# UNIVERSITY DEPARTMENTS
ANNA UNIVERSITY, CHENNAI 600 025
REGULATIONS - 2013
M.E. MULTIMEDIA TECHNOLOGY
I – IV SEMESTERS CURRICULUM AND SYLLABUS

## SEMESTER I

<table>
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<th>SL. NO.</th>
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OBJECTIVES:
- To understand the usage of algorithms in computing.
- To learn and use hierarchical data structures and its operations.
- To learn the usage of graphs and strings and its applications.
- To select and design data structures and algorithms that is appropriate for problems.
- To study about NP Completeness of problems.

UNIT I    ROLE OF ALGORITHMS IN COMPUTING

UNIT II HIERARCHICAL DATA STRUCTURES

UNIT III GRAPHS & STRINGS

UNIT IV ALGORITHM DESIGN TECHNIQUES

UNIT V NP COMPLETE AND NP HARD

OUTCOMES:
- Design data structures and algorithms to solve computing problems.
- Become familiar with the specification, usage, implementation and analysis of hierarchical data structures and algorithms.
- Design algorithms using graph structure and various string matching algorithms to solve real-life problems.
- Apply suitable design strategy for problem solving.

REFERENCES:
OBJECTIVES:
- To provide an introduction to the fundamental principles and techniques in multimedia signal processing.
- To provide an overview of the current multimedia standards and technologies.
- To provide details about representation and computing algorithms of multimedia.
- To review latest trends and future technologies.

UNIT I  FUNDAMENTALS OF MULTIMEDIA SIGNALS  9
Introduction To Multimedia – Continuous time (analogue) - Discrete time and digital signals - Introduction to signal processing as applied to speech, music and multimedia - 2D signals – Sampling in 2D – Sampling theorem – 2D processing of Analog signals - Sampling theory – Aliasing and the effect of quantization - 'Sample and hold' reconstruction - Sampling rate conversion and oversampling to simplify analogue filters - Overall design of digital systems for processing speech, music and multimedia.

UNIT II  TEXT AND AUDIO  9

UNIT III  GRAPHICS AND ANIMATION  9

UNIT IV  VIDEO  9

UNIT V  MULTIMEDIA TOOLS AND DEVELOPMENT  9

TOTAL: 45 PERIODS

OUTCOMES:
Upon Completion of the course, the students should be able to
- Implement basic algorithms related to multimedia components.
- Familiar with the open source tools for processing multimedia components.
- Design and implement some basic multimedia applications in Internet.
- Critically analyze the role of multimedia components in Internet related applications.

REFERENCES:
OBJECTIVES:

- To understand the Multimedia Communication Models.
- To analyze the Guaranteed Service Model.
- To study the Multimedia Transport in Wireless Networks.
- To solve the Security issues in multimedia networks.
- To explore real-time multimedia network applications.

UNIT I  MULTIMEDIA COMMUNICATION MODELS


UNIT II  GUARANTEED SERVICE MODEL


UNIT III  MULTIMEDIA TRANSPORT


UNIT IV  MULTIMEDIA OVER WIRELESS NETWORKS


UNIT V  MULTIMEDIA NETWORK SECURITY AND APPLICATIONS


TOTAL: 45 PERIODS

OUTCOMES:

At the end of the course, the students will be able to

- Deploy the right multimedia communication models.
- Apply QoS to multimedia network applications with efficient routing techniques.
- Solve the security threats in the multimedia networks.
- Develop the real-time multimedia network applications.

REFERENCES:

OBJECTIVES:
- To understand the basic ideas of compression algorithms related to multimedia components – Text, speech, audio, image and Video.
- To understand the principles and standards and their applications with an emphasis on underlying technologies, algorithms, and performance.
- To appreciate the use of compression in multimedia processing applications
- To understand and implement compression standards in detail.

UNIT I  FUNDAMENTALS OF COMPRESSION  9

UNIT II  TEXT COMPRESSION  9

UNIT III  IMAGE COMPRESSION  9

UNIT IV  AUDIO COMPRESSION  9

UNIT V  VIDEO COMPRESSION  9

TOTAL : 45 PERIODS

OUTCOMES:
Upon Completion of the course, the students should be able to
- Implement basic compression algorithms.
- Familiar with the use of MATLAB and its equivalent open source environments.
- Design and implement some basic compression standards.
- Critically analyze different approaches of compression algorithms in multimedia related mini projects.

REFERENCES:
OBJECTIVES:
- To introduce the basic concepts of one dimensional and two dimensional Random Variables.
- To provide information about Estimation theory, Correlation, Regression and Testing of hypothesis.
- To enable the students to use the concepts of multivariate normal distribution and principle components analysis.

UNIT I ONE DIMENSIONAL RANDOM VARIABLES 9+3

UNIT II TWO DIMENSIONAL RANDOM VARIABLES 9+3
Joint distributions – Marginal and Conditional distributions – Functions of two dimensional random variables – Regression Curve – Correlation.

UNIT III ESTIMATION THEORY 9+3

UNIT IV TESTING OF HYPOTHESES 9+3
Sampling distributions – Type I and Type II errors – Tests based on Normal, t, 2 and F distributions for testing of mean, variance and proportions – Tests for Independence of attributes and Goodness of fit.

UNIT V MULTIVARIATE ANALYSIS 9+3

TOTAL 45+15:60 PERIODS

OUTCOMES:
Upon Completion of the course, the students should be able to
- Acquire the basic concepts of Probability and Statistical techniques for solving mathematical problems which will be useful in solving Engineering problems.

REFERENCES:
OBJECTIVES:
- To provide information about wider engineering issues that form the background to developing complex, evolving (software-intensive) systems.
- To plan a software engineering process to account for quality issues and non-functional requirements.
- To employ a selection of concepts and techniques to complete a small scale analysis and design in mini projects.
- To impart knowledge to translate requirement specifications into a design, and then realize that design practically, all using an appropriate software engineering methodology.
- To provide basic knowledge about software project management.

