Code No: 07A60510 **R07** **Set No. 2**

III B.Tech II Semester Examinations,APRIL 2011
DIGITAL IMAGE PROCESSING
Electronics And Computer Engineering

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

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) What are the different fields in which Digital Image Processing is used?
   (b) With reference to relation between pixels explain:
      i. 4 connectivity
      ii. 8 connectivity
      iii. Mixed connectivity. [8+8]
2. Explain the different color models used for image processing in detail. [16]
3. (a) Explain the method of Histogram Specification for image enhancement.
   (b) Develop a procedure for computing the median of an n × n neighborhood. [8+8]
4. (a) Determine a 4×4 DCT matrix.
   (b) How KL transform is different from other transforms and what are the applications of it? [8+8]
5. (a) Explain the coding redundancy process for data compression.
   (b) Explain how a run length codes are used for image compression? [8+8]
6. (a) What are different types of high pass filters used in image enhancement?
   (b) Explain the process of unsharp masking in frequency domain? [8+8]
7. (a) Explain the method of restoration which is used when only the mean and variance of the noise are known.
   (b) Using the transfer function $H(u,v) = -\sqrt{2\pi}\sigma(u^2+v^2)e^{-2\pi^2(u^2+v^2)}$ derive the equation of constrained least squares filter. [8+8]
8. Explain the water shed Transform and how it is used for Image segmentation. [16]

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Code No: 07A60510 **R07** **Set No. 4**

III B.Tech II Semester Examinations,APRIL 2011
DIGITAL IMAGE PROCESSING
Electronics And Computer Engineering

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

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Explain the method for image restoration which consider both degradation function and statistical characteristics of noise.
   (b) Explain the method of constrained Least Squares Filtering for image restoration. [8+8]
2. Explain the processing techniques applicable to full color images in detail. [16]
3. (a) What is data redundancy and how it is measured?
   (b) What are the basic components of a lossless predictive coding system and explain working of their components? [8+8]
4. (a) Explain how Laplacian mask is used for image enhancement?
   (b) Explain how the image is enhanced by a high boost filter? [8+8]
5. (a) Explain the local processing for edge-point linking .
   (b) Show that the Sobel and Prewitt gradient masks give isotropic results only for horizontal edges, vertical edges and for the edges oriented at $\pm 45^0$. [8+8]
6. Define the terms luminance, chrominance
   (a) as used in image processing
   (b) How to reduce the aliasing in an image [10+6]
7. (a) What are the different applications of image subtraction?
   (b) Can nonlinear spatial filers are applicable for an image? If so, how to use them?
   (c) What are the side effects of image averaging? [6+6+4]
8. (a) How to find the average value using DFT?
   (b) Define the 2-D DCT and how to implement it. [6+10]

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Code No: 07A60510 **R07** **Set No. 1**

III B.Tech II Semester Examinations,APRIL 2011
DIGITAL IMAGE PROCESSING
Electronics And Computer Engineering

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

Answer any FIVE Questions
All Questions carry equal marks

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1. Explain the following terms with respect to an image
   (a) neighbors of a pixel
   (b) connectivity
   (c) distance measures
   (d) sampling and quantization. [16]
2. Explain the histogram processing methods for global enhancement in detail. [16]
3. Explain the techniques to detect the points, lines and edges in detail. [16]
4. (a) Prove the following properties of 2-D DFT
      i. Translation
      ii. Periodicity
      iii. Distributivity
      iv. Scaling
   (b) A 2×2 block of image is given as . Image = $\begin{vmatrix} 20 & 13 \\ 20 & 01 \end{vmatrix}$. Determine the Haar coefficients. [8+8]
5. (a) Define data redundancy and compression ratio
   (b) What are the applications of loss less image compression?
   (c) How to calculate the prediction error in lossy predictive coding? [4+4+8]
6. (a) How to estimate the parameters of periodic noise?
   (b) Compare the wiener and constrained least squares filtering.
   (c) Explain why the contra harmonic filter is effective in elimination pepper noise when order of filter is positive? [6+6+4]
7. (a) Derive the CMY transformations to generate the complement of a color image.
   (b) Sketch the surface in RGB space for the points that satisfy the equation $D(z,a) = \left[(z-a)^T C^{-1}(z-a)\right]^{\frac{1}{2}} = D_0$ Where D_0 is a specified nonzero constant Assume that a=0 and that Assume that a=0 and $C = \begin{bmatrix} 800 \\ 010 \\ 001 \end{bmatrix}$ [8+8]

8. (a) Explain how the high boost filter is used for image enhancement when the input image is darker than desired?

   (b) Prove that the low frequencies correspond to the slowly varying components and high frequencies correspond to the faster gray level changes of an image. [8+8]

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Code No: 07A60510 **R07** **Set No. 3**

III B.Tech II Semester Examinations,APRIL 2011
DIGITAL IMAGE PROCESSING
Electronics And Computer Engineering

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

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Explain a simple Image formation model.
   (b) Define the terms luminance, chrominance and perceived brightness as used in image processing. [8+8]
2. (a) What are the advantages of segmentation of an image?
   (b) What type of mask is used to detect an edge in an image?
   (c) Explain the basic approach for region growing which is used in image segmentation. [4+4+8]
3. (a) Explain how the smoothing filters are used to reduce the sharp transition in gray levels?
   (b) Explain how the first derivatives is used for image enhancement? [8+8]
4. (a) Draw the model of the image restoration process and explain how it works.
   (b) What are the different sources of noise in digital image processing? Explain them. [8+8]
5. (a) Compare the local and global enhancement of an image.
   (b) Explain how mean and variance are used for image enhancement. [8+8]
6. (a) Compare full color and pseudo-color image processing
   (b) Explain how an edges can be computed directly in color vector space. [8+8]
7. (a) Show that the Fourier transform and its inverse are linear processes.
   (b) Discuss the computational requirements for determining DCT for 256×256, eigth-bit monochrome image. [8+8]
8. (a) Explain the transform coding system for compressed and decompressed image.
   (b) Can variable-length coding procedures be used to compress a histogram equalized image with 2^n gray levels? Explain. [8+8]

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