

USN

| | | | | | | | | | | | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| | | | | | | | | | | | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|

10EC763

Seventh Semester B.E. Degree Examination, Dec.2015/Jan.2016
Image Processing

Time: 3 hrs.

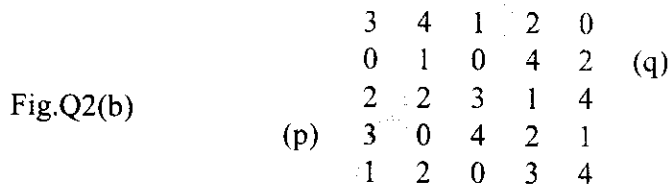
Max. Marks:100

Note: Answer any FIVE full questions, selecting atleast TWO questions from each part.

PART - A

- 1 a. With a block diagram, explain the fundamental steps involved in Digital Image Processing. (10 Marks)
- b. With a neat diagram of the eye, explain the human visual system working. (10 Marks)

- 2 a. What is meant by path? Give the formula for calculating D_4 and D_8 distances. What is the difference between D_8 distance and D_m distance? (10 Marks)
- b. For $V = \{2, 3, 4\}$, compute the lengths of shortest 4, 8 and m path between p and q in the following image. (06 Marks)



- c. Explain spatial resolution and gray level resolution. (04 Marks)

- 3 a. Given $A = \frac{1}{2} \begin{bmatrix} \sqrt{3} & 1 \\ -1 & \sqrt{3} \end{bmatrix}$ and image $u = \begin{bmatrix} 1 & 2 \\ 1 & 2 \end{bmatrix}$, calculate the transformed image V and the basis images. (08 Marks)
- b. What are the properties of Unitary Transforms? (04 Marks)
- c. Construct 4×4 DFT matrix and show that it is unitary. (08 Marks)

- 4 a. Write the recursive definition of Hadamard Transform and using this, construct Hadamard transform for $N = 8$. (10 Marks)
- b. Determine 4×4 slant transform matrix. List its properties. (10 Marks)

PART - B

- 5 a. Perform histogram equalization of an image whose pixel intensity distribution is given in Table :

| | | | | | | | | |
|------------------|-----|------|-----|-----|-----|-----|-----|----|
| Gray levels | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Number of Pixels | 790 | 1023 | 850 | 656 | 329 | 245 | 122 | 81 |

- Construct the histogram of the images before and after equalization. (10 Marks)
- b. What is meant by Laplacian filter? Using the second derivative, develop a Laplacian mask for image sharpening. (10 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.

10EC763

- 6 a. With the help of a block diagram, explain the steps involved in frequency domain filtering. **(10 Marks)**
b. With the help of a block diagram, explain the Homomorphic filtering approach for image enhancement. What are the advantages of these filters? **(10 Marks)**
- 7 a. Explain the model of image degradation / restoration. **(08 Marks)**
b. What are the three methods of estimating the degradation function? Explain each of them. **(12 Marks)**
- 8 a. Describe RGB color model with the help of neat diagram. Write equations to convert RGB to CMY. **(10 Marks)**
b. What is Pseudo colour? Explain any one type of pseudo_colour processing with a neat functional block diagram. **(10 Marks)**
