

## ALCCS – NEW SCHEME

Time: 3 Hours

**FEBRUARY 2012**

Max. Marks: 100

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

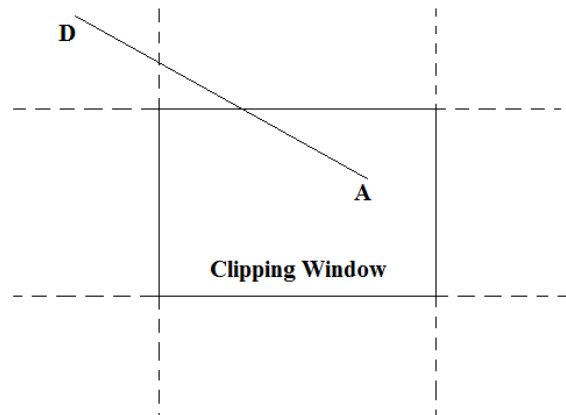
**NOTE:**

- 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.

- Q.1**
- Write the matrix of rotation of a point through an angle of  $45^\circ$  in the counter clock wise direction. Investigate its effect on the line joining A(2, 3) and B(7, 11).
  - Write the open GL code that defines a two-dimensional straight line segment with co-ordinates (180, 15) and (10, 145).
  - Give the transformation sequence for rotating an object about an axis that is parallel to x-axis.
  - What are the two basic characteristics of a fractal object? What are self-similar and self-affine fractals?
  - Explain the concept of vanishing points. What is a principal vanishing point? Give an example of one point perspective projection with z-axis vanishing point.
  - How do we identify that a given polygon is a concave polygon? How can we split into a set of convex polygons?
  - Obtain the matrix that represents two-dimensional scaling by factor  $S_x$  and  $S_y$  along x and y – axis respectively. (7×4)
- Q.2**
- Using Bresenham's line-drawing algorithm, digitize the line with end points (20, 10) and (30, 18). (9)
  - Write the midpoint circle generating algorithm. (9)
- Q.3**
- Investigate the effect of the transformations  $T_1$  and  $T_2$  on a triangle having co-ordinates A(2, 2), B(4, 2) and C(4, 4), where  $T_1$  denotes rotation through  $90^\circ$  in the counter clockwise direction and  $T_2$  denotes a reflection with respect to the line  $y = -x$ . Do we obtain the same result when the two transformations are applied in the reverse order? (9)

b. Obtain the matrices for three-dimensional x – axis, y – axis and z – axis rotation. (9)

**Q.4** a. Explain the concept of region codes (or outcodes) in the Cohen-Sutherland line clipping algorithm. Use the algorithm to clip the line AD given below. (10)



b. Write and explain a pseudocode for the Cyrus-Beck line clipping algorithm. (8)

**Q.5** a. What do you understand by Bezier curve? Obtain the four Bernstein polynomials used in Bezier curve. (8)

b. Write a short note on B-spline curves. (10)

**Q.6** a. Explain the depth-buffer method for detecting visible surfaces. (9)

b. Describe the scan-line method for identifying visible surfaces. (9)

**Q.7** a. Write a short note on polygon rendering methods. (9)

b. What are key-frame systems? Explain the concept of morphing. (9)