

PIT6J002 DIGITAL IMAGE PROCESSING

Module-I (10 hours)

Digital Image Fundamentals: Introduction, Steps in Digital Image Processing, Components, Elements of Visual Perception, Image Sensing and Acquisition, Image Sampling and Quantization, Relationships between pixels, color models.

Enhancement in spatial domain: Gray level transformations, Histogram equalization and specification techniques, Enhancement using arithmetic/logic operations, Spatial filtering: smoothing and sharpening.

Module-II (10 hours)

Enhancement in frequency domain: Two dimensional Discrete Fourier transform and its inverse, filtering in frequency domain, smoothing frequency domain filters, sharpening frequency domain filters, homo-morphic filtering. **Image Restoration:** Noise models, Restoration in the presence of noise by spatial filtering, Periodic noise reduction by frequency domain filtering, estimating the degradation function, Inverse filtering, Wiener filtering, Geometric transformations.

Module- III (10 hours)

Morphological Image Processing: Operations involving binary images, Dilation, erosion, opening, closing, Hit-or-Miss Transformation, Basic morphological Algorithms-boundary extraction, region filling, extraction of connected components, thinning, thickening, pruning, dilation and erosion in gray scale images.

Module-IV (10 hours)

Image Compression: Need for Image compression, Image Compression models, Huffman coding, Arithmetic coding, LZW coding, Bit-plane coding, Transform coding, DCT, JPEG standard. Wavelets and Multi-resolution processing.

Additional Module: Introduction to Pattern Recognition and applications in current scenario.

Text book:

1. Rafael C. Gonzalez, Richard E.Woods, "Digital Image Processing", Pearson, Second Edition, 2004.

Reference Books:

1. William K. Pratt, "Digital Image Processing", John Wiley, New York, 2002
2. Anil K. Jain, "Fundamentals of Digital Image Processing", Pearson 2002
3. Rafael C. Gonzalez, Richard E. Woods, Steven Eddins, "Digital Image Processing using MATLAB", Pearson Education, Inc., 2004