



Seventh Semester B.E. Degree Examination, June/July 2023 Digital Image Processing

Max. Marks: 80

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

Module-1

- 1 a. With the block diagram, explain the fundamental steps involved in “Digital Image Processing”. (08 Marks)
- b. Derive a “Simple Image Formation Model” in Digital Image Processing. (04 Marks)
- c. Consider the image subsets S_1 and S_2 shown in the Fig.Q1(c). For $V = \{1\}$, determine whether these two subsets are: (i) 4 – adjacent (ii) 8 – adjacent (iii) m – adjacent

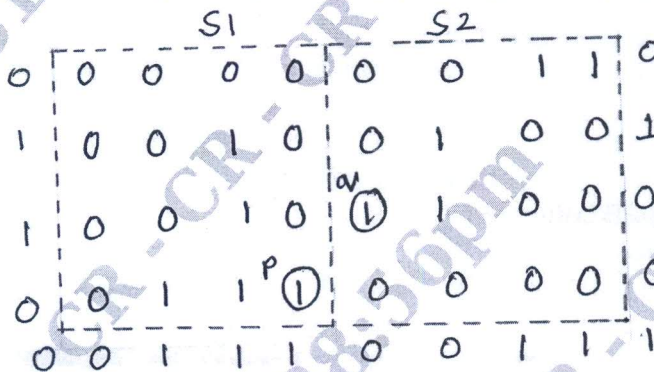


Fig.Q1(c)

(04 Marks)

OR

- 2 a. Define digital image processing. Explain the components of an image processing system. (08 Marks)
- b. With relevant sketches, explain image sampling and quantization. (04 Marks)
- c. Consider an image segment shown in Fig.Q2(c).



Fig.Q2(c)

- (i) Let $v = \{0, 1\}$, compute the lengths of the shortest 4, 8 and m-paths between p and q. If a particular path does not exist between these two points explain why?
- (ii) Repeat for $v = \{1, 2\}$ (04 Marks)

Module-2

- 3 a. Explain the following enhancement techniques in image processing:
 - (i) Image Negatives (06 Marks)
 - (ii) Log transformations (04 Marks)
 - (iii) Power law transformation (06 Marks)
- b. Discuss homomorphic filtering. (04 Marks)
- c. Develop a method for second order derivative for enhancement in spatial domain. (06 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. Explain with block diagram the basic steps for image filtering in frequency domain. (06 Marks)
 b. Explain histogram matching. (04 Marks)
 c. Explain smoothing in spatial domain. (06 Marks)

Module-3

- 5 a. Explain the model of image degradation/restoration. (08 Marks)
 b. Explain observation and experimentation ways to estimate the degradation function. (08 Marks)

OR

- 6 a. Mention the probability density function, mean, variance of the following noise models:
 (i) Gaussian noise
 (ii) Rayleigh noise
 (iii) Gamma noise
 (iv) Exponential noise (08 Marks)
 b. With relevant expressions, explain minimum mean square filtering (wiener). (08 Marks)

Module-4

- 7 a. Classify color models and explain the following color models:
 (i) RGB color model (08 Marks)
 (ii) HSI color model (08 Marks)
 b. Explain Dilation and Erosion with respect to morphological image processing. (08 Marks)

OR

- 8 a. Define multiresolution and explain the subband coding related to multiresolution. (08 Marks)
 b. Perform the following conversions in color models:
 (i) RGB to HSI
 (ii) HSI to RGB (08 Marks)

Module-5

- 9 a. Define segmentation and explain segmentation based on discontinuity in intensity levels. (08 Marks)
 b. Explain Region Based Segmentation. (08 Marks)

OR

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- 10 a. Briefly explain the basic edge detection and relate first and second order derivative to gray level profile. (08 Marks)
 b. Explain the following related to representation and description:
 (i) Chain codes
 (ii) Signatures
 (iii) Skeletons (08 Marks)
