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

III B.Tech II Semester Examinations,December 2010
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) Explain how the gradient is used for image enhancement?
   (b) Explain how high-boost filter in frequency domain is used for image enhancement? [8+8]
3. (a) Explain how the quality of an image has to be assessed?
   (b) Draw and explain the source encoder and decoder model. [8+8]
4. (a) What is image restroration and explain the model of the image restoration.
   (b) What are different sources of noise and explain the quality of the reconstructed image from noisy image. [8+8]
5. (a) Explain the mapping method for image enhancement.
   (b) Explain how to use Arithmetic/Logic operations for image enhancement? [8+8]
6. (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]
7. (a) Explain the local processing for linking edge points in an image.
   (b) Prove that the average value of any image convolved with Laplacian operator is zero. [8+8]
8. (a) What are the three approaches for enclosing data for enclosing data regions for RGB vector segmentation?
   (b) Assume that the monitor and printer of an imaging system are imperfectly calibrated. An image that looks balanced on the monitor appears yellowish in print. Describe general transformations that might correct the imbalance. [8+8]

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

III B.Tech II Semester Examinations,December 2010
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 following terms with respect to color image
   i. Hue
   ii. Saturation
   iii. Intensity
   (b) Explain pseudo-color image enhancement. [8+8]
2. Explain the histogram processing methods for global enhancement in detail. [16]
3. (a) How zero-crossing property of the second derivative is used in an image ?
   (b) Explain the global processing for edge-point linking . [8+8]
4. (a) What is principle of smoothing filter?
   (b) Why the second-order derivative is better suited for image enhancement?
   (c) What is high boost filtering? [6+6+4]
5. (a) What is the significance of high frequency components of the image? Why would the Fourier transform be of use in their analysis?
   (b) Derive a slant Transformation matrix of size 8×8. [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. Explain the following error free compression methods.
   (a) variable length coding
   (b) Huffman coding
   (c) Arithmetic coding
   (d) LZW coding. [4+4+4+4]
8. (a) Give the probability density functions for the following noises
   i. Uniform noise
   ii. Impulse noise
   iii. Periodic noise
   iv. Exponential noise
   (b) How to estimate noise parameters? [12+4]

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

III B.Tech II Semester Examinations,December 2010
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 types of masks are used to detect a line in an image?
   (b) Explain the image segmentation based on finding the regions directly. [8+8]
2. (a) Draw the model of the image degradation process and explain each block.
   (b) Derive the expression for Wiener filter for image restoration of images degraded by noise. [8+8]
3. (a) Define the 2-D Slant Transform and how to implement it.
   (b) Define Haar function and hence derive the Haar transform. [8+8]
4. (a) Explain the coding redundancy process for data compression.
   (b) Explain how run length codes are used for image compression? [8+8]
5. (a) Explain how smoothing filters are used to reduce noise?
   (b) Explain how Homomorhic filtering approach is used in image processing? [8+8]
6. (a) Explain the conceptual relationships between the RGB and HSE color models.
   (b) Explain the geometric interpretation of the intensity-slicing technique. [8+8]
7. (a) Explain with suitable examples where the concept of connectivity is used in image processing.
   (b) What will happen when the number of samples in a digital image is varied? [10+6]
8. (a) Two images f(x,y) and g(x,y) have histograms hf and hg. Give the conditions under which you can determine the histograms of
      i. f(x,y)+g(x,y)
      ii. f(x,y)-g(x,y)
      iii. f(x,y) x g(x,y)
      iv. $f(x, y) \div g(x, y)$

      interms of hf and hg. Explain how to obtain the histogram in each case.
   (b) Show that subtracting the Laplacian from an image is proportional to unsharp masking . [8+8]

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

III B.Tech II Semester Examinations,December 2010
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 procedure of region growing segmentation.
   (b) What is low cost path and how it is used for edge-linking? [8+8]
2. (a) Define the 2-D Hadamard Transform and write its properties and applications.
   (b) Define the 2-D DCT and write its properties and applications. [8+8]
3. Explain how to use the following filters for noise-reduction
   (a) Geometric mean filter
   (b) Alpha-trimmed mean filter
   (c) Adaptive filter
   (d) Harmonic mean filter [16]
4. (a) Show that the isotropic property is lost in general if the gradient is computed using the equation $\nabla f = |G_x| + |G_y|$
   (b) What is the transformation function for histogram equalization, if the histogram of the input image as Gaussian probability density function? [8+8]
5. (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]
6. (a) How a color image can be compressed?
   (b) How many different shades of gray are there in a color of RGB system in which each RGB image is an 8-bit image? [10+6]
7. (a) Consider the image segment shown. Let V=1,2 and compute the lengths of the shortest 4-, 8-, and m-path between p and q. If a particular path does not exist between these two points. Explain why

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

   (b) Explain how an image is formed from the scene? [8+8]
8. (a) Explain the role of DCT in image compression?

(b) Consider following table and construct Hulfman code for word "call"

Symbol	Probability
a	0.5
l	0.1875
e	0.1875
c	0.125

[8+8]

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