Exam Date & Time: 12-Dec-2023 (02:30 PM - 05:30 PM)

MANIPAL ACADEMY OF HIGHER EDUCATION

SEVENTH SEMESTER B.TECH END SEMESTER EXAMINATIONS, NOV / DEC 2023

Computer Graphics and Animation [ICT 4301]

Marks: 50 **Duration: 180 mins.**

A

Answer all the questions.

Instructions to Candidates: Answer ALL questions Missing data may be suitably assumed

1) Write a OpenGL program to draw a rectangle also mention OpenGL applications (5)

A)

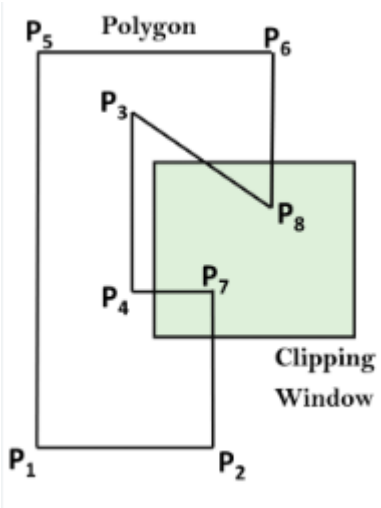
B) Prove that initial decision parameter in region 2 is $p2_0 = r_y^2(x_0 + \frac{1}{2})^2 r_x^2 (y_0 - 1)^2 - r_x^2 r_y^2$ in Mid Point Ellipse algorithm. (3)

C) Differentiate between the following openGL functions:

glBegin(GL_LINE_STRIP) and glBegin(GL_LINES) . (2)

2) Clip the polygon in Fig. Q.2A using the Sutherland Hodgeman algorithm with the interpretation of every phase output.

A)



(5)

Figure Q.2A

B) Differentiate between orthogonal and perspective projection. (3)

C) Derive the expression to obtain starting value for initial decision parameter in Bresenham's line drawing algorithm (2)

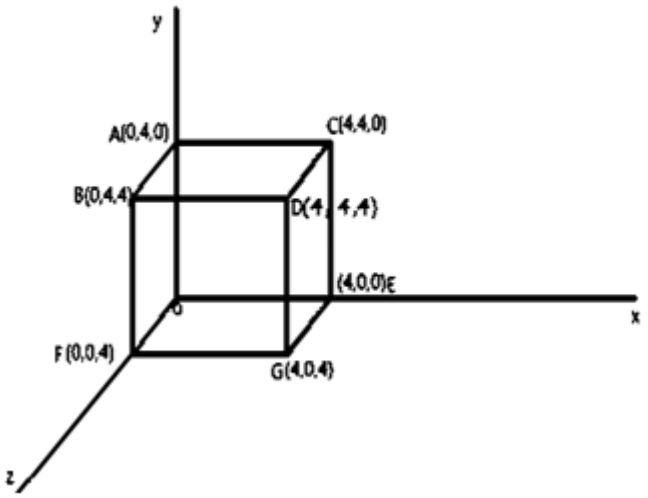
3) Given a 2D triangle with coordinate points P(2, 6), Q(5, 7), R(4, 9) (5)

i. Apply the reflection on the Y axis and obtain the new coordinates of the object.

A) ii. Perform a counter clockwise 45 degree rotation and translation of 4 units on the above mentioned triangle. Assume the origin is at (2,2).

B) Consider the rectangle window with vertices E(20,20), F(90,20), G(90,70), and H(20,70). Determine the region codes for the endpoints and apply the Cohen-Sutherland algorithm to clip the line Q1Q2, where Q1(15,40) and Q2(70,90). (3)

C) Apply rotation transformation to a cube shown in Figure 3C, then rotate it 90 degrees anti clockwise around the y-axis.



(2)

Figure 3C

4) Using the midpoint circle drawing algorithm, determine the points of a circle with a radius r=6 and center is (0,0) (5)

A)

B) Explain the working of the following functions with respect to openGL

i. glClearColor(0.0,1.0,0.0,0.0);

ii. glutMainLoop(); (3)

iii. glutDisplayFunc(funcname);

C) Draw the architecture of a raster-graphics system with a display processor. And justify the use of display processor used in this architecture (2)

5) Assume radius along x-axis is r_x=8 and along y-axis r_y=6, generate all points using midpoint ellipse drawing algorithm.. (5)

A)

B) Prove that two Successive translation and rotation are additive in 2D transformation. (3)

C) Differentiate between world coordinates and viewing coordinates. (2)

-----End-----