

**ALCCS – NEW SCHEME**

Time: 3 Hours

**AUGUST 2012**

Max. Marks: 100

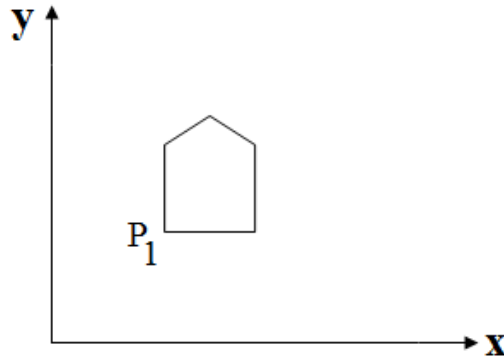
*PLEASE WRITE YOUR ROLL NO. AT THE SPACE PROVIDED ON EACH PAGE IMMEDIATELY AFTER RECEIVING THE QUESTION PAPER.*

**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.

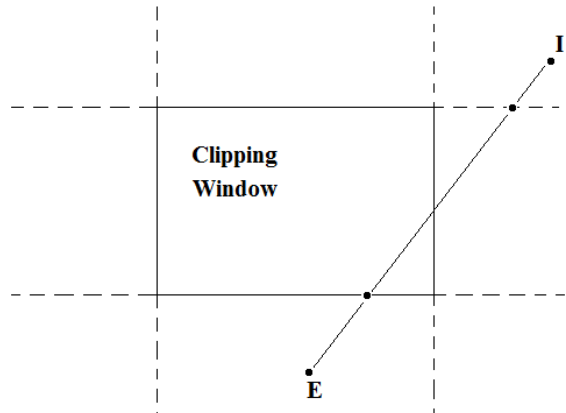
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- Q.1**
- Write the open GL commands to plot three equally spaced points along a two-dimensional straight line path with a slope of 2.
  - What are quadric surfaces? Write the equation of a sphere in Cartesian and spherical coordinates  $(r, \theta, \phi)$ .
  - Obtain the matrix that represents two dimensional translation by factors  $l_x$  and  $l_y$  along x and y axis respectively.
  - What is morphing? Show by a diagram transformation of a triangle into a quadrilateral using linear interpolation.
  - What is the combined effect of rotation through  $90^\circ$  followed by reflecting along the line  $y = -x$  on the line segment joining  $(2, 2)$  and  $(4, 4)$ ?
  - What are sweep translations? Explain.
  - Are squares self-similar? Are hexagons or a circle self similar? Draw examples to justify your answer. (7×4)
- Q.2**
- Write a routine for the DDA line drawing algorithm. Also explain the algorithm using a suitable example. (10)
  - Find the pixel location approximating the first octant of a circle having a centre  $(2, 3)$  and a radius of 2 units using Bresenham circle algorithm. Use this to plot the complete circle on a Cartesian graph representing pixel grids. (8)
- (8)
- Q.3**
- Explain the steps involved in rotating an object about an axis that is not parallel to x-axis. Draw appropriate diagrams. (9)

b. The following figure represents a house in the xy-plane.

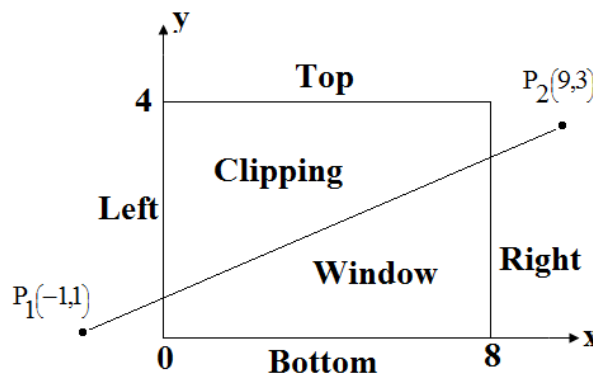


The house is to be rotated about the point  $P_1$  through an angle  $\theta$  in the counter clockwise direction. Write the sequence of three fundamental transformations required to do this. Obtain the corresponding composite matrix and illustrate each step through pictures. (9)

Q.4 a. Use Cohen-Sutherland line clipping algorithm to clip the line EI given below. (9)



b. Clip the line  $P_1P_2$  shown in the figure below using Cyrus-Beck clipping algorithm. (9)



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

- Q.5** a. What do you understand by vanishing points for perspective projections? Clearly explain with the help of diagrams the concept of one-point and two-point perspective projection. (9)
- b. Write a short note on orthogonal projection of an object. Illustrate your answer with the help of appropriate diagrams. (9)
- Q.6** a. Explain the Back-Face detection method for locating the back faces of a polyhedron. Illustrate with the help of suitable diagrams. (9)
- b. Describe the scan-line method for identifying visible surfaces of a polyhedron. (9)
- Q.7** a. Write a short note on Hermite splines. (6)
- b. Explain the Gouraud surface rendering method. (6)
- c. Find the equation of the Bezier curve which passes through (0, 0) and (-4, 2) and controlled through (14, 10) and (4, 0). (6)