Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Electronics (Sp. Digital Instrumentation) Semester- B			
Subject Code & Name	Instructions Hours per Week			Credits			
DIR2C1: Digital Image Processing	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	**3**	**1**	**2**	**3**	**1**	**1**	**5**

COURSE CINTENTS

Unit I

Introduction: Background, Digital Image Representation, Elements of a Digital Image Processing System. Data Acquisition Vidicon and Digital Camera working principles, Elements of visual perception, brightness, contrast, hue, saturation, machband effect, Color image fundamentals RGB, HSI models, Image sampling, Quantization, dither.

Image Transforms: Geometric and spatial transforms Introduction to the Fourier Transform, The Discrete Fourier Transform, Properties of the Two-Dimensional Fourier Transform, Other Separable Image Transforms.

Unit II

Morphological Image Processing: Dilation and Erosion, Labelling connected components, Morphological reconstruction, Gray-scale morphology, Image descriptors: Region and boundary extraction, Image representation: Chain code, boundary, skeletons, signature descriptors: shape numbers, Fourier descriptors, statistical moments, corner, Regional descriptors, PCA

Unit III

Image Enhancement and segmentation: Spatial Domain Methods, Frequency Domain Methods, Some Simple Intensity Transformations, Histogram Processing, Image Subtraction, Image Averaging, Background, Smoothing Filters, Sharpening Filters, Low-pass Filtering, High-pass Filtering, Generation of Spatial Masks from Frequency Domain Specifications. point, line, Edge detection, line detection using Hough transform, Thresholding, Region based segmentation, Region growing, Region splitting and Merging, Segmentation by morphological watersheds.

Unit IV

Image Restoring: Degradations Model - Definitions, Noise Models, Diagonalization of Circulant and Block-Circulant Matrices, Circulant Matrices, Block Circulant Matrices, Effects of Diagonalization on the Degradation Model, Restoration approach, Unconstrained Restoration, Constrained Restoration, Inverse Filtering – Formulation, Removal of Blur Caused by Uniform Linear Motion, Restoration in the Spatial Domain, Geometric Transformation.

Unit V

Image Compression: Fundamentals, Types of Redundancy, Fidelity Criteria. Image Compression Models, The Source Encoder and Decoder, The Channel Encoder and Decoder. Elements of Information Theory Error-Free Compression, Variable-Length Coding, Bit-Plane Coding, Lossless Predictive Coding. Lossy Compression, Lossy Predictive Coding, Transform Coding.

Text and Reference Books:

[1] Rafael. C. Gonzalez & Richard E.Woods.- Digital Image Processing, 2/e Pearson Education, New Delhi - 2006

[2] W.K.Pratt.-Digital Image Processing ,3/e Edn., John Wiley & sons, Inc. 2006

[3] A.K. Jain-Fundamentals of Digital Image processing- PHI, New Delhi(1995)

[4] M. Sonka et.al Image Processing, Analysis and Machine Vision, 2/e, Thomson, Learning, India Edition, 2007.