

## SECOND SEMESTER

### DIGITAL IMAGE & VIDEO PROCESSING

#### **Module I (12 Hrs)**

**Image representation:** Gray scale and colour Images, image sampling and quantization. Two dimensional orthogonal transforms: DFT, WHT, Haar transform, KLT, DCT. Image enhancement - filters in spatial and frequency domains, histogram-based processing, homomorphic filtering. Edge detection - non parametric and model based approaches, LOG filters, localisation problem.

**Image Restoration:** Degradation Models, PSF, circulant and block - circulant matrices, deconvolution, restoration using inverse filtering, Wiener filtering and maximum entropy-based methods.

#### **Module II (14 Hrs)**

**Image Segmentation:** Pixel classification, Bi-level thresholding, Multi-level thresholding, P-tile method, Adaptive thresholding, Spectral & spatial classification, Edge detection, Hough transform, Region growing.

**Image compression:** Fundamental concepts of image compression - Compression models - Information theoretic perspective - Fundamental coding theorem - Lossless Compression: Huffman Coding- Arithmetic coding - Bit plane coding - Run length coding - Lossy compression: Transform coding - Image compression standards.

#### **Module III: (10 Hrs)**

Video Processing: Representation of Digital Video, Spatio-temporal sampling; Motion Estimation; Video Filtering; Video Compression, Video coding standards.

#### **Texts/References**

1. A. K. Jain, Fundamentals of digital image processing, Prentice Hall of India, 1989.
2. R. C. Gonzalez, R. E. Woods, *Digital Image Processing*, Pearson Education. II Ed.,2002
3. W. K. Pratt, Digital image processing, Prentice Hall, 1989
4. A. Rosenfold and A. C. Kak, Digital image processing, Vols. 1 and 2, Prentice Hall, 1986.
5. H. C. Andrew and B. R. Hunt, Digital image restoration, Prentice Hall, 1977
6. R. Jain, R. Kasturi and B.G. Schunck, Machine Vision, McGraw-Hill International Edition, 1995
7. A. M. Tekalp, Digital Video Processing , Prentice-Hall, 1995
8. A. Bovik, Handbook of Image & Video Processing, Academic Press, 2000