Code No: RR410407 **Set No.1**

IV B.Tech. I Semester Regular Examinations, November -2005
DIGITAL IMAGE PROCESSING
(Common to Electronics & Communication Engineering and Electronics & Telematics)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Explain how an image is formed? Discuss about various elements of an image processing system. [10]
   (b) Listout the applications of image processing. [6]
2. (a) Explain about
      i. 4-connectivity
      ii. 8-connectivity and
      iii. m-connectivity with an example of each. [6]
   (b) Discuss about various distance measures. [6]
   (c) What are the applications of ALU operations in image processing? [4]
3. (a) Obtain the Hadamand transform kernel for N=8. [8]
   (b) Explain the applications of Hotelling transform. [8]
4. (a) Show that histogram equalization method gives uniform historgram for continuous images. [8]
   (b) Explain how addition and subtraction operations are useful in image enhancement with an example of each. [8]
5. (a) What are circulant and block circulant matrices? What is the effect of diagonalization on the degradation model? Explain. [8]
   (b) Derive an expression for restored image using wiener filtering. [8]
6. (a) What is meant by image segmentation? Explain the features that are considered for segmentation. [6]
   (b) Explain with an example how derivative operators are useful for edge detection. [10]
7. (a) Explain the basic principle of Hough transform and how it is employed for edge detection. [10]
   (b) Explain the concept of region split and merge algorithm for segmentation. [6]
8. (a) Explain how subimage selection and bit allocation effects the compression and quality of an image. [8]

(b) Compare and contrast lossless and lossy compression methods in all aspects. [8]

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Code No: RR410407 **Set No.2**

IV B.Tech. I Semester Regular Examinations, November -2005
DIGITAL IMAGE PROCESSING
(Common to Electronics & Communication Engineering and Electronics & Telematics)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) What is meant by digital image processin? What are the applications of it? How an image is represented? Explain. [8]
   (b) What are the fundamental steps in image processing? Explain with a block diagram. [8]
2. (a) Explain about
      i. 4-connectivity
      ii. 8-connectivity
      iii. m-connectivity with an example of each [6]
   (b) Discuss about various distance measures. [6]
   (c) What are the applications of ALU oeprations in image processing? [4]
3. (a) Show that I-D discrete Fourier transform and its inverse transform are periodic functions. [8]
   (b) Develop an FFT algorithm using successive doubling method. [8]
4. Explain about various spatial filters for image smoothing and sharpening operations. [16]
5. (a) What are circulant and block circulant matrices? What is the effect of diagonalization on the degradation model? Explain. [8]
   (b) Derive an expression for restored image using wiener filtering. [8]
6. Describe the procedure for image segmentation based on
   (a) region growing and
   (b) region splitting & merging.

   with relevant examples. [16]
7. (a) Obtian the arithmetic code for the message sequence a e e o i u ! given the code model: [8]

Symbol	Probability
a	0.2
e	0.3
i	0.1
o	0.2
u	0.1
!	0.1

(b) For the above code model develope an Huffman code. [8]

8. (a) Describe the principle of lossless and lossy predictive coding methods. [10]

(b) Explain with a block diagram about transform coding system. [6]

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Code No: RR410407 **Set No.3**

IV B.Tech. I Semester Regular Examinations, November -2005
DIGITAL IMAGE PROCESSING
(Common to Electronics & Communication Engineering and Electronics & Telematics)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) What are isopreference curves? What is their significance? Explain with an example. [8]
   (b) Explain the effect of reducing spatial resolution and gray level quantization. [8]

2. (a) Explain about
      i. 4-connectivity
      ii. 8-connectivity &
      iii. m-connectivity with an example of each. [6]
   (b) Discuss about various distance measures [6]
   (c) What are the applications of ALU operations in image processing? [4]

3. (a) State and prove any two properties of 2-D fourier transform. [8]
   (b) Obtain I-D DCT Kernel coefficients for N=8. [8]

4. (a) Distinguish between spatial and frequency domain methods of image enhacement. [6]
   (b) Briefly explain about image enhancement using point processing techniques. [10]

5. (a) What are circulant and block circulant matrices? What is the effect of diagonalization on the degradation model? Explain? [8]
   (b) Explain the method of inverse filtering for image restoration. [8]

6. (a) Explain with an example how derivative operators are useful for edge detection. [10]
   (b) What is the role of thresholding in segmentation? Explain. [6]

7. (a) What is meant by image compression? What is the need for compression? Explain, with an example, in terms of storage and transmission requirements. [8]
   (b) What are the various data redundancies? Explain . [8]

8. (a) What is bit-plane slicing? How it is used for achieving compression? Explain. [6]

   (b) The arithmetic decoding process is the reverse of the encoding procedure. Decode the message 0.234 given the coding model: [10]

Symbol	Probability
a	0.2
e	0.3
i	0.1
o	0.2
u	0.1
!	0.1

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Code No: RR410407 **Set No.4**

IV B.Tech. I Semester Regular Examinations, November -2005
DIGITAL IMAGE PROCESSING
(Common to Electronics & Communication Engineering and Electronics & Telematics)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Explain how a digital image is formed for a given continuous image. [8]
   (b) Explain the effect of reducing the No. of samples and no. of gray levels of given digital image. [8]
2. (a) Explain about
      i. 4-connectivity
      ii. 8-connectivity and
      iii. m-connectivity with an example of each. [6]
   (b) Discuss about various distance measures [6]
   (c) What are the applications of ALU operations in image processing? [4]
3. (a) State and prove the following properties 2-D Fourier Transform
      i. Seperability
      ii. Translation [8]
   (b) Derive the kernal coefficients for I-D walsh Transform. [8]
4. (a) Show that a high-pass filtered image can be obatined in the spatial domain as:
      High pass = original - low pass
      Assume 3×3 filters. [8]
   (b) Discuss the properties of Butterworth filter. [8]
5. (a) What are circulant and block circulant matrices? What is the effect of diagonalization on the degradation model? Explain. [8]
   (b) Explain the method of inverse filtering for image restoration. [8]
6. (a) Explain with an example how derivative operators are useful for edge detection. [10]
   (b) What is the role of thresholding in segmentation? Explain [6]
7. (a) Explain the basic principle of Hough transform and how it is employed for edge detection. [10]
   (b) Explain the concept of region split and merge algorithm for segmentation. [6]

8. (a) Consider an 8-pixel line of gray-scale data, {12, 12, 13, 13, 10, 13, 57, 54}, which has been uniformly quantized with 6-bit accuracy. Construct its 3-bit IOS code. [8]

   (b) Explain the principle of 2-D ran length coding with an example. [8]

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