COMPUTER GRAPHIC
SEM V, 2012-13
B.TECH
UTTARAKHAND TECHNICAL UNIVERSITY
(UTU)

TIME: 3 HOURS

TOTAL MARKS: 100

SECTION - I

Attempt any **FOUR** questions**:**

5*4=20

1. List the operating characteristics for the following display technologies: raster refresh system, vector refresh system, plasma panel and LCD.
2. How much time is spent scanning across each row of pixels during screen refresh on a raster system with a resolution of 1280 by 1024 and a refresh rate of frames per second?
3. Implement the polynomial function using the DDA algorithm, given any number (n) of input points is to be plotted when n=1.
4. Implement the line type function by modifying Bresenham's line drawing algorithm to display either solid, dashed, or dotted lines.
5. List some applications appropriate for each of the display technologies.
6. List the different input and output components that are typically used with virtual reality systems. Also explain how users interact with a virtual scene displayed with different output devices.

SECTION - II

Attempt any **TWO** questions:

10*2=20

1. Set up a geometric data table for unit cube using only: (a) vertex and polygon tables, and (b) a single polygon table. Compute the two methods for representing the unit cube with a representation using three data tables, and estimate storage requirement for each.

2. Define an efficient polygon representation for a cylinder. Justify your choice of representation.
3. How would the values for plane surface have to be altered if the coordinate reference is changed from a right handed system to left handed system? Explain in detail.

SECTION - III

Attempt any **two** questions:

10*2=20

1. Prove that the multiplication of transformation matrices for each of the following sequence of operation is commutative:
   (i) Two successive rotation
   (ii) Two successive translation
2. What are the results of performing two successive block transfer into the same area of a frame buffer using the binary arithmetic operations? Write a routine to implement rotation by any specified angle in a frame buffer block transfers.
3. Compare the number of arithmetic operations performed in the Cohen-Sutherland and the Liang-Barsky line clipping algorithms for several different line orientations relative to clipping window.

SECTION - IV

Attempt any **two** questions:

10*2=20

1. Derive the transformation matrix for scaling an object by a scaling factor s in direction defined by direction angles a, b and c.
2. Using any clipping procedure, write a procedure to perform a complete viewing transformation from world coordinates to device coordinates for any specified parallel projection vector.
3. Explain a back face detection procedure using a perspective projection to view visible faces of a convex polyhedron. Assume that all parts of object are in front of the view plane, and provide a mapping onto a screen view-port for display.

SECTION- V

Attempt any **two** questions:

10*2=20

1. Write a program to implement dynamic motion specifications. Specify a scene with two or more objects, initial motion parameters, and specified forces.
2. Write an interactive procedure that allows selection of HSV color parameters from a displayed menu, then the HSV values are to be converted to RGB values for storage in a frame buffer.
3. Write short notes on following:

   (i) OpenGL API
   (ii)The Sierpinski Gasket.