UNIT I SOFTWARE PRODUCT AND PROCESS

UNIT II SOFTWARE REQUIREMENTS

UNIT III DESIGN CONCEPTS AND PRINCIPLES

UNIT IV TESTING

UNIT V SOFTWARE PROJECT MANAGEMENT

TOTAL: 45 PERIODS

OUTCOMES:
Upon Completion of the course, the students should be able to:
- Implement mini projects incorporating the basic principles of software engineering.
- Familiar with the basic concepts of software design, implementation.
- Familiar with software testing of simple mini projects.
- Familiar with the Rational Rose and its equivalent open source tools for understanding basic software engineering concepts.
- Design and implement some basic cost estimation models.
- Critically analyze and apply software project management principles in simple projects.
REFERENCES:

MM8111  DATA STRUCTURES AND ALGORITHMS LABORATORY  L T P C
0 0 3 2
OBJECTIVES:
- To develop skills in design and implementation of data structures and their applications.
- To learn and implement linear, non linear and tree data structures.
- To learn Set ADT and Graph data structures and its applications.
- To study, implement and analyze different sorting techniques.

The following experiments should be practiced
1. Abstract Data type Implementation of List, Stack and Queues.
2. Tree ADT
3. Tries Implementation
4. Set ADT– Bit Vector Implementation
5. Graph Representations
6. Graph Traversals
7. Shortest Path Implementation
8. Spanning Tree Implementation
9. Sorting Algorithms
10. Implementation of Algorithms using Dynamic Programming, Backtracking

OUTCOMES:
Upon Completion of the course, the students should be able to
- Design and implement basic and advanced data structures extensively.
- Design algorithms using graph structure and various string matching algorithms to solve real– life problems.
- Design and Develop efficient algorithms with minimum complexity.

TOTAL: 45 PERIODS

MM8112  MULTIMEDIA PROCESSING LABORATORY  L T P C
0 0 3 2
COURSE OBJECTIVES:
- To explore the various multimedia editing tools like Photoshop/EQV/MATLAB, Audacity, Garageband, iMovie and OpenCV.
- To explore media processing tools.
The following experiments should be practiced
1. Image color/contrast balancing and Enhancement using Photoshop/ MATLAB.
2. Image compositing using Photoshop / MATLAB.
3. Applying special effects using Photoshop / MATLAB.
4. Music composing using Garage Band/ Audacity/ MATLAB.
5. Audio editing using Garage Band/Audacity/ MATLAB.
6. Video Preproduction works
   a. Storyboarding Concepts
   b. Animatics
7. Creation of 2D Animation using Flash/ Director.
8. Creation of 3D Animation using 3Ds Max/Maya.
9. Video Editing using iMovie/ Final cut Pro/ Adobe Premiere.
10. Multimedia Applications using open CV.
11. Mini Project.

OUTCOMES:
Upon Completion of the course, the students should be able to
- Process media elements using various multimedia tools.
- Create 2D and 3D animations.
- Build multimedia applications.

TOTAL: 45 PERIODS

MM8201 DIGITAL IMAGE PROCESSING TECHNIQUES

OBJECTIVES:
- To understand the basic concepts and algorithms of digital image processing.
- To familiarize the student with the image processing environments like Matlab and its equivalent open source Image processing environments.
- To expose the student to a broad range of image processing techniques and issues and their applications, and to provide the student with practical experience using them.
- To appreciate the use of image processing in current technologies and to expose the students to real-world applications of image processing.

UNIT I FUNDAMENTALS OF IMAGE PROCESSING

UNIT II IMAGE ENHANCEMENT AND RESTORATION

UNIT III IMAGE SEGMENTATION AND IMAGE FEATURE ANALYSIS
UNIT IV  MULTI RESOLUTION ANALYSIS AND MORPHOLOGICAL PROCESSING


UNIT V  IMAGE PATTERN RECOGNITION AND CASE STUDIES


OUTCOMES:
Upon Completion of the course, the students should be able to
- Implement basic image processing algorithms using MATLAB tools.
- Design an application that incorporates different concepts of Image Processing.
- Apply and explore new techniques in the areas of image enhancement, restoration, segmentation, compression, wavelet processing and image morphology.
- Critically analyze different approaches to implement mini projects.
- Explore the possibility of applying Image processing concepts in various domains.

REFERENCES:

MM8202  WEB PROGRAMMING AND DESIGN

OBJECTIVES:
- To understand the issues in the design of web application development.
- To learn the concepts of client side and server side technologies.
- To learn the concept of three tier application using MVC.
- To understand and learn the importance of java based security solutions.
- To learn the concepts of software components using EJB.

UNIT I  WEB DESIGN BASICS

UNIT II  CLIENT AND SERVER SIDE SCRIPTING
UNIT II WEB APPLICATION DEVELOPMENT

UNIT IV COMPONENT BASED DEVELOPMENT

UNIT V ADVANCED FRAMEWORKS

TOTAL: 45 PERIODS

OUTCOMES:
Upon completion of the course, the student should be able to
• Design and develop web applications using various models.
• Web application development using HTML and scripting technologies.
• Web application development using advanced features.
• Learn Security features supported in java.
• Develop web services using J2EE and related technologies.
• Design and develop applications using other frameworks.

REFERENCES:

IF8253 GPU ARCHITECTURE AND PROGRAMMING

OBJECTIVES:
• To understand the architecture of GPUs in order to program them effectively.
• To program using GPU programming frameworks.
• To optimize multimedia applications to run on GPUs.

UNIT I GPU ARCHITECTURES

UNIT II CUDA

UNIT III OPENCL BASICS
UNIT IV  OPENCL CONCURRENY AND EXECUTION MODEL  9
OpenCL Synchronization – Kernels – Fences – Barriers – Queuing – Global Synchronization –
Memory Consistency – Events – Host side memory model – Device Side memory Model.

UNIT V  PERFORMANCE AND CASE STUDY  9
CPU / GPU Interaction – OpenCL on AMD – Memory Performance Consideration – Case Studies.

OUTCOMES:
Upon completion of the course, the student will be able to
  • Design multimedia applications using GPUs.
  • Write Programs for GPUs using CUDA / OpenCL.
  • Optimize programs to run on massive parallel architectures.

