Printed Page:-

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 (2022 - 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. A basic image is represented in ___ dimensions? (CO1) 1

(a) 1D

(b) 2D

(c) 3D

(d) 4D

1-b. A typical size comparable in quality to monochromatic TV image is of size. (CO1) 1

(a) 256×256

(b) 512×512

(c) 1920×1080

(d) 1080×1080

1-c. Which of the following is the general representation of power transformation? (CO2) 1

(a) c = sry

(b) s = rcy

(c) s = cry

(d) s = rc

1-d. The subtraction operation results in areas that appear as dark shades of gray. Why? (CO2) 1

(a) Because the difference in such areas is little, that yields low value

(b) Because the difference in such areas is high, that yields low value

(c) Because the difference in such areas is high, that yields high value

(d) None of the mentioned

1-e. The purpose of image restoration is to (CO3) 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 range images? (CO3) 1

(a) Gaussian noise

(b) Poisson noise

(c) Rayleigh noise

(d) Erlang noise

1-g. Laplacian is a_____.(CO4) 1

(a) First order derivative filter

(b) Sobel operator

(c) Canny operator

(d) Second order derivative filter

1-h. Threshold based segmentation is based on (CO4) 1

(a) Number of clusters

(b) Clip level

(c) Number of regions

(d) All of the above

1-i. The color spectrum consists of (CO5) 1

(a) 4 Colors

(b) 6 Colors

(c) 7 Colors

(d) 8 Colors

1-j. Radiance is measured in (CO5) 1

(a) Joule

(b) Watts

(c) Lumens

(d) Meter

2. Attempt all parts:-

2.a. Write down any four applications of digital image processing. (CO1) 2

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

2.c. What do you understand by image degradation? (CO3) 2

2.d. Define grey level co-occurrence matrix. (CO4) 2

2.e. Discuss the Color model in brief? (CO5) 2

SECTION B 30

3. Answer any five of the following:-

3-a. Explain the different Linear and Nonlinear Operations on digital images. (CO1) 6

3-b. Define briefly the following terms (i) image restoration (ii) compression (iii) segmentation (iv) morphological process. (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. Discuss the image enhancement process using (i) Image Subtraction (ii) Image Averaging. (CO2) 6

3.e. Write a short note on (i) Gaussian noise, (ii) Rayleigh noise, (iii) Uniform noise. (CO3) 6

3.f. Write a short note on (i) Image segmentation (ii) Hough transform (iii) Wavelet transform (CO4) 6

3.g. Explain the Pseudo colouring process with suitable example. (CO5) 6

SECTION C 50

4. Answer any one of the following:-

4-a.	Explain the procedure of sampling and quantization in detail with a suitable diagram. (CO1)	10
4-b.	Explain sensing and image acquisition process in detail. Also explain the relationship between pixels specifying their importance. (CO1)	10

5. Answer any one of the following:-

5-a.	Define histogram with its significance. Write the algorithms for both histogram equalization and histogram specification. Also mention the advantage of using histogram specification over histogram equalization. (CO2)	10
5-b.	Explain Arithmetic and Logic operations for image enhancement in spatial domain. (CO2)	10

6. Answer any one of the following:-

6-a.	Explain different noises models in detail based on nature of noises. (CO3)	10
6-b.	Draw the pdf of Gaussian noise and derive the expression of its mean. (CO3)	10

7. Answer any one of the following:-

7-a.	Explain the following: (i) edge detection segmentation and edge linking technique, (ii) DWT, (iii) Hough Transform. (CO4)	10
7-b.	Write short note on (i)Fuzzy C-means (ii) Line detection algorithm (CO4)	10

8. Answer any one of the following:-

8-a.	Explain the basic fundamental of different Color models. Give the formation of CMY, YCbCr, and Pseudo colour in detail. (CO5)	10
8-b.	Write a short note on: (a) Dilation and Erosion Operators (b) Top Hat Filter (c) HSI and False color. (CO5)	10