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

IV B.Tech I Semester Supplementary Examinations, December 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. Formulate 2D - DFT expressions from 1D - DFT expressions.Also give relations between Δu, Δx and Δv, Δy. [16]
3. Show that a high pass filtered Image can obtained in the spatial domain as High pass= Original - Low pass, for simplicity assume 3x3 filters. [16]
4. Sketch perspective plot of an 2-D Ideal Low pass filter transfer function and filter cross section and explain its usefulness in Image enhancement. [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 about Adaptive, local noise reduction filter. [16]
7. Write about various edge Detectors available in function edge. [16]
8. An 8 level image has the gray level distribution given in table.

$\mathbf{r}_k$	$\mathbf{P}_r(\mathbf{r}_k)$	Code 1	$\mathbf{L}_1(r_k)$	Code 2	$\mathbf{L}_2(\mathbf{r}_k)$
r_0= 0	0.19	000	3	11	2
r_1=1/7	0.25	001	3	01	2
r_2=1/7	0.21	010	3	10	2
r_3=3/7	0.10	011	3	001	3
r_4=4/7	0.08	100	3	0001	4
r_5=5/7	0.06	101	3	00001	5
r_6=6/7	0.03	110	3	000001	6
r_7=1	0.02	111	3	000000	6

   (a) compute entropy of the source
   (b) construct the Huffman code for source symbol and explain any difference between the constructed code and code 2. [16]

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

IV B.Tech I Semester Supplementary Examinations, December 2013
DIGITAL IMAGE PROCESSING
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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. Compute Fourier transform of 2D-gate function f(x,y) with amplitude ?A? and width along x- axis is 'X' and width along y- axis is 'Y'. Also sketch its spectrum and light intensity function. [16]
3. Suppose that a digital Image is subjected to histogram equalization. Show that a second pass of histogram equalization will produce exactly the same result as the first pass. [16]
4. What is homomorphic filtering, Discuss its usefulness in Image enhancement. Explain with the help of block diagram. [16]
5. Explain with a neat diagram how the gray levels are transformed to color. [16]
6. The white bars in the test pattern shown in figure 6b 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]

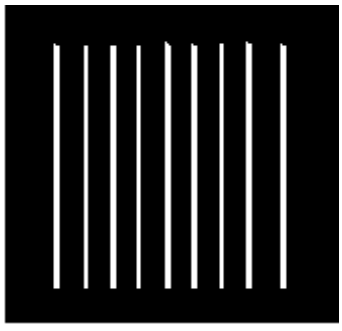

Figure 6b

7. What is region based Segmentation? Explain about region growing. [16]
8. (a) Draw and explain a general compression system model.
   (b) Draw the relevant diagram for source encoder and source decoder. [8+8]

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

IV B.Tech I Semester Supplementary Examinations, December 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. Show that the D4 distance between two points p and q is equal to the shortest 4-path between these points. Is this path unique? [16]
2. (a) State and prove 2D-DFT scaling property.
   (b) Obtain average value of function in term of Fourier transform. [8+8]
3. (a) Develop a procedure for computing the median of an nxn neighborhood.
   (b) Propose a technique for updating the median as the center of the neighborhood is moved from pixel to pixel. [16]
4. Discuss the frequency domain techniques of Image enhancement in detail. [16]
5. Explain about the CMY and CMYK color models in detail? [16]
6. Explain the following:
   (a) Gaussian noise
   (b) Rayleigh noise. [16]
7. Explain the three techniques for detecting basic types of gray level discontinuities in a digital image. [16]
8. Explain about the following:
   (a) One-dimensional compression
   (b) Two-dimensional compression. [8+8]

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

IV B.Tech I Semester Supplementary Examinations, December 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. 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]

2. (a) Discuss the dynamic range compression property w.r.t 2D-DFT.
   (b) State and prove separability property of 2D-DFT. [8+8]

3. Discuss Image smoothing with the following
   (a) Low pass spatial filtering
   (b) Median filtering [16]

4. Discuss the frequency domain techniques of Image enhancement in detail. [16]

5. Draw and Explain the schematic diagram of the RBG color cube showing the primary and secondary colors of the light at the vertices Points along the main diagonal have gray values from the black at the origin to white at point (1,1,1).[16]

6. What is Noise? what are the spatial and frequency properties of noise? [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) Draw and explain a general compression system model.
   (b) Draw the relevant diagram for source encoder and source decoder. [8+8]

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