REFERENCES:
1. David B. Kirk, Wen-mei W. Hwu, “Programming massively parallel processors”, Morgan

MM8251  MULTIMEDIA DATABASES  
L T P C  
3 0 0 3

OBJECTIVES:
  • To study issues concerning both the traditional and modern database systems and
    technologies for multimedia data management.
  • To understand the basic concepts and techniques pertinent to multimedia databases.
  • To learn about Image databases and Text/Document databases, Audio and Video
    databases.
  • To study and use advanced technologies to develop web–based multimedia applications.

UNIT I  INTRODUCTION  9
An introduction to Object oriented Databases - Multidimensional Data Structures - K d Trees, Point
Quad trees, -The MX Quad tree - R Trees – Comparison of Different Data Structures.

UNIT II  IMAGE DATABASES AND TEXT/DOCUMENT DATABASES  9
Raw Images - Compressed Image Representations - Image Processing Segmentation, Similarity
based Retrieval – Alternative Image DB Paradigms – Representing Image DBs with Relations –
Representing Image DBs with R Trees – Retrieving Images By Spatial Layout - Implementations
Text/Document Databases - Precision and Recall – Stop Lists – Word Stems and Frequency
Tables – Latent Semantic Indexing -TV Trees – Other Retrieval Techniques.

UNIT III  VIDEO DATABASES AND AUDIO DATABASES  9
Video Databases - Organizing Content of a Single Video – Querying Content of Video Libraries –
Video Segmentation – video Standards Audio Databases - A General Model of Audio Data –
Capturing Audio Content through Discrete Transformation – Indexing Audio Data.
UNIT IV  MULTIMEDIA DATABASES  9

UNIT V  OBJECT MODEL AND SPATIAL DATABASES  9

TOTAL: 45 PERIODS

OUTCOMES:
Upon completion of the course, the student will be able to
- Provide a basic study of the development of fundamental database systems.
- Understand the most fundamental MDBMS concepts and techniques
- Acquire knowledge of Image databases, Text/Document databases, Audio and Video databases.
- Grasp the modern database technologies suitable for multimedia data management, and Apply some of the advanced technologies such as spatial databases to develop web based multimedia applications.

REFERENCES:

MM8252  VIDEO ANALYTICS  L T P C
3 0 0 3

OBJECTIVES:
- To know the fundamental concepts of big data and analytics.
- To learn various techniques for mining data streams.
- To acquire the knowledge of extracting information from surveillance videos.
- To learn Event Modelling for different applications.
- To understand the models used for recognition of objects in videos.

UNIT I  INTRODUCTION TO BIG DATA AND DATA ANALYSIS  9

UNIT II  MINING DATA STREAMS  9
UNIT III VIDEO ANALYTICS

UNIT IV BEHAVIOURAL ANALYSIS AND ACTIVITY RECOGNITION

UNIT V HUMAN FACE RECOGNITION AND GAIT ANALYSIS

OUTCOMES:
Upon successful completion of this course, students will be able to:
- Work with big data platform and its analysis techniques.
- Design efficient algorithms for mining the data from large volumes.
- Work with surveillance videos for analytics.
- Design optimization algorithms for better analysis and recognition of objects in a scene.
- Model a framework for Human Activity Recognition.

REFERENCES

MM8211 GPU PROGRAMMING LABORATORY

OBJECTIVES:
- To understand GPU programming frameworks and GPU program structures.
- To understand CPU–GPU interaction.
- To program GPUs using CUDA/OpenCL.
- To solve data parallel image processing and video processing tasks using GPUs.

LIST OF EXPERIMENTS:
Programming using CUDA/ OpenCL
1. Vector and Matrix operations such as addition, multiplication, dot product, etc.
2. Image manipulations such as image rotation, histogram, convolution etc.
3. Implementation of filters.
4. Implementation of compression and decompression algorithms.
5. Video processing tasks such as decompression, event identification, and enhancements.
6. Development of a complete application for some image/video processing domain.

TOTAL: 45 PERIODS
REFERENCES:

OUTCOMES:
Upon successful completion of this course, students will be able to:
- Identify problems suitable for solving using GPUs.
- Breakdown a task for parallelism.
- Write programs for GPUs using CUDA / OpenCL.
- Design and optimize multimedia tasks to run on GPUs.
- Debug CUDA/OpenCL programs.

MM8212 WEB PROGRAMMING AND DESIGN LABORATORY L T P C
0 0 0 3 2

OBJECTIVES:
- To learn how to create a simple web page using html along with the usage of style sheets, lists, creation of tables with borders, padding and colors.
- To get acquainted with JavaScript and how to embed JavaScript in Html code.
- To construct dynamic server side web pages and integrate the Web application with many of the other Java 2 Enterprise Edition application server methodologies.
- To develop Java Enterprise Applications using EJB3 and other Java EE technology and J2ME.

The following experiments should be implemented
1. Web programming with HTML tags, CSS for styling, Page layout.
2. Develop web pages using JavaScript for client side programming and HTML forms.
3. Using The DOM and the JavaScript object models.
4. Website optimization crunching HTML, using CSS to replace HTML and light–weight graphics to speed up websites.
5. Creating XML file with XML DTD and XML schema, SAX, XSL.
6. Web site creation with PHP for server side programming for storing current date – time using cookies and for storing page views using sessions.
7. Web application development using Servlet/ PHP/ JSP/ ASP.NET.
8. Working with PHP and MySQL.
9. Constructing dynamic server – side web pages using JSF and integrate the Web application with many of the other Java2 Enterprise Edition application server methodologies such as Enterprise Java Beans, Java Mail, and SOAP.
10. Developing Java Enterprise Applications Using EJB3 Session beans, entity beans and message–driven beans.
11. Working with JNDI, JDBC, JMS.
12. Application development using J2ME.

OUTCOMES:
Upon successful completion of this course, students will be able to:
- Develop Web application using HTML and scripting technologies.
- Acquire hands on experience on Web application development using advanced features.
- Design and develop dynamic server– side web pages.
- Develop web services using J2EE and related technologies.
- Design and develop applications using other frameworks.

