



Seventh Semester B.E. Degree Examination, June/July 2011
Image Processing

Time: 3 hrs.

Max. Marks:100

**Note: Answer any FIVE full questions selecting
at least TWO questions from each part.**

PART – A

- 1 a. Write in detail the fundamental steps in digital image processing. (10 Marks)
- b. How is image formed in the human eye? Explain with examples the perceived brightness is not a simple function of intensity. (10 Marks)
- 2 a. How many minutes would it take to transmit a 1024×1024 image with 256 gray levels using 56 k baud modem? (Baud rate is the number of bits transmitted per second. Assume each byte is one packet with a start bit and a stop bit.) (04 Marks)
- b. Explain image sampling and quantization. (10 Marks)
- c. Consider the image segment given in Fig.Q2(c). Let $V = \{0, 1\}$, Compute the lengths of the shortest 4, 8 and m-path between 'p' and 'q'. If path does not exist, explain why. (06 Marks)

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

Fig.Q2(c)

- 3 a. Derive the expression for 2D circular convolution theorem. (10 Marks)
- b. Consider the 2×2 transform A and the image U given below:

$$A = \frac{1}{2} \begin{bmatrix} \sqrt{3} & 1 \\ -1 & \sqrt{3} \end{bmatrix}, \quad U = \begin{bmatrix} 2 & 3 \\ 1 & 2 \end{bmatrix}$$

Calculate the transformed image V and the basis images. Check the transformed image V using the basis images and U. (10 Marks)

- 4 a. Derive the relation between DCT and DFT. (10 Marks)
- b. Write H matrix for the Harr transform for N = 8 and explain how it is constructed. (05 Marks)
- c. Write four properties of Hadamard transform. (05 Marks)

PART – B

- 5 a. Explain histogram equalization technique. (10 Marks)
- b. Explain the following with applications:

i) Contrast stretching	ii) Bit plane slicing	iii) Gray-level slicing
iv) AND operation	v) OR operation.	

 (10 Marks)
- 6 a. Discuss homomorphic filtering. (08 Marks)
- b. Explain sharpening filters in the frequency domain. (06 Marks)
- c. Explain smoothing filters in the frequency domain. (06 Marks)
- 7 a. Explain adaptive median filter and its advantages. (06 Marks)
- b. How do you reduce the periodic noise using frequency domain filters? (06 Marks)
- c. Derive the expression for observed image when the degradations are linear, position invariant. (08 Marks)
- 8 a. Explain RGB and HSI colour models with their conversions. (10 Marks)
- b. Explain pseudo colour image processing. (05 Marks)
- c. Explain inverse filtering. (05 Marks)

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