EASTERN UNIVERSITY, SRILANKA

THIRD EXAMINATION IN SCIENCE

THIRD YEAR FIRST SEMESTER-2004/2005 (Nov./Dec.,2006)

CS301–Computer Graphics

[Special Repeat]

Answer all questions **Time: 2Hour**

Q1)

1. Define the graphics terms **Window** and **View Port**. [20 Marks]

2. Give an algorithm to draw the circle using **Midpoint Circle** technique. [50 Marks]

3. Using your above algorithm compute successive points to plot in the display in order to draw the first quarter of the circle with center at (20,20) and radius 7. [30 Marks]

Q2)

1. Explain **Bresenham's** line drawing method and algorithm to generate straight line with slope less than one. [20 Marks]

2. Show how you would modify your algorithm to draw straight line with any slope. [20 Marks]

3. Using your above algorithm compute successive points to plot in the display in order to draw a straight line from the point **(1,2)** to the point **(10,12)** . [20 Marks]

4. Describe and distinguish **Flood-Fill Algorithm** and **Boundary-Fill Algorithm** to fill regions in a raster display. [40 Marks]

Q3)

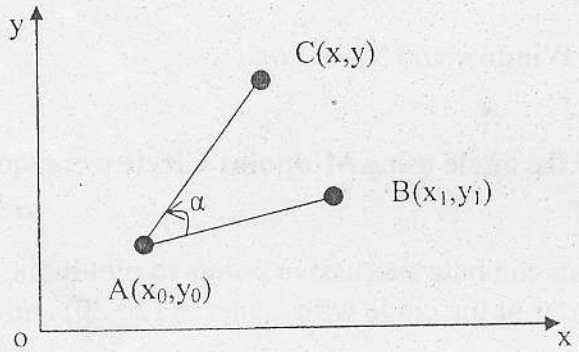
1. Describe all basic transformation that would be useful in two-dimensional graphics and give the transformation matrices.

[30 Marks]

2. Give the transformation matrix to find the mirror image of a **line** with respect to y-axis.

[30 Marks]

3. Consider the given coordinate system as given below. Let $A(x_0,y_0)$, $B(x_1,y_1)$ and $C(x,y)$ the three points on this coordinate system. The point $C(x,y)$ is obtained by rotating the point $B(x_1,y_1)$ by an angle α with respect to the point $A(x_0,y_0)$. Write the formula for coordinates x and y.



[40 Marks]

Q4)

1. Define **Parallel Projection** and **Perspective Projection** in three dimensional viewing.

[30 Marks]

2. Give the equation for three-dimensional rotation about z-axis by an angle β.

[30 Marks]

3. Derive a transformation matrix to project a point $P(x,y,z)$ onto $Q(x',y',z')$ on a plane parallel to XY-Plane but going through $(0,0,z_{vp})$. The type of projection applied is perspective with reference point at $(0,0,z_{rp})$.
Let $P(-10, 5, 10)$, $z_{vp}= 5$, $z_{rp}=10$. Find the projected coordinate of the point P.

[40 Marks]