TOTAL: 45 PERIODS
OBJECTIVES:
- To understand the basics of different geometrical shapes modeling.
- To appreciate the different aspects of visibility of an objects.
- To get an understanding of rendering real natural scene.
- To understand the concepts of radio city and kinematics in animation.

UNIT I MATHEMATICS FOR MODELING

UNIT II MODELING SHAPES

UNIT III SHADING AND ILLUMINATION MODELS

UNIT IV TEXTURE AND RENDERING

UNIT V COMPUTER ANIMATION

REFERENCES:

OUTCOMES:
Upon completion of the course, the students will be able to
- Design different polygons and real world objects.
- Apply rendering techniques to make objects more realistic.
- Apply lighting techniques to objects realism.
- Analyze and Design an animation game.
OBJECTIVES:
- To learn the principles and fundamentals of designing agents.
- To analyze architecture design of different agents.
- To understand user interaction with agents.

UNIT I  INTRODUCTION  9

UNIT II  AGENT BASED MODELING AND NET LOGO BASICS  9

UNIT III  MODEL DESIGN CONCEPTS  9

UNIT IV  PATTERN ORIENTED MODELING  9

UNIT V  MODEL ANALYSIS  9

TOTAL :45 PERIODS

OUTCOMES:
Upon Completion of the course, the students will be able to,
- Implement a architecture design for an agent.
- Implement communicative actions with agents.
- Use a tool to implement typical agents for different types of applications.

REFERENCES:
OBJECTIVES:
- To understand the standard algorithms used to provide confidentiality, integrity and authenticity.
- To understand security issues those arise in communication systems and web services.

UNIT I  CLASSICAL TECHNIQUES  8
Cryptanalysis – Cryptanalysis of the Affine Cipher – Cryptanalysis of the Substitution Cipher –
Cryptanalysis of the Vigenere Cipher – Shannon’s Theory.

UNIT II  ENCRYPTION STANDARDS  11
Block Cipher and the Advanced Encryption Standard – Substitution – Permutation Networks –
Linear Cryptanalysis – Differential Cryptanalysis – The Data Encryption Standard – The Advanced
Encryption Standard – Modes of Operation – Cryptography Hash Function – Hash Function and
Data Integrity – Security of Hash Function – Iterated Hash Functions – Message Authentication
Codes – Key Agreement Scheme – Diffie–Hellman Key agreement – Formal Analysis of

UNIT III  AUTHENTICATION  8
The RSA Cryptosystem and Factoring Integer – Introduction to Public–key Cryptography –
Number theory – The RSA Cryptosystem, Other Attacks on RSA – The ELGamal Cryptosystem –
Shanks’ Algorithm – Finite Fields – Elliptic Curves over the Reals – Elliptical Curves Modulo a
Prime, Signature Scheme – Digital Signature Algorithm.

UNIT IV  NETWORK SECURITY  9
Real time Communication Security: Session Key Establishment – Perfect Forward Secrecy–
Stream Protection – Negotiating Crypto Parameters – IPSec: AH and ESP – Internet Key
Exchange – ISAKMP – SSL/TLS.

UNIT V  APPLICATIONS  9
Digital Cash – Introduction to Intrusion Detection – Firewalls.

TOTAL: 45 PERIODS

OUTCOMES:
Upon Completion of the course, the students should be able to
- Understand the basic security algorithms required by any computing system.
- Aware of the security challenges and issues that may arise in any system.
- Design any secure system.

REFERENCES:
2006.
5. Wade Trappe and Lawrence C. Washington, “Introduction to Cryptography with Coding Theory”
OBJECTIVES:

- To gain knowledge about the Standards in the real world service creations.
- To know about new generation set top boxes, hand held devices, and PC add in cards.
- Understand MPEG–2 System Standards.

UNIT I  INTRODUCTION TO BROADCASTING  9

UNIT II  DATA BROADCASTING  9

UNIT III  DESIGN AND INSTALLATION OF VIDEO AND AUDIO SYSTEMS  9

UNIT IV  AUDIO VIDEO STREAMING  9

UNIT V  ALGORITHMS AND INTERFACES  9

TOTAL: 45 PERIODS

REFERENCES

OUTCOMES:

- To Implement the Standards in the real world service creations.
- To work with new generation set–top boxes, hand held devices, and PC add in cards.
- To design various video streaming techniques.
OBJECTIVES:
- To understand the basic ideas and principles in biometrics.
- To understand the basic concepts of statistical data analysis for validating the biometrics projects.
- To familiarize the student with the image processing facilities in Matlab and its equivalent open source tools like Open CV.
- To appreciate the use of biometrics Industrial applications and to understand the role of biometrics in modern security environment.
- To understand and implement more advanced topics in current research literature.
- To understand the role of multi–biometrics.

UNIT I BIOMETRICS FUNDAMENTALS

UNIT II FINGER AND FACIAL SCAN
Finger scan – Features – Components – Operation (Steps) – Competing finger Scan technologies – Strength and weakness - Types of algorithms used for interpretation - Facial Scan – Features – Components – Operation (Steps) – Competing facial Scan technologies – Strength – weakness.

UNIT III IRIS AND VOICE
Iris Scan – Features – Components – Operation (Steps) – Competing iris Scan technologies – Strength and weakness - Voice Scan – Features – Components – Operation (Steps) – Competing voice Scan (facial) technologies – Strength and weakness.

UNIT IV PHYSIOLOGICAL BIOMETRICS

UNIT V BIOMETRICS APPLICATION DEVELOPMENT

TOTAL :45 PERIODS

OUTCOMES:
Upon Completion of the course, the students should be able to
- Implement basic biometrics related algorithms.
- Familiar with the use of MATLAB and its equivalent open source environments.
- Design and implement industrial applications that incorporates different concepts of biometrics.
- Critically analyze different approaches to implement mini projects in industrial environment and in security related projects.

REFERENCES:
OBJECTIVES:
- To understand the mathematics behind graphics.
- To understand creation and manipulation of 2D and 3D graphic objects.
- To know the various coloring models.
- To gain an in-depth knowledge about fractals and their creation.

