Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

SEVENTH SEMESTER B.TECH DEGREE EXAMINATION(S), MAY 2019

Course Code: CS401

Course Name: COMPUTER GRAPHICS

Max. Marks: 100 Duration: 3 Hours

PART A

Answer all questions, each carries 4 marks.

		Marks
1	Differentiate between raster scan and random scan display systems.	(4)
2	How 8-way symmetry of circle can be used for writing circle drawing algorithms? Write the symmetric points if (x, y) is a point on the circle with centre at origin.	(4)
3	Write the DDA line drawing algorithm.	(4)
4	What do you mean by homogeneous coordinate system? What is its significance?	(4)
5	Define the terms window, viewport and windowing transformation in the context of 2D viewing with suitable diagrams.	(4)
6	Describe the steps involved in scaling a 3D object with respect to a fixed point (xf, yf, zf). Derive the composite transformation matrix.	(4)
7	Distinguish between parallel and perspective projections.	(4)
8	Explain the back face detection algorithm for hidden surface removal.	(4)
9	Consider the image segment shown. Let V= {1, 2} and compute the lengths of the shortest 4-path, 8-path, and m-path between pixels ***p*** and ***q***.	(4)

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

10	Define the following terms related to pixel of an image: i) pixel neighbourhood ii) digital path iii) connected set	(4)

PART B

Answer any two full questions, each carries 9 marks.

11	a)	Explain the architecture of raster graphics system with suitable diagrams.	(6)
	b)	Explain the working of Direct View Storage Tube (DVST).	(3)
12	a)	Explain the boundary fill algorithm using 4-connected approach.	(4)
	b)	Rasterize the line segment from pixel coordinate (1, 1) to (8, 5) using Bresenham's line drawing algorithm.	(5)

13 a) Consider a raster system with a resolution of 2560 x 2048. Determine the frame buffer size (in bytes) needed for the system to store 12-bits per pixel. How much storage is required if 24-bits per pixel are to be stored? (2)

b) Explain the working of a delta-delta shadow mask CRT. (4)

c) Explain the non-zero winding number rule to identify interior regions of a polygon. (3)

PART C

Answer any two full questions, each carries 9 marks.

14 a) Perform the following transformations on a point (6, 4). (4)

i) Translate by tx = −2 and ty = 4

ii) then, Scale by sx = 2 and sy = 1

iii) and Rotate by 90° in clockwise direction. Determine the final coordinates of the transformed point.

b) Prove that the multiplication of 2D transformation matrices for two successive rotations is commutative. (3)

c) Explain the concept of point clipping in 2D. (2)

15 a) Explain Weiler Atherton polygon clipping algorithm with illustrations. (6)

b) A rectangular parallelepiped is unit distance on Z-axis, 2 units on X-axis and 3 units on Y-axis. Determine the new coordinates of the parallelepiped when it is rotated counter clockwise about X-axis by an angle of 45°. (3)

16 a) What is a quadric surface? Explain about any one of the quadric surfaces. (3)

b) Explain the Cohen Sutherland line clipping algorithm with suitable examples. (6)

PART D

Answer any two full questions, each carries 12 marks.

17 a) List out the differences between z-buffer method and A-buffer method for determining the visible surfaces. (4)

b) Describe about the depth-sorting method to display the visible surfaces of any given object with plane faces. Also explain the tests to identify overlapping surfaces. (8)

18 a) Explain the components of a general purpose digital image processing system with a neat diagram. (6)

b) How edge detection is performed in digital images using (6)

(i) Sobel operator (ii) Prewitt operator.

What are the advantages of Sobel operator over Prewitt operator?

19 a) Derive the transformation matrix for oblique parallel projection with the help of a neat diagram. (6)

b) Discuss the role of histogram equalization in a digital image. (2)

c) What do you mean by histogram of a digital image? Discuss on the histogram of four basic image types. (4)

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