

Department: Computer Science and Engineering	
Course title: Digital Image Processing	Course Code: CS6_____
Credits(L:T:P): 3:0:1	Core/Elective: Elective
Type of Course: Lecture, Practical	Total Contact Hours:39:26
CIE Marks : 50	SEE Marks: 100

Pre-requisite: Basic mathematics, any programming language

Course Outcomes:

After completing this course, students should be able to:

CO1: Understand, comprehend and appreciate the fundamental operations of digital image processing.

CO2: Apply and analyse the effects of fundamental operations on digital images.

CO3: Design and develop real world applications which uses digital images.

Unit No.	Course Content	No. of Hours
1.	Introduction: Digital Image Processing, The Origins of Digital Image Processing, Examples of Fields that Use Digital Image Processing, Fundamental Steps in Digital Image Processing, Components of an Image Processing System, Image Sampling and Quantization, Some Basic Relationships Between Pixels, Mathematical tools used in digital image processing.	09
2.	Image Enhancement in the Spatial Domain: Basic Gray Level Transformations: Image negatives, Log transformations, Powerl-Law transformations, Piecewise linear transformations, Histogram Processing: Histogram Equalization, Histogram Specification/Matching, Local Histogram processing, Histogram statistics for image enhancement, Fundamentals of Spatial Filtering, Smoothing Spatial Filters, Sharpening Spatial Filters, Combining Spatial Enhancement Methods.	10
3	Color Image Processing: Color fundamentals, Color models: RGB, CMY, CMYK, HIS, Pseudo color Image Processing, Full color Image processing.	06
4.	Morphological Image Processing and Image Segmentation: Erosion and Dilation, opening and closing, Hit-or-Miss transformations, Basic morphological algorithms: Boundary extraction, Hole filling, Extraction of connected components, Convex Hull, Thinning, Thickening, Skeletons, and Pruning.	08
5.	Image Segmentation: Point, Line and Edge detection, Detection of discontinues, edge linking and boundary detection, Gradient operators in edge detection, thresh holding, region –based segmentation	08

Lab Exercise:

1.	<p>Program to enhance image using image arithmetic and logical operations</p> <p>Program for an image enhancement using pixel operations</p> <p>Program for gray level slicing with and without background</p> <p>Program for image enhancement using histogram equalization</p> <p>Program to filter an image using averaging low pass filter in spatial domain and median filter</p> <p>Program to sharpen an image using 2-D laplacian high pass filter in spatial domain.</p> <p>Program for detecting edges in an image using Roberts cross gradient operator and sobel operator.</p> <p>To create a vision program for Non-Linear Filtering technique using edge detection</p> <p>To create a vision program to determine the edge detection of an image using different operators.</p>	10
2.	Programs for illustrating color image processing.	05
3.	<p>Programs for morphological image operations-Erosion, Dilation, Opening, Closing, Thinning, Thickening, Skeletons and Pruning.</p> <p>Programs for Boundary extraction, Hole filling, Extraction of connected components</p>	06
4.	To create programs for segmentation of an image: To detect lines, edges, boundaries.	05

Text Books:

Rafael C Gonzalez and Richard E Woods, Digital Image Processing, Pearson Education, 4th edition , 2017

Reference Books:

1. Anil K Jain, Fundamental of Digital Image Processing, Prentice Hall of India, 2004.
2. William K Pratt, Digital Image Processing PIKS Scientific Inside, 4th Edition
3. Wiley Vipul Singh, Digital Image Processing With Matlab & LabView, Reed Elsevier India Pvt Ltd, 2013.