USN ☐☐☐☐☐☐☐☐☐☐

21EC753

Seventh Semester B.E./B.Tech. Degree Examination, Dec.2024/Jan.2025
Basic Digital Image Processing

Time: 3 hrs.

Max. Marks: 100

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

Module-1

1   a. Explain fundamental steps in digital image processing with block diagram. **(10 Marks)**

   b. Consider the two image subsets S_1 and S_2, shown in the following Fig.Q1(b). For $V = \{1\}$, find whether these two subsets are (i) 4-adjacent (ii) 8-adjacent (iii) m-adjacent.
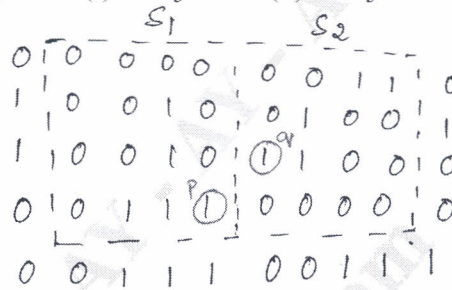

Fig.Q1(b) **(10 Marks)**

OR

2   a. Explain the process of image sampling and quantization. **(10 Marks)**

   b. With a neat block diagram describe various components used in general purpose image processing system. **(10 Marks)**

Module-2

3   a. Explain log and power law transformation used for spatial image enhancement. **(10 Marks)**

   b. Apply histogram equalization on a 3-bit image ($L = 8$) of size 64*64 pixels. The intensity distribution of the pixel is given below.

r_k	0	1	2	3	4	5	6	7
N_k	790	1023	850	656	329	245	122	81

(10 Marks)

OR

4   a. Apply image sharpening in spatial domain using 2nd order Laplacian derivative. **(10 Marks)**

   b. Explain unsharp masking and high boost filtering. **(10 Marks)**

Module-3

5   a. Explain smoothing of images in frequency domain using ideal Butterworth and Gaussian lowpass filter. **(10 Marks)**

   b. Explain basic steps of image filtering in frequency domain. **(10 Marks)**

OR

6   a. Explain Homomorphic filtering approach for image enhancement. **(10 Marks)**

   b. Explain image sharpening using Ideal Butterworth and Gaussian high pass filter. **(10 Marks)**

Module-4

7 a. What is pseudo color image processing? Explain intensity slicing as applied to pseudo color image processing. **(10 Marks)**
   b. Explain RGB color model. **(10 Marks)**

OR

8 a. Explain HSI color model and conversion from HSI to RGB colors. **(10 Marks)**
   b. Explain CMY color model and conversion from RGB to HSI color model. **(10 Marks)**

Module-5

9 a. Explain the importance of image restoration process in image processing with the basic model diagram. **(10 Marks)**
   b. Explain any four noise probability density functions. **(10 Marks)**

OR

10 a. Explain Weiner filtering and inverse filtering in image processing. **(10 Marks)**
   b. Discuss the importance of adaptive filters in image restoration system highlighting the working of adaptive median filter. **(10 Marks)**

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