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NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech

SEM: VI - 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. What is the procedure done on a digital image to alter the values of its individual pixels known as?(CO1) 1
- (a) Geometric Spacial Transformation
- (b) Single Pixel Operation
- (c) Image Registration
- (d) Neighbourhood Operations
- 1-b. Which filter does not have sharp output?(CO1) 1
- (a) Linear phase filter
- (b) Delayed symmetric filter
- (c) Linear phase & Delayed symmetric filter
- (d) None of the mentioned
- 1-c. What is Histogram matching also called as(CO2) 1
- (a) Histogram Specification
- (b) Histogram equalization

- (c) Stretching
- (d) Enhancement
- 1-d. What is the full form for PDF, a fundamental descriptor of random variables i.e. gray values in an image?(CO2) 1
- (a) Pixel distribution function
- (b) Probability density function
- (c) Portable document format
- (d) Pixel density function
- 1-e. When is the contrast stretching transformation a linear function, for r and s as gray-value of image before and after processing respectively?(CO3) 1
- (a) $r_1 = s_1$ and $r_2 = s_2$
- (b) $r_1 = r_2$, $s_1 = 0$ and $s_2 = L - 1$, L is the max gray value allowed
- (c) $r_1 = 1$ and $r_2 = 0$
- (d) None of the mentioned
- 1-f. Example of discontinuity approach in image segmentation is:(CO3) 1
- (a) Edge based segmentation
- (b) Boundary based segmentation
- (c) Region based segmentation
- (d) Both a & b
- 1-g. How many bit RGB color image is represented by full-color image?(CO4) 1
- (a) 32-bit RGB color image
- (b) 16-bit RGB color image
- (c) 10-bit RGB color image
- (d) 24-bit RGB color image
- 1-h. High contrast images are considered as(CO4) 1
- (a) low resolution
- (b) High resolution
- (c) Blurred
- (d) Noisy
- 1-i. The color spectrum consists of(CO5) 1
- (a) 4 colors
- (b) 6 colors
- (c) 7 colors

	(d) 8 colors	
1-j.	RGB color system is based upon(CO5)	1
	(a) Cartesian plane	
	(b) Cartesian system	
	(c) Cartesian plane system	
	(d) Cartesian coordinate system	

2. Attempt all parts:-

2.a.	What do you understand by reflection?(CO1)	2
2.b.	Define term Histogram stretching.(CO2)	2
2.c.	Define the local thresholding.(CO3)	2
2.d.	Define Rotation.(CO4)	2
2.e.	What is an example of dilation?(CO5)	2

SECTION B

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3. Answer any five of the following:-

3-a.	Discuss the Two-dimensional Image Representation model.(CO1)	6
3-b.	What is meant by neighborhood criteria in an image?((CO1)	6
3-c.	Explain the working of adaptive median filter.(CO2)	6
3-d.	Discuss the linear order statistics filters.(CO2)	6
3.e.	What do you understand by image thinning process?(CO3)	6
3.f.	Enlist the applications of image transformation.(CO4)	6
3.g.	Explain about Pseudo Coloring.(CO5)	6

SECTION C

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4. Answer any one of the following:-

4-a.	Explain the following terms: i) image sensing ii) Image regions and boundaries iii) Arithmetic operation(CO1)	10
4-b.	Explain in detail about the structure of human eye.(CO1)	10

5. Answer any one of the following:-

5-a.	Explain about the Split technique.(CO2)	10
5-b.	Compare the various filters available under frequency domain for image enhancement.(CO2)	10

6. Answer any one of the following:-

6-a.	Explain the concept of edge detection?Discuss the categories of edge detection	10
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operators.(CO3)

6-b. Discuss in detail Canny edge and Laplacian operator in segmentation.(CO3) 10

7. Answer any one of the following:-

7-a. Discuss the following : 1)Similarity Metrics 2) Cross Correlations.(CO4) 10

7-b. Given a circle C with radius 10 and center coordinates (1, 4). Apply the translation with distance 5 towards X axis and 1 towards Y axis. Obtain the new coordinates of C without changing its radius.Discuss the advantages of Transformations.(CO4) 10

8. Answer any one of the following:-

8-a. Explain the briefly application of gray scale morphology like image smoothing, morphological gradient, top-hat transform?(CO5) 10

8-b. Explain the different types of boundary descriptors with suitable diagrams.(CO5) 10

2022-23 Jan_June