

# CBCS SCHEME

15EC72

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## Seventh Semester B.E. Degree Examination, Jan./Feb. 2023 Digital Image Processing

Time: 3 hrs.

Max. Marks: 80

*Note: Answer any FIVE full questions, choosing ONE full question from each module.*

### Module-1

- 1 a. Define digital image processing. Briefly explain the areas of applications of digital image processing. (08 Marks)
- b. With a neat block diagram, explain the fundamental steps involved in digital image processing. (08 Marks)

OR

- 2 a. Explain the following terms:
  - i) Gray level resolution
  - ii) Spatial resolution
  - iii) Isopreference curves. (06 Marks)
- b. Let  $p$  and  $q$  be the pixels at coordinates (12, 14) and (20, 25) respectively. Find out which distance measure gives the minimum distance between the pixels. (06 Marks)
- c. Consider the image segment shown in Fig.Q.2(c). Compute the lengths of the shortest 4-, 8- and  $m$ -path between  $p$  and  $q$  for the set  $V = \{2, 3\}$ . If path does not exist between  $p$  and  $q$  points, explain why.

			(q)	
	4	2	3	2
	3	3	1	3
	2	3	2	2
(p)	2	1	2	3

Fig.Q.2(c)

(04 Marks)

### Module-2

- 3 a. Explain the basic intensity transformation functions with necessary graphs. (08 Marks)
- b. The histogram of the 8-level of size  $64 \times 64$  is shown in Fig.Q.3(b).

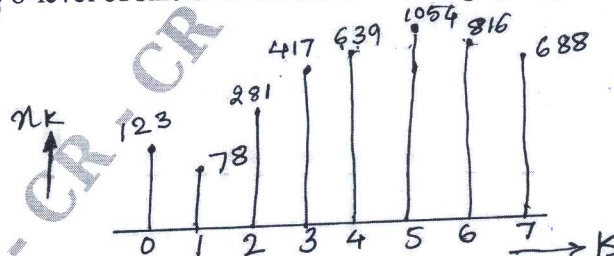


Fig.Q.3(b)

Draw the histogram of the equalized image.

(08 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and/or equations written eg.  $42+8=50$ , will be treated as malpractice.

OR

- 4 a. Using the second derivative, develop a Laplacian mask for image sharpening. (08 Marks)  
b. Explain the homomorphic filtering approach for image enhancement. (08 Marks)

**Module-3**

- 5 a. Define the process of restoration. Explain the order statistics filter for restoring images in the presence of noise. (08 Marks)  
b. Explain how a Wiener filter achieves restoration of a given degraded image. (08 Marks)

OR

- 6 a. Describe the most common noise PDFs found in image processing. (08 Marks)  
b. Explain the methods used to estimate the degradation function in image processing. (08 Marks)

**Module-4**

- 7 a. Briefly explain any two types of color model. (08 Marks)  
b. Define wavelet transform and Multi Resolution theory. Explain the scaling function fundamental requirements of Multi Resolution Analysis (MRA). (08 Marks)

OR

- 8 a. Briefly explain the basic pseudocolor image processing techniques. (08 Marks)  
b. Briefly explain the erosion and dilation operation of morphology. (08 Marks)

**Module-5**

- 9 a. With the help of basic formulation explain the concept of region splitting and merging. (08 Marks)  
b. Explain the Minimum-Perimeter Polygons (MPP) algorithm. (08 Marks)

OR

- 10 a. What is Thresholding? Describe the algorithm used for basic global thresholding. (08 Marks)  
b. Explain Fourier descriptors for boundary sequence. Also mention the basic properties of Fourier descriptors for  $s(k)$ . (08 Marks)

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