



SRI CHANDRASEKHARENDRA SARASWATHI VISWA MAHAVIDYALAYA

(University established under section 3 of UGC Act 1956)

(Accredited with 'A' Grade by NAAC)



CURRICULUM FOR FULL TIME

BE - ELECTRONICS AND COMMUNICATION ENGINEERING

HONS./MINOR DEGREE IN EMERGING AREAS(OPTIONAL)

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING





B.E. (Hons.) Electronics and Communication Engineering

B.E. (Hons.) Electronics and Communication Engineering

B.E /B.TECH-Hons./Minor Degrees in Emerging Areas (Optional)

Emerging Areas	Offered as Hons., for the following Major Disciplines*	Offered as Minor Degrees for the following Major Disciplines**
5G COMMUNICATION SYSTEMS	Electronics and Communication Engineering / Computer Science and Engineering / Information Technology/ Electrical and Electronics Engineering	Electronics and Instrumentation Engineering/ Mechatronics / Mechanical Engineering / Civil Engineering
VLSI DESIGN	Electronics and Communication Engineering / Computer Science and Engineering / Information Technology/ Electrical and Electronics Engineering	Electronics and Instrumentation Engineering/ Mechatronics / Mechanical Engineering / Civil Engineering
IMAGE PROCESSING AND COMPUTER VISION	Electronics and Communication Engineering / Computer Science and Engineering / Information Technology	Electrical and Electronics Engineering /Electronics and Instrumentation Engineering/ Mechatronics/ Mechanical Engineering / Civil Engineering
DRONE TECHNOLOGY	Electronics and Communication Engineering/ Electrical and Electronics Engineering/ Mechatronics/ Mechanical Engineering	Computer Science and Engineering / Information Technology/ Civil Engineering

Note: The “Minor Degree or Hons. will cumulatively require additional 18 to 20 credits in the specified area in addition to the credits essential for obtaining the Under Graduate Degree in Major Discipline.

* Under Graduate Degree Courses in EMERGING AREAS shall be allowed as specialization from the same Department. The minimum additional Credits for such Courses shall be in the range of 18-20 and the same shall be mentioned in the degree, as specialization in that particular area.

** Minor specialization in EMERGING AREAS in Under Graduate Degree Courses may be allowed where a student of another Department shall take the minimum additional Credits in the range of 18-20 and get a degree with minor from another Department.



**ELECTRONICS AND COMMUNICATION
ENGINEERING WITH
HONS. /MINOR DEGREES
IMAGE PROCESSING AND
COMPUTER VISION**



CURRICULUM & SYLLABUS

For B.E. (Hons.) Electronics and Communication Engineering with Specialization in
IMAGE PROCESSING AND COMPUTER VISION

S.No	Year	Sem	Course Code	Course Name	L	T	P	C	IA	EA	TM
1	II	IV		MULTIDIMENSIONAL DIGITAL SIGNAL PROCESSING	3	0	0	3	40	60	100
2	III	V		DIGITAL IMAGE PROCESSING	3	0	0	3	40	60	100
3	III	V		COMPUTER VISION	3	0	0	3	40	60	100
4	III	VI		IMAGE ANALYSIS	3	0	0	3	40	60	100
5	IV	VI		DEVELOPMENT TOOLS FOR IMAGE AND VIDEO PROCESSING LABORATORY	0	0	2	2	40	60	100
6	IV	VII		PATTERN RECOGNITION AND MACHINE LEARNING	3	0	0	3	40	60	100
7	IV	VII		DIGITAL IMAGE PROCESSING LABORATORY	0	0	2	2	40	60	100
Total Credits					19						



B.E. (Hons.) Electronics and Communication Engineering

Course Code		L	T	P	C	IA	EA	TM	
Course Name	MULTIDIMENSIONAL DIGITAL SIGNAL PROCESSING	3	0	0	3	40	60	100	
Course Category	PROFESSIONAL SPECIALIZED COURSE	Syllabus Revision					V.1.0		
Pre-requisite	Basic Engineering Mathematics, Signals and System, Digital Signal processing								

Course Objectives:

The course should enable the students

1. To understand one-dimensional and two-dimensional signals.
2. To gain a better understanding of the sampling theorem and reconstruction, it's important to consider both down sampling and up sampling, which involve using different sampling techniques.
3. To gain knowledge of a discrete space transform for Fourier transform and fast Fourier transform.
4. To understand and analyze wavelet transformations and 2D Z transformations.
5. To acquire knowledge and comprehend the design of FIR and IIR filters.

