

**ALCCS – NEW 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.

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- Q.1**
- a. What are uniform periodic B-spline curves? Explain the periodic blending functions.
  - b. Write the OpenGL code for defining a two-dimensional straight line segment with coordinates (120, 20) and (30, 110).
  - c. Explain how a general two-dimensional fixed point scaling is carried out. Give the matrix for the operation.
  - d. Explain why we need line drawing algorithms to display a line on a raster monitor.
  - e. Explain how back faces are detected using the front-back tests.
  - f. What are key frame systems and how do they function? What are cels and how are they used in animation?
  - g. What are self-similar and self-affine fractals? (7×4)
- Q.2**
- a. What do you mean by the term ray-tracing? What is it used for? Briefly explain the basic ray-trace algorithm. (10)
  - b. Explain in detail, how diffuse reflections are calculated. (8)
- Q.3**
- a. Explain how hidden surface elimination is carried out using the scan line method. (8)
  - b. Explain the Depth Buffer algorithm for Hidden Surface Elimination. (10)
- Q.4**
- a. Digitize a line from (10, 12) to (20, 18) on a raster screen using Bresenham's straight line algorithm. Show the result on a Cartesian graph. (9)
  - b. Write Pseudocode for DDA algorithm. Using a suitable example, explain working of this algorithm. (9)

**Code: CT72****Subject: COMPUTER GRAPHICS**

- Q.5** a. A mirror is placed such that it passes through (2, 0) and (0, 2). Find the reflected view of a triangle with vertices (3, 4), (5, 5) and (4, 7) in this mirror. **(9)**
- b. Investigate the effect of the transformations T1 and T2 on a triangle having co-ordinates A(2,2), B(4,2) and C(4,4), where T1 denotes rotation through 90 degrees in the counter clockwise direction and T2 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)**
- Q.6** a. Explain the Cohen-Sutherland algorithm. This algorithm is efficient when outcode testing can be done cheaply. Explain this statement. **(10)**
- b. A cubic Bezier Curve Segment is described by control points  $P_0(2,2)$ ,  $P_1(4,8)$ ,  $P_2(8,8)$  and  $P_3(9,5)$ . Another curve segment is described by  $Q_0(a,b)$ ,  $Q_1(c,2)$ ,  $Q_2(15,2)$  and  $Q_3(18,2)$ . Determine the value of a, b and c so that the two curve segments join smoothly. **(8)**
- Q.7** a. Write a short note on the perspective projections clearly explaining vanishing points and view volumes. **(8)**
- b. Explain the following terms with relevant diagram:
- (i) Orthogonal projection **(5)**
  - (ii) Axonometric and Isometric orthogonal projection **(5)**