

Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
B.Tech Degree S7 (R,S) Examination November 2025 (2019 Scheme).

Course Code: CST435

Course Name: COMPUTER GRAPHICS

Max. Marks: 100**Duration: 3 Hours**

PART A

Answer all questions, each carries 3 marks.

Marks

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| 1 | Define the aspect ratio and resolution of a display screen in a raster scan display. | (3) |
| 2 | Identify the purpose of a frame buffer in a display system. | (3) |
| 3 | Outline the flood fill algorithm for filling a polygon. | (3) |
| 4 | Explain the limitations of boundary fill algorithm. Summarize the ways to overcome it. | (3) |
| 5 | Explain that the composition of two rotation is additive by concatenating the matrix representation for $R(\theta_1)$ and $R(\theta_2)$. | (3) |
| 6 | Modify a triangle about the origin with vertices at original coordinates (10,20), (10,10), (20,10) by 30 degrees. | (3) |
| 7 | Define the terms window, viewport and windowing transformation in the context of 2D viewing with suitable diagrams. | (3) |
| 8 | How does Cohen Sutherland algorithm determine whether a line is visible, invisible or a candidate for clipping based on the region codes assigned to the end points of the line? | (3) |
| 9 | Define Orthographic Parallel Projection and list the equation for Transformation equation for Orthographic Parallel Projection. | (3) |
| 10 | List the information stored in a linked list in case of an A-buffer algorithm. | (3) |

PART B

Answer any one full question from each module, each carries 14 marks.

Module I

- 11 a) Explain in detail about the applications of computer graphics (7)
 b) Describe in detail about thin film luminescent and plasma panel display. (7)

OR

- 12 a) Explain about the shadow masking techniques in CRT with necessary diagrams. (8)
 b) Consider three different raster systems with resolutions of 640 by 480, 1280 by 1024 and 2560 by 2048. Determine the size of a frame buffer (in bytes) is needed for each of these systems to store 12 bits per pixel and 24 bits per pixel. (6)

Module II

- 13 a) Digitize a line with end points (35, 40) and (43, 45) using DDA algorithm. List the advantage of DDA algorithm. (8)
 b) Explain how the 4-connected area filling approach differs from 8- connected area filling in boundary filling algorithm. (6)

OR

- 14 a) Given a circle radius $r = 10$, demonstrate the midpoint circle algorithm by determining positions along the circle octant in the first quadrant from $x = 0$ to $x = y$. (7)
 b) Use Bresenham's algorithm for rasterizing line (0,0) to (4,6). (7)

Module III

- 15 a) Consider a triangle at (2,2), (8,2), (2,8). Perform the following 2D transformations in succession and find the resultant vertices (7)
 i: Scale with respect to (2,2) by scaling factors (4,4) along x and y directions.
 ii: Rotate by 90-degree clockwise direction.
 iii: Reflection based on x-axis
 b) Explain in detail about the types of 2D transformations. (7)

OR

- 16 a) Reflect a triangle ABC about the line $3x - 4y + 8 = 0$, where the coordinates of the triangle are given as A(4,1), B(5,2) and C(4,3). (8)

- b) Explain the Sutherland Hodgeman algorithm for polygon clipping with an example. (6)

Module IV

- 17 a) Explain clipping. List out any 5 real life applications of clipping. (6)
- b) Explain Cohen-Sutherland line clipping algorithm. Use the algorithm to clip line with end points P1 (70, 20) and P2(100,10) against a window with lower left-hand corner (50,10) and upper right-hand corner (80,40). (8)

OR

- 18 a) Explain Sutherland Hodgeman polygon clipping algorithm with illustrations? (7)
- b) Given a clipping window A (40,40), B (80,40) C (80, 60) and D (40,60). Using Cohen Sutherland algorithm, find the visible portion of the line segment joining the points P (60,90) and Q (130,50). (7)

Module V

- 19 a) Explain the Scan line algorithm in detail with multiple surfaces. (7)
- b) Explain the method used in back face detection to detect visible surface. (7)

OR

- 20 a) Explain how visible surface detected using depth buffer algorithm. (7)
- b) Explain in detail about different types of perspective projection. (7)