Course Outcomes:

On completion of the course, the student will be able to

Course Outcomes	Description	Highest Bloom's Taxonomy
CO1	Apply the knowledge of one dimensional and two dimensional signals.	K2
CO2	Apply concepts of sampling theorem and reconstruction.	K3
CO3	Explain the basic concepts of Fourier transform and fast Fourier transform.	K2
CO4	Describe different wavelet transform and Z transforms.	K4
CO5	Design and implementation of FIR and IIR filters.	K4

Correlation between Course Outcomes (COs) and Program Outcomes (POs):

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2	PS O 3
	CO1	S	M	M	S	L	L	M	-	-	-	L	M	S	L
CO2	M	S	M	-	-	-	-	-	-	-	S	M	M	M	L



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CO3	S	M	M	-	-	-	-	-	L	M	L	M	M	S	L	
CO4	M	S	S	-	M	L	M	-	-	-	L	L	S	M	L	
CO5	M	M	M	-	L	-	S	-	-	-	M	M	S	M	M	
UNIT-I														INTRODUCTION		9 Hours
One Dimensional and Two Dimensional Signals and Systems- Separable Signals- Periodic Signals - General Periodicity - 1D & 2-D Discrete Space Systems. 1 D & 2D Convolution. Continuous Space Fourier Transform.																
UNIT-II														SAMPLING IN ONE AND TWO DIMENSIONS		9 Hours
Ideal Rectangular Sampling – Sampling Theorem. General Case – Change of Sampling Rate - Sampling Lattice – Reconstruction – Down sampling and Up sampling by integers.																
UNIT-III														DISCRETE SPACE TRANSFORMS		9 Hours
1D & 2D Discrete Fourier Series - 1D & 2-D Discrete Fourier transform- Properties – Discrete Time Fourier Transform- Short Time Fourier Transform – Fast Fourier Transform.																
UNIT-IV														WAVELET TRANSFORM		9 Hours
Gabor Transform. Two Dimensional Systems and Z-Transforms - 2D Spatial Systems – Z-Transforms - Regions of Convergence - Linear Mapping of Variables - Inverse Z-Transform.																
UNIT-V														FILTER DESIGN FUNDAMENTALS		9 Hours
Ideal and finite order Filters - Two Dimensional Filter Design - FIR and IIR filter design - Window Functions - Rectangular and Rotated windows.																
														Total Hours		45 Hours
Text Book(s)																
1.	Dan E. Dudgeon and Russell M. Mersereau, "Multidimensional Digital Signal Processing", Prentice-hall, 1984.															
2.	John W. Woods, "Multidimensional Signal, Image, and Video Processing and Coding", Second Edition, Academic Press, Elsevier Inc. 2012.															
3.	Steven W. Smith, "Digital Signal Processing – A Practical Guide for Engineers and Scientists", Newnes Elsevier Science, 2013.															
Reference Book(s)																
1.	Alan V Oppenheim and Schafer Ronald W, "Digital Signal Processing", Prentice Hall, 2008.															
2.	Sanjit K Mitra, "Digital Signal Processing: A Computer-Based Approach", Third Edition, McGraw-Hill Companies, 2005.															



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Course Code		L	T	P	C	IA	EA	TM							
Course Name	DIGITAL IMAGE PROCESSING	3	0	0	3	40	60	100							
Course Category	PROFESSIONAL SPECIALIZED COURSE	Syllabus Revision					V.1.0								
Pre-requisite	Basic Digital Electronics, Signals and System, Digital Signal Processing														
Course Objectives:															
The course should enable the students															
<ol style="list-style-type: none"> 1. To acquire knowledge about image representation and image digitization. 2. Gain insight into the fundamental principles of image transformation, smoothing, and restoration. 3. To examine different image segmentation and graph cut algorithms. 4. To acquire knowledge and identify different types of color image processing. 5. To study various color transformations. 															
Course Outcomes:															
On completion of the course, the student will be able to															
Course Outcomes	Description							Highest Bloom's Taxonomy							
CO1	Apply the knowledge of image representation, image digitization.							K3							
CO2	Apply concepts of image transformation, smoothing and image restoration.							K3							
CO3	Explain the basic concepts of image segmentation and graph cut algorithm.							K2							
CO4	Apply and identify color image processing.							K4							
CO5	Describe and implement color transformation.							K4							
Correlation between Course Outcomes (COs) and Program Outcomes (POs):															
COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2	PS O 3
CO1	M	S	M	-	-	-	-	L	L	-	L	M	M	L	M
CO2	M	L	L	M	-	L	M	-	M	-	M	M	M	L	S
CO3	M	M	M	-	L	-	-	L	-	-	S	L	S	M	S
CO4	S	S	L	-	M	-	M	-	M	-	L	L	S	M	L
CO5	S	L	M	-	L	-	L	-	L	-	L	M	M	M	L



