EC-406A	DIGITAL IMAGE PROCESSING (ELECTIVE - IV)	L T P C 4 - - 3

COURSE OBJECTIVES:

1. To understand the use of digital image fundamental steps and the role human Visual system plays in perception of gray image data and various application of image processing in industry, medicine.
2. To understand different methods for smoothening and sharpening of digital images as part of enhancement in spatial domain methods.
3. To understand various image Restoration techniques and color image processing.
4. To understand different types of lossless and lossy compression techniques and their applications.
5. To understand different types of filters and algorithms used for segmentation, Understand the different representation techniques, boundary and regional descriptors which are used for image analysis.
6. To understand various color image processing techniques.

COURSE OUTCOMES:

After successful completion of the course, the students are able to

1. understand the fundamental concepts of image processing.
2. understand image enhancement, restoration, compression, segmentation, representation, description and colour image processing techniques.
3. apply filtering techniques for enhancement, restoration and segmentation on images.
4. analyse contrast enhancement using histogram processing.
5. compare compression techniques on images.

UNIT I *Text Book - 1* **(10)**

INTRODUCTION : Origin of Digital Image Processing, Fields that uses Digital Image Processing, Fundamental steps in Digital Image Processing, Components of an Image Processing System.

DIGITAL IMAGE FUNDAMENTLS : Elements of Visual perception, Image sampling and Quantization, Basic relationships between Pixels, Linear and Non-linear operations, Arithmetic/Logic operations.

UNIT II *Text Book - 1* **(10)**

IMAGE ENHANCEMENT IN SPATIAL DOMAIN : Some basic intensity transformations, histogram processing, Smoothing Spatial Filters, Sharpening Spatial Filters.

IMAGE RESTORATION : Noise models, Restoration in the presence of Noise only- Spatial Filtering, Periodic Noise reduction by Frequency Domain Filtering, Linear Position-Invariant Degradation, Inverse Filtering, Wiener Filtering.

UNIT III *Text Book - 1* **(10)**

IMAGE COMPRESSION : Fundamentals, Image Compression methods- Huffman coding, Golomb coding, Arithmetic coding, LZW coding, Run-Length coding, Symbol-based coding, Bit-Plane coding, Block transfer coding ,Wavelet coding.

UNIT IV *Text Book - 1,2* **(10)**

IMAGE SEGMENTATION : Fundamentals - Point, Line and Edge Detection, Thresholding-basic Global Thresholding, Optimum Global Thresholding, Region based segmentation.

IMAGE REPRESENTATION AND DESCRIPTION : Representation schemes, Boundary Descriptors, Regional Descriptors.

UNIT V *Text Book - 1* **(10)**

COLOR IMAGE PROCESSING : Color model ,Pseudo Color Image processing, color transformation, Smoothing and shaping, color segmentation, noise in color images, color image compression.

LEARNING RESOURCES:

TEXT BOOK(s):

1. R C Gonzalez and Richard E Woods - Digital Image Processing, Pearson Education, Third Edition, 2015
2. R C Gonzalez and Richard E Woods - Digital Image Processing, Pearson Education, Second Edition