

Course Learning Objectives:

- Fundamental concepts of a digital image processing system.
- Analyze the basic algorithms used for image processing & image compression with morphological image processing.
- To study the image fundamentals and mathematical transforms necessary for image processing.
- Design algorithms to solve image processing problems and meet design specifications.

Course Outcomes: After completing the course, the students will be able to,

- CO1: Understand the need for image transforms different types of image transforms and their properties.
- CO2: Develop any image processing application and understand the rapid advances in Machine vision.
- CO3: Learn different techniques employed for the enhancement of images.
- CO4: Identify different causes for image degradation and overview of image restoration techniques.
- CO5: Explain different Image enhancement techniques
- CO6: Design & Synthesize Color image processing and its real world applications.
- CO7: Come across the image representation with their model approaches.

UNIT- I**12 Hrs.**

Digitized Image and Its Properties: Basic Concepts, Image Digitization, **Digital Image Properties**. Image Preprocessing: **Image Pre-Processing; Histogram** Processing, Enhancement Using Arithmetic / Logic Operations, **Basics of Spatial Filtering**, Smoothing Spatial Filters, Sharpening Spatial Filters. Brightness and Geometric Transformations, Local preprocessing.

UNIT-II**12 Hrs.**

Image Enhancement: Image enhancement in the frequency domain: Background, Introduction to the Fourier transform and the frequency domain, **Smoothing Frequency-Domain filters**, **Sharpening Frequency Domain filters**, Homomorphic filtering.

UNIT-III**12 Hrs.**

Segmentation: **Thresholding**, Edge-based segmentation, Region based segmentation, Matching. Image Compression: Image compression: Fundamentals, **Image compression models**, Elements of information theory, **Error-Free Compression**, Lossy compression.

UNIT-IV**12 Hrs.**

Image Representation and Description: Region Identification, Contour-Based Shape Representation and Description, **Region Based Shape Representation and Description**, Shape Classes. Morphology: **Basic Morphological Concepts, Morphology Principles**, Binary Dilation and Erosion, Gray-Scale Dilation and Erosion, Morphological Segmentation and **Watersheds**.

REFERENCE BOOKS:

1. Milan Sonka, Vaclav Hlavac and Roger Boyle, Image Processing, Analysis and Machine Vision 2nd Edition, Thomson Learning, 2001.
2. Rafael C Gonzalez and Richard E Woods, Digital Image Processing, 2nd Edition, Pearson Education, 2003.
3. Anil K Jain, Fundamentals of Digital Image Processing Pearson Education/Prentice-Hall of India Pvt. Ltd., 1997.
4. B. Chanda, D Dutta Majumder, Digital Image Processing and Analysis Prentice-Hall India, 2002.

