

GUJARAT TECHNOLOGICAL UNIVERSITY

B.E. SEMESTER : VIII

ELECTRONICS AND COMMUNICATION ENGINEERING

Subject Name: **FUNDAMENTALS OF IMAGE PROCESSING**

Sr. No.	Course Contents
1.	Digital Image Fundamentals Human visual system, Image as a 2D data, Image representation – Gray scale and Color images, image sampling and quantization
2.	Image enhancement in Spatial domain: Basic gray level Transformations, Histogram Processing, Spatial Filtering
3.	Filtering in the Frequency Domain: Preliminary Concepts, Extension to functions of two variables, Image Smoothing, Image Sharpening, Homomorphic filtering, 2D- DFT, 2D- FFT, 2D- DCT, Fundamentals of 2D-wavelet transform, Image pyramids, sub-band coding.
4.	Image Restoration and Reconstruction: Noise Models, Noise Reduction, Inverse Filtering, MMSE (Wiener) Filtering
5.	Color Image Processing: Color Fundamentals, Color Models, Pseudocolor image processing.
6.	Image Compression: Fundamentals of redundancies, Basic Compression Methods: Huffman coding, Arithmetic coding, LZW coding, JPEG Compression standard.
7.	Image Segmentation: Edge based segmentation, Region based segmentation, Region split and merge techniques, Region growing by pixel aggregation, optimal thresholding.
8.	Morphological Image Processing: Erosion, dilation, opening, closing, Basic Morphological Algorithms: hole filling, connected components, thinning, skeletons

Practical/TW: Practical / Term Work [minimum 8-10 experiments based on above topics.]

Reference Books:

1. Digital Image Processing, Rafael C. Gonzalez and Richard E. Woods, Third Edition, Pearson Education
2. Digital Image Processing Using MATLAB, Rafael C. Gonzalez, Richard E. Woods, and Steven L. Eddins, Second Edition, Tata McGraw Hill Publication
3. Digital Image Processing, S Jayaraman, S Esakkirajan, T Veerakumar, Tata McGraw Hill Publication
4. Digital Image Processing, S Sridhar, Oxford University Press.