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

IV B.Tech I Semester Supplementary Examinations, Feb/Mar 2011
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. (a) What is the usefulness of DCT in Image processing?
   (b) Give the expressions for 1D and 2D DCT and explain. [6+10]
3. What is high boost filtering? How it is different from high pass filtering, compare these techniques. [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. 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. Explain the following Order-Statistics Filters.
   (a) Max and min filters
   (b) Median filter
   (c) Alpha-trimmed mean filter. [16]
7. (a) Write about Roberts edge Detector.
   (b) Explain about Laplacian of a Gaussian (LoG) Detector. [8+8]
8. Explain about the following:
   (a) Compression by quantization
   (b) IGS quantization procedure with table. [8+8]

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

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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. Derive transformation matrices for
   (a) Translation
   (b) Scaling
   (c) Rotation about X-axis. [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. Give the expression for 2-D Butterworth Low pass filter transfer function and sketch it. Explain its usefulness in Image enhancement. [16]
5. Explain in detail about the HIS and CMYK color spaces. [16]
6. Explain the following Order-Statistics Filters.
   (a) Max and min filters
   (b) Median filter
   (c) Alpha-trimmed mean filter. [16]
7. The results obtained by a single through an image of some 2D- masks can also be achieved by two passes using 1-D masks. The results of using a 3 × 3 smoothing mask with coefficients 1/9 can also be obtained by passing through an image the mask [1 1 1]. The result of this pass is then followed by a pass of the mask. $\begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}$. The final result is then scaled by 1/9.show that the Sobel masks can be implemented by one pass of a differencing mask of the form [-1 0 1] (or it's vertical counterpart) followed By a smoothing mask of the form [1 2 1] (or it's vertical counterpart). [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, Feb/Mar 2011
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. The 3×3 mask shown below is frequently used to compute the derivative in the x - direction at each point in an image.

$$\begin{matrix} -1 & -2 & -1 \\ 0 & 0 & 0 \\ 1 & 2 & 1 \end{matrix}$$

Give an ALU procedure to implement this operation. [16]

2. State and prove following properties of 2D-DFT
   (a) Translation
   (b) Periodicity
   (c) Conjugate symmetry. [6+5+5]

3. What is spatial filtering? How it is useful for Image enhancement, also discuss different types spatial filters used in Image enhancement. [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 intensity mapping function of si = kri + (1-k) I=1,2,3 from its RGB counterpart in si = kri I =1,2,3. [16]

6. Explain the model of image degradation and restoration process with appropriate diagram. [16]

7. 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]

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. 4**

IV B.Tech I Semester Supplementary Examinations, Feb/Mar 2011
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) Discuss in detail sampling and quantization of Images.
   (b) Define spatial resolution? What is its effect on Image processing. [10+6]
2. Discuss the basics separable transforms. Also give example for it. [16]
3. What is meant by histogram equalization? Discuss how it is useful to Image enhancement. [16]
4. What is homomorphic filtering, Discuss its usefulness in Image enhancement. Explain with the help of block diagram. [16]
5. (a) What is meant by color Image smoothing? Explain.
   (b) What is meant by color image Sharpening? Explain. [8+8]
6. Explain the following:
   (a) Gaussian noise
   (b) Rayleigh 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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