DISCIPLINE SPECIFIC ELECTIVE 2– Digital Image Processing

Course title &Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Digital Image Processing	4	3	0	1	NA	NA

Learning objectives:

1. To understand the sensing, acquisition and storage of digital images.
2. To study the image fundamentals and mathematical transforms necessary for image processing.
3. To understand the digital processing systems and corresponding terminology.
4. To understand the base image transformation domains and methods.

Learning Outcomes:

1. Understand the fundamentals of Image Processing and its role and importance in a varietyof applications.
2. Write programs to read/write and manipulate images for the purpose of enhancement.
3. Understand the need for image transforms and their properties.
4. Understand different causes for image degradation and use various techniques to restore images.

UNIT-I **(8 hours)**

Introduction: Digital Image Fundamentals, Brightness, Adaptation and Discrimination, Light and Electromagnetic Spectrum, Image Sampling and Quantization, Some Basic Relationships between Pixels Types of images.

UNIT-II **(7 hours)**

Spatial Domain Filtering: Some Basic Intensity Transformation Functions, Histogram Equalization, Spatial Correlation and Convolution, Smoothening Spatial Filters-Low pass filters, Order Statistics

filters; Sharpening Spatial Filters- Laplacian filter.

UNIT-III **(8 hours)**

Filtering in Frequency Domain: The Discrete Fourier Transformation (DFT), Frequency Domain Filtering:-Ideal and Butterworth Low pass and high pass filters

UNIT-IV **(7 hours)**

Image Degradation and Compression: Noise models, Noise Restoration Filters, Fundamentals of Image Compression, Huffman Coding, Run Length Coding

UNIT-V **(10 hours)**

Morphological Image Processing: Erosion, Dilation, Opening, Closing, Hit-or-Miss Transformation, Basic Morphological Algorithms.

UNIT VI **(5 hours)**

Image Segmentation: Point, Line and Edge Detection, Thresholding.

References:

1. *Gonzalez, R. C., & Woods, R. E. Digital Image Processing. 4th edition. PearsonEducation, 2017*
2. *Castleman, K. R. Digital Image Processing. 1st edition. Pearson Education,2007*
3. *Gonzalez, R. C., Woods, R. E., & Eddins, S. Digital Image Processing using MATLAB. Pearson Education Inc., 2004*
4. *Jain, A. K. Fundamentals of Digital Image Processing. 1st edition Prentice Hall of India,1988.*