USN											21CST602

B.E. Degree(Autonomous) Sixth Semester End Examination (SEE), July/August 2024

Computer Graphics & Fundamentals of Image Processing

(Model Question Paper- I)

Time:3 Hours **MaximumMarks:100**

Instructions to students

1. Answer FIVE FULL Questions.

Q. No.	Questions	Marks	CO	RBT Levels
1 (a)	Define the following: a) Pixel b) Resolution c) Bit Plane d) Raster e) Depth of the frame Buffer f) Refresh Rate g) Frame Buffer h) Rasterization i) Aspect Ratio. Consider three different raster systems with resolutions of 640 x 480, 1280 x 1024, and 2560 x 2048.What size is frame buffer (in bytes) for each of these systems to store 12 bits per pixel?	10	CO1	L2
1(b)	Explain DDA Line Algorithm. Consider a line from (0,0) to (5,5). Using simple DDA to calculate the points of this line.	10	CO1	L3
	OR			
2 (a)	Describe the working of CRT with a neat diagram.	10	CO1	L2
2(b)	Give Bresenham's Line Drawing Algorithm. Use Bresenham's line drawing algorithm to draw pixels of the line XY(1,1) and Y (8,5)	10	CO1	L3
3 (a)	Define and represent the following 2-D transformations in homogenous coordinate system. a. Translation b. Rotation c. Scaling d. Shear	12	CO2	L2
3(b)	Explain window, view port and window - to - view port transformation. Obtain the net transformation matrix for the same.	08	CO2	L3
	OR			
4 (a)	Design transformation matrix to rotate an 3D object about an axis that is parallel to one of the co-ordinate axis	8	CO2	L3
4(b)	With the help of a suitable diagram explain basic 3D Geometric transformation techniques and give the transformation matrix.	12	CO2	L2
5 (a)	Explain how mouse events are recognized by GLUT. Give suitable example.	10	CO3	L2
5(b)	How pop-up menus are created using GLUT? Illustrate with an example.	10	CO3	L2
	OR			
6 (a)	Explain the key factors to be considered when designing a user interface to ensure optimal user experience and accessibility?	10	CO3	L2
6(b)	Explain the following: (i) Request Mode (ii)Sample Mode (iii) Event Mode	10	CO3	L2

7 (a)	Explain in detail the classification of images	**10**	**CO4**	**L2**
7 (b)	Consider the following two images. Perform the logical operations AND, OR and NOT. $f_1=\begin{pmatrix}1&0&0\\1&1&1\\0&0&1\end{pmatrix}$ $f_2=\begin{pmatrix}1&1&1\\1&1&1\\1&1&1\end{pmatrix}$	**10**	**CO4**	**L3**
	OR			
8 (a)	Briefly explain the following terms: (i) Euclidean distance. (ii) City block distance. (iii) Chessboard distance Compute the Euclidean Distance (D1), City-block Distance (D2) and Chessboard distance (D3) for points p and q, where p and q be (5, 2) and (1, 5) respectively. Give answer in the form (D1, D2, D3).	**10**	**CO4**	**L2**
8 (b)	Consider the following two images. The addition and subtraction of images are given by f1+f2 and f1−f2. Assume both the images are of the 8-bit integer type. f1= 100 100 100 and f2 = 50 50 25 50 50 50 40 40 50 200 150 150 50 50 75	**10**	**CO4**	**L3**
9 (a)	Explain the various stages involved in edge detection process	**10**	**CO5**	**L2**
9 (b)	Explain the classification of various image segmentation algorithms and delineate their distinct types.	**10**	**CO5**	**L3**
	OR			
10 (a)	Define image segmentation formally and describe the characteristics of the segmentation process.	**08**	**CO5**	**L2**
10 (b)	Explain the three fundamental types of gray-level discontinuities in digital images.	**12**	**CO5**	**L2**