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.*

SECTION-A 20

1. Attempt all parts:-

1-a. Which of the following is the abbreviation of JPEG? (CO1) 1

(a) Joint Photographic Experts Group

(b) Joint Photographs Expansion Group

(c) Joint Photographic Expanded Group

(d) Joint Photographic Expansion Group

1-b. An image is considered to be a function of a(x,y), where a represents (CO1) 1

(a) Height of image

(b) Width of image

(c) Amplitude of image

(d) Resolution of image

1-c. What is the output of a smoothing, linear spatial filter? (CO2) 1

(a) Median of pixels

(b) Maximum of pixels

(c) Minimum of pixels

(d) Average of pixels

1-d. Which of the following is the correct representation of log transformation? (CO2) 1

(a) s=clog10(1+r)

(b) s=clog10(1/r)

(c) s=clog10(1-r)

(d) s=clog10(1*r)

1-e. Filter that replaces the pixel value with the minimum of intensity level is (CO3) 1

(a) Max filter
(b) Geometric mean filter
(c) Median filter
(d) Min filter

1-f. Degraded image is produced using degradation process and (CO3) 1

(a) pixels
(b) Destruction
(c) Coordinates
(d) Additive Noise

1-g. Thresholding is the example of (CO4) 1

(a) Continuity
(b) Similarity
(c) Recognition
(d) Discontinuity

1-h. Segmentation is a process of (CO4) 1

(a) Low level process
(b) Edge level process
(c) Mid level process
(d) High level process

1-i. Color model is also named as (another name): (CO5) 1

(a) Color space
(b) Color gap
(c) Color space & color system
(d) Color system

1-j. How many bits of RGB color images are represented by a full-color image? (CO5) 1

(a) 32-bit RGB color image
(b) 24-bit RGB color image
(c) 16-bit RGB color image
(d) 8-bit RGB color image

2. Attempt all parts:-

2.a. List out the different image formats. (CO1) 2

2.b. Specify the objective of image enhancement technique. (CO2) 2

2.c. Draw the block diagram of image degradation (restoration) model and explain in brief. (CO3) 2

2.d. What do you understand by Hough transform? (CO4) 2

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

SECTION-B 30

3. Answer any five of the following:-

3-a. How image acquisition can be done by using a single sensing element? (CO1) 6

3-b. What are the steps involved in digital image processing? (CO1) 6

3-c. Obtain the digital negative image of the 3 Bit image as shown below: (CO2) 6

1	2	2	2	2
3	2	4	5	2
2	6	6	7	0
2	6	6	5	1
0	2	3	2	1

3-d. Explain in detail (i) Image Thresholding (ii) Gray Level Slicing. (CO2) 6

3.e. What is the difference between image restoration and image enhancement? (CO3) 6

3.f. What do you understand by segmentation? List out its applications. (CO4) 6

3.g. Explain CMY model in detail. (CO5) 6

SECTION-C 50

4. Answer any one of the following:-

4-a. Calculate the number of bits required to store a 256 X 256 image with 256 gray levels? (CO1) 10

4-b. Define digital image? What are the 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. What is histogram? Explain histogram equalization with one example. (CO2) 10

5-b. Discuss the image smoothing filter with its model in the spatial domain. (CO2) 10

6. Answer any one of the following:-

6-a. What are the different types of noise model? Explain in detail. (CO3) 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 one of the following:-

7-a. How is line detected? Explain in detail. (CO4) 10

7-b. Write short note on (i) Wavelet transform (ii) Discrete wavelet transform (iii) Hough transform. (CO4) 10

8. Answer any one of the following:-

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

8-b. Explain about color segmentation process. (CO5) 10