ROLL NO. _____

Code: CS40 **Subject: COMPUTER GRAPHICS**

ALCCS – OLD SCHEME

Time: 3 Hours **AUGUST 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. Provide four examples each for Input and output devices used in Computer Graphics. Briefly describe technical specification of any one of them.

b. How half toning is useful in anti-aliasing?

c. Write the seed fill algorithm. How to find seed point before running the algorithm?

d. Compute rotation matrix for rotating (x, y, z) by an angle θ about Y-axis.

e. What is knot and knot vector? Why is it considered in B-spline curves?

f. Briefly explain the application of Union & Intersection operations in representation of solid in Computer Graphics.

g. Define ambient light source and give formula for the intensity of ambient light at a point. **(7 × 4)**

Q.2 a. How a TFT display device works? What is source of light in a TFT display? **(6)**

b. (i) Write Bresenhem's circle drawing algorithm. Why co-ordinates of only one eighth of the total pixels lying on circumference of a circle are computed? How coordinates of other pixels are computed? **(8)**

(ii) Write digital differential analyzer algorithm for line drawing. **(4)**

Q.3 a. Write the scan line fill algorithm and use the algorithm to fill polygon bounded by lines joining vertices: (1, 1), (2, 3), (4, 2) and (5, 1). **(9)**

b. Use Cohen-Sutherland algorithm to clip the line $P_1(1, 2)$ to $P_2(8, 5)$ with respect to the clipping window given by $0 \le x \le 7, 0 \le y \le 4$. **(9)**

Q.4 a. Deduce a matrix to shear an object by unit 5 along X – axis and then by unit 4 along Y – axis. **(6)**

b. What is affine transformation? What features of an object are retained after transforming it from one reference frame to another? **(6)**

c. How a vanishing point is related to perspective projection? Can we think of a perspective projection without a vanishing point? **(6)**

Q.5 a. Find the transformation matrix for projecting a 3D object in Y-Z plane where object is viewed from positive X-axis side and object is lying in the first octant. **(10)**

b. Determine a formula for computing intensity of light at a point (x, y) on a surface using Phong shading. **(8)**

Q.6 a. Compare Z- Buffer algorithm and Depth sort algorithm for back face culling. **(9)**

b. Write the BSP algorithm for removal of hidden surfaces. **(9)**

Q.7 Write short notes on any **TWO** of the following:

(i) Mandelbrot Set
(ii) Rendering Process
(iii) Importance of in-between Key-frame **(9+9)**