ELECTIVE: III

BEIT803T2 DIGITAL IMAGE PROCESSING

(Theory Credit: 05)

Teaching Scheme:	**Examination Scheme:**
Lecture: 4 Hours/week	**Theory: T (U): 80 Marks T (I): 20 Marks**
Tutorial: 1 Hour/week	**Duration of University Exam. : 03 Hours**

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UNIT I:

DIGITAL IMAGE FUNDAMENTALS

Elements of digital image processing systems, Vidicon and Digital Camera working principles, Elements of visual perception, brightness, contrast, hue, saturation, mach band effect, Image sampling, Quantization, dither, Two-dimensional mathematical preliminaries, 2D transforms - DFT, DCT, KLT, SVD.

UNIT II:

IMAGE ENHANCEMENT

Histogram equalization and specification techniques, Noise distributions, Spatial averaging, Directional Smoothing, Median, Geometric mean, Harmonic mean, Contra harmonic mean filters, Homomorphic filtering, Color image fundamentals - RGB, HSI models, Color image enhancement.

UNIT III:

IMAGE RESTORATION

Image Restoration - degradation model, unconstrained restoration - Lagrange multiplier and constrained restoration, Inverse filtering-removal of blur caused by uniform linear motion, Wiener filtering, Geometric transformations-spatial transformations.

UNIT IV:

IMAGE SEGMENTATION

Edge detection, Edge linking via Hough transform, Thresholding, Region based segmentation, Region growing, Region splitting and merging, Segmentation by morphological watersheds, basic concepts, Dam construction, and Watershed segmentation algorithm.

UNIT V:

IMAGE COMPRESSION

Need for data compression, Huffman, Run Length Encoding, Shift codes, Arithmetic coding, Vector Quantization, Transform coding, JPEG standard, MPEG

UNIT VI:

FEATURE EXTRACTION

Representation, Topological Attributes, Geometric Attributes Description, Boundary-based Description, Region-based Description, Relationship, Object Recognition, Deterministic Methods, Clustering, Statistical Classification, Syntactic Recognition, Tree Search, Graph Matching.

Text Books:

1. Rafael C. Gonzalez, Richard E. Woods, Digital Image Processing, Pearson Education, Third Edition, 2008.
2. Anil K. Jain, Fundamentals of Digital Image Processing', Pearson 2002.

Reference Books:

1. Kenneth R. Castleman, Digital Image Processing, Pearson, 2006
2. Rafael C. Gonzalez, Richard E. Woods, Steven Eddins,' Digital Image Processing using MATLAB', Pearson Education, Inc., 2004.
3. D. E. Dudgeon and RM. Mersereau, Multidimensional Digital Signal Processing', Prentice Hall Professional Technical Reference, 1990.
4. William K. Pratt, Digital Image Processing' , John Wiley, New York, 2002
5. Milan Sonka etaI, 'IMAGE PROCESSING, ANALYSIS AND MACHINE VISION', Brookes/Cole, Vikas Publishing House, 2nd edition, 1999,

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