

B.Tech IV Year II Semester (R09) Supplementary Examinations April 2017

DIGITAL IMAGE PROCESSING

(Common to MCT & ECE)

Time: 3 hours

Max. Marks: 70

Answer any FIVE questions
All questions carry equal marks

- 1 Discuss in detail about the following mathematical operations used in digital image processing:
 - (a) Array & matrix operations.
 - (b) Arithmetic & logic operations.
 - (c) Linear & non linear operations.
 - (d) Probabilistic methods.

- 2
 - (a) What are image transforms? Explain their significance in image processing.
 - (b) Explain about least mean square error property of KL transform.

- 3 Discuss various intensity transformation functions and hence justify histogram processing is also an intensity transformation method.

- 4
 - (a) Derive a correspondence between spatial and frequency domain filtering.
 - (b) Discuss image sharpening in frequency domain.

- 5 With the help of an image degradation/restoration model, explain the restoration process and hence derive an expression for inverse filter used for restoration.

- 6
 - (a) Explain detection process of the point, line, edge discontinuities in an image.
 - (b) Explain how motion is used in segmentation process.

- 7 Explain the three types of redundancies in images and suggest a technique for each to eliminate these redundancies.

- 8 What are color models? Write about the following color models and their importance with respect to an application.
 - (a) RGB.
 - (b) HSV.
 - (c) CMYK.

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Answer any FIVE questions
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- 1 (a) Discuss the image sampling and quantization.
(b) Explain the fundamental steps involved in digital image processing.
- 2 (a) Compute DCT matrix for $N = 4$.
(b) Find 2D Haar transform for $f(x, y)$ shown below:
$$\begin{bmatrix} 4 & -1 \\ 2 & 3 \end{bmatrix}$$
- 3 (a) Define grey level transformation.
(b) Discuss image enhancement using histogram techniques.
- 4 With neat block diagram, explain the concept of Homomorphic filtering.
- 5 (a) Distinguish image enhancement and restoration.
(b) Discuss the formulation of 1D degradation model.
- 6 (a) Explain the concept of edge linking and boundary detection.
(b) Discuss the region oriented segmentation.
- 7 (a) What is the need for image compression?
(b) Discuss the loss less predictive coding with the help of block diagram.
- 8 (a) Distinguish Pseudo-color image processing and full color image processing.
(b) Explain the concept RGB color model.

Code: 9A04802

R09

B.Tech IV Year II Semester (R09) Regular & Supplementary Examinations April 2015

DIGITAL IMAGE PROCESSING
(Common to MCT & ECE)

Time: 3 hours

Max. Marks: 70

Answer any FIVE questions
All questions carry equal marks

- 1 (a) Explain about fundamental steps of digital image processing.
(b) With neat diagram explain the concept of sampling and quantization.
- 2 (a) Explain the properties of discrete cosine transform.
(b) Explain the properties of slant transform.
- 3 (a) What is histogram of a digital image? Explain how histogram is useful in image enhancement.
(b) Explain smoothing linear filters and order-static filters.
- 4 (a) What is the difference between enhancement in spatial domain and frequency domain? Explain about sharpening in frequency domain.
(b) Explain how we can achieve simultaneous gray level range compression and contrast enhancement.
- 5 (a) Explain about the restoration filters used when the image degradation is due to noise only.
(b) Explain about Wiener filter used in image restoration.
- 6 (a) Explain the significance of thresholding in image segmentation.
(b) What are the basic types of gray level discontinuities in a digital image? How are they detected?
- 7 (a) Explain about fidelity criterion and explain about loss less predictive coding.
(b) Explain a method of generating variable length code with example.
- 8 (a) Explain about color fundamentals.
(b) Explain about color transformations.

Code: 9A04802

B.Tech IV Year II Semester (R09) Regular & Supplementary Examinations May/June 2014

DIGITAL IMAGE PROCESSING

(Common to MCT & ECE)

Time: 3 hours

Max. Marks: 70

Answer any FIVE questions
All questions carry equal marks

- 1 (a) Explain the digital image representation.
(b) Derive basic relationships between pixels.
(c) Discuss the following tools used in digital image processing.
- 2 (a) Obtain the Hadamard transform matrix for $N=4$.
(b) Explain the correlation with an example. The input matrix $X(m, n)$, and $h(m, n)$ perform the linear convolution between these two matrices, where

$$X(m, n) = \begin{bmatrix} 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix} \quad h(m, n) = \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}$$
- (c) Explain the properties of unitary transforms.
- 3 (a) What is histogram? Explain in detail about histogram equalization with an example.
(b) Explain about any two spatial smoothing filter techniques.
- 4 (a) Mention various frequency domain filter techniques for image sharpening and discuss any two such filters.
(b) Discuss about homomorphic filtering and explain how it is related to image model.
- 5 (a) Discuss about degradation model in detail.
(b) Discuss about Weiner filtering.
- 6 (a) What is the purpose of image segmentation? Explain edge detection using gradient operators.
(b) Discuss about different thresholding techniques.
- 7 (a) On what basis Huffman coding and arithmetic coding are useful for image compression? Explain.
(b) Describe about
 - (i) Run length coding.
 - (ii) Scalar & Vector quantization.
- 8 (a) Explain the conversion from HSI to RGB color model.
(b) Discuss about color segmentation process.
