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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Sixth Semester B.Tech Degree (R,S) Examination May 2024 (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		What is the use of computer graphics? List out and explain any 2 applications of computer graphics.	(3)
2		Define the terms aspect ratio and resolution of a display screen in a raster scan display?	(3)
3		What do you mean by homogeneous coordinate system? What is its significance?	(3)
4		Show that the composition of two successive rotations are additive i.e. $R(\Theta 1).R(\Theta 2) = R(\Theta 1 + \Theta 2)$.	(3)
5		Which are the steps involved in window to viewport coordinate transformation in 2D?	(3)
6		Differentiate between oblique and orthogonal projection.	(3)
7		What are the components of the image processing system?	(3)
8		Explain the terms adjacency and connectivity in the context of digital images.	(3)
9		What is log transformation and write its use in image processing.	(3)
10		Compare smoothening and sharpening techniques in image processing.	(3)

PART B

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

Module I

11	a)	With a neat diagram describe the working of a cathode ray display device.	(6)
	b)	Digitize the line with end points (3, 7) and (8, 3) using DDA.	(8)

OR

12	a)	Draw a circle using Midpoint Circle algorithm having radius as 10 and center of circle (100,100).	(8)
	b)	Describe simple random scan display system and draw its architecture.	(6)

Module II

13 a) Write the boundary fill algorithm for filling a polygon using eight connected approach. (8)

b) Describe the relevance and various methods of inside-outside test used in polygon filling. (6)

OR

14 a) Write short notes on 2D rotation transformation. (8)

b) Perform 45 degree rotation of a triangle A(0,0) B(1,1) C(5,3) about the origin and about the fixed point (-1,-1). (6)

Module III

15 a) Given a clipping window A(-20,-20),B(40,-20),C(40,30) and D(-20,30) using Cohen Sutherland line clipping algorithm, find the visible portion of the line segment joining the points P(-30,20) and Q(60,-10). (6)

b) Describe in detail the depth buffer visible surface detection technique. (8)

OR

16 a) Explain the Cohen Sutherland line clipping algorithm with suitable examples. (8)

b) Explain scan line algorithm is used for visible surface detection. (6)

Module IV

17 a) Consider the image segment shown. Let V= {0,1} and compute the lengths of the shortest 4-path, 8-path, and m-path between pixels p and q. Repeat for V={1,2}. (8)

	3	1	2	1 (q)
	2	2	0	2
	1	2	1	1
(p)	1	0	1	2

b) What do you understand by the following terms with respect to pixels: i) Neighbours, ii)Adjacency, iii) Connectivity. (6)

OR

18 a) Explain the fundamental steps in Digital Image Processing with a neat diagram? (8)

b) Describe the basic concepts of sampling and quantization with a neat sketch. (6)

Module V

19 a) How edge detection is performed in digital images using (i) Sobel operator (ii) (6)

Prewitt operator. What are the advantages of Sobel operator over Prewitt operator?

b) Define Histogram equalization. Also, apply histogram equalization method on the following 3 bit method: (8)

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

OR

20 a) What is edge detection? Explain any one edge detection technique in digital image processing. (6)

b) Describe how an image is segmented using split and merge technique in association with the region adjacency graph. (8)

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