

Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
B.Tech Degree S6 (R,S) Examinations April 2026 (2019 Scheme)



Course Code: AIT322
Course Name: CONCEPTS IN COMPUTER GRAPHICS AND IMAGE PROCESSING

Max. Marks: 100

Duration: 3 Hours

PART A

Answer all questions, each carries 3 marks.

Marks

- | | | |
|----|--|-----|
| 1 | Define Computer Graphics. Mention any two applications. | (3) |
| 2 | State the difference between Midpoint and Bresenham's circle algorithms. | (3) |
| 3 | What is Reflection in 2D graphics? | (3) |
| 4 | What is the need for homogeneous coordinate system? | (3) |
| 5 | What is viewing transformation in 3D graphics? | (3) |
| 6 | Write the steps involved in depth buffer algorithm | (3) |
| 7 | Define pixel. What information does a pixel contain? | (3) |
| 8 | What is meant by pixel neighbourhood? | (3) |
| 9 | What is contrast stretching? Why is it used? | (3) |
| 10 | What is meant by gradient in image processing? | (3) |

PART B

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

Module I

- | | | |
|----|--|-----|
| 11 | a) Compare DDA and Bresenham's algorithms in terms of accuracy, speed, and efficiency | (6) |
| | b) Using DDA algorithm, draw a line from (2, 3) to (10, 7). Calculate all intermediate points. | (8) |

OR

- | | | |
|----|---|-----|
| 12 | a) Apply Bresenham's Line Algorithm to draw a line from (1, 2) to (8, 5). Show iteration table with decision parameter. | (8) |
| | b) Describe; | (6) |
| | (a) Persistence | |
| | (b) Framebuffer | |
| | (c) Resolution | |

Module II

13 a) Describe the basic 3D transformations with matrix representation. (8)

b) A triangle has vertices A(1,1), B(3,1), C(2,4). (6)

(a) Scale it by $s_x=2, s_y=2$

(b) Then translate it by (3,2)

Find final coordinates using composite transformation matrix.

OR

14 a) Rotate point P(3,4) by 90° counterclockwise about origin. Find the new coordinates. (6)

b) Describe the Boundary Fill and Flood Fill algorithms with examples. (8)

Module III

15 a) Explain Sutherland–Hodgman polygon clipping algorithm in detail. Clip the polygon (8)

with vertices A(30,30), B(140,40), C(120,140), D(40,120) against the clipping window

$x_{min} = 50, x_{max} = 120, y_{min} = 50, y_{max} = 110$.

Show intermediate polygon outputs after clipping against each boundary.

b) Differentiate between perspective and parallel projection with suitable examples. (6)

OR

16 a) Describe the Scan Line Algorithm for visible surface detection. (6)

b) Explain Parallel Projection in detail. Compare Orthographic and Oblique projections. (8)

Module IV

17 a) Explain the fundamental steps in Digital Image Processing with a neat block diagram. (8)

b) Discuss various applications of Digital Image Processing in engineering and medical fields. (6)

OR

18 a) Explain in detail sampling and quantization processes and discuss the effects of under sampling and over-quantization (6)

b) Compare and contrast spatial resolution and gray level resolution, and explain their impact on image quality with examples. (8)

Module V

19 a) Explain in detail the various gray level transformation functions with equations and graphs. (8)

b) Discuss intensity thresholding and global thresholding methods. (6)

OR

20 a) An image has 3-bit gray levels ($L = 8$). The pixel distribution is: (8)

rk	0	1	2	3	4	5	6
nk	101	15	20	25	10	8	7

Perform histogram equalization and compute:

1. Probability distribution
 2. CDF
 3. New gray levels
- b) Compare Sobel and Prewitt edge operators.

(6)
