Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S6 (S,FE) (FT/WP/S4 PT) Examination December 2025 (2019 Scheme)

Course Code: CST304

Course Name: COMPUTER GRAPHICS AND IMAGE PROCESSING

Max. Marks: 100 Duration: 3 Hours

PART A

Answer all questions, each carries 3 marks. Marks

1	Distinguish between raster scan and random scan display systems.	(3)
2	Find the points in the line from (9, 18) to (14, 22) using the Bresenham's line drawing algorithm.	(3)
3	Given a triangle with vertices at coordinates (10,20), (10,10), (20,10). Find the coordinates of vertices after translating with parameters tx=5, ty=10.	(3)
4	List the steps for general pivot point scaling.	(3)
5	Draw the flowchart (series of operations) of Three Dimensional viewing pipeline.	(3)
6	Distinguish between orthographic and oblique projection.	(3)
7	What is image convolution?	(3)
8	The spatial resolution of an image is given by 1024 X 1024. What is its storage requirement if it is represented by 64 gray levels?	(3)
9	Briefly explain region splitting and merging.	(3)
10	What is the role of illumination in thresholding?	(3)

PART B

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

Module I

11 a) Explain the working of Refresh Cathode Ray Tubes with suitable figures. (7)

b) Write midpoint circle drawing algorithm. Find the points in a circle octant in the first quadrant with the centre point coordinates (0, 0) and radius as 10. (7)

OR

12 a) Explain the working of the raster scan system with suitable figures. (7)

b) Explain DDA line drawing algorithm with the help of an example. (7)

Module II

13 a) What is a homogeneous coordinate system? How is it useful in transformations? Explain with an example. (7)

b) Perform the following transformation on a triangle with vertices A(10, 20), B(10, 10) and C(20, 10). Find out the new coordinates and draw the result of each transformation. (7)

i) Rotate the triangle by 90 degree anticlockwise direction.

ii) Reflection about x axis.

OR

14 a) Explain Flood fill algorithm to fill the interior of any specified area. Differentiate Boundary fill and flood fill algorithms. (7)

b) Show that two successive reflections about either of the coordinate axes is equivalent to a single rotation about the coordinate origin.. (7)

Module III

15 a) Describe in detail Sutherland Hodgeman polygon clipping algorithm. What is the problem that this algorithm encounters when applied on concave polygons? (7)

b) Given a clipping window A(50,10), B(80,10), C(80,40) and D(50,40). Using Cohen Sutherland line clipping algorithm, find the visible portion of the line segment joining the points P(70,20) and Q(100,10). (7)

OR

16 a) What are projections? Explain different types of projections. (7)

b) Explain window to viewport transformation. Derive the transformation for converting a window area into a viewport area. (7)

Module IV

17 a) Explain the components of an image processing system. (7)

b) Explain any seven applications of digital image processing. (7)

OR

18 a) What are the various steps in image processing? Explain briefly. (7)

b) Describe image representation in Grayscale, Binary and Colour images. (7)

Module V

19 a) Describe spatial sharpening filters used for image enhancement.. (7)

b) How edge detection is performed in digital images? Write any two advantages of Sobel operator over Prewitt operator? (7)

OR

20 a) What is thresholding? Explain any two methods of thresholding in detail? (7)

b) Discuss about region based image segmentation techniques. How is region-based segmentation different from threshold based segmentation? (7)

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