**CBCS SCHEME**

USN ☐☐☐☐☐☐☐☐☐☐ **15EC72**

### Seventh Semester B.E. Degree Examination, July/August 2022
## 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. With a neat block diagram, explain the fundamental steps involved in digital image processing. **(10 Marks)**
   b. Let p and q be the pixels at coordinates (10, 12) and (15, 20) respectively. Find which distance measure gives the minimum distance between the pixels. **(06 Marks)**

**OR**

2  a. Explain in brief how an image can be sensed and acquired using multiple arrays. **(10 Marks)**
   b. Consider the two image subsets $S_1$ and $S_2$, shown in Fig.Q2(b), for V = {1}, determine whether two subsets are (i) 4-adjacent  (ii) 8-adjacent  (iii) m-adjacent.
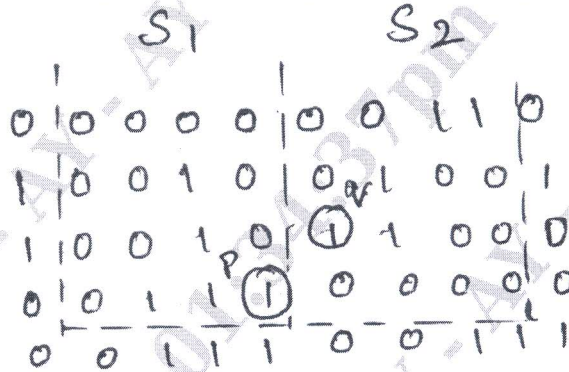


Fig.Q2(b) **(06 Marks)**

### Module-2

3  a. Explain the basic gray level transformation functions with necessary graphs. **(08 Marks)**
   b. The histogram of 3-bit image of 64 × 64 pixels is shown in Fig.Q3(b). Construct the histogram of original image and equalized histogram.

| $r_k$ | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|-------|-----|------|-----|-----|-----|-----|-----|-----|
| $n_k$ | 790 | 1023 | 850 | 656 | 329 | 245 | 122 | 81 |

Fig.Q3(b) **(08 Marks)**

**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. With a neat diagram, explain a model of the image degradation/restoration process. **(04 Marks)**
   b. Explain common noise probability density functions in image processing. **(04 Marks)**
   c. Explain the ordered statistic filters used for image restoration. **(08 Marks)**

**OR**

6 a. Explain the following methods to estimate the degradation function used in image restoration:
   (i) Estimation by image observation
   (ii) Estimation by experiment (08 Marks)
   b. Explain the inverse filtering and Weiner filtering image restoration. (08 Marks)

## Module-4

7 a. Explain the procedure in converting colors from RGB to HSI. (08 Marks)
   b. Name the different techniques of wavelet coding and explain in brief any one techniques of wavelet coding of an image. (08 Marks)

**OR**

8 a. Explain the different methods of pseudocolor image processing. (08 Marks)
   b. Explain the following basic morphological algorithms:
   (i) Convex hull
   (ii) Thinning
   (iii) Pruning
   (iv) Skeleton (08 Marks)

## Module-5

9 a. What is thresholding? Describe the algorithm used for basic global thresholding. (08 Marks)
   b. With the help of basic formulation, explain the concept of region splitting and merging. (08 Marks)

**OR**

10 a. With a neat sketch illustrate boundary-following algorithm and explain. (08 Marks)
   b. Briefly explain the watershed segmentation algorithm. (08 Marks)

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