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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S6 (R,S) Exam April 2025 (2019 Scheme)

Course Code: AIT322

Course Name: CONCEPTS IN COMPUTER GRAPHICS AND IMAGE PROCESSING Duration: 3 Hours

Max. Marks: 100

		PART A Answer all questions, each carries 3 marks.	Marks
1		List any six applications of Computer Graphics.	(3)
2		Differentiate the aspect ratio and resolution of a raster scan display?	(3)
3		What are Homogeneous Coordinates and why are they necessary?	(3)
4		Differentiate between Boundary Filling and Flood Filling Algorithms.	(3)
5		Discuss the steps in 2D Viewing Pipeline.	(3)
6		Distinguish between cavalier and cabinet projection.	(3)
7		What are the advantages of Digital Image Processing?	(3)
8		Discuss about Image Formation Model.	(3)
9		Enhance the given image using power law transformations for $c=1$ and $\gamma = 0.2$.	(3)
10		What is the histogram of an image? Explain the significance of the histogram.	(3)
		PART B Answer one question from each module, each carries 14 marks.	
		Module I	
11	a)	Describe the working principle of a Refresh CRT monitor with suitable diagrams.	(8)
	b)	Plot the circle with centre (5,3) and radius 5 using Bresenham's circle drawing	(6)
		algorithm. Show the steps in detail.	
		OR	
12	a)	Explain the architecture of Raster Scan Display System with suitable diagrams.	(8)

b) Explain DDA Algorithm. Given Starting point (5,6) and end points (8,12). Draw (6) a line using DDA Algorithm.

Module II

13 a) Perform the following transformations on a line with end points A(3, 5) and B(6, 5)(8) 9). Also, plot original and resultant lines for each case.

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- i) Translate two unit in x-direction and three units in y-direction.
- ii) Rotate the object by 45 degrees counterclockwise about the origin.

b) Explain two-dimensional reflections based on (x,y). Also, give the (6) transformation matrices.

OR

14	a)	Describe Scan-line	Polygon Filling	algorithm and	illustrate how	it manages t	he (8)
		special cases.						

b) Compare Scaling and Shearing operations in 2D Transformations. (6)

Module III

15	a)	Explain the Depth Buffer method for visible surface detection.	(8)
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b) Explain the Sutherland-Hodgeman Polygon clipping algorithm with an example. (6)

OR

- 16 a) Distinguish between Parallel and Perspective Projections. (6)
 - b) Consider the clipping window with vertices in the order (50,10), (80,10), (8) (50,40), and (80,40). Perform clipping of the line segment joining Pl(40,15) and P2(75,45) using the Cohen-Sutherland line clipping algorithm. Also find the intersection with the clipping window.

Module IV

17	a)	Explain the Fundamental steps in Digital Image Processing.	(8)
	b)	Differentiate Sampling and Quantization in detail.	(6)
		OR	
18	a)	Explain the components of an Image Processing System.	(8)
	b)	Define the basic relationships between pixels in an image.	(6)
		Module V	
19	a)	Explain Region splitting and Merging segmentation methods.	(8)
	b)	Compare and contrast Linear and Non-linear filters used in image processing.	(6)

OR

a) Apply Histogram equalization of the following image

1	2	1	1	1]
2	5	3	5	2	
2	5	5	5	2	
2	5	3	5	2	
1	1	1	2	1	

b) Illustrate the working of the (i) Sobel (ii) Prewitt edge detectors.

(6)