UNIT I  INTRODUCTION TO GRAPHICS
9

UNIT II  TRANSFORMATION AND PROJECTION
9

UNIT III  COLOUR MODELS AND SHADING OBJECTS
9

UNIT IV  CURVE AND SURFACE DESIGN
9

UNIT V  FRACTALS
9

TOTAL :45 PERIODS

OUTCOMES:
Upon Completion of the course, the students will be able to
- Create 2D and 3D graphical objects.
- Model the various techniques involved in 3D graphic design.
- Apply various shading and color models over three dimensional objects.

REFERENCES:
OBJECTIVES:
- To provide information about various medical imaging modalities.
- To understand the basic concepts of image enhancement, image restoration, morphological image processing, image segmentation, feature recognition in medical images.
- To provide information about classification and image visualization in medical image processing projects.
- To familiarize the student with the image processing facilities in Matlab and its equivalent open source tools.

UNIT I  FUNDAMENTALS OF IMAGE PROCESSING  9

UNIT II  IMAGE ENHANCEMENT AND RESTORATION  9

UNIT III IMAGE REGISTRATION AND VISUALIZATION  9

UNIT IV IMAGE ANALYSIS AND CLASSIFICATION  9
Image segmentation – Pixel based, Edge based, Region based segmentation - Active contour models and Level sets for medical image segmentation – Image representation and analysis – Feature extraction and representation – Statistical, Shape, Texture feature - Statistical image classification.

UNIT V RECONSTRUCTION AND CASE STUDY  9

TOTAL 45 PERIODS

OUTCOMES:
Upon Completion of the course, the students should be able to
- Implement basic medical image processing algorithms.
- Familiar with the use of MATLAB and its equivalent open source tools.
- Design and implement image processing applications that incorporate different concepts of medical Image Processing.
- Critically analyze different approaches to implement mini projects in medical domain.
- Explore the possibility of applying Image processing concepts in modern hospitals.

REFERENCES:
OBJECTIVES:
- To introduce the basics of multimedia information storage technology, techniques for analysis, representation and retrieval that is commonly used in industry.
- To compare and contrast information retrieval models and internal mechanisms such as Boolean, Probability, and Vector Space Models.
- To outline the structure of queries and media elements.
- To critically evaluate Multimedia retrieval system effectiveness and improvement techniques.

UNIT I  MULTIMEDIA STORAGE

UNIT II  TEXTUAL INFORMATION RETRIEVAL

UNIT III  IMAGE RETRIEVAL

UNIT IV  MUSIC AND VIDEO RETRIEVAL
Content Based Music Retrieval - Symbolic Representation for Music information retrieval – Melody Segmentation – Melodic similarity – Music indexing – Query and Retrieval and content analysis - Content Based Video Retrieval - Video Segmentation into Shots – Video Segmentation into Shot Aggregates – Video Annotation – Accessing Video Content – Content based video indexing and retrieval techniques – Video scene analysis.

UNIT V  RETRIEVAL METRICS
Average recall and average precision - Harmonic mean - Evaluation of a search engine – Relevance Issue – Kappa Measure – Quality versus Quantity, possible factors which influence outcome of a search – Grandfield Experimental Study.

TOTAL:45 PERIODS
OUTCOMES:
Upon the completion of the course the student can able to
- Learn the basics of multimedia information storage technology, techniques for analysis, representation and retrieval that is commonly used in industry.
- Compare and contrast information retrieval models and internal mechanisms such as Boolean, Probability, and Vector Space Models.
- Outline the structure of queries and media elements.
- Critically evaluate Multimedia retrieval system effectiveness and improvement techniques.

REFERENCES:

MM8008 PATTERN RECOGNITION

OBJECTIVES:
- To know about Supervised and unsupervised Learning.
- To study about feature extraction and structural pattern recognition.
- To explore different classification models.
- To understand Fuzzy Pattern Classifiers and Perception.

UNIT I PATTERN CLASSIFIER

UNIT II CLUSTERING
Clustering for unsupervised learning and classification – Clustering concept – C Means algorithm – Hierarchical clustering – Graph theoretic approach to pattern Clustering – Validity of Clusters.

UNIT III FEATURE EXTRACTION AND STRUCTURAL PATTERN RECOGNITION

UNIT IV HIDDEN MARKOV MODELS AND SUPPORT VECTOR MACHINE

UNIT V RECENT ADVANCES
Fuzzy logic – Fuzzy Pattern Classifiers – Pattern Classification using Genetic Algorithms – Case Study Using Fuzzy Pattern Classifiers and Perception.

TOTAL :45 PERIODS
OUTCOMES:
Upon Completion of the course, the students will be able to
- Classify the data and identify the patterns.
- Extract feature set and select the features from given data set.

REFERENCES:

MM8009 VISUALIZATION TECHNIQUES

OBJECTIVES:
- To understand the importance of data visualization.
- To know the different types of visualization techniques.
- To create various visualizations.

UNIT I INTRODUCTION

UNIT II FOUNDATIONS FOR DATA VISUALIZATION
Visualization stages – Experimental Semiotics based on Perception Gibson’s Affordance theory – A Model of Perceptual Processing – Power of visual perception– Types of Data– Visualization and data objects.

UNIT III COMPUTER VISUALIZATION
Non– Computer Visualization – Computer Visualization Exploring Complex Information Spaces – Fisheye Views – Applications – Comprehensible Fisheye views – Fisheye views for 3D data – Interacting with visualization.

UNIT IV MULTIDIMENSIONAL VISUALIZATION

UNIT V CASE STUDIES
Small interactive calendars – Selecting one from many – Web browsing through a key hole – Communication analysis – Archival analysis.

OUTCOMES:
Upon Completion of the course, the students will be able to
- Compare various visualization techniques.
- Design creative visualizations.
- Apply visualization over different types of data.
REFERENCES:

IF8071 ARTIFICIAL INTELLIGENCE  L T P C 
3 0 0 3

OBJECTIVES:
- To provide a strong foundation of fundamental concepts in Artificial Intelligence.
- To enable Problem- solving through various searching techniques.
- To enable the student to apply these techniques in applications which involve perception, reasoning and learning.
- To apply AI techniques primarily for machine learning, vision, and robotics.

