.

Printed Page:-3 **Subject Code:- AEC0513**

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA
(An Autonomous Institute Affiliated to AKTU, Lucknow)
B.Tech
SEM: V - THEORY EXAMINATION (2025 - 2026)
Subject: Image Processing and pattern Recognition

Time: 3 Hours **Max. Marks: 100**

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 20

1. Attempt all parts:-

1-a. If the pixel value is '0' then it represents ___ color?(CO1,K1) 1

(a) White
(b) Black
(c) Red
(d) Grey

1-b. What is the first and foremost step in Image Processing?(CO1,K1) 1

(a) Image restoration
(b) Image enhancement
(c) Image acquisition
(d) Segmentation

1-c. What is the name of the process, which reverses the image's intensity? (CO2,K1) 1

(a) Piecewise Linear Transformations
(b) Image Negatives
(c) Log Transformations
(d) None of the above

1-d. What is the main idea behind grey-level slicing?(CO2,K1) 1

(a) For brightening the relevant grey-valued pixels and preserving the background
(b) To give all grey levels of a specific range high value and a low value to all other grey levels.
(c) All of the above
(d) None of the above

.

1-e. The purpose of image restoration is to (CO3,K1) 1

(a) Enhance the original image
(b) Degrade the original image
(c) Retrieve the original image
(d) None of the mentioned

1-f. Which one of the following noise is mostly found in medical ultrasound images?(CO3,K1) 1

(a) Additive Noise
(b) Multiplicative Noise
(c) Speckle Noise
(d) None of the above

1-g. Accuracy of image segmentation can be improved by the type of:(CO4,K1) 1

(a) Image
(b) Division
(c) Processes
(d) Sensors

1-h. What are the two approaches to segmentation?(CO4,K1) 1

(a) Haar-like feature & 3-D rectangle approach
(b) Region based segmentation & edge segmentation
(c) Adaboost approach & edge segmentation
(d) None of the above

1-i. Color model used for printers (CO5,K1) 1

(a) CMYK
(b) RCB
(c) RGB
(d) CMR

1-j. What are the characteristics that are used to distinguish one color from the other?(CO5,K1) 1

(a) Brightness, Hue, and Saturation
(b) Hue, Brightness, and Intensity
(c) Saturation, Hue
(d) Brightness, Saturation, and Intensity

2. Attempt all parts:-

2.a. What is feature extraction?(CO1,K2) 2

2.b. What is meant by histogram equalization? (CO2,K2) 2

2.c. Define median and mid-point filter.(CO3,K2) 2

2.d. How the derivatives are obtained in edge detection during formulation?(CO4,K2) 2

2.e. Define "Intensity Slicing".(CO5,K2) 2

SECTION-B 30

3. Attempt all parts:-

3.a. Answer any one of the following:-

3.a.(i)	Explain image sampling and quantization with an example. (CO1,K2)	6
3.a.(ii)	Define simple image formation model for object having the property of reflectance.(CO1,K2)	6

3.b. Answer any one of the following:-

3.b.(i)	Write a short note on image sharpening filters in spatial domain.(CO2,K2)	6
3.b.(ii)	Write a short note on image smoothening filters in frequency domain. (CO2,K2)	6

3.c. Answer any one of the following:-

3.c.(i)	Explain different types of noise based on source.(CO3,K2)	6
3.c.(ii)	Explain (i) Median filter (ii) Mid – point filter.(CO3,K2)	6

3.d. Answer any one of the following:-

3.d.(i)	What is Edge & Line detection?(CO4,K2)	6
3.d.(ii)	What do you understand by morphological watershed?(CO4,K2)	6

3.e. Answer any one of the following:-

3.e.(i)	Explain the Pseudo colouring process with suitable example. (CO5,K4)	6
3.e.(ii)	Discuss procedure for conversion from HSI color model to RGB color model.(CO5,K2)	6

SECTION-C 50

4. Answer any one of the following:-

4-a.	What is image acquisition using sensor arrays? Explain.(CO1,K2)	10
4-b.	What is digital image? Explain different types of neighbors of a pixel in a digital image. Explain with an example. (CO1,K2)	10

5. Answer any one of the following:-

5-a.	What are image sharpening filters in spatial domain? Explain the various types of it in detail.(CO2,K2)	10
5-b.	Compare the various image transformation technique. (CO2,K4)	10

6. Answer any one of the following:-

6-a.	What do you understand by inverse filtering? Explain in detail.(CO3,K2)	10
6-b.	What do you understand by quantization noise and photon noise? Explain in detail.(CO3,K2)	10

7. Answer any one of the following:-

7-a.	Explain thinning and thickening operation with suitable example.(CO4,K2)	10
7-b.	Explain Otsu and adaptive thresholding techniques. (CO4,K2)	10

8. Answer any one of the following:-

8-a.	What are the different color models used in image processing? Explain in detail. Give the conversion formula between RGB to HSI model and vice-verca.(CO5,K4)	10
8-b.	What is morphological image processing? Write a note on Erosion and Dilation.(CO5,K4)	10