Code No: 37037 **SET-1**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
R05 IV B.Tech. I Semester Supplementary Exams, May/June – 2009
DIGITAL IMAGE PROCESSING
(Electronics & Communication Engineering)

Time: 3 hours Max Marks: 80

Answer any FIVE Questions.
All Questions carries equal marks.

1.a] Explain the basic principle of imaging in different bands of electromagnetic spectrum.
b] Explain about components of an Image processing system. [10+6]

2.a] Define 2D Fourier transform and its Inverse. State and prove the following properties of 2D Fourier transform:
i) Translation. ii) Distributivity iii) Scaling iv) Seperability.
b] Define Discrete cosine Transform and explain its properties. [9+7]

3.a] What is the objective of Image enhancement. Define spatial domain. Define point processing.
b] Explain about the following point processing operations in spatial domain with a simple 6- bit input image of 4x4 size .
i) Image negative. ii) Contrast stretching. iii) Gray level slicing iv) Bit-plane slicing. [2+12]

4.a] Define frequency domain and frequency component with respect to a Digital image. How do we relate frequencies in Fourier transform with the intensity variations in a digital image.
b] Explain the basics of filtering in the frequency domain.
c] Explain about Smoothing frequency domain filters. [4+4+8]

5.a] Define Image restoration. Derive the degradation model for discrete functions.
b] Explain Digitalization of Circulate and Block circulant matrices. [8+8]

6.a] Explain about color models.
b] Explain about Gray level to Color transformations. [10+6]

7.a] What is image segmentation. Explain the techniques of detecting different gray level discontinues in Digital image.
b] Explain any one of the linking procedures. [10+6]

8.a] Define image compression. Explain about the redundancies in a Digital image.
b] Explain about image compression models. [10+6]

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Code No: 37037 **SET-2**

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R05 IV B.Tech. I Semester Supplementary Exams, May/June – 2009
DIGITAL IMAGE PROCESSING
(Electronics & Communication Engineering)

Time: 3 hours Max Marks: 80

Answer any FIVE Questions.
All Questions carries equal marks.

1.a] Explain about the applications of Image processing in different bands of electromagnetic spectrum.
b] Explain about elements of visual perception. [8+8]

2.a] Explain how Fourier transforms are useful in digital image processing and explain the properties of Fourier transform.
b] Explain about Haar transform and its properties. [8+8]

3.a] Define histogram of a digital image. Explain how histogram is useful in image enhancement.
b] Explain about histogram equalization process. Apply the same on a simple 8- bit image of size 4x4 and get the output image. Finally discuss the limitation of histogram equalization process. [6+10]

4.a] Wwhat is difference between enhancement in spatial domain and frequency domain. Explain about sharpening frequency domain filters.
b] Explain how we can achieve simultaneous gray level range compression and contrast enhancement. [8+8]

5.a] Explain about color fundamentals.
b] Explain about color transformations. [8+8]

6.a] Explain about algebraic approach to image restoration.
b] Explain about the model of Image degradation/restoration model. And discuss about the principle sources of noise in digital images. [8+8]

7.a] Discuss approaches for implementing first and second order digital derivatives for the detection of edjes in the image.
b] Explain about region growing and region splitting. [8+8]

8.a] Explain about fidelity criterion.
b] Explain a method of generating variable length codes with an example.
c] Explain about lossless predictive coding. [4+6+6]

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Code No: 37037 **SET-3**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
R05 IV B.Tech. I Semester Supplementary Exams, May/June – 2009
DIGITAL IMAGE PROCESSING
(Electronics & Communication Engineering)

Time: 3 hours Max Marks: 80

Answer any FIVE Questions.
All Questions carries equal marks.

1.a] Explain about fundamental steps in digital image processing.
b] Explain about image sampling and quantization process. [8+8]

2.a] Explain the properties of Slant transform.
b] Explain the properties of Hardmard transform. [8+8]

3.a] What is histogram of a digital image. Explain histogram specification process. And apply the process to a 8 – bit image of size 5x5 and get the output image that has the specified histogram.
b] Explain about image averaging process. [12+4]

4.a] Explain how derivative helps to derive tools for image sharpening.
b] Explain about local enhancement. [10+6]

5.a] Explain the process of converting colors from RGB to HIS and vice versa.
b] Explain about Pseudocolor image processing. [8+8]

6.a] Explain about Least mean square filter used for image restoration.
b] Explain about constrained least squares restoration process for image restoration. [8+8]

7.a] Explain about Basic global thresholding and basic adaptive thresholding processes used in image segmentation.
b] Explain about region based segmentation. [8+8]

8.a] What is the drawback of Huffman encoding process. How it is overcome in Arithmetic encoding process, explain with an example.
b] Explain LZW coding with an example. [8+8]

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Code No: 37037 **SET-4**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
R05 IV B.Tech. I Semester Supplementary Exams, May/June – 2009
DIGITAL IMAGE PROCESSING
(Electronics & Communication Engineering)

Time: 3 hours Max Marks: 80

Answer any FIVE Questions.
All Questions carries equal marks.

1.a] Define spatial and gray level resolution. Explain about Isopreference curves.
b] Explain about the basic relationships and distance measures between pixels in a digital image. [6+10]

2.a] Explain the properties of the Discrete cosine transform.
b] Explain the properties of Slant transform. [8+8]

3.a] Discuss about the mechanics of filtering in spatial domain. Mention the points to be considered in implementing neighborhood operations for spatial filtering.
b] Compare smoothing linear filters and order-static filters. [8+8]

4.a] Explain basic steps for filtering in frequency domain. How do you relate frequency components of Fourier transform with the spatial variation in the gray levels of the image.
b] Explain how Laplacian is implemented in frequency domain.
c] What is High frequency filtering. [8+4+4]

5.a] Explain about color image smoothing and sharpening process.
b] Explain about color segmentation process. [8+8]

6.a] Explain about the restoration filters used when the image degradation is due to noise only.
b] Explain about Wiener filter used for image restoration. [8+8]

7.a] What are the basic types of gray level discontinuities in a digital image. And how they are detected.
b] Explain the significance of Thresholding in image segmentation. [8+8]

8.a] Define image compression. Explain about data redundancy.
b] Explain with example how Huffman encoding process reduces coding redundancy.
c] Explain about lossy predictive coding. [5+6+5]

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