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UNIT-I	IMAGE REPRESENTATION AND PROPERTIES	9 Hours
Introduction - Image Representation - Image Digitization - Digital Image Properties – Discrete Fourier Transform - Image Pre-Processing in Spatial and Frequency Domain.		
UNIT-II	IMAGE TRANSFORMATION	9 Hours
Pixel Brightness Transformation - Geometric Transformations - Local Preprocessing - Image Smoothing – Edge Detectors - Corner Detectors – Image Restoration.		
UNIT-III	IMAGE SEGMENTATION	9 Hours
Thresholding – Edge- Based Segmentation – Region Based Segmentation, Mean shift segmentation, Graph cut algorithm– Matching – Evaluation Issues in Segmentation, Watersheds.		
UNIT-IV	COLOR IMAGE PROCESSING	9 Hours
Color Fundamentals – Color Models – Pseudocolor Image Processing – Basics of Full Color Image Processing.		
UNIT-V	COLOR TRANSFORMATIONS	9 Hours
Smoothing and Sharpening – Color Segmentation – Noise in Color Images.		
Total Hours		45 Hours
Text Book(s)		
1.	Rafael C. Gonzalez and Richard E. Woods, “Digital Image Processing”, Third Edition, Pearson Education, 2009.	
2.	Milan Sonka, Vaclav Hlavac and Roger Boyle, “Image Processing, Analysis and Machine Vision”, Third Edition, Cengage Learning, 2007.	
Reference Book(s)		
1.	William K. Pratt, “Digital Image Processing”, Fourth Edition, Wiley Interscience, 2007	
2.	Anil K Jain, “Fundamentals of Digital Image Processing”, Prentice Hall, 1989.	



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Course Code		L	T	P	C	IA	EA	TM							
Course Name	COMPUTER VISION	3	0	0	3	40	60	100							
Course Category	PROFESSIONAL SPECIALIZED COURSE	Syllabus Revision				V.1.0									
Pre-requisite	Engineering Mathematics, Knowledge, Digital Electronics, Digital Image Processing.														
Course Objectives:															
The course should enable the students															
<ol style="list-style-type: none"> 1. To Gain knowledge on how images are formed requires understanding how they are formed. 2. To analyze the idea of camera models and calibration. 3. To learn and understand the different types of Local Feature Detectors and Descriptors. 4. To acquire knowledge of multiplane methods in pose Estimation. 5. To learn and understand the Stereo and Multi-view Geometry. 															
Course Outcomes:															
On completion of the course, the student will be able to															
Course Outcomes	Description							Highest Bloom's Taxonomy							
CO1	Apply the knowledge of image formation.							K3							
CO2	Apply concepts of camera models and calibration.							K2							
CO3	Apply the knowledge of Local Feature Detectors and Descriptors.							K3							
CO4	Apply and identify calibration methods.							K4							
CO5	Describe and implement for Stereo and Multi-view Geometry.							K4							
Correlation between Course Outcomes (COs) and Program Outcomes (POs):															
COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O2	PS O3
CO1	S	M	S	M	L	M	M	-	L	M	M	M	S	M	M
CO2	M	L	M	-	L	L	-	-	-	M	-	L	M	L	L
CO3	S	M	S	M	M	L	-	M	-	L	L	M	S	M	M
CO4	M	M	L	M	L	M	-	-	-	-	M	-	L	S	M
CO5	S	L	L	S	M	L	-	L	-	M	L	-	M	L	L



