53 (CS 604) CPGR

2018

COMPUTER GRAPHICS

Full Marks : 100

Time : Three hours

The figures in the margin indicate full marks for the questions.

*Answer **any five** questions.*

1. 2×10

(a) Define Aspect Ratio.

(b) Write the rotational matrix when the object is rotated through an angle θ in clockwise direction.

(c) A circle, if scaled only in one direction becomes a (circle, ellipse, parabola) ..... .

(d) (2, 4) is a point on a circle. Find the corresponding other symmetric points.

(e) ..... (translation, rotation, shearing, reflection) is not a rigid body transformation.

(f) Define a Convex Polygon.

(g) In a display, it is specified as 600 × 400. What is the aspect ratio ?

(h) What is the difference between Computer Graphics and Image Processing ?

(i) What is resolution ?

(j) $x=at^2 ; y=2at$ is the parametric equation of (line, parabola, circle, hyperbola) ..... .

2. (a) Write the Bresenham line drawing algorithm. What are the advantages of this algorithm ?

(b) Apply the midpoint circle drawing algorithm, calculate the pixels where centre of the circle is at (0,0) and radius is 5 unit.

10+10

3. (a) What do you mean by rotation ? Find the mathematical expression (i.e. rotational matrix) of rotation.

(b) Using the above expression, find the co-ordinate of the point (5, 0) after rotation 360° in anti-clockwise direction. What do you notice after the above rotation ? 8+7+5

4. What is Reflection ? Find the reflection matrix with respect to the line $y = 2$. Hence, find the reflection of the points (5,7) and (5,2) with respect to that line respectively. 4+12+4

5. (a) Define window and view port. Derive window to viewport transformation.

(b) Describe the technique of inside-outside test of a point with respect to a polygon by the winding number method. 15+5

6. (a) What is Clipping ? Describe a suitable line clipping algorithm.

(b) What is Filling ? Describe a boundary filling algorithm. Write its advantages and disadvantages. 10+10

7. (a) Describe the Z-buffer algorithm for hidden surface elimination.

(b) Describe the Hermite Curve and its Blending function. 6+14