

**Course No : MCA-5EL3**

**Course Title: Digital Image Processing**

**UNIT I**

Introduction to discrete time signals and systems: Discrete time signals, Discrete time systems, Analysis of discrete time, Linear time-invariant systems [Both 1D and 2D].

Introduction to digital image processing: Digital Image representation, Fundamental steps in image processing. Elements of digital image processing systems, Applications of digital image processing

**UNIT II**

Image sensing and acquisition. Image sampling and quantization, imaging geometry.

Image transforms : Concepts of Spatial domain and Frequency domain Images, Fourier, Inverse Fourier, Fast Fourier [Both 1D and 2D].

**UNIT III**

Image Enhancement: Enhance in the spatial domain, some basic grey level transformations, Histogram processing, Enhancement using arithmetic/logic operations, Basics of spatial filtering, Smoothing of spatial filters, Sharpening spatial filters.

Enhancement in frequency domain: Smoothing frequency domain filters, Sharpening frequency domain filters, Homomorphic filtering.

**UNIT IV**

Image Restoration: Model of the image Degradation / Restoration process, Noise models, Restoration in the presence of noise only-spatial filtering, Linear, Position- invariant degradation, Estimating the degradation function, Inverse filtering, Minimum mean square error(Wiener) filtering, Constrained least squares filtering, Restoration by SVD.

Image segmentation: Detection of discontinuities, Edge linking and boundary detection, Thresholding based segmentation, Region based segmentation.

Image Compression models: Error criteria, Lossy compression, Loss-less compression.

**Reference Books :**

- 1) Digital image processing 2nd edition by Rafael C.Gonzalez, Richard E.Woods(Pearson edition) .
- 2) Fundamentals of digital image processing by A.K.Jain(Pearson edition) .
- 3) Fundamentals of digital image processing by Catlemrene(Pearson edition).
- 4) Image processing analysis and machine vision by Milan Sonka, Vaclavhvac, Roger Boyle.
- 5) Digital signal processing by John G.Proakis, G.Manolakin “, 4/e Pearson Education