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UNIT-I	IMAGE FORMATION	9 Hours
Geometric image formation, Photometric image formation.		
UNIT-II	CAMERA MODELS AND CALIBRATION	9 Hours
Camera Projection Models – Orthographic, Affine, Perspective, Projective models. Projective Geometry: Transformation of 2D and 3D, Internal Parameters, Lens Distortion Models.		
UNIT-III	LOCAL FEATURE DETECTORS AND DESCRIPTORS	9 Hours
Hessian corner detector, Harris Corner Detector, LOG detector, DOG detector, SIFT, PCA-SIFT, GLOH, SURF, HOG, Pyramidal HOG, PHOW.		
UNIT-IV	CALIBRATION METHODS	9 Hours
Linear, Direct, Indirect and Multiplane methods - Pose Estimation.		
UNIT-V	STEREO AND MULTI-VIEW GEOMETRY	9 Hours
Epipolar Geometry, Rectification and Issues related to Stereo, General Stereo with E Matrix Estimation, Stratification for 2 Cameras, Extensions to Multiple Cameras, Self-Calibration with Multiple Cameras, 3D reconstruction of cameras and structures, Three View Geometry.		
Total Hours		45 Hours
Text Book(s)		
1.	Forsyth and Ponce, “Computer Vision – A Modern Approach”, Second Edition, Prentice Hall, 2011.	
2.	Emanuele Trucco and Alessandro Verri, “Introductory Techniques for 3-D Computer Vision”, Prentice Hall, 1998.	
Reference Book(s)		
1.	Olivier Faugeras, “Three Dimensional Computer Vision”, MIT Press, 1993.	
2.	Richard Szeliski, “Computer Vision: Algorithms and Applications”, Springer, 2011.	
3.	Milan Sonka, Vaclav Hlavac and Roger Boyle, “Image Processing, Analysis and Machine Vision”, Third Edition, CL Engineering, 2013.	



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Course Code		L	T	P	C	IA	EA	TM							
Course Name	IMAGE ANALYSIS	3	0	0	3	40	60	100							
Course Category	PROFESSIONAL SPECIALIZED COURSE	Syllabus Revision				V.1.0									
Pre-requisite	Signals and System, Digital Signal Processing, Digital Image Processing.														
Course Objectives:															
The course should enable the students															
<ol style="list-style-type: none"> 1. To learn and understand the image morphology and segmentation. 2. To analyze the performance of feature extraction and measurement. 3. To understand various image representations and descriptions. 4. To learn and understand the Texture representation and analysis 5. To become familiar image understanding. 															
Course Outcomes:															
On completion of the course, the student will be able to															
Course Outcomes	Description							Highest Bloom's Taxonomy							
CO1	Analyze given images and identify image morphology and segmentation.							K3							
CO2	Apply the concepts of feature extraction and measurement.							K2							
CO3	Describe various image representations and descriptions.							K4							
CO4	Apply the concepts of texture description and recognition methods							K3							
CO5	Analyze the point distribution models of image understanding.							K4							
Correlation between Course Outcomes (COs) and Program Outcomes (POs):															
COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O2	PS O3
CO1	S	S	M	M	L	-	M	-	L	M	M	L	S	M	M
CO2	M	M	S	S	M	L	-	L	M	-	M	M	M	S	L
CO3	S	M	L	M	L	-	-	M	-	L	L	L	M	L	S
CO4	M	S	L	M	L	M	M	-	L	-	L	M	L	M	M
CO5	M	M	L	S	M	-	L	-	L	-	M	L	S	M	M



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UNIT-I	IMAGE MORPHOLOGY	9 Hours
Binary and gray scale Morphological analysis - Dilation and Erosion - Skeletons and Object Marking – Granulometry – Morphological Segmentation.		
UNIT-II	FEATURE EXTRACTION	9 Hours
Global image measurement, feature specific measurement, characterizing shapes, Hough Transform.		
UNIT-III	REPRESENTATION AND DESCRIPTION	9 Hours
Region Identification – Contour Based and Region Based Shape Representation and Description – Shape Classes. Flexible shape extraction: active contours, Flexible shape models: active shape and active appearance.		
UNIT-IV	TEXTURE REPRESENTATION AND ANALYSIS	9 Hours
Statistical Texture Description – Syntactic Texture Description Methods – Hybrid Texture description Methods – Texture Recognition Method Applications.		
UNIT-V	IMAGE UNDERSTANDING	9 Hours
Control Strategies –RANSAC – Point Distribution Models – Scene Labeling and Constraint Propagation. Image Data Compression: Predictive Compression Methods – Vector Quantization, DCT, Wavelet, JPEG.		
Total Hours		45 Hours
Text Book(s)		
1.	Milan Sonka, Vaclav Hlavac and Roger Boyle, “Image Processing, Analysis and Machine Vision”, Third Edition, Cengage Learning, 2007.	
2.	Tinku Acharya, Ajoy K Ray, “Image Processing- Principles and Applications”, Wiley, 2005.	
3.	John C. Russ, “The Image Processing Handbook”, Sixth Edition, CRC Press, 2007.	
Reference Book(s)		
1.	Mark S. Nixon, Alberto S. Aguado, “Feature Extraction and Image Processing”, Second Edition, Academic Press, 2008.	



