IMAGE PROCESSING
(Professional Elective-III))/(Common to CSE & IT)

COURSE CODE: 15CT1127

L T P C
3 0 0 3

Pre-requisites: Computer Graphics

COURSE OUTCOMES:
At the end of the course the student shall be able to

CO1: Understand the image fundamentals and mathematical transforms necessary for image processing.
CO2: Explain the image enhancement techniques
CO3: Describe image restoration procedures.
CO4: Explain the image compression procedures
CO5: Understand the image segmentation and representation techniques

UNIT I   **(8-10 Lectures)**

INTRODUCTION : Examples of fields that use digital image processing, fundamental steps in digital image processing, components of image processing system. Digital Image Fundamentals: A simple image formation model, image sampling and quantization, basic relationships between pixels
IMAGE ENHANCEMENT IN THE SPATIAL DOMAIN : Basic gray-level transformation, histogram processing, enhancement using arithmetic and logic operators, basic spatial filtering, smoothing and sharpening spatial filters.

UNIT-II   **(8-10 Lectures)**

IMAGE RESTORATION : A model of the image degradation/ restoration process, noise models, restoration in the presence of noise– only spatial filtering, geometric transforms; Introduction to the Fourier transform and the frequency domain, estimating the degradation function.
COLOR IMAGE PROCESSING : Color fundamentals, color models, basics of full–color image processing, color transforms, smoothing and sharpening, color segmentation.

UNIT-III   **(8-10 Lectures)**

IMAGE COMPRESSION : Fundamentals, image compression models, error-free compression, lossy predictive coding, image compression standards: JPEG compression standard, Fractal compression scheme, Wavelet compression scheme.
MORPHOLOGICAL IMAGE PROCESSING : Preliminaries, dilation, erosion, open and closing, hit or miss transformation, basic morphological algorithms.

UNIT-IV (8-10 Lectures)

IMAGE SEGMENTATION : Detection of discontinuous-First order and second order edge operators, Edge linking and boundary detection, Canny's edge detection algorithm, Hough transform for detecting lines and curves, Edge linking, thresholding, region–based segmentation.

UNIT-V (8-10 Lectures)

OBJECT RECOGNITION : Patterns and patterns classes, recognition based on decision–theoretic methods, matching, optimum statistical classifiers, neural networks, structural methods – matching shape numbers, string matching.

TEXT BOOK:

1.   Rafeal C.Gonzalez, Richard E.Woods, *"Digital Image Processing"*, 3rd Edition, Pearson Education/PHI,2010.

REFERENCE BOOKS:

1.   Milan Sonka, Vaclav Hlavac and Roger Boyle, *"Image Processing, Analysis, and Machine Vision",* 2nd Edition, Thomson Learning, 2010.
2.   Alasdair McAndrew, *"Introduction to Digital Image Processing with Matlab"*,1st Edition, Thomson Course Technology,2010.
3.   Adrian Low, *"Computer Vision and Image Processing"*, 2nd Edition, B.S. Publications, 2010.
4.   Rafeal C.Gonzalez, Richard E.Woods, Steven L. Eddins, *"Digital Image Processing Using Matlab"*, 1st Edition Pearson Education, 2010.
5.   William K. Prat, Wily, *"Digital Image Processing"*, 3rd Edition
6.   B. Chanda, D. Datta Majumder, *"Digital Image Processing and Analysis"*, 2nd Edition Prentice Hall of India, 2011.