Reg No.:_____   Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Seventh Semester B.Tech Degree Examination (Regular and Supplementary), December 2020

Course Code: CS463

Course Name: DIGITAL IMAGE PROCESSING

Max. Marks: 100   Duration: 3 Hours

PART A
Answer all questions, each carries 4 marks.   Marks

1	Differentiate city block distance and chessboard distance.	(4)
2	List some applications of digital image processing.	(4)
3	Define DCT. Write the properties of DCT.	(4)
4	CRT devices would produce images that are darker than intended. How it is rectified? Explain.	(4)
5	Write short notes on max and min filters.	(4)
6	Differentiate Ideal low pass filter and Gaussian low pass filter.	(4)
7	Differentiate image segmentation based on thresholding and image segmentation based on region growing techniques.	(4)
8	Explain about Prewitt and Sobel masks for detecting edges.	(4)
9	Differentiate erosion and dilation.	(4)
10	Define shape number.	(4)

PART B
Answer any two full questions, each carries 9 marks.

11	a)	What is a digital image? How to represent a digital image?	(3)
	b)	Explain the fundamental steps in digital image processing with the help of a neat diagram.	(6)
12	a)	What is unitary transform? Write the properties of unitary transforms. Prove that 4 x 4 DFT matrix is unitary.	(6)
	b)	Compute the Hadamard transform of the image $\begin{bmatrix} 3 & 2 \\ 4 & 3 \end{bmatrix}$	(3)
13	a)	The sample of a function is f(x)={2,3,4,4}. Find the DFT coefficients of this function.	(5)
	b)	Consider the image segment shown.	(4)

$$
\begin{array}{cccc}
3 & 1 & 2 & 1 \quad (q) \\
2 & 2 & 0 & 2 \\
1 & 2 & 1 & 1 \\
(p) \quad 1 & 0 & 1 & 2
\end{array}
$$

Let the set of adjacency values used to define adjacency, V= {0, 1} and compute the lengths of the shortest 4-, 8-, and m- path between p and q. If a particular path does not exist between these two points, explain why?

PART C
Answer any two full questions, each carries 9 marks.

14 a) Write short note on median filters. (4)

   b) Explain homomorphic filtering. (5)

15 a) Define histogram. How histogram is generated for an image. Sketch the histograms of dark image, light image, low-contrast image and high contrast image. (6)

   b) How negative of an image is obtained? (3)

16 a) Explain about smoothing frequency domain filters and sharpening frequency domain filters. (9)

PART D
Answer any two full questions, each carries 12 marks.

17 a) Explain the use of polygonal approximations to find boundary in an image. (6)

   b) How to detect isolated points in an image? (3)

   c) Give 3 X 3 masks to detect horizontal line and vertical line in an image. (3)

18 a) Explain region based segmentation. (6)

   b) Explain edge detection techniques using first order and second order derivatives. (6)

19 a) Elucidate the use of chain codes to represent boundary in an image. (6)

   b) Explain about the following morphological operations: (6)
      a) Opening
      b) Closing

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