UNIT I INTRODUCTION

UNIT II SEARCHING TECHNIQUES

UNIT III KNOWLEDGE AND REASONING

UNIT IV LEARNING

UNIT V AI PLANNING AND APPLICATIONS

TOTAL :45 PERIODS
OUTCOMES:
Upon Completion of the course, the students should be able to
- Gain knowledge in the goals and methods of Artificial Intelligence.
- Design intelligent computational agents.
- Gain knowledge through learning and that can be used both for problem solving and for reasoning.
- Improve problem solving, reasoning, planning, natural language understanding, computer vision, automatic programming and machine learning.

REFERENCES:

IF8072 COMPILER DESIGN 3 0 0 3

OBJECTIVES:
- To understand the optimization techniques used in compiler design.
- To be aware of the various computer architectures that support parallelism.
- To become familiar with the theoretical background needed for code optimisation.
- To understand the techniques used for identifying parallelism in a sequential program.
- To learn the various optimization algorithms.

UNIT I INTRODUCTION 9

UNIT II INSTRUCTION LEVEL PARALLELISM 9

UNIT III OPTIMIZING FOR PARALLELISM AND LOCALITY – THEORY 9
Basic Concepts – Matrix Multiply An Example – Iteration Spaces – Affine Array Indexes – Data Reuse Array - Data dependence Analysis.

UNIT IV OPTIMIZING FOR PARALLELISM AND LOCALITY– APPLICATION 9

UNIT V INTERPROCEDURAL ANALYSIS 9

TOTAL:45 PERIODS
OUTCOMES:
Upon completion of the course, the students should be able to
- Design and implement techniques used for optimization by a compiler.
- Modify the existing data structures of an open source optimizing compiler.
- Design and implement new data structures and algorithms for code optimisation.
- Critically analyze different data structures and algorithms used in the building of an optimizing compiler.

REFERENCES:

IF8073 COMPUTER VISION L T P C 3 0 0 3

OBJECTIVES:
- To provide knowledge about computer vision algorithms.
- To understand the basic concepts of camera calibration, stereoscopic imaging and higher level image processing operations.
- To familiarize the student with the image processing facilities in Matlab and its equivalent open source tools like OpenCV.
- To appreciate the use of computer vision in Industrial applications and to understand the role of computer vision.
- To understand and implement more advanced topics in current research literature.

UNIT I FUNDAMENTALS OF VISION

UNIT II GEOMETRIC VISION
Linear filters – Multiple Views Geometry – Stereopsis – Two View and Multi View Stereo Structure from Motion – Recognition – Bags of Features – Affine Structure from Motion.

UNIT III VISION ALGORITHMS
Segmentation – Edge detection – Optical flow and Tracking – Feature extraction (corners and blobs) – Grouping and fitting – Hough transform – RANSAC and Alignment.

UNIT IV GEOMETRIC METHODS

UNIT V HIGH LEVEL VISION
Classifiers – Finding templates – Geometric templates from spatial relations – Applications.

TOTAL : 45 PERIODS

OUTCOMES:
Upon completion of the course, the students should be able to
- Implement basic computer vision algorithms.
- Familiarize with the use of MATLAB and OpenCV environment.
- Design and implement industrial applications that incorporate different concepts of medical Image Processing.
- Critically analyze different approaches to implement mini projects in industrial environment.
REFERENCES

REFERENCES

IF8074 DATA WAREHOUSING AND DATA MINING L T P C 3 0 0 3

OBJECTIVES:
- To understand Data mining principles and techniques and introduce Data Mining as a cutting edge business intelligence.
- To expose the students to the concepts of Data Warehousing Architecture and Implementation.
- To study the overview of developing areas – Web mining, Text mining and ethical aspects of Data mining.
- To identify Business applications and Trends of Data mining.

UNIT I DATA WAREHOUSE 8

UNIT II DATA MINING & DATA PREPROCESSING 9
Introduction to KDD process – Knowledge Discovery from Databases - Need for Data Preprocessing – Data Cleaning – Data Integration and Transformation – Data Reduction – Data Discretization and Concept Hierarchy Generation.

UNIT III ASSOCIATION RULE MINING 8
Introduction - Data Mining Functionalities - Association Rule Mining - Mining Frequent Itemsets with and without Candidate Generation - Mining Various Kinds of Association Rules - Constraint-Based Association Mining.

UNIT IV CLASSIFICATION & PREDICTION 10

UNIT V CLUSTERING 10

TOTAL : 45 PERIODS

REFERENCES:
OUTCOMES:
Upon Completion of the course, the students will be able to,

- Evolve Multidimensional Intelligent model from typical system.
- Discover the knowledge imbibed in the high dimensional system.
- Evaluate various mining techniques on complex data objects.

IF8075                                           DIGITAL SIGNAL PROCESSING                         L T P C
                                                  3 0 0 3

OBJECTIVES:
- To understand the basics of signals and systems.
- To analyze various frequency transforms and to determine their use to DSP.
- To design and analyze various digital filters.
- To give exposure on musical sound processing and image processing.

UNIT I    SIGNS AND SYSTEMS                        9
Basic elements of DSP – Concepts of Frequency in Analog and Digital Signals – Sampling
Transform – Convolution (Linear And Circular) – Correlation.

UNIT II   DISCRETE FOURIER TRANSFORMS             9
Introduction to DFT – Properties of DFT – Filtering methods based on DFT – FFT Algorithms –
Decimation in Time Algorithms - Decimation in Frequency Algorithms – Use of FFT in Linear
Filtering.

UNIT III  IIR FILTER DESIGN                       9
Structures of IIR – Analog filter design – Discrete time IIR filter from analog filter – IIR filter design
by Impulse Invariance – Bilinear transformation – Approximation of derivatives – (HPF, BPF, BRF)
Filter design using frequency translation.

UNIT IV    FIR FILTER DESIGN                      9
Structures of FIR – Linear phase FIR filter – Filter design using windowing techniques - Frequency
sampling techniques – Finite word length effects in digital Filters.

