20ES011 - Digital Image Processing

UNIT – I

Digital image fundamentals

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 Linear Space Invariant Systems - 2D Convolution - Correlation 2D Random Sequence - 2D Spectrum.

UNIT– II

Image transforms and enhancement

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:- Histogram Equalization Technique- Point Processing-Spatial Filtering-In Space And Frequency - Nonlinear Filtering-Use Of Different Masks.

UNIT – III

Image restoration and construction

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 Interactive Methods - Blind Deconvolution-Image Reconstruction From Projections.

UNIT – IV

Image compression & segmentation

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. Hit And Miss Algorithms Feature Analysis

UNIT – V

Color and multispectral image processing

Color Image-Processing Fundamentals, RGB Models, HSI Models, Relationship Between Different Models. Multispectral Image Analysis - Color Image Processing Three Dimensional Image Processing-Computerized Axial Tomography-Stereometry-Stereoscopic Image Display-Shaded Surface Display.

Text Book

1. Digital Image Processing, Gonzalez.R.C & Woods. R.E., 3/e, Pearson Education, 2008.
2. Digital Image Processing, Kenneth R Castleman, PearsonEducation,1995.
3. Digital Image Procesing, S. Jayaraman, S. Esakkirajan, T. Veerakumar, McGraw Hill Education,2009. Pvt Ltd,NewDelhi
4. Fundamentals of Digital image Processing, Anil Jain.K, Prentice HallofIndia, 1989.
   Image Processing, Sid Ahmed, McGraw Hill, New York,199