



**MANGALORE UNIVERSITY**

**Department of Electronics**

**MSc Electronics**

**ELH 501 - DIGITAL IMAGE PROCESSING**

**Course Outcome:**

1. Fundamentals of digital image acquisition and processing to compare with human visual system.
2. Study on image as spatial domain as well as frequency domain signal using transformation functions.
3. Application of 2-D DFT for image enhancement and demising process.
4. Study on mathematical modelling of noise functions and corresponding filter design
5. Study on the Morphological Operations and Segmentation used in digital image processing.
6. Basics of color image processing and various color models for image representation

**Unit I**

**Introduction and Digital Image fundamentals:** Introduction to Digital Image Processing, Elements of Visual Perception, Light and the Electromagnetic Spectrum, Image Sensing and Acquisition, Image Sampling and Quantization, Some Basic Relationships between Pixels, Mathematical tools used in DIP.

**Intensity Transformations and Spatial Filtering:** Some basic intensity Transformation Functions, Histogram Processing, Fundamentals of Spatial Filtering, Smoothing Spatial Filters, Sharpening Spatial Filters, Combining Spatial Enhancement Methods.

**16 hours**

**Unit II**

**Filtering in Frequency Domain:** Preliminary concepts, Sampling, Fourier Transform of sampled Functions, DFT of two variables, Properties of 2D DFT, Basics of Filtering in the Frequency Domain, Image Smoothing using Frequency-Domain Filters, Image Sharpening using Frequency Domain Filters, Selective Filtering.

**Image Restoration and Reconstruction:** Model of the Image Degradation/Restoration Process, Noise Models, Restoration in the Presence of Noise Only–Spatial Filtering, Periodic Noise Reduction by Frequency Domain Filtering, Linear Position-Invariant.

**16 hours**

### Unit III

**Morphological Image Processing:** Preliminaries, Erosion and Dilation, Opening and Closing, the Hit or Miss Transformation, Basic Morphological Algorithms, Gray Scale Morphology. **Image Segmentation:** Fundamentals, Point, Line and Edge Detection, Thresholding, Region-Based Segmentation. **Color Image Processing:** Color Fundamentals, Color Models, Pseudo-color Image Processing, Full-Color Image Processing, Color Transformations, Smoothing and Sharpening,

**16 hours**

#### Books:

1. “Digital Image Processing”, Rafael Gonzalez and Richard Woods, PHI.2<sup>nd</sup> Edition.
2. “Fundamentals of Digital Image Processing”, A. K. Jain, Prentice Hall of India, 1989.
3. “Digital Image Processing”, W. K. Pratt, Prentice Hall, 1989.

