B 0300CST304052202

Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
Sixth Semester B.Tech Degree Examination June 2022 (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	How many bits are required for 1024×1024 raster with each pixel being represented by 24 bits ?	(3)
2	Derive the initial decision parameter of Midpoint Circle drawing algorithm.	(3)
3	Explain the non-zero winding number rule to identify the interior regions of a polygon.	(3)
4	Write the boundary fill algorithm for filling a polygon using four connected approach.	(3)
5	Explain the window to viewport coordinate transformation.	(3)
6	Explain the Cohen Sutherland line clipping algorithm with a suitable diagram.	(3)
7	Explain sampling and quantization.	(3)
8	What are the components of the image processing system?	(3)
9	What are the applications of the nonlinear spatial filter?	(3)
10	What is the histogram of an image? Explain the significance of the histogram.	(3)

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

Module I

11 a) Compute the intermediate points to rasterize a line segment with end points (1,7) and (5,9) using Bresenham's line drawing algorithm (6)

b) Use the Mid Point circle drawing algorithm to plot a circle whose radius is 8 units and centre at (6,5). (8)

OR

12 a) Explain the working of the random scan display system and draw its architecture diagram. (6)

b) Apply the DDA line drawing algorithm to rasterize a line segment with endpoints (2,8) and (12,18). (8)

Module II

13 a) Perform a 60 degree counter clockwise rotation of a triangle ABC having the   (8)
        vertices at A(4,4) B(12,4) and C(4,10) about the origin and draw the original and
        resultant triangles.

    b) Explain the steps involved in scaling a 3D object with respect to a fixed point   (6)
        (x, y, z). Also, derive the composite transformation matrix.

OR

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

            i) Translate two unit in x-direction and three units in y-direction.

            ii) Rotate the object by 45 degree counterclockwise about the origin.

    b) Explain three-dimensional reflection based on zy,xy and xz planes Also, give the   (6)
        transformation matrices.

Module III

15 a) Explain the Depth Buffer method for visible surface detection.   (6)

    b) Explain in detail the scan line algorithm for visible surface detection by listing   (8)
        the tables used in this algorithm.

OR

16 a) Explain the Sutherland – Hodgeman Polygon clipping algorithm with an   (8)
        example.

    b) Distinguish between parallel and perspective projections. What is the principal   (6)
        vanishing point?

Module IV

17 a) Explain any three applications of digital image processing.   (6)

    b) Define 4-adjacency, 8-adjacency and m-adjacency. Explain using an example   (8)
        for each.

OR

18 a) Explain the process of convolution with an example.   (8)

    b) With a neat diagram, explain the fundamental steps in Digital Image Processing.   (6)

Module V

19 a) Explain the following region based segmentation methods.   (8)

            i)   Region Growing

            ii)   Region Splitting and Merging

    b) Explain the Prewitt and Sobel edge detectors.   (6)

OR

20 a) Explain the following grey level transformation functions. (6)

    i)   Image negatives

    ii)   Gamma Transformation

  b) What is histogram equalization? Also, apply the histogram equalization method (8)
on the following 3 bit image.

3	2	1	1
4	4	5	5
5	5	6	7
1	2	6	7

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