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Course Code		L	T	P	C	IA	EA	TM							
Course Name	DEVELOPMENT TOOLS FOR IMAGE AND VIDEO PROCESSING LABORATORY	0	0	2	2	40	60	100							
Course Category	PROFESSIONAL SPECIALIZED COURSE	Syllabus Revision					V.1.0								
Pre-requisite															
Course Objectives:															
<ol style="list-style-type: none"> 1. To understand the importance of Open-Source Tools for Image Processing and Computer Vision. 2. Familiarize the Beagle Board XM and Beagle Bone Black. 3. To study and implement NI Vision System Camera with LabView. 4. To learn and understand the iRobot for Matlab programming for Navigation scenario. 5. To Design and implement Lego Mindstorm Simple Robot Programming. 															
Course Outcomes:															
On completion of the course, the student will be able to															
Course Outcomes	Description							Highest Bloom's Taxonomy							
CO1	Able to understand OpenSource Tools for Image Processing and Computer Vision.							K5							
CO2	Able to Implement and design NI Vision System Camera with LabView.							K6							
CO3	Able to Implement and design of Lego Mindstorm Simple Robot Programming.							K6							
CO4	Able to Implement and design of iRobot for Matlab programming for Navigation scenario.							K6							
CO5	Able to Implement Lego Mindstorm Simple Robot Programming.							K5							
Correlation between Course Outcomes (COs) and Program Outcomes (POs):															
COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O2	PS O3
CO1	M	S	S	M	S	-	M	-	M	-	M	M	S	S	S
CO2	S	M	S	M	M	-	-	S	-	M	L	M	S	M	M
CO3	M	S	S	M	M	-	S	-	M	M	M	L	M	M	S
CO4	S	S	S	M	M	-	-	M	-	-	L	L	M	M	M
CO5	M	M	M	S	S	-	M	-	S	L	M	M	S	M	M



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LIST OF EXPERIMENTS	
1	Open Source Tools for Image Processing and Computer Vision - OpenCV, OpenGL
2	BeagleBoard XM and BeagleBone Black - Application Development using OpenCV/Java for Image Processing concepts
3	NI Vision System Camera with LabView - Data Acquisition - Basic Image Processing concepts
4	iRobot - Matlab programming for Navigation scenario Lego Mindstorm
5	iRobot - Simple Robot Programming - Object



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Course Code		L	T	P	C	IA	EA	TM							
Course Name	PATTERN RECOGNITION AND MACHINE LEARNING	3	0	0	3	40	60	100							
Course Category	PROFESSIONAL SPECIALIZED COURSE	Syllabus Revision					V.1.0								
Pre-requisite	Knowledge of Machine Learning Fundamentals, Digital Image Processing														
Course Objectives:															
The course should enable the students															
<ol style="list-style-type: none"> 1. To learn and understand the concept of pattern recognition and classification. 2. Describe and analyze the kernel methods and support vector machines. 3. To learn and analyze the graphical models, mixture models. 4. To understand the applications of principal component analysis and Markov models. 5. To learn the concept of deep learning and Deep Architecture. 															
Course Outcomes:															
On completion of the course, the student will be able to															
Course Outcomes	Description							Highest Bloom's Taxonomy							
CO1	Apply the concept of pattern recognition and classification.(K3)							K2							
CO2	Implements the kernel methods and support vector machines							K4							
CO3	Manipulate the graphical models, mixture models.							K4							
CO4	Apply the concepts of principal component analysis and Markov models.							K3							
CO5	Categorizes deep learning and Deep Architecture.							K4							
Correlation between Course Outcomes (COs) and Program Outcomes (POs):															
COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2	PS O 3
CO1	S	M	L	M	L	-	-	-	M	L	L	M	M	M	S
CO2	M	M	M	S	L	-	M	L	-	-	M	L	L	L	M
CO3	S	M	S	M	L	-	-	-	M	L	L	M	S	M	L
CO4	S	M	L	L	M	-	L	-	M	-	L	L	M	M	M
CO5	M	L	M	M	L	-	-	-	-	L	M	L	M	L	L



