IV/IV B. TECH. FIRST SEMESTER
IMAGE PROCESSING (Elective-I)

Course Code: CS 7T4C   **Credits: 3**
Lecture:3 periods/week   **Internal assessment: 30 Marks**
Tutorial: 1period/week   **Semester end examination: 70 Marks**

Prerequisites: signals and systems

Course Objectives:

1. To introduce students to the Basic concepts and analytical methods of analysis of digital images.
2. To Study fundamental concepts of Digital Image Processing and basic relations among pixels.
3. To Study different Spatial and Frequency domain concepts.
4. To understand Restoration process of degraded image and Multi resolution processing.
5. To understand image compression and Segmentation Techniques.

Course Outcomes:

At the end of this course student will:

CO1) Understand different components of image processing system

CO2) Describe various image transforms, enhancement techniques using various processing methods

CO3) Illustrate the compression and segmentation techniques on a given image

CO4) Demonstrate the filtering and restoration of images(pixels) with examples

CO5) Illustrate the various schemes for image representation and edge detection techniques with examples

Syllabus:

UNIT 1

Introduction: Digital Image Processing, Fundamental Steps in Digital Image Processing, Components of an Image Processing System.
Digital Image Fundamentals: Elements of Visual Perception, Image Sensing and Acquisition, Image Sampling and Quantization, Some basic Relationships between Pixels.

UNIT 2

Image Enhancement in the Spatial Domain: Some Basic Gray Level Transformation, Histogram Processing, Enhancement Using Arithmetic/Logic Operations, Basics of Spatial Filtering, Smoothing spatial Filters, Sharpening spatial Filters.

Image Enhancement in the Frequency Domain: Introduction to the Fourier Transform and the Frequency Domain, Smoothing frequency-domain Filters, Sharpening Frequency-domain Filters, Homomorphic Filtering, Implementation.

UNIT 3
Image Restoration: A Model of the Image Degradation/Restoration Process, Linear, Position-Invariant Degradations, Inverse Filtering, Minimum Mean Square Error (Wiener) Filtering, Constrained Least Squares Filtering. Wavelets and Multi resolution Processing: Multi resolution Expansions, Wavelet Transforms in one Dimension, The Fast Wavelet Transform, Wavelet Transforms in Two Dimensions.

UNIT 4
Image Compression: Image Compression Models, Error-free Compression, Lossy Compression, Image Compression Standards.

Image Segmentation: Detection of Discontinuities, Edge Linking and Boundary Detection, Thresholding, Region-Based Segmentation.

UNIT 5

Representation and Description: Various schemes for representation, boundary descriptors, and regional descriptors.

Learning Resource

Text Books

1. Rafael C. Gonzalez and Richard E. Woods, Digital Image Processing. Prentice Hall India/Pearson Education.

References

1. A.K.Jain, Fundamentals of Digital Image Processing. Prentice Hall India.

2. Madhuri.A.Joshi, Digital Image Processing, PHI.

3. Sonka, Image Processing, Analysis and Machine Vision. Cengage Publications.

4. Fundamentals of Digital Image Processing, Anna durai,Shanmuga lakshmi.