USN

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 1024×1024 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.
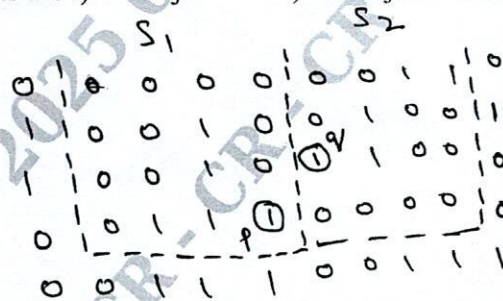

Fig Q3(b) **(08 Marks)**
   c. What is linear and Non-linear operations in image processing. **(04 Marks)**

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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