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UNIT-I	INTRODUCTION	9 Hours
Pattern recognition systems - The design cycle - Learning and adaptation -Linear models for classification - Discriminant functions (Two and multiple classes) - Least squares classification functions - Fisher's discriminant analysis for two and multiple classes - Probabilistic generative models - Maximum likelihood solution.		
UNIT-II	KERNEL METHODS	9 Hours
Constructing kernels - Kernel density estimators - Nearest neighbor methods - Gaussian processes and classification - Sparse kernel machines - Support vector machines - Maximum margin classifiers - Multi-class support vector machines.		
UNIT-III	GRAPHICAL MODELS	9 Hours
Bayesian networks - Generative models - Linear Gaussian models - Conditional independence. Mixture models and Expectation maximization: K-means clustering - Mixtures of Gaussian - Expectation maximum for Gaussian mixtures.		
UNIT-IV	CONTINUOUS LATENT VARIABLES	9 Hours
Principal component analysis - Applications of principal component analysis - PCA for higher dimensional data - Factor analysis. Sequential data: Markov models - Hidden Markov models - Maximum likelihood for HMM - Forward-backward algorithm. Combining models - Tree based models - Decision trees - Classification and regression trees (CART).		
UNIT-V	DEEP LEARNING FOR HIGH-LEVEL VISION	9 Hours
Introduction to Deep Learning, main types of Deep Architectures, Application of Deep Learning Architecture to Computer Vision.		
Total Hours		45 Hours
Text Book(s)		
1.	Christopher M. Bishop, "Pattern Recognition and Machine Learning", Springer, 2006.	
2.	Richard O. Duda, Peter E. Hart and David G. Stork, "Pattern Classification", Second Edition, John Wiley and Sons, 2003.	
Reference Book(s)		
1.	Earl Gose, Richard Johnsonbaugh and Steve Jost, "Pattern Recognition and Image Analysis", Prentice Hall of India, 2002.	



B.E. (Hons.) Electronics and Communication Engineering

Course Code		L	T	P	C	IA	EA	TM							
Course Name	DIGITAL IMAGE PROCESSING LABORATORY	0	0	2	2	40	60	100							
Course Category	PROFESSIONAL SPECIALIZED COURSE	Syllabus Revision					V.1.0								
Pre-requisite															
<p>Course Objectives: The course should enable the students</p> <ol style="list-style-type: none"> 1. Study the image fundamentals, mathematical transforms necessary for image processing. 2. To understand the Display of an Image, Negative of an Image (Binary & Gray Scale). 3. To implement the various techniques of image enhancement, reconstruction, compression and segmentation. 4. To implement sampling and reconstruction procedures. 5. To design image processing systems. 															
<p>Course Outcomes: On completion of the course, the student will be able to</p>															
Course Outcomes	Description							Highest Bloom's Taxonomy							
CO1	Able to understand the image fundamentals, mathematical transforms necessary for image processing.							K4							
CO2	Demonstrate knowledge about the Contrast stretching of a low contrast image, Histogram, and Histogram Equalization.							K6							
CO3	Able to identify, formulate and solve image smoothing and sharpening problems.							K6							
CO4	Able to identify and formulate image Edge Detection and compression problems.							K4							
CO5	Able to implement image restoration techniques.							K3							
Correlation between Course Outcomes (COs) and Program Outcomes (POs):															
COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	S	S	-	M	S	-	M	-	M	-	M	M	S	M	M
CO2	S	S	S	-	M	-	-	S	-	M	-	M	S	S	M
CO3	M	S	S	M	M	-	S	-	M	M	M	-	M	S	S
CO4	S	M	M	S	M	-	-	M	-	-	-	-	M	M	M
CO5	M	S	S	M	S	-	M	-	S	-	M	M	S	M	S



LIST OF EXPERIMENTS	
1.	To study the Image Processing concept.
2.	Simulation and Display of an Image, Negative of an Image (Binary & Gray Scale).
3.	Implementation of Relationships between Pixels.
4.	Implementation of Transformations of an Image.
5.	Contrast stretching of a low contrast image, Histogram, and Histogram Equalization.
6.	Computation of Mean, Standard Deviation, Correlation coefficient of the given Image.
7.	Implementation of Image Smoothing Filters (Mean, Median filtering of an Image).
8.	Implementation of image sharpening filters and Edge Detection using Gradient Filters.
9.	Image Compression by DCT,DPCM, HUFFMAN coding.
10.	Implementation of image restoration techniques.