Code No: 07A70501 **R07** **Set No. 2**

IV B.Tech I Semester Examinations,MAY 2011
DIGITAL IMAGE PROCESSING
Electronics And Communication Engineering

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

Answer any FIVE Questions
All Questions carry equal marks

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1. Propose a technique for detecting gaps of length ranging between 1 and L pixels in line segment of a binary image. Assume that the lines are 1 pixel thick.
   Note: base your technique on 8-neighbor connectivity analysis. [16]

2. Formulate 1D Hadamard (Rendundant) kernel for N=8. [16]

3. What is homomorphic filtering, Discuss its usefulness in Image enhancement. Explain with the help of block diagram. [16]

4. The white bars in the test pattern shown in figure 4b are 7 pixels wide and 210 pixels high. The separation between bars is 17 pixels. What would this image look like after application of

   (a) A 7 × 7 geometric mean filter?
   (b) A 9 × 9 geometric mean filter? [16]

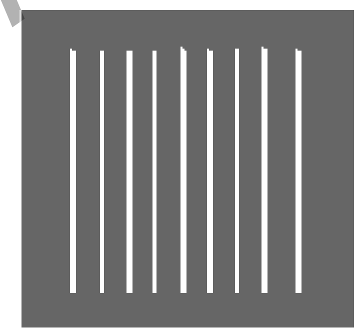

Figure 4b

5. Explain the following:

   (a) Spatial processing
   (b) Color vectoring processing. [8+8]

   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 IGS code. [16]

7. What is high boost filtering? How it is different from high pass filtering, compare these techniques. [16]

8. Consider the image segment shown below

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

(a) Let V = {0,1} and compute the D4, D8 and Dm distances between p and q

(b) repeat for V = {1,2} [16]

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Code No: 07A70501 **R07** **Set No. 4**

IV B.Tech I Semester Examinations,MAY 2011
DIGITAL IMAGE PROCESSING
Electronics And Communication Engineering

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

Answer any FIVE Questions
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1. Explain the following Order-Statistics Filters.
   (a) Max and min filters
   (b) Median filter
   (c) Midpoint filter. [16]

2. (a) Explain the need of color image smoothing.
   (b) Draw the HIS color model and give the expression for R G B interms of HIS. [8+8]

3. Explain the working of LZW source level encoding with an example. [16]

4. (a) With example discuss FWT concept .
   (b) What are the advantages and disadvantages of FWT. [8+8]

5. Basic approach used to compute the digital gradient involves taking the differences of the form f(x,y) - f(x+1,y).
   (a) Obtain filter transfer function H(u,v) for performing equivalent process in the frequency domain.
   (b) Show that it is a high pass filter. [16]

6. Develop an algorithm for converting a one pixel thick, 8-connected path to 4-connected path. [16]

7. Answer the following from the given 3 X 3 image Assume that the Prewitt masks are used to obtain Gx and Gy.
   Show that the gradient
   Computed by $\nabla f = mag(\nabla f)[G_x^2 + G_y^2]^{1/2}$ and $\nabla f = |Gx| + [Gy]$ give identical for edges oriented in the horizontal and vertical directions.
   Note: masks used to compute the gradient at point labeled Z_5.
   $\nabla f = mag(\nabla f)[G_x^2 + G_y^2]^{1/2}$ and $\nabla f = |Gx| + |Gy|$ give identical results for edges oriented in the horizontal and vertical directions. [16]

Z1	Z2	Z3
Z4	Z5	Z6
Z7	Z8	Z9

8. Discuss the limiting effect of repeatedly applying a 3X3 low pass spatial filter to a digital Image. You may ignore the border effects. [16]

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Code No: 07A70501 **R07** **Set No. 1**

IV B.Tech I Semester Examinations,MAY 2011
DIGITAL IMAGE PROCESSING
Electronics And Communication Engineering

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

Answer any FIVE Questions
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1. Draw and explain HIS triangle of the RBG color cube. [16]

2. With mathematical expressions discuss Haar transform and explain how it is useful in Image processing. [16]

3. (a) Write about Roberts edge Detector.
   (b) Explain about Laplacian of a Gaussian (LoG) Detector. [8+8]

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

5. The white bars in the test pattern shown in figure 5b are 7 pixels wide and 210 pixels high. The separation between bars is 17 pixels. What would this image look like after application of
   (a) A 3×3 geometric mean filter?
   (b) A 9×9 geometric mean filter? [16]

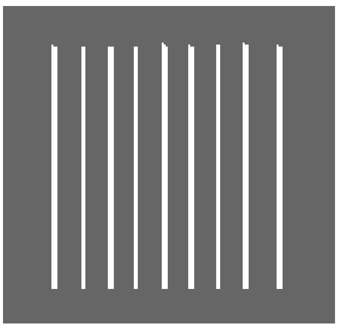

Figure 5b

6. (a) Construct the entire 4-bit Gray code.
   (b) Create a general procedure for converting a gray coded number to its binary equivalent and use it to decode 0111010100111. [8+8]

7. 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 pockets 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 256 gray levels at 300 baud?

(b) What would the time be at 9600 baud?

(c) Repeat
(a) and (b) for a 1024×1024 image 256 gray levels. [16]

8. (a) State and explain convolution theorem and correlation theorem.

(b) What is succesive doubling and how it is used to formulate Fast Fourier transform. [8+8]

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Code No: 07A70501 **R07** **Set No. 3**

IV B.Tech I Semester Examinations,MAY 2011
DIGITAL IMAGE PROCESSING
Electronics And Communication Engineering

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

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Explain the need for Image enhancement.
   (b) Explain Gray level transformation functions for contrast enhancement. [8+8]
2. Explain about Adaptive, local noise reduction filter. [16]
3. Explain the following properties of 2D-Fourier Transform:
   (a) Distributives and scaling
   (b) Rotation
   (c) Periodicity and conjugate symmetry
   (d) Seperability. [16]
4. Prove that the average value of any image convolved with the equation $\nabla^2 h = ((r^2 - \sigma^2)/\sigma^4))\exp(-r^2/2\sigma^2)$ is zero. [16]
5. Explain the following:
   (a) Arithmetic operations on Images
   (b) Logical operations on Images. [16]
6. (a) Draw the relevant diagram for a communication system model.
   (b) Explain the noiseless coding theorem. [8+8]
7. Derive the CMY intensity mapping function of si = kri + (1-k) I=1,2,3 from its RGB counterpart in si = kri I =1,2,3. [16]
8. (a) Assume continuous variables and show that the Fourier transform the constant function f(x,y) =1 is the unit impulse function δ(u,v), defined as δ(u,v) = infinity, if u=v=0 and δ(u,v)=0 otherwise.
   (b) What is the result if f(x,y) =1 is now a digital Image of size NXN. [8+8]

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