K L University
Department of Electronics & Computer Engineering
M.Tech (Embedded Systems)

Course No.   : 15-EM51B3
Course Title   : Image and Video Processing
Course Structure   : 3-0-0
SYLLABUS:

UNIT I
Fundamentals of Image Processing and Image Transforms: Basic steps of Image Processing System Sampling and Quantization of an image – Basic relationship betweenpixelsImage Transforms: 2 D- Discrete Fourier Transform, Discrete Cosine Transform (DCT), Wavelet Transforms:Continuous Wavelet Transform, Discrete Wavelet Transforms.

UNIT II
Image Processing Techniques:
Image Enhancement: Spatial domain methods: Histogram processing, Fundamentals of Spatial filtering, Smoothing spatial filters,Sharpening spatial filters.Frequency domain methods: Basics of filtering in frequency domain, image smoothing, image sharpening,Selective filtering.
Image Segmentation: Segmentation concepts, Point, Line and Edge Detection, Thresholding, Region Based segmentation.

UNIT III
Image Compression: Image compression fundamentals - Coding Redundancy, Spatial and Temporal redundancy, Compressionmodels: Lossy& Lossless, Huffman coding, Arithmetic coding, LZW coding, Run length coding, Bit plane
coding, Transform coding, Predictive coding, Wavelet coding, JPEG Standards.

UNIT IV
Basic steps of Video Processing: Analog Video, Digital Video. Time-Varying Image Formation models: Three-Dimensional Motion Models,Geometric Image Formation, Photometric Image Formation, Sampling of Video signals, Filtering operations.

UNIT V 2-D
Motion Estimation: Optical flow, General Methodologies, Pixel Based Motion Estimation, Block- Matching Algorithm, and Mesh basedMotion Estimation, Global Motion Estimation, Region based Motion Estimation, Multi resolution motion
estimation, Waveform based coding, Block based transform coding, Predictive coding, Application of motion estimation in Video coding.

Text Books:
1. Digital Image Processing – Gonzaleze and Woods, 3rd ed., Pearson.
2. Video processing and communication – Yao Wang, JoemOstermann and Ya–quin Zhang. 1st Ed., PH Int.

References :
1. Digital Video Processing – M. Tekalp, Prentice Hall International