

B4.4-R4: COMPUTER GRAPHICS & MULTIMEDIA

NOTE:

1. Answer question 1 and any FOUR from questions 2 to 7.
2. Parts of the same question should be answered together and in the same sequence.

Time: 3 Hours

Total Marks: 100

1.
 - a) Draw and describe the working of a Light Pen?
 - b) What steps are required to plot a line whose slope is between 0° and 45° using Bresenham's method?
 - c) Describe the World coordinate system (WCS), window, Normalized device coordinate system (NDCS), and viewport?
 - d) What is the difference between a local illumination model and a global illumination model?
 - e) Perform a 45° rotation of triangle A(0, 0), B(1, 1), C(5, 2) about P(-1, -1)?
 - f) While constructing a perspective view, what are the certain anomalies introduced?
 - g) Describe the various Multimedia Applications?

(7x4)

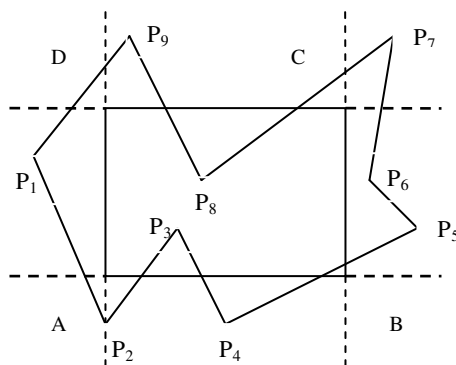
2.
 - a) With the help of a suitable and well labeled diagram, describe the working of Color Cathode Ray Tube using a shadow mask.
 - b) Illustrate the differences between Refresh CRT and Raster Scan Display.

(12+6)

3.
 - a) What are the steps required to scan-convert an arc using the trigonometric method?
 - b) Let $\mathbf{V}_1 = 2\mathbf{I} - \mathbf{J} + \mathbf{K}$ and $\mathbf{V}_2 = \mathbf{I} + \mathbf{J} - \mathbf{K}$. Find (i) the angle between \mathbf{V}_1 and \mathbf{V}_2 , (ii) a vector perpendicular to both \mathbf{V}_1 and \mathbf{V}_2 and (iii) a unit vector perpendicular to both \mathbf{V}_1 and \mathbf{V}_2 .

(9+9)

4.
 - a) What are the major differences between a flood fill and the boundary fill algorithm for polygon filling?
 - b) Describe the steps required to clip a line segment using the Cohen-Sutherland line clipping algorithm. Clip the polygon P_1, \dots, P_9 given in Figure below against the window ABCD using the Sutherland-Hodgman polygon clipping algorithm starting from point P_1 .



(6+12)

- 5.
- a) Derive the expression for four blending functions for Bezier Curves. Show that Bezier Curve lies within the convex hull of control points.
 - b) Derive the expression for Phong's formula of specular reflection in terms of vector H, where vector H bisects the angle between vector L and vector V.

([10+2]+6)

- 6.
- a) Reflect a diamond shaped polygon whose vertices are A(-1, 0), B(0, -2), C(1, 0) and D(0, 2) about (i) the horizontal line $y = 2$, (ii) the vertical line $x = 2$ and (iii) the line $y = x + 2$.
 - b) Identify the major challenge of traditional animation and explain three different methods to overcome those challenge.

(12+6)

- 7.
- a) What is the distinction between MPEG2 and MPEG4 video compression?
 - b) Write a short note on compression and decompression of audio, video and images. What are the two major types of compression? Identify and explain which type is best for compressing an encyclopedia. Identify and explain which type is best for compressing a digital photo of an ocean.

(6+12)