UNIT V    SIGNAL PROCESSING                       9
Multirate signal processing – Adaptive filter – Compression – Musical sound processing – Image
enhancement.

TOTAL :45 PERIODS

OUTCOMES:
Upon completion of the course, the students should be able to

- Understand the basics of signals and systems.
- Analyze various frequency transforms and to determine their use to DSP.
- Design and analyze various digital filters.
- Gain exposure on signal processing like musical sound processing and image processing.

REFERENCES:
   Education / Prentice Hall, 2002.
OBJECTIVES:
- To understand the architecture of embedded processor, microcontroller and peripheral devices.
- To interface memory and peripherals with embedded systems.
- To study the embedded network environment.
- To understand challenges in Real time operating systems.
- To study, analyze and design applications on embedded systems.

UNIT I EMBEDDED PROCESSORS

UNIT II EMBEDDED COMPUTING PLATFORM

UNIT III EMBEDDED NETWORK ENVIRONMENT

UNIT IV REAL TIME CHARACTERISTICS

UNIT V SYSTEM DESIGN TECHNIQUES

OUTCOMES:
Upon completion of the course, the students should be able to
- Understanding of different architectures of embedded processor, microcontroller and peripheral devices.
- Interfacing memory and peripherals with embedded systems.
- Be familiar with embedded network environment.
- Understanding challenges in Real time operating systems.
- Design and analyze applications on embedded systems.

REFERENCES:
OBJECTIVES:
To learn the principles and fundamentals of human computer interaction (HCI)
- To analyze HCI theories, as they relate to collaborative or social software.
- To establish target users, functional requirements, and interface requirements for a given computer application.
- To understand user interface design principles, and apply them to designing an interface.
- To learn user interface designs through usability inspection and user models.
- To know the applications of multimedia on HCI.

UNIT I DESIGN PROCESS

UNIT II DESIGN AND EVALUATION OF INTERACTIVE SYSTEMS

UNIT III MODELS

UNIT IV EXPERIMENTAL DESIGN AND STATISTICAL ANALYSIS OF HCI

UNIT V THEORIES

OUTCOMES:
Upon completion of the course, the students will be able to
- Interpret the contributions of human factors and technical constraints on human–computer interaction.
- Evaluate the role of current HCI theories in the design of software.
- Apply HCI techniques and methods to the design of software.
- Categorize and carefully differentiate various aspects of multimedia interfaces.
- Design and develop issues related to HCI for real application.

TOTAL: 45 PERIODS
REFERENCES:

IF8079 INFORMATION RETRIEVAL L T P C 3 0 0 3

OBJECTIVES:
- To understand the basics of Information Retrieval with pertinence to modeling, Query operations and indexing.
- To get an understanding of machine learning techniques for text classification and clustering.
- To understand the various applications of Information Retrieval giving emphasis to Multimedia IR, Web Search.
- To understand the concepts of digital libraries.

UNIT I INTRODUCTION 9
Introduction - Goals and history of IR - The impact of the web on IR - The role of artificial intelligence (AI) in IR – Basic IR Models Boolean and vector space retrieval models – Ranked Retrieval – Text similarity metrics –TF IDF (term frequency/inverse document frequency) weighting - Cosine Similarity.

UNIT II PREPROCESSING 9

UNIT III METRICS 9

UNIT IV CATEGORIZATION AND CLUSTERING 9

UNIT V EXTRACTION AND INTEGRATION 9

TOTAL: 45 PERIODS

OUTCOMES:
Upon completion of the course, the students will be able to
- Build an Information Retrieval system using the available tools.
- Identify and design the various components of an Information Retrieval system.
- Apply machine learning techniques to text classification and clustering which is used for efficient Information Retrieval.
- Analyze the Web content structure.
- Design an efficient search engine.
REFERENCES:

IF8080 SERVICE ORIENTED ARCHITECTURE L T P C
3 0 0 3

OBJECTIVES:
- To understand various architectures for application development.
- To learn the importance of SOA in Application Integration.
- To learn web service and SOA related tools.

UNIT I SOA BASICS 9

UNIT II SOA ANALYSIS AND DESIGN 9

UNIT III SOA GOVERNANCE 9

UNIT IV SOA IMPLEMENTATION 9

UNIT V APPLICATION INTEGRATION 9

OUTCOMES:
Upon Completion of the course, the students will be able to
- Compare different IT architecture.
- Analyse and design SOA based applications.
- Implement web service and realization of SOA.
- Implement RESTful services.
- Design and implement SOA based Application Integration using BPEL.

REFERENCES:
OBJECTIVES:
- To learn the key aspects of soft computing and neural networks.
- To study fuzzy logic components.
- To gain insight onto Neuro Fuzzy modeling and control.
- To know about the components and building block hypothesis of Genetic algorithm.
- To gain knowledge in machine learning through Support vector machines.

UNIT I INTRODUCTION TO SOFT COMPUTING

UNIT II GENETIC ALGORITHMS

UNIT III NEURAL NETWORKS

UNIT IV FUZZY LOGIC

UNIT V NEURO FUZZY MODELING

TOTAL :45 PERIODS

OUTCOMES:
Upon Completion of the course, the students will be able to
- Discuss on machine learning through Neural networks.
- Develop a Fuzzy expert system.
- Model Neuro Fuzzy system for clustering and classification.
- Develop Genetic Algorithm and Support vector machine based machine learning system.

REFERENCES:
OBJECTIVES:
- To introduce the basics and necessity of Software testing.
- To introduce various testing techniques along with software production.
- To introduce the concepts of Software quality and its assurance.

UNIT I  INTRODUCTION

UNIT II  SOFTWARE TESTING METHODOLOGY
Software Test Plan– Components of plan – Types of technical reviews– Static and dynamic testing– software testing in spiral manner– Information gathering– Test planning– Test case design– Test development– Test coverage– Test evaluation– Prepare for next spiral– Conduct system test, Acceptance test– Summarize testing results.

UNIT III  EMERGING SPECIALIZED AREAS IN TESTING

UNIT IV  SOFTWARE QUALITY IN PERSPECTIVE

UNIT V  QUALITY THROUGH CONTINUOUS IMPROVEMENT PROCESS
Role of Statistical methods in software quality – Transforming requirements into test cases – Deming’s Quality Principles – Continuous Improvement through Plan Do Check Act (PDCA).

