Code No: M0424/R07 **Set No. 1**

IV B.Tech I Semester Supplementary Examinations, March 2013
DIGITAL IMAGE PROCESSING
(Electronics & Communication Engineering)

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

Answer any FIVE Questions
All Questions carry equal marks

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1. Explain following relations between pixels
   (a) Relations,Equivalence and transitive closures of pixels.
   (b) Concept of distance measures between pixels. [16]
2. (a) Give the expression and explain for 2D convolution expression for AXB size Image.
   (b) What is meant by wrap around error. [10+6]
3. Discuss the following:
   (a) High pass spatial filters
   (b) Low pass spatial filters. [16]
4. Sketch perspective plot of an 2-D Ideal High pass filter transfer function and filter cross section and explain its usefulness in Image enhancement. [16]
5. Consider the following image composed of solid color squares for discussing your answer, choose a gray scale consisting of eight shades of gray, 0 through 7, where 0 is black and 7 is white. Suppose that the image is converted to H S I color space,. Answer the following questions:
   (a) Sketch the hue image.
   (b) Sketch the saturation image.
   (c) Sketch the intensity image.
   Note : use specific numbers for the grade shades. shown in figure 5c. [16]

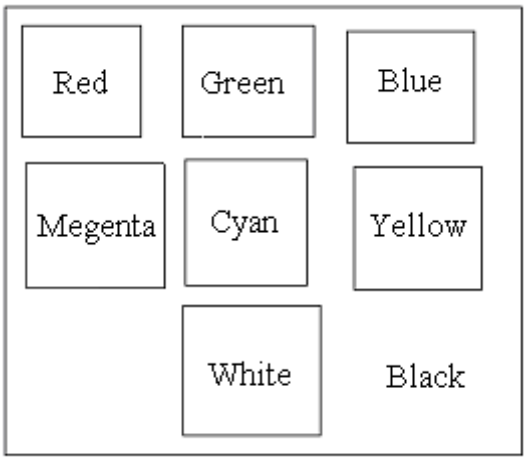

Figure 5c

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6. (a) What is the function of Inverse Filter
   (b) Draw the Appropriate Diagram for Inverse Filter
   (c) Explain about Pseudoinverse Filter. [5+5+6]

7. (a) Explain about Sobel edge Detector.
   (b) Write about Roberts edge Detector. [8+8]

8. Explain about Fidelity Criteria. [16]

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Code No: M0424/R07 **Set No. 2**

IV B.Tech I Semester Supplementary Examinations, March 2013
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Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. The 3×3 mask shown below is frequently used to compute the derivative in the y-direction at each point in an image.
   −1 0 1
   −2 0 2
   −1 0 1
   Give an ALU procedure to implement this operation. [16]

2. (a) Find Fourier transform 2 -D sinusoidal function $n(x,y) = A \sin(u_0x + v_0y)$
   (b) Obtain the spectrum in above case. [10+6]

3. Explain following spatial filters.
   (a) Median filter
   (b) Min. filter
   (c) Max.filter
   (d) Low pass filter. [16]

4. Give the expression for 2-D Butterworth Low pass filter transfer function and sketch it. Explain its usefulness in Image enhancement. [16]

5. Derive the CMY transformations to generate the complement of a color image. [16]

6. Explain the following:
   (a) Gaussian noise
   (b) Rayleigh noise. [16]

7. (a) Explain about Prewitt edge Detector.
   (b) Write about Roberts edge Detector. [8+8]

8. Write about the following:
   (a) Interpixel Redundancy
   (b) Psychovisual Redundancy. [8+8]

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Code No: M0424/R07 **Set No. 3**

IV B.Tech I Semester Supplementary Examinations, March 2013
DIGITAL IMAGE PROCESSING
(Electronics & Communication Engineering)

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

Answer any FIVE Questions
All Questions carry equal marks

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1. Explain following relations between pixels
   (a) Neighbors of pixels
   (b) Connectivity of pixels
   (c) Labeling of connected components. [16]
2. (a) Find Fourier transform 2 -D sinusoidal function n(x,y) = A sin(u_0x + v_0y)
   (b) Obtain the spectrum in above case. [10+6]
3. What is spatial filtering? How it is useful for Image enhancement, also discuss different types spatial filters used in Image enhancement. [16]
4. Suppose that you form a Low pass spatial filter that averages the 4- neighbors of point (x,y), but excludes the point (x,y) itself
   (a) Find the equivalent filter H(u,v) in the frequency domain
   (b) Show that your result a low pass filter. [16]
5. Derive the CMY intensity mapping function of si = kri + (1-k) where i=1,2,3 from its RGB counterpart in si = kri where i =1,2,3. [16]
6. Explain the following Order-Statistics Filters.
   (a) Max and min filters
   (b) Median filter
   (c) Alpha-trimmed mean filter. [16]
7. Explain about Line detection using the Hough Transform. [16]
8. Write about the following:
   (a) Interpixel Redundancy
   (b) Psychovisual Redundancy. [8+8]

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Code No: M0424/R07 **Set No. 4**

IV B.Tech I Semester Supplementary Examinations, March 2013
DIGITAL IMAGE PROCESSING
(Electronics & Communication Engineering)

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

Answer any FIVE Questions
All Questions carry equal marks

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1. A common measure of transmission for digital data is the baud rate, defined as the number of bits transmitted per second. Generally, transmission is accomplished in packets consisting of starting bit, a byte of information, and a stop bit. Using this approach, answer the following.
   (a) How many minutes would it take to transmit a 512×512 image with 128 grey levels at 300 baud?
   (b) What would the time be at 9600 baud?
   (c) Repeat (a) and (b) for a 1024×1024 image 128 grey levels. [16]
2. Discuss the basics separable transforms. Also give example for it. [16]
3. Discuss the following:
   (a) High pass spatial filters
   (b) High boost spatial filters. [16]
4. Explain the concept of generation of spatial masks from frequency domain specifications. [16]
5. Show that the saturation component of the complement of a color image cannot be computed from the saturation component of the input image alone. [16]
6. Explain the following Order-Statistics Filters.
   (a) Max and min filters
   (b) Median filter
   (c) Alpha-trimmed mean filter. [16]
7. A binary image contains straight lines oriented horizontally, vertically, at 45^0 and at -45^0 give a set of 3×3 mask that can be used to detect 1-pixel-long brakes in these lines.assume that the gray levels of lines is one and that the gray level of the background is 0. [16]
8. A binary erasure channel is one in which there is a finite probability β that a transmitted symbol will not be received. The channel has three possible outputs: a0, an erasure (no received symbol), and a1. These three outcomes form the three

rows of the binary erasure channel matrix.

$$Q = \begin{bmatrix} 1-\beta & 0 \\ \beta & \beta \\ 0 & 1-\beta \end{bmatrix}$$

(a) Find the capacity of the channel.

(b) Would you prefer a binary symmetric channel with a 0.125 probability of error or an erasure channel with probability of erasure $\beta = 0.5$? [16]

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