GUJARAT TECHNOLOGICAL UNIVERSITY

M.E. Bio-Medical Engineering

Semester: I

Subject Name: **Biomedical Image Processing**

Sr.No	Course content
1.	**Visual Preliminaries and Image Transformation :** Introduction, brightness adaptation and contrast, activity and contour, texture and pattern discrimination.
2.	Geometric model of an image, basic transformations, perspective projection, photometric model: intensity, transformation of energy, noise process.
3.	**Image Transforms :** 2-D Fourier transform, Discrete cosine transform, Short time Fourier transform, Gabor transform, Radon transform.
4.	**Image Enhancement:** • Contrast intensification: linear stretching, non-linear stretching, histogram specification, low contrast stretching. • Smoothing: Image averaging, mean filter, order statistics filter, edge preserving smoothing. • Sharpening: High pass filtering, homomorphic filtering.
5.	Image Restoration
6.	Minimum mean-square error restoration, least-square error restoration, constrained least-square error restoration, restoration by singular value decomposition, restoration by homomorphic filtering.
7.	**Image Analysis:** Segmentation • Region extraction, pixel based approach: feature thresholding, optimum threshold, threshold selection methods, multilevel thresholding, and region based approach
8.	**Image Analysis:** Edge detection • Edge detection, derivative operators: Sobel, Prewittt, Canny, second order derivative, line detection: overview of earlier work.

Reference Books:

1. Digital Image Processing, R.C.Gonzalez & R.Woods, Addison-Wesley, 1992
2. Syntactic Pattern Recognition: An Introduction, R.C.Gonzalez and M.G.Thomason
3. Pattern Classification and Scene Analysis, R.O. Duda and P.E. Hart, Wiley 1973
4. Pattern Recognition Statistical, Structural and Neural Approaches, R.J Schalkoff, Wiley, 1992
5. Pattern Recognition Engineering, M. Nadler and E.P. Smith, Wiley, 1993
6. The Image Processing Handbook, J.C. Russ, CRC Press, 1992
7. Digital Image Processing, K.R. Castleman, Prentice Hall, 1996
8. Digital Image Processing, W.K. Pratt, Wiley 1991
9. Computer Imaging: Digital Image Analyis and Processing , Scott E Umbaugh, The CRC Press, Boca Raton, FL, January 2005
10. Digital Image processing and analysis, B. Chanda, D. Dutta Mujumder, PHI, 2000.