TOTAL: 45 PERIODS

OUTCOMES:
Upon completion of the course the students can able to
- Apply various software testing methodologies on applications.
- Design quality software products.

REFERENCES:

OBJECTIVES:
To understand the basics of Adhoc and Sensor Networks
- To learn various fundamental and emerging protocols of all layers.
- To study about the issues pertaining to major obstacles in establishment and efficient management of adhoc and sensor networks.
- To understand the nature and applications of ad– hoc and sensor networks.
- To understand various security practices and protocols of Adhoc and Sensor Networks.
UNIT I ADHOC NETWORKS FUNDAMENTALS & MAC PROTOCOLS

UNIT II ADHOC NETWORK ROUTING AND MANAGEMENT

UNIT III SENSOR NETWORK FUNDAMENTALS & COMMUNICATION PROTOCOLS

UNIT IV SENSOR NETWORK MANAGEMENT & PROGRAMMING

UNIT V ADHOC AND SENSOR NETWORK SECURITY

TOTAL :45 PERIODS

OUTCOMES:
Upon Completion of the course, the students should be able to
• Gain knowledge about Adhoc and sensor networks, protocols and standards.
• Establish a Sensor network environment for different type of applications.
• Provide different types of security environments depending upon the application requirements.

REFERENCES:
OBJECTIVES:
- To learn the fundamentals of Operating system.
- To gain knowledge on Distributed operating system concepts that includes architecture, Mutual exclusion algorithms, Deadlock detection algorithms and agreement protocols.
- To gain insight on to the distributed resource management components viz. the algorithms for implementation of distributed shared memory, recovery and commit protocols.
- To know the components and management aspects of Real time, Mobile operating systems.

UNIT I OPERATING SYSTEM BASICS

UNIT II DISTRIBUTED OPERATING SYSTEM

UNIT III DISTRIBUTED RESOURCE MANAGEMENT

UNIT IV REAL TIME AND MOBILE OPERATING SYSTEMS

UNIT V CASE STUDIES

OUTCOMES:
Upon completion of the course, the students should be able to
- Gain an overview of process management and memory management of Operating system.
- Demonstrate the Mutual exclusion, Deadlock detection and agreement protocols of Distributed operating system.
- Gain knowledge regarding distributed resource management.
- Outline the Real time, Mobile operating systems.

REFERENCES:
OBJECTIVES:
- To understand the concept of cloud and utility computing.
- To understand the various issues in cloud computing.
- To familiarize themselves with the lead players in cloud.
- To appreciate the emergence of cloud as the next generation computing paradigm.
- To be able to set up a private cloud.

UNIT I INTRODUCTION

UNIT II VIRTUALIZATION

UNIT III CLOUD INFRASTRUCTURE

UNIT IV PROGRAMMING MODEL

UNIT V SECURITY IN THE CLOUD

TOTAL:45 PERIODS

OUTCOMES:
- Articulate the main concepts, key technologies, strengths and limitations of cloud computing
- Identify the architecture, infrastructure and delivery models of cloud computing
- Explain the core issues of cloud computing such as security, privacy and interoperability
- Choose the appropriate technologies, algorithms and approaches for the related issues

REFERENCES:
OBJECTIVES:

- To understand the basics of Mobile computing and Personal Computing.
- To learn the role of wireless networks in Mobile Computing and Pervasive Computing.
- To study about the underlying wireless networks.
- To understand the architectures of mobile and pervasive applications.
- To become familiar with the pervasive devices and mobile computing platforms.

UNIT I  INTRODUCTION


UNIT II  3G AND 4G CELLULAR NETWORKS


UNIT III  SENSOR AND MESH NETWORKS


UNIT IV  CONTEXT AWARE COMPUTING


UNIT V  APPLICATION DEVELOPMENT


OUTCOMES:

Upon completion of the course the student should be able to
- To deploy 3G networks.
- To develop suitable algorithms for 4G networks.
- To use sensor and mesh networks to develop mobile computing environment.
- To develop mobile computing applications based on the paradigm of context aware computing.

REFERENCES:


MM8071 DIGITAL VIDEO PROCESSING L T P C

3 0 0 3

OBJECTIVES:
- To provide an introduction to the fundamental principles and techniques in multimedia signal processing.
- To provide an overview of the current multimedia standards and technologies.
- To provide details about representation and computing algorithms of multimedia.
- To review latest trends and future technologies.

UNIT I FUNDAMENTALS OF VIDEO PROCESSING


UNIT II DIGITAL VIDEO


UNIT III VIDEO SEGMENTATION AND VIDEO FEATURE ANALYSIS

Video Modeling – Camera Models – Pinhole Model – Object Model – Shape Model, Motion Model – Scene Model - Two Dimensional Motion Models – Definition and Notation - Two Dimensional Motion Models Corresponding to Typical Camera Motions – Two Dimensional Motion Corresponding to Three Dimensional Rigid Motion and Approximation of Projective Mapping.

UNIT IV MOTION ESTIMATION

Two Dimensional Motion Estimation – Optical Flow – Two Dimensional Motion versus Optical Flow - Optical Flow Equation and Ambiguity in Motion Estimation - General Methodologies – Motion Representation - Motion Estimation Criteria – Optimization Methods - Pixel Based Motion Estimation - Regularization Using the Motion Smoothness Constraints – Block Matching Algorithm – Exhaustive Block Matching Algorithm – Phase Correlation Method and ultiresolution Motion Estimation – General Formulation and Hierarchical Block Matching Algorithm.

UNIT V DIGITAL VIDEO ANALYSIS AND CASE STUDIES


TOTAL: 45 PERIODS

OUTCOMES:
Upon Completion of the course, the students should be able to
- Implement basic algorithms related to digital video.
- Familiarize with the MATLAB and its equivalent open source tools for processing video.
- Design and implement some basic video related applications in domains like biometrics, object traction and in Industrial environment.
- Critically analyze the role of video in modern technologies.

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REFERENCES: