EASTERN UNIVERSITY, SRI LANKA
DEPARTMENT OF MATHEMATICS
EXTERNAL DEGREE EXAMINATION IN SCIENCE
THIRD YEAR EXAMINATION IN SCIENCE (2008/2009)
FIRST SEMESTER (Dec/Jan, 2012/2013)
EXTCS 301 COMPUTER GRAPHICS

Answer all Questions   Time: 2 Hours

Q1)

a) What is meant by Scan conversion?

b) List out the 5 graphics devices?

c) What are the differences between **raster scan display & random scan display**?

d) Consider the **Midpoint circle** algorithm,

   i. Derive the necessary equations to generate **Midpoint circle** algorithm.

   ii. Write the **Midpoint circle** algorithm.

   iii. Get all the pixel co-ordinates to draw a circle of radius $r = 8$ with center $(0, 0)$.

    (Apply this algorithm)

   iv. Describe how the above algorithm can be used to draw a full circle.

Q2)

The basic **2-D** transformations in Computer graphics are translation, scaling, and rotation.

a) Give the corresponding matrices (in homogeneous system) for each of the following transformations:

   i. Translation

   ii. Scaling

   iii. Rotation

b) Reflect a diamond shaped polygon whose vertices are $A(-1,0)$, $B(0,-2)$, $C(1,0)$ and $D(0,2)$ about:

   i. The horizontal line $y = 2$;

   ii. The vertical line $x = 2$;

   iii. The line $y = x+2$.

Q3)

a) Define window and viewport in Computer graphics.

b) Describe the 2D viewing transformation pipe line.

c) What is meant by 2D clipping?

d) Briefly explain the Cohen-Sutherland line clipping algorithm.

e) Let W be a window whose bottom-left corner is (100, 100) and the top right corn (200, 200) and AB be a straight line with A= (50, 50) and B= (150, 250). Appl above algorithm to clip AB against W, and count in how many steps the cli completes.

Q4)

a) Give the equation for three Dimensional(**3D**) rotation about Z axis by an angle θ

b) Describe the parallel projection and perspective projection of a 3D object on t plane.

c) Consider the objects ABCD positioned in a 3D coordinate system such that:
A= (150, 0,450), B= (150, 0, 900), C= (350, 0, 250) and
D= (100, 600, 250).

Find the perspective projection of this object on the XY plane with the Cen Projection at (0, 0,-100) and draw the projected image.