5th Semester IMCA Examination, 2020

Subject – Computer Graphics **Paper- 5.2**

Full Marks – 70 **Time: 3hours**

(Answer All . Each Question Carries Equal Marks)

Q.1) a) Which raster locator would be choosen by Bresenham's algorithm when converting a line (20,10) to (30,18).

b) Find out the intermediate points of a line having end points A(0,0) and B(4,5) using DDA algorithm.

OR

c) Draw a circle having radius 10cm and centre at (5,5) using Bresenham's midpoint Circle Algorithm.

b) State and explain Midpoint Circle Drawing Algorithm.

Q.2) a) A circle with radius 50mm & centre A(10,10) is to be converted into the ellipse with major axis 90mm and minor axis 60mm. Find the total transformation.

b) State and explain Cohen – Sutherland Polygon Clipping Algorithm .

OR

c) Perform the following transformations independently and find the resultant Transformation Matrix.

i) Scale the object two times in X-direction and three times in Y-direction.

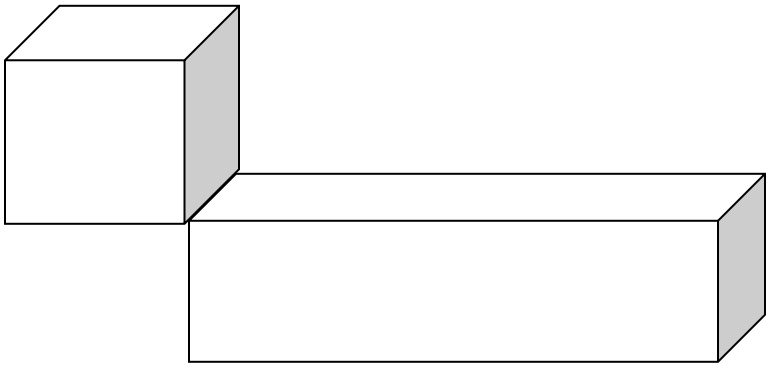
ii) Rotate the object by 90^0 anti clockwise .

iii) Translate one unit in X-direction and two unit in Y-direction.

d) Write short notes on : Text Clipping

Q.3) a) The co-ordinates of four control points relative to a curve are given by $p_1(1,2)$, $p_2(3,4)$, $p_3(6,-6)$ and $p_4(10,8)$. Write the equation of Bezier curve. Also find the co-ordinates points of the curve for step size 0.2 . Also plot the Bezier Curve on graph.

b) Create Constructive Solid Geometry (CSG) of the following model using set theory without dimension.



OR

c) What do you mean by Fractal ? State the characteristics of fractal. Also explain the concept of fractal geometry.

d) Explain the concept of quadratic surface with its equation.

Q.4) a) Consider a region defined by the position vector

$$P = \begin{matrix} 1 & 1 & 2 & 1 \\ 2 & 1 & 2 & 1 \\ 2 & 2 & 2 & 1 \\ 1 & 2 & 2 & 1 \end{matrix}$$

Relative to global XYZ axis system. It is rotated by $+30^0$ about X axis and passing through point { 1.5, 1.5, 1.5}. Find the final position of region.

b) A cube of length 10 units having one of its corner of origin (0,0,0) and three edges along three principal axis. If the cube is to rotate about Z – axis by an angle of 45^0 in counter clockwise direction, then calculate the new position of the cube.

OR

c) What do you mean by three dimension transformations ?

What are the different types of 3D transformations ? Explain each one in brief .

d) Differentiate between Parallel Projection and Perspective Projection.

Q.5) a) What do you mean by Visible surface detection ?

State and explain Depth Buffer method of Visible surface detection .

b) Differentiate between Image Space and Object Space Method .

OR

c) Differentiate between Local Illumination and Global Illumination .

d) What do you mean by Light ? State the properties of Light .

State and explain Phong shading technique .