Question Paper

Exam Date & Time: 06-May-2024 (02:30 PM - 05:30 PM)

MANIPAL ACADEMY OF HIGHER EDUCATION

SIXTH SEMESTER B.TECH END SEMESTER EXAMINATIONS, MAY 2024

COMPUTER GRAPHICS [ICT 4033]

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

A

Answer all the questions.

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

1) 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) Apply scan line polygon filling algorithm for Figure Q. 1B. Show each step clearly. (Note: scan lines are represented as dotted lines). (3)

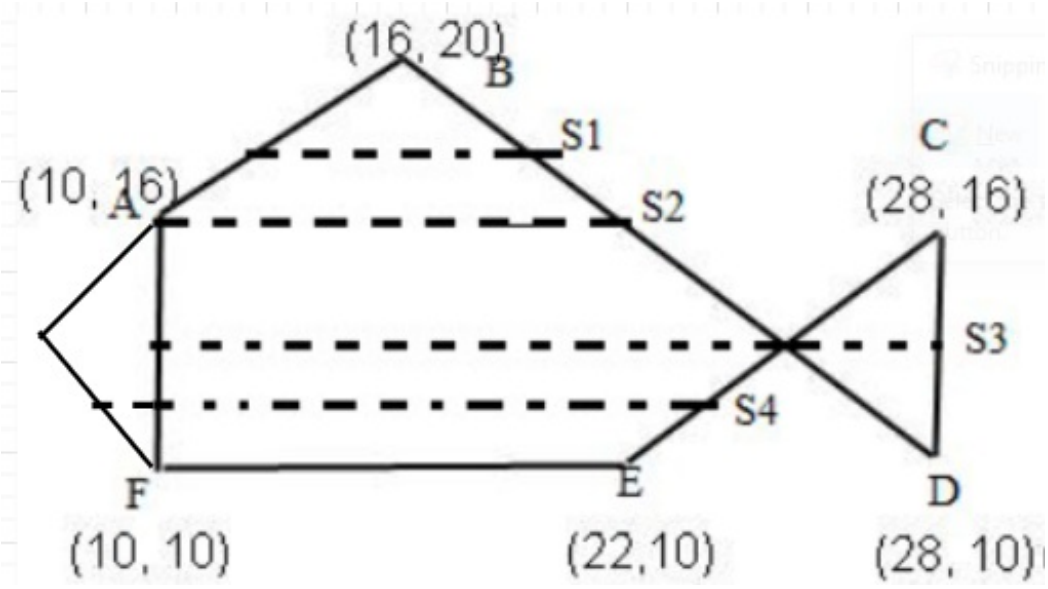

Figure Q.1B.

C) Differentiate between the following openGL functions: (2)

glBegin(GL_LINE_STRIP) and glBegin(GL_LINES) .

2) Clip the polygon in Fig. Q.2A using the Sutherland Hodgeman algorithm with the interpretation of every phase output. (5)

A)

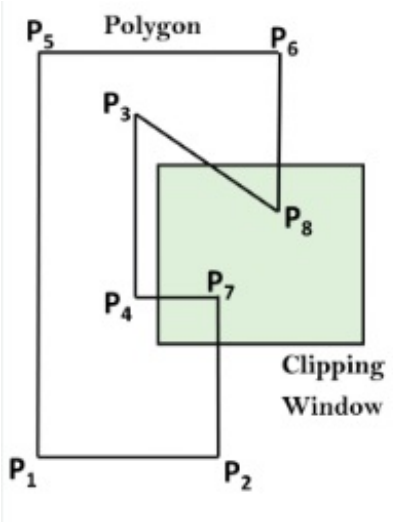

Figure Q.2A

B) Describe the following functions with respect to OpenGL . (3)

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

ii. glutMainLoop();

iii. glutDisplayFunc(funcname);

C) Differentiate between orthogonal, oblique and perspective projections. (2)

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

A) i. Apply the reflection on X-axis and Y-axis and obtain the new coordinates of the object.
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 polygon shown in Figure Q.3B. Apply odd- even method and winding number techniques to identify the point "P" lies inside the polygon or not.? (3)

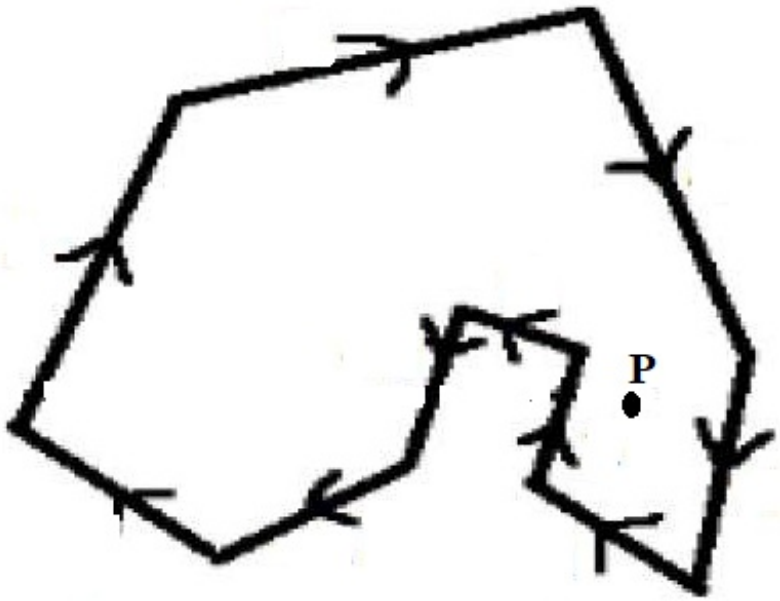

Figure Q.3B.

C) Differentiate between seed fill and flood fill polygon filling algorithms. (2)

4) Develop an algorithm to identify visible surface using image space technique. Also, explain its (5)

working with an example.

A)

B) Consider a triangle having vertices P(3,6), Q(4,8) and R(6,11). Perform the following: (3)

i. Apply Shear parameter 4 Units on X-axis and 3 units on Y-axis.

ii. Perform a clockwise 30 degree rotation.

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) Derive the basis matrix for Bezier curve. Calculate five points along a Bezier curve controlled by four given control points: P0(1, 1), P1(3, 3), P2(6, 3), and P3(8, 6). Also, plot the Bezier curve. (5)

A)

B) Generate all points between P(2,2) and Q(5,4) using DDA line drawing algorithm. What are the drawbacks of DDA line drawing algorithm. (3)

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

-----End-----