AMITY SCHOOL OF ENGINEERING & TECHNOLOGY
Digital Image Processing (ETIT- 418)

Total teaching weeks: 14 **Semester – VIII**
Total Lectures: 41 **Credit – 3**

	TOPICS TO BE COVERED	LECTURE
1	**UNIT I Introduction and Digital Image Fundamentals:** The origins of Digital Image Processing, Examples of Fields that Use Digital Image Processing	1
2	Fundamentals Steps in Image Processing, Elements of Digital Image Processing Systems, Image Sampling and Quantization,	2
3	Some basic relationships like Neighbors, Connectivity, Distance Measures between pixels, Linear and Non Linear Operations	2
4	**Image Enhancement in the Spatial Domain:** Some basic Gray Level Transformations, Histogram Processing, Enhancement Using Arithmetic and Logic operations,	2
5	Basics of Spatial Filters, Smoothening and Sharpening Spatial Filters, Combining Spatial Enhancement Methods.	3
6	**UNIT II Filtering in the Frequency Domain:** Introduction to Fourier Transform and the frequency Domain,	1
7	Smoothing and Sharpening Frequency Domain Filters.	2
8	**Image Restoration:** A model of The Image Degradation / Restoration Process,	2
9	Noise Models, Restoration in the presence of Noise Only Spatial Filtering, Periodic Noise Reduction by Frequency Domain Filtering,	2
10	Estimation of Degradation Function, Inverse filtering, Wiener filtering, Constrained Least Square Filtering,	2
11	Geometric Mean Filter, Geometric Transformations.	2
	End of 1st Term	
12	**UNIT III Image Compression**: fundamentals of compression, coding redundancy, Lossy and lossless compression,	2
13	Spatial and temporal redundancy,	2
14	Image compression models. Some basic compression methods	2
15	**Image Segmentation:** Detection of Discontinuities, Edge linking and boundary detection,	2
16	Region Oriented Segmentation, Motion based segmentation.	2
17	**UNIT IV Representation and Description:** Representation, Boundary Descriptors, Regional Descriptors,	2
18	Use of Principal Components for Description, Introduction to Morphology,	2
19	Some basic Morphological Algorithms.	2
20	**Object Recognition:** Patterns and Pattern Classes,	2
21	Decision-Theoretic Methods, Structural Methods.	2
	End of 2nd Term	

Text Books:

[T1] Rafael C. Gonzalez & Richard E. Woods, "Digital Image Processing", 3rd edition, Pearson, 2002.
[T2] A.K. Jain, "Fundamental of Digital Image Processing", PHI, 1989.

Reference Books:

[R1] Bernd Jahne, "Digital Image Processing", 5th ed., Springer, 2002
[R2] William K Pratt, "Digital Image Processing: Piks Inside", John Wiley & Sons, 2001

Dr. A K Yadav

DIGITAL IMAGE PROCESSING

	L	T/P	C
Paper Code: ETIT-418			
Paper: Digital Image Processing	**3**	**0**	**3**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objectives: The aim of this course is to provide digital image processing fundamentals, hardware and software, digitization, encoding, segmentation, feature extraction etc. It will enhance the ability of students to apply tools in image restoration, enhancement and compression and to apply the techniques in both the spatial and frequency domains. It will enhance the ability of students to identify the quality characteristics of medical images, differences between computer vision and image processing and help in studying the remote sensing images of the environmental studies.

UNIT- I:

Introduction and Digital Image Fundamentals: The origins of Digital Image Processing, Examples of Fields that Use Digital Image Processing, Fundamentals Steps in Image Processing, Elements of Digital Image Processing Systems, Image Sampling and Quantization, Some basic relationships like Neighbors, Connectivity, Distance Measures between pixels, Linear and Non Linear Operations.

Image Enhancement in the Spatial Domain: Some basic Gray Level Transformations, Histogram Processing, Enhancement Using Arithmetic and Logic operations, Basics of Spatial Filters, Smoothening and Sharpening Spatial Filters, Combining Spatial Enhancement Methods**.**

[T1, T2][No. of Hrs: 10]

UNIT- II:

Filtering in the Frequency Domain: Introduction to Fourier Transform and the frequency Domain, Smoothing and Sharpening Frequency Domain Filters.

Image Restoration: A model of The Image Degradation / Restoration Process, Noise Models, Restoration in the presence of Noise Only Spatial Filtering, Periodic Noise Reduction by Frequency Domain Filtering, Estimation of Degradation Function, Inverse filtering, Wiener filtering, Constrained Least Square Filtering, Geometric Mean Filter, Geometric Transformations.

[T1, T2][No. of Hrs. 12]

UNIT- III:

Image Compression: fundamentals of compression, coding redundancy, Lossy and lossless compression, Spatial and temporal redundancy, Image compression models. Some basic compression methods

Image Segmentation: Detection of Discontinuities, Edge linking and boundary detection, Region Oriented Segmentation, Motion based segmentation.

[T1, T2][No. of Hrs. 12]

UNIT- IV:

Representation and Description: Representation, Boundary Descriptors, Regional Descriptors, Use of Principal Components for Description, Introduction to Morphology, Some basic Morphological Algorithms.

Object Recognition: Patterns and Pattern Classes, Decision-Theoretic Methods, Structural Methods.

[T1, T2][No. of Hrs: 10]

Text Books:

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