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Subject Code:- AEC0513

Roll. No:

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NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech

SEM: V - CARRY OVER THEORY EXAMINATION - APRIL 2023

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. Approaches to image processing that work directly on the pixels of incoming image work in _____ (CO1) 1
- (a) Spatial domain
 - (b) Inverse transformation
 - (c) Transform domain
 - (d) None of the Mentioned
- 1-b. How many number of steps are involved in image processing? (CO1) 1
- (a) 10
 - (b) 9
 - (c) 11
 - (d) 12
- 1-c. What is the technique for a gray-level transformation function called, if the transformation would be to produce an image of higher contrast than the original by darkening the levels below some gray-level m and brightening the levels above m in the original image. (CO2) 1

- (a) Contouring
 - (b) Contrast stretching
 - (c) Mask processing
 - (d) Point processing
- 1-d. What is the name of the process, which reverses the image's intensity? (CO2) 1
- (a) Piecewise Linear Transformations
 - (b) Image Negatives
 - (c) Log Transformations
 - (d) None of the above
- 1-e. Power spectra and noise of undegraded image must be known as (CO3) 1
- (a) Wiener Filter
 - (b) Notch Filter
 - (c) Band Pass Filter
 - (d) None of these
- 1-f. Which is not a type of noise? (CO3) 1
- (a) Gamma Noise
 - (b) Rayleigh Noise
 - (c) Black Noise
 - (d) Exponential Noise
- 1-g. Example of Histogram-Based Methods is (CO4) 1
- (a) Level Set Methods
 - (b) Graph Partitioning Methods
 - (c) Watershed Transformation
 - (d) Neural Networks Segmentation
- 1-h. Segmentation is the process of (CO4) 1
- (a) low level process
 - (b) Edge level process
 - (c) Mid level process
 - (d) None of the above
- 1-i. Full color images have at least (CO5) 1
- (a) 2 Components
 - (b) 3 Components
 - (c) 4 Components

(d) 5 Components

- 1-j. Color transformation is modelled using (CO5) 1
- (a) $g(x,y) = [f(x,y)]$
- (b) $g(x,y) = T[f(x)]$
- (c) $g(x,y) = T[f(y)]$
- (d) $g(x,y) = T[f(x,y)]$

2. Attempt all parts:-

- 2.a. Define image acquisition. (CO1) 2
- 2.b. What is maximum filter and minimum filter? (CO2) 2
- 2.c. Write the expression of the PDF of uniform noise and calculate its mean value. (CO3) 2
- 2.d. What are the two properties used for establishing similarity of edge pixels? (CO4) 2
- 2.e. Define Brightness. (CO5) 2

SECTION B

30

3. Answer any five of the following:-

- 3-a. What are the components of digital image processing? (CO1) 6
- 3-b. Find the number of bits required to store a 256 X 256 image with 32 gray levels? (CO1) 6
- 3-c. Explain in detail (i) Image Thresholding (ii) Gray Level Slicing. (CO2) 6
- 3-d. Compare smoothing & sharpening in frequency domain image enhancement. (CO2) 6
- 3.e. Explain the block diagram of image degradation and restoration model. (CO3) 6
- 3.f. Write a short note on (i) Distance transform (ii) Medial axis transform 6
- 3.g. Explain the RGB model in detail. 6

SECTION C

50

4. Answer any one of the following:-

- 4-a. How image acquisition can be done using sensor strips? (CO1) 10
- 4-b. What is digital image? Explain different types of neighbors of a pixel in a digital image. Explain with an example. (CO1) 10

5. Answer any one of the following:-

- 5-a. Explain in detail (i) Image Negative Transformation (ii) Logarithmic Transformation (iii) Power Law Functions (CO2) 10

5-b. Analyze the performance of sharpening filters Ideal HPF. (CO2) 10

6. Answer any one of the following:-

6-a. Discuss (i) Median filter (ii) Mid – point filter (iii) Max filter (iv) Min filter. (CO3) 10

6-b. What is image degradation? What are the various ways in which an image can be degraded? Explain image degradation model in detail. (CO3) 10

7. Answer any one of the following:-

7-a. Explain edge detection technique in detail. (CO4) 10

7-b. Define thresholding and explain the various methods of thresholding in detail. (CO4) 10

8. Answer any one of the following:-

8-a. Explain various color models in details used in image processing. (CO5) 10

8-b. Explain the morphological operation to extract the boundary of object for binary image. (CO5) 10