VIDEO PROCESSING

(Program Elective-IV)

CourseCode	19IT4701C	**Year**	IV	**Semester**	I
CourseCategory	PE	**Branch**	IT	**CourseType**	Theory
Credits	3	**L-T-P**	3-0-0	**Prerequisites**	Computer Graphics
Continuous Internal Evaluation:	30	**Semester End Evaluation:**	70	**Total Marks:**	100

CourseOutcomes		**Blooms Taxonomy Level**
Upon successful completion of the course, the student will be able to		
CO1	Understand the basic concepts of Video processing techniques	L2
CO2	Interpret various video signals, modeling and coding	L3
CO3	Analyze dimensional motion models of video processing	L4

Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (H:High, M:Medium, L:Low)

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1		1		2	2								2	
CO2		1		2	3								2	
CO3		1		2	2								2	

Syllabus		
Unit No	**Contents**	**Mapped CO**
I	**Video Formation, Perception, and Representation**: Color Perceptionand Specification, Video Capture and Display, Analog Video Raster, Analog Color Television Systems, Digital Video. **Fourier Analysis of Video Signals and Frequency Response of the Human Visual System**: Multidimensional Continuous-Space Signals and Systems, Multi dimensional Discrete-Space Signals and Systems, Frequency Domain Characterization of Video Signals, Spatial and Temporal Frequencies, Temporal Frequencies Caused by Linear Motion, Frequency Response of the Human Visual System, Temporal Frequency Response and Flicker Perception.	**CO1, CO2**
II	**Video Sampling**: Basics of the Lattice Theory, Sampling over Lattices, Sampling Process and Sampled-Space Fourier Transform, The Generalized Nyquist Sampling Theorem, Sampling Efficiency, Sampling of Video Signals, Filtering Operations in Cameras and Display Devices	**CO1, CO2**

III	**Video Modeling**: Camera Model, Illumination Model, Object Model, Scene Model, Two-Dimensional Motion Models. **Two- Dimensional Motion Estimation**: Optical Flow, General Methodologies, Pixel-Based Motion Estimation, Block-Matching Algorithm, Deformable Block-Matching Algorithms, Mesh-Based Motion Estimation, Global Motion Estimation.	**CO2, CO3**
IV	**Three-Dimensional Motion Estimation**: Feature-Based Motion Estimation, Direct Motion Estimation, Iterative Motion Estimation, Foundations Of Video Coding: Overview of Coding Systems, Basic Notions in Probability and Information Theory.	**CO2, CO3**
V	**Wave form-Based Video Coding**: Block-Based Transform Coding, Predictive Coding, Video Coding Using Temporal Prediction and Transform Coding.	**CO2, CO3**

Learning Resources

TextBooks

1. Yao Wang, Jorn Ostermann, Ya-QinZhang, 'Video Processing and Communications', Prentice Hall,2002
2. AlanC.Bovik,'TheEssentialGuidetoVideoProcessing',ElsevierScience,edition2,2009

References

1. A. Murat Tekalp, 'Digital Video Processing', Prentice Hall,edition1,1996
2. Relf, Christopher G, "Image acquisition and processing with Lab VIEW",CRC press
3. Anerozdemi R, "Inverse Synthetic Aperture Radar Imaging with MATLAB Algorithms", John Wiley & Sons
4. Chris Solomon, Toby Breck on "Fundamentals of Digital Image Processing A Practical Approach with Examples in Matlab", John Wiley & Sons