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**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. Digitizer is a device for converting the output of the physical sensing device into \_\_\_\_.(CO1,K2) 1
- (a) analog form
- (b) image
- (c) digital form
- (d) all of the above
- 1-b. In Which filter does not have sharp output? (CO1,K2) 1
- (a) Linear phase filter
- (b) Delayed symmetric filter
- (c) Linear phase & Delayed symmetric filter
- (d) None of the mentioned
- 1-c. In spatial domain, which of the following operation is done on the pixels in sharpening the image?(CO2,K2) 1
- (a) Integration
- (b) Average
- (c) Median
- (d) Differentiation
- 1-d. In Which filter(s) used to find the brightest point in the image?(CO2,K2) 1
- (a) Median filter
- (b) Max filter
- (c) Mean filter
- (d) All of the above

- 1-e. Image segmentation is based on?(CO3,K2) 1
- (a) Morphology
  - (b) Set theory
  - (c) Extraction
  - (d) Recognition
- 1-f. Points exceeding the threshold in output image are marked as(CO3,K2) 1
- (a) 0
  - (b) 1
  - (c) 11
  - (d) X
- 1-g. In grayscale images, pixel intensity ranges from:(CO4,K2) 1
- (a) 0to 50
  - (b) 0 to 100
  - (c) 0 to 1000
  - (d) 0 to 255
- 1-h. Diagonal lines are angles at (CO4,K2) 1
- (a) 0
  - (b) 70
  - (c) 90
  - (d) 45
- 1-i. Intensity slicing is called\_\_\_\_\_ (CO5,K2) 1
- (a) density slicing
  - (b) image slicing
  - (c) color slicing
  - (d) region slicing
- 1-j. RGB color system is based upon (CO5,K2) 1
- (a) Cartesian plane
  - (b) Cartesian system
  - (c) Cartesian plane system
  - (d) Cartesian coordinate system

2. Attempt all parts:-

- 2.a. Mention one major component of a digital image processing setup.(CO1,K2) 2
- 2.b. State the main goal of image enhancement.(CO2,K2) 2
- 2.c. Discuss the any two types of thresholding in brief. (CO3,K2) 2
- 2.d. State the main goal of image registration.(CO4,K2) 2
- 2.e. State the primary components of the RGB colour model.(CO5,K2) 2

**SECTION-B** 30

3. Attempt all parts:-

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

- 3.a.(i) Explain the difference between lossless and lossy image compression with 6

examples. (CO1,K2)	
3.a.(ii) Describe the functional architecture of an image processing system and explain the role of each major component. (CO1,K2)	6
3.b. Answer any one of the following:-	
3.b.(i) Discuss the concept of Differentiation of Gaussian( DOG) method in detail. (CO2,K2)	6
3.b.(ii) Discuss the concept of Spatial convolution. (CO2,K2)	6
3.c. Answer any one of the following:-	
3.c.(i) Discuss the difference between skeletonization and morphological thinning.(CO3,K2)	6
3.c.(ii) Describe the importance of convex hull in analyzing object outlines.(CO3,K2)	6
3.d. Answer any one of the following:-	
3.d.(i) Describe the importance of multimodal registration in combining anatomical and functional data for medical diagnosis.(CO4,K2)	6
3.d.(ii) Discuss the advantages and disadvantages of Transformation. (CO4,K2)	6
3.e. Answer any one of the following:-	
3.e.(i) Explain the concept and formulation of the CMY and CMYK colour models, focusing on their application in printing and colour reproduction systems.(CO5,K2)	6
3.e.(ii) Explain the Properties of Opening and closing operation ? Explain with an example.(CO5,K2)	6
<b>SECTION-C</b>	<b>50</b>
4. Answer any <u>one</u> of the following:-	
4-a. Explain the differences in compression techniques among JPEG, PNG, BMP, and TIFF file formats.(CO1,K2)	10
4-b. Describe the process of image digitization and the need for sampling and quantization.(CO1,K2)	10
5. Answer any <u>one</u> of the following:-	
5-a. Discuss the fundamental objectives and processes involved in image enhancement.(CO2,K2)	10
5-b. Analyze the working mechanism of smoothing filters in removing image noise.(CO2,K5)	10
6. Answer any <u>one</u> of the following:-	
6-a. Explain the concept and mathematical formulation of Otsu's method for automatic threshold determination.(CO3,K2)	10
6-b. Present a detailed explanation of the medial axis transform and skeletonization process, emphasizing shape simplification. (CO3,K2)	10
7. Answer any <u>one</u> of the following:-	
7-a. Elaborate the characteristics of local registration, focusing on the adaptation of transformations to spatially varying regions.(CO4,K4)	10
7-b. Explain the Affine Transformation in detail with example.(CO4,K2)	10
8. Answer any <u>one</u> of the following:-	

- 8-a. Discuss the term Operators .How they plays an important role in image processing and also discuss the different types of operators(CO5,K2). 10
- 8-b. Explain the implementation steps for reading a grey scale image and convert into RGB model.(CO5,K2) 10

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