Register No.: .... Name: ....

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

SIXTH SEMESTER B.TECH DEGREE EXAMINATION (R), MAY 2023
COMPUTER SCIENCE AND ENGINEERING
(2020 SCHEME)

Course Code : **20CST304**

Course Name: **Computer Graphics and Image Processing**

Max. Marks : **100** **Duration: 3 Hours**

PART A

(Answer all questions. Each question carries 3 marks)

1. State the functionality of frame buffer. The display device has a resolution of 1920x1080 and a color depth of 32 bits per pixel, compute the size of the frame buffer.
2. Compare and contrast DDA algorithm over Bresenham's algorithm.
3. Consider the triangle ABC whose coordinates are A(4,1) (5,2) and C(4,3). Reflect the triangle about x and y axis.
4. Mention the limitations of scan line polygon filling. How can these limitations be addressed?
5. Define window and view port?
6. Discuss the limitations of Sutherland Hodgeman Polygon clipping algorithm.
7. List the fundamental steps in image processing with an example.
8. What is spatial and gray level resolution?
9. Define power-law transformation in image processing. State how does it affect the contrast of the image?
10. What is contrast stretching? Give an example.

PART B

(Answer one full question from each module, each question carries 14 marks)

MODULE I

11. a) Derive Bresenham's line drawing algorithm. Mention the use of decision parameter/error term. Using Bresenham's algorithm rasterize the line (0,0) to (6,7) (10)

 b) Compare and contrast Raster Scan displays and Random scan displays. (4)

OR

12\. a) Discuss the steps of Midpoint circle algorithm with its derivation. Calculate the pixel positions to draw a circle having center as (0,0) and radius as 10 units. (10)

b) How Midpoint circle algorithm differ from Bresenham's circle drawing algorithm? (4)

MODULE II

13\. a) Explain in detail about 2D transformations with an example for each. Mention the applications of each type of transformation? (10)

b) Briefly explain boundary filling algorithm. How is it different from the flood filling algorithm? (4)

OR

14\. a) Discuss the process of rotation, translation and scaling in 3D transformations with its illustration and applications. (10)

b) Consider an object ABCD with given coordinates A(10,10) B(60,10) C(60,60) and D(10,60). keeping point A as fixed, double the size of object (Sx=2, Sy=2). (4)

MODULE III

15\. a) Explain Cohen Sutherland Line Clipping Algorithm. Outline the steps involved in clipping a line using this algorithm. Use the Cohen Sutherland algorithm to clip line P1 (70,20) and P2(100,10) against a window lower left hand corner (50,10) and upper right hand corner (80,40). (10)

b) How does orthographic projection differ from oblique projection? Demonstrate it with an example. (4)

OR

16\. a) Discuss Depth Buffer Algorithm for visible surface detection. Illustrate the working of this algorithm with an example? What are the advantages and disadvantages? (10)

b) Describe the concept of foreshortening in perspective projection. List the types of perspective projection. (4)

MODULE IV

17\. a) Explain the role and effects of sampling and quantization in digital image processing. (10)

b) Discuss the basic relationship between pixels in an image with respect to neighbourhood, adjacency and connectivity. (4)

OR

18\. a) Write a short note on different applications of image processing in medical imaging. Mention the role of image processing in medical diagnosis with examples. (10)

b) Elaborate the concept of the convolution operation with its functionality. (4)

MODULE V

19. a) Explain in detail about various spatial domain filters used for image enhancement with an example. (10)

 b) Discuss how histogram equalization is used for image enhancement. (4)

OR

20. a) Give different types of region splitting and merging techniques used in image segmentation. Illustrate the role of each technique in the segmentation process with an example. (10)

 b) List out the different challenges in edge detection. Explain the function of Sobel and Prewitt operators in edge detection. (4)

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