Semester, End Semester Examination 2010
Bengal Engineering & Science University, Shibpur
Subject: Computer Graphics (IT-405)
Full Marks: 70 **Duration: 3 Hours**

Answer question number one (Q.l) and any Jive from the rest

Q. 1 ***Answer any Jive questions.*** **5x2**

a) If we want to resize a 1024x768 image to one that is 640 pixels wide with the same aspect ratio, what would be the height of the resized image?

b) When three point axis vanishing points will occur?

c) What is persistence?

d) What are hue, saturation and brightness of a color?

c) What are the major adverse **side** effects of scan conversion? What methods are adopted to remove those effects?

0 Can a 5inchx3inch image be represented at 6inchx4inch without geometric distortion?

g) Write the 3D shearing transformation matrix along X-axis and Y-axis respectively.

Q.2

a) Describe the mathematical basis of *Bresenham's* line drawing algorithm in detail.

b) Digitize a line from point (0, 2) to point **(4,** 5). Show the values of the decision parameter in each step.

c) Compare the advantages and disadvantages of the Bresenham's line drawing algorithm with the DDA algorithm

6+4+2

Q.3

a) What is homogeneous coordinate system?

b) - Rotate a triangle ABC by an angle 90° about a point (-1, 1) where the triangle has the coordinates A(5, 0). B(10, 2) and C(7, 4).

c) Prove that a shear transformation can be expressed in terms of rotation and scaling operations.

2+5+5

Q.4

a) What are the different types of axonomelric projections possible and define them?

b) Determine the transformation matrix for the oblique projection and categories the different types of oblique projection. What are the different foreshortening factors obtained in the above types of projections?

c) What is vanishing point? How many vanishing points we can obtain for a general perspective projection?

2+7+3

Q.5

a) Determine the two-dimensional viewing transformation matrix.

b) Find the normalization transformation which uses the rectangle A(l.l). B{5,3), C(4.5) and D(0,3) as a window and the normalized device screen as the viewport.

5+7

Q.6

a) Describe in detail how the Cohen-Sutherland algorithm clips a line.

b) Describe the Sutherland-Hodgman algorithm for polygon clipping with example.

c) What is the main drawback of this algorithm?

7+4+1

Q 7

a) What are the different types of coherence properties considered for scan line filling algorithm? Define therh.

b) What are the different data structures used for scan-line filling algorithm? Explain with example?

c) What are the different problems arises during implementation of scan-line filling algorithm and how they can be solved? Explain with example for each case.

3+5+4

Q.8

a) Explain how geometrically a Bezier curve can be drawn?

b) Let P and Q be two Bezier curves in 2D each of having degree 2 defined by the given set of control points {pi, p_2, **P3}** and {qj, **q2.** qs} respectively, where coordinates of the points are$_p$|«(-1, 0), p_2-(-l. -1), **P3**=(0,i)> qi=(0,l),q_2=(UI) and q_3-(1.0).

Draw both the Bezier curves. Do the curves join without any break? If the answer is yes, are the curves joined smoothly? Justify. Use Bernstein polynomials to draw the Bezier curve.

c) Prove that the for a cubic Bezier curve the tangent to the curve at the endpoints are along the line joining the respective endpoints to the adjacent control points.

3+5+4

Q.9 Write short notes on *any two* the fallowings: 6+6

a) Color models RGB and CYMK.

b) Liquid Crystal Display (LCD).

c) Cubic splines curves