

IV B.Tech I Semester Regular Examinations, November - 2016

DIGITAL IMAGE PROCESSING

(Common to Electronics & Communication Engineering, Electronics & Instrumentation Engineering and Electronics & Computer Engineering)

Time: 3 hours**Max. Marks: 70***Question paper consists of Part-A and Part-B**Answer ALL sub questions from Part-A**Answer any THREE questions from Part-B*

PART-A (22 Marks)

1. a) Define neighbors of a pixel. [3]
- b) Write short notes on selective filtering. [4]
- c) Write the difference between image restoration and image enhancement. [4]
- d) What is the advantage of color in image processing applications? [4]
- e) What is meant by digital image water marking? [3]
- f) What is meant by image segmentation? Write its use in image processing. [4]

PART-B (3x16 = 48 Marks)

2. a) Explain the following mathematical operations on digital images [8]
 - i) Array versus Matrix operations
 - ii) Linear versus Nonlinear Operations
- b) Explain the following two properties of 2D-DFT: [8]
 - i) Convolution
 - ii) Correlation
3. a) What is meant by histogram specification? Explain. [8]
- b) Explain image smoothing using ideal lowpass filters and Butterworth lowpass filters. [8]
4. a) What are the advantages of adaptive filters? Explain about adaptive median filter. [8]
- b) Explain about image restoration using inverse filtering. Write the draw backs of this method. [8]
5. a) What is Pseudocolor image processing? Explain. [8]
- b) Explain about color image smoothing. [8]
6. a) Explain two-band subband coding and decoding system. [8]
- b) With an example, explain about run-length coding. [8]
7. a) What is Hit-or-Miss transformation? Explain. [8]
- b) Explain about edge detection using gradient operator. [8]

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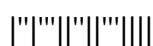
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PART-A (22 Marks)

1. a) What is the need for image transform? Explain. [4]
- b) What is meant by moiré patterns? Explain. [4]
- c) Draw the model of Image degradation/Restoration process. [3]
- d) What is the significance of color model? [4]
- e) Define subband coding? [3]
- f) Explain how a point can be detected in an image? [4]

PART-B (3x16 = 48 Marks)

2. a) Explain the various basic relationships between pixels. [8]
- b) What is Haar Transform? Write the procedure to determine the Haar transformation matrix. [8]
3. a) Explain the following operations: [8]
 - i) Contrast stretching
 - ii) Bit-plane slicing
- b) What is notch filter? Explain its use in image processing. [8]
4. a) List out different noise probability density functions used in image processing applications. [8]
- b) With an example, explain how an image can be reconstructed from projections. [8]
5. a) Explain about RGB color model? [8]
- b) Explain about histogram processing of color images. [8]
6. a) What are the various requirements for multi-resolution analysis? Explain. [8]
- b) Draw the functional block diagram of image compression system and explain the purpose of each block. [8]
7. a) Explain the following morphological algorithms
 - i) Boundary extraction
 - ii) Hole filling
- b) What is meant by edge linking? Explain edge linking using local processing. [8]



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PART-A (22 Marks)

1. a) What is meant by isopreference curves? Explain. [4]
- b) What is log transformation? How it is useful in image processing? [3]
- c) Explain about alpha-trimmed mean filter? [4]
- d) What is meant by pixel depth? Explain. [3]
- e) What is image compression? Why it is needed? Explain. [4]
- f) Explain the effect of noise on edge detection. [4]

PART-B (3x16 = 48 Marks)

2. a) What are the various fundamental steps in digital image processing? Explain. [8]
- b) Find the Haar transformation matrix for $N = 8$. [8]
3. a) Explain image sharpening using laplacian operator. [8]
- b) With necessary equations, explain about Homomorphic filtering. [8]
4. a) Explain how periodic noise can be reduced using frequency domain filtering. [8]
- b) What are the different ways to estimate the degradation function? Explain. [8]
5. a) Explain the procedure of converting colors from RGB to HSI. [8]
- b) Explain about color image sharpening. [8]
6. a) Discuss about wavelet transform in two dimensions. [8]
- b) What is block transform coding? Explain. [8]
7. a) Explain the following morphological algorithms [8]
 - i) Thinning
 - ii) Thickening
- b) Explain edge linking using Hough transform. [8]

Code No: RT41043

R13

Set No. 4

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PART-A (22 Marks)

1. a) Explain about image acquisition using a circular sensor strip. [4]
- b) What are the advantages and disadvantages of local histogram processing when compared to global histogram processing. [4]
- c) What is meant by image restoration? [3]
- d) What is the purpose of color model? Explain. [3]
- e) Write the difference between wavelet transform and Fourier transform. [4]
- f) Prove that Erosion and dilation are duals of each other. [4]

PART-B (3x16 = 48 Marks)

2. a) Explain about image sampling and Quantization. [8]
- b) Prove that both the 2-D continuous and discrete Fourier transforms are linear operations. [8]
3. a) Explain the concept of Unsharp masking and Highboost filtering. [8]
- b) Explain image sharpening using Butterworth highpass and Gaussian highpass filters. [8]
4. a) What are the different types of mean filters used for noise reduction? Explain. [8]
- b) Explain about image restoration using minimum mean square error filtering. [8]
5. a) Explain the procedure of converting colors from HSI to RGB. [8]
- b) Discuss about noise in color images. [8]
6. a) Compute the Haar transform of the 2 x 2 image [8]
$$F = \begin{bmatrix} 3 & -1 \\ 6 & 2 \end{bmatrix}$$
- b) With an example, explain Huffman coding. [8]
7. a) With necessary figures, explain the opening and closing operations. [8]
- b) Discuss about region based segmentation. [8]