

SYLLABUS :-

Introduction: Digital image, steps of digital image processing systems, elements of visual perception, connectivity and relations between pixels. Simple operations - arithmetic, logical, geometric operations. Mathematical preliminaries- 2D LTI systems, 2D convolution, correlation, 2D random sequence, 2D spectrum. Image Transforms: 2D orthogonal and unitary transforms- properties and examples. 2D DFT, FFT, DCT, Hadamard transform, Haar Transform, Slant transform, KL Transform- properties and examples. Image Enhancement: point processing, spatial filtering-in space and frequency, Nonlinear filtering, Color image processing fundamentals. Image Restoration: Image observation and degradation model, circulant and block circulant matrices and its application in degradation model, Algebraic approach to restoration, Inverse by Wiener filtering, Generalized inverse- SVD and iterative methods, blind deconvolution, image reconstruction from projections. Image compression: redundancy and compression models ; loss less and lossy. Loss less- variable-length, Huffman, Arithmetic coding, bit-plane coding, Loss less predictive coding, lossy Transform (DCT) based coding, JPEG standard, sub band coding. Image segmentation: Edge detection, line detection, curve detection, Edge linking and boundary extraction, boundary representation, region representation and segmentation, morphology-dilation, erosion, opening and closing. Image understanding and recognition: Matching by templates, classifiers-models, statistical, neural network based, matching shapes by contour and texture. Applications: Automatic visual system in part inspection, forensic and security system, entertainment- multimedia, scientific and medical investigation