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Printed Page:-3 **Subject Code:- AMTCSE0213**

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA
(An Autonomous Institute Affiliated to AKTU, Lucknow)
M.Tech
SEM: II - THEORY EXAMINATION (2025 - 2026)
Subject: Digital Image Processing

Time: 3 Hours **Max. Marks: 70**

General Instructions:

IMP: *Verify that you have received the question paper with the correct course, code, branch etc.*

1. *This Question paper comprises of* ***three Sections -A, B, & C.*** *It consists of Multiple Choice Questions (MCQ's) & Subjective type questions.*

2. *Maximum marks for each question are indicated on right -hand side of each question.*

3. *Illustrate your answers with neat sketches wherever necessary.*

4. *Assume suitable data if necessary.*

5. *Preferably, write the answers in sequential order.*

6. *No sheet should be left blank. Any written material after a blank sheet will not be evaluated/checked.*

SECTION-A 15

1. Attempt all parts:-

(1.1) Images quantized with insufficient brightness levels is lead to the occurrence of_____(CO1,K2) 1

(a) Pixillation
(b) Blurring
(c) False contours
(d) None of the mentioned

(1.2) Smoothing filter is used to remove _____ from an image.(CO2,K2) 1

(a) Smooth transitions of brightness levels
(b) Smooth transitions of grey levels
(c) Sharp transitions of brightness levels
(d) Sharp transitions of grey levels.

(1.3) The transforming relations performed by DTFT are (CO3,K2) 1

1) Linearity
2) Modulation
3) Shifting
4) Convolution

(a) 1, 2 and 3 are correct
(b) 1 and 2 are correct
(c) 1 and 3 are correct
(d) All of the mentioned

(1.4) Reflection and translation of the image objects are based on.(CO4,K2) 1

(a) pixels

(b) frames
(c) structuring elements
(d) coordinates

(1.5) Information lost when expressed mathematically is called(CO5,K2) 1

(a) markov
(b) finite memory source
(c) fidelity criteria
(d) noiseless theorem

2. Attempt all parts:-

(2.1) Define sampling and quantization. (CO1,K2) 2

(2.2) Define Laplace filter.(CO2,K2) 2

(2.3) Write The Expression For Hadamard Transforms. (CO3,K2) 2

(2.4) Give the properties of the second derivative around an edge. (CO4,K2) 2

(2.5) Define psycho visual redundancy.(CO5,K2) 2

SECTION-B 20

Answer any one of the following:-

(3.1) Write down the steps involved in converting an image into digital image for image processing in detail . (CO1,K2) 4

(3.2) Explain with example a) Neighbors of pixel b) Connectivity(CO1,K2) 4

Answer any one of the following:-

(3.3) Define histogram and Explain histogram equalization. (CO2,K2) 4

(3.4) Perform histogram equalization on the following 3x3 image matrix and show the resulting output.(CO2,K3) 4

$$\text{Image: } \begin{pmatrix} 60 & 120 & 180 \\ 80 & 140 & 200 \\ 100 & 160 & 220 \end{pmatrix}$$

Answer any one of the following:-

(3.5) Explain 2D Walsh Transform(CO3,K3) 4

(3.6) Explain forward transformation kernel with example.(CO3,K2) 4

Answer any one of the following:-

(3.7) Write short notes on image segmentation.(CO4,K2) 4

(3.8) Write short notes on edge detection(CO4,K2) 4

Answer any one of the following:-

(3.9) Analyze the fundamentals of color image processing.(CO5,K2) 4

(3.10) Explain CMY color model. (CO5,K3) 4

SECTION-C 35

4. Answer any one of the following:-

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(4.1)	Explain and make pixel representation for the following arrangement- (CO1,K3) 4- Adjacent 8- Adjacent m-Adjacent	7
(4.2)	Explain the purpose of image compression in digital image processing. Also explain the purpose of morphological processing. (CO1,K2)	7

5. Answer any one of the following:-

(5.1)	Explain Homomorphic filtering in detail. Also, calculate the enhanced image g(x, y) (CO2,K2)	7
(5.2)	Explain Grey Level Transformation in image enhancement. (CO2,K2)	7

6. Answer any one of the following:-

(6.1)	Explain Discrete cosine transform in detail(CO3,K3)	7
(6.2)	Explain boundary descriptor with suitable equations. (CO3,K2)	7

7. Answer any one of the following:-

(7.1)	Explain the principal approaches used in image processing to describe the texture of a region.(CO4,K2)	7
(7.2)	Explain the Region-Based and Contour based Image Segmentation. (CO4,K3)	7

8. Answer any one of the following:-

(8.1)	Compare lossy compression and lossless compression.(CO5,K2)	7
(8.2)	Obtain the Huffman code for the word ‘COMMITTEE’.(CO5,K3)	7