ROLL NO. _____

Code: CS40 **Subject: COMPUTER GRAPHICS**

ALCCS – OLD SCHEME

Time: 3 Hours **FEBRUARY 2013** **Max. Marks: 100**

PLEASE WRITE YOUR ROLL NO. AT THE SPACE PROVIDED ON EACH PAGE IMMEDIATELY AFTER RECEIVING THE QUESTION PAPER.

NOTE:

- **Question 1 is compulsory and carries 28 marks. Answer any FOUR questions from the rest. Marks are indicated against each question.**
- **Parts of a question should be answered at the same place.**
- **All calculations should be up to three places of decimals.**

Q.1 a. Investigate the effect of translation with $t_x=2$, $t_y=3$ followed by scaling with $s_x=2$, $s_y=3$ on the line AB with A(0,0) and B(1,1)

b. Describe the DDA line drawing algorithm.

c. Briefly describe the Cohen-Sutherland line clipping algorithm.

d. Write a short note on Morphing.

e. What do you understand by self-similar and self-affine fractals?

f. What are homogeneous co-ordinates? How are they used in matrix representation of transformations?

g Briefly explain the binary space-partitioning method. **(7×4)**

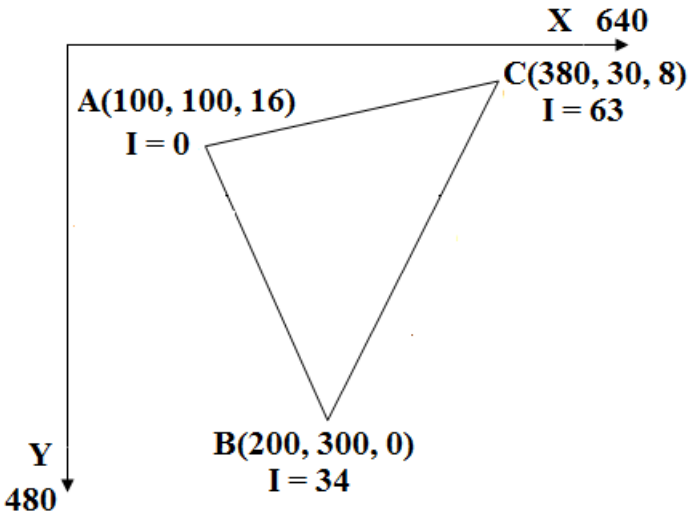
Q.2 a. Explain the Constructive Solid Geometry(CSG) method for solid modeling. Briefly explain how ray-casting methods are used to implement CSG operations. **(9)**

b. What are Octrees and why are they useful? How are they implemented? **(9)**

Q.3 a. Explain the Z-Buffer method of Hidden Surface removal. **(9)**

b. Explain the Depth-sorting method for the elimination of Hidden surfaces. What are the basic functions it performs? **(9)**

Q.4 a. Calculate the pixel colour value at the centroid of the triangle as shown below. The figure shows the coordinates and the colour of the vertices of the triangle. Use the Gouraud interpolation technique for interpolation. **(10)**



b. Explain the Phong shading model for rendering of polygon surfaces. **(8)**

Q.5 a. Explain how Bresenham's Line Algorithm is used to create accurate and efficient raster lines. **(9)**

b. Why do we need to antialiase our output? How is it done? **(9)**

Q.6 a. Write the matrix of:
(i) Rotation through theta degrees in the counter clockwise direction
(ii) Reflection in x-axis
(iii) Reflection in y-axis **(9)**

b. Investigate the effect of reflection in x-axis followed by rotation through 45 degrees followed by reflection in y-axis on the square A(0,0), B(0,1), C(1,1), D(1,0). **(9)**

Q.7 a. Find the equation of the Bezier curve that passes through (0, 0) and (-4, 2) and controlled through (14, 10) and (4, 0). **(6)**

b. What are B-spline curves? Explain briefly mentioning a few of their properties. **(6)**

c. Enumerate the major differences between Bezier curve, B-spline curves and B-spline curve-NURBS. **(6)**