USN | | | | | | | | | | |          **18EC733**

### Seventh Semester B.E. Degree Examination, Dec.2024/Jan.2025
## 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. With neat diagram, explain the fundamental steps in Digital Image Processing.    **(10 Marks)**

b. Explain the method of image Acquisition using a single sensor and linear sensor strip.    **(10 Marks)**

### OR

**2**  a. A common measure of transmission for digital data is the baud rate. Generally transmission is accomplished in packets consisting of a start bit, a byte (8 bits) of information and a stop bit. Using these facts answer the followings :
   i)  How many minutes would it take to transmit a $1024 \times 1024$ image with 256 gray levels using 56K baud modem?
   ii) What would the time be at 750 K baud a representative speed of a phone DSL connection?    **(08 Marks)**

b. Explain the following :
   i)  Image formation in the eye
   ii) Brightness Adaptation and Discrimination    **(12 Marks)**

### Module-2

**3**  a. Illustrate the concept of sampling and quantization.    **(08 Marks)**

b. Consider the two image subsets $S_1$ and $S_2$, shown in the Fig Q3(b). For $V = \{1\}$, determine whether these two subsets are i) 4 – adjacent    ii) 8 – adjacent    iii) m – adjacent.
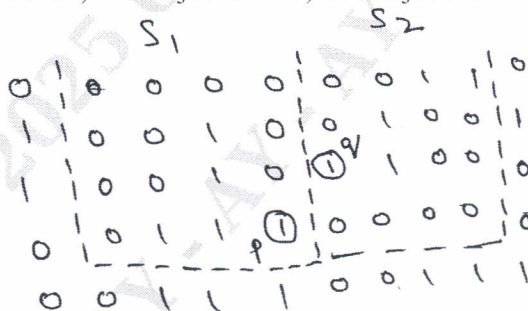


Fig Q3(b)    **(08 Marks)**

c. What is linear and Non-linear operations in image processing.    **(04 Marks)**

### OR

**4**  a. Explain the various relationships between pixels.    **(10 Marks)**

b. Explain the following Gray level transformation
   i) log transformation
   ii) Power – Law Transformation.    **(10 Marks)**

## Module-3

5 a. Explain the basic steps for Filtering in the frequency domain with the help of block diagram.
(08 Marks)

   b. Describe the following smoothing frequency – domain filters
      i) Ideal Lowpass Filters
      ii) Butterworth Lowpass Filters (12 Marks)

**OR**

6 a. Explain the following sharpening frequency Domain filters. (12 Marks)
      i) Ideal Highpass filters
      ii) Laplacian in the frequency domain.
   b. Explain the Homomorphic filtering approach for image enhancement. (08 Marks)

## Module-4

7 a. Explain various probability density functions used in image processing applications.
(12 Marks)

   b. Describe the various mean filters used to restoration in the presence of Noise. (08 Marks)

**OR**

8 a. Explain Estimating the degradation function by
      i) Image observation
      ii) Experimentation (12 Marks)
   b. Explain Minimum Mean Square Error Filtering. (08 Marks)

## Module-5

9 a. Explain the following Morphological operations
      i) Dilation
      ii) Erosion (14 Marks)
   b. Mention the properties of opening and closing operations in morphological image processing. (06 Marks)

**OR**

10 a. Explain the following color models
      i) CMY color model
      ii) HSI floor model (12 Marks)
   b. Describe the Pseudocolor coding approach for color modeling. (08 Marks)

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