Printed Page:- 04 **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 (2023-2024)

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.*

COP MARCH 2024

SECTION A **20**

1. Attempt all parts:-

1-a. Which of the following fact is correct for an image? (CO1) 1

(a) An image is the multiplication of illumination and reflectance component

(b) An image is the subtraction of reflectance component from illumination component

(c) An image is the subtraction of illumination component from reflectance component

(d) An image is the addition of illumination and reflectance component

1-b. What is pixel? (CO1) 1

(a) Pixel is the elements of a digital image

(b) Pixel is the elements of an analog image

(c) Pixel is the cluster of a digital image

(d) Pixel is the cluster of an analog image

1-c. The domain that refers to image plane itself and the domain that refers to Fourier transform of an image is/are: (CO2) 1

(a) Spatial domain in both

(b) Frequency domain in both

(c) Spatial domain and Frequency domain respectively

(d) Frequency domain and Spatial domain respectively

1-d. A smoothing filter can also be called a median filter. 1

(a) TRUE

(b) FALSE

1-e. Degraded image is obtain in a 1

(a) Frequency domain

(b) Spatial domain

(c) Time domain

(d) None of the Mentioned

1-f. Gaussian noise is also known as 1

(a) Black noise

(b) White noise

(c) Red noise

(d) Normal noise

1-g. In the sense of predicate two regions of the image must be 1

(a) Same

(b) Different

(c) Overlapped

(d) Disjoin

1-h. Segmentation is difficult for images that are 1

(a) Trivial

(b) Non trivial

(c) Illuminated

(d) Low resolution

1-i. What do you mean by the term pixel depth? 1

(a) It is the number of bits used to represent each pixel in RGB space

(b) It is the number of bytes used to represent each pixel in RGB space

(c) It is the number of units used to represent each pixel in RGB space

(d) It is the number of mm used to represent each pixel in RGB space

1-j. What is the equation used to obtain S (saturation) component of each RGB pixel in RGB color format? 1

COP MARCH 2024

(a) S=1+3/(R+G+B) [min(R,G,B)].

(b) S=1+3/(R+G+B) [max(R,G,B)]

(c) S=1-3/(R+G+B) [max(R,G,B)]

(d) S=1-3/(R+G+B) [min(R,G,B)]

2. Attempt all parts:-

2.a.	Define JPEG and PNG format of digital image.	2
2.b.	What is contrast stretching?	2
2.c.	What do you understand by image degradation? (CO3)	2
2.d.	List out the different shape properties.	2
2.e.	Define "Pseudo Color-Processing"?	2

SECTION B **30**

3. Answer any <u>five</u> of the following:-

3-a.	Explain the image acquisition using sensor strips.	6
3-b.	Explain image sampling and quantization with an example. (CO1)	6
3-c.	What is mean filter? If an image is given as following, What would be the output of box filter? (CO2)	6

1	5	7
2	4	8
3	6	9

3-d.	Explain in detail (i) Image Contrast Streching (ii) Bit Plain Slicing.	6
3.e.	Write a short note on (i) Gaussian noise (ii) Impulse noise (iii) Poisson noise. (CO3)	6
3.f.	Describe the term distance transform, and medial axis transform.	6
3.g.	Compare RGB and HSI color image models.	6

SECTION C **50**

4. Answer any <u>one</u> of the following:-

4-a.	Describe in detail the steps involved in digital image processing.	10
4-b.	Write a short note on (i) Adjacency (ii) Connectivity (iii) Regions (iv) Boundaries.	10

5. Answer any <u>one</u> of the following:-

5-a.	Explain the various types of gray level transformation used for image	10

COE MARCH 2024

enhancement.

5-b. Discuss the following spatial enhancement techniques a) Spatial averaging b) Median filtering. 10

6. Answer any <u>one</u> of the following:-

6-a. Define uniform distribution and derive the expression of its mean and variance. 10

6-b. Write short note on (i) Arithmetic mean filter (ii) Geometric mean filter (iii) Harmonic mean filter (iv) Contra – harmonic mean filter. (CO3) 10

7. Answer any <u>one</u> of the following:-

7-a. Explain Otsu and adaptive thresholding techniques. 10

7-b. Explain morphological watershed in detail.(CO4) 10

8. Answer any <u>one</u> of the following:-

8-a. Define Color model? Why is it necessary? Explain about the L*a*b color model in detail. (CO5) 10

8-b. Explain about color fundamentals. 10

COP MARCH 2024