4/4 B.Tech. SECOND SEMESTER
IMAGE PROCESSING

CS8T3A   **Credits: 4**

Elective – IV

Lecture: 4 periods/week   **Internal assessment: 30 marks**
Tutorial: 1 period /week   **Semester end examination: 70 marks**

Course Context and Overview: This course introduces the fundamental concepts of Image Processing. With this foundation students can take up engineering career in industry or research.

Prerequisites: C LANGUAGE, I/O ANALOG AND DIGITAL INTERFACING, AND PERIPHERALS

Learning Outcomes:
   Ability to:

   1. Basic concepts and analytical methods of analysis of digital images.
   2. Fundamental concepts of Digital Image Processing and basic relations among pixels.
   3. Different Spatial and Frequency domain concepts.
   4. Restoration process of degraded image and Multi resolution processing.
   5. Image compression and Segmentation Techniques.
   6. Various descriptors for image representation.

UNIT I: **Digital Image fundaments:**

Introduction, An image model, sampling & quantization, basic relationships between Pixels.

UNIT II: **Image Transforms:**

Properties of 2 – D Fourier transform FFT algorithm and other separable image transforms. Walsh transforms.

UNIT III: **Image Enhancement:**

Background, enhancement by point processing, histogram processing, spatial filtering and enhancement in frequency domain.

UNIT IV: **Image filtering and restoration**:

Degradation model, diagnolisation of circulant and block circulate matrices, Algebraic approach to restoration, inverse filtering, least mean squares and interactive restoration.
UNIT V: **Image compression:**

Fundamentals, image compression modes, error free compression, lossy compression, image compression standards.

UNIT VI: **Image segmentation:**

Detection of discontinuities, edge linking and boundary detection thresholding, region –

oriented segmentation, use of motion in segmentation.

UNIT VII: **Representation and description:**

Various schemes for representation, boundary descriptors, and regional descriptors.

UNIT VIII: **Image Reconstruction :**

Image reconstruction from Projections, Radon Transforms; Convolution/Filter back – Project Algorithms.

Learning Resources

Text Book:

1. Digital Image Processing, 3/e, Gonzalez, Woods, Addison Wesley

Reference Books:

1. Fundamentals of Digital Image Processing, A.K.JAIN, PHI

2. Fundamentals of Digital Image Processing, Anna durai, shanmuga lakshmi, Pearson

3. Introduction to Digital Image Processing, Alasdair, McAndrew, Cengage

4. Digital Image Processing, Castleman, Pearson

5. Digital Image Processing, S Jayaraman, SEsakkirajan, T Veerakumar,TMH