

CBCS SCHEME



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15EC72

Seventh Semester B.E. Degree Examination, Aug./Sept. 2020 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 the help of a neat diagram, explain the components of general purpose image processing system. (08 Marks)
 - b. Explain how image is formed in human eye. Suppose a camera is focused at a pillar of height 2 meters and situated at a distance of 10 metres. The focal length of the image produced in camera. (06 Marks)
 - c. Consider the two image subsets, S_1 and S_2 as shown in Fig.Q1(c). For $V = \{1\}$ determine whether these two subsets are :
 - i) 4 – adjacent
 - ii) 8 – adjacent or
 - iii) m – adjacent.

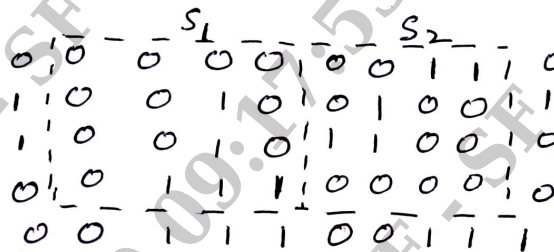


Fig.Q1(c)

(02 Marks)

OR

2.
 - a. Explain the following terms :
 - i) False contouring
 - ii) Checker board effect
 - iii) Neighbors of pixels
 - iv) Distance measure. (08 Marks)
 - b. Define m – adjacency. Compute shortest 4, 8 and m path between p and q for $v = \{1, 2\}$.

3	1	2	1	(q)
2	2	0	2	
1	2	1	1	
1	0	1	2	

(p)

(05 Marks)

- c. Find the time required in seconds to transmit a monochrome image of size $2.5'' \times 2''$ scanned at 150 DPI sent at 28 kilo bits per sec. (03 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.

**Module-2**

- 3 a. Using 2nd order derivative, develop a laplacian mask. (06 Marks)
b. What is linear filtering? (02 Marks)
c. The following table gives the number of pixels at each of the gray levels 0 to 7 in an image.

n_k	0	1	2	3	4	5	6	7
r_k	123	78	281	417	639	1054	816	688

Draw the histogram corresponding to these grey levels. Perform histogram equalization and draw resulting histogram. (08 Marks)

OR

- 4 a. Explain Homomorphic filters for image enhancement with necessary equations, block diagram and transfer function. (08 Marks)
b. Explain smoothing filters in frequency domain. (04 Marks)
c. Compute median value of the marked pixels shown below using 3×3 mask.

18	22	33	25	32	24
34	128	24	172	26	33
22	19	32	31	28	26

Fig.Q4(c)

(04 Marks)

Module-3

- 5 a. Explain the following noise models :
i) Gaussian noise ii) Raleigh noise iii) Impulse noise iv) Uniform noise. (08 Marks)
b. Explain inverse filter and Wiener filter with the help of equations. Explain the advantages of Wiener filter over inverse filter. (08 Marks)

OR

- 6 a. Define the process of image restoration. How is restoration different from enhancement? (05 Marks)
b. What are adaptive filters? Explain adaptive mean filter and its advantages. (08 Marks)
c. What are order statistics filters? List any four such filters. (03 Marks)

Module-4

- 7 a. Explain RGB color model in detail listing its applications. What are Wele – safe colors? (08 Marks)
b. With the help of block diagram, explain two-band sub-band coding and decoding system with its spectrum. (08 Marks)

OR

- 8 a. What is pseudo color image processing? Explain any one method of pseudo color image processing. (08 Marks)
b. Explain erosion and dilation operations used for morphological processing. (08 Marks)

Module-5

- 9 a. Explain Otsu's algorithm for global thresholding using suitable equations. (08 Marks)
b. Explain chain codes for boundary representation. (08 Marks)

OR

- 10 a. Explain the role of Fourier descriptor for boundary representation. (08 Marks)
b. What is Laplacian of a Gaussian (LoG) write a 5×5 LoG mask with the graph? (08 Marks)
