PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

I. To prepare students to excel in research and to succeed in Information Technology profession through global, rigorous post graduate education.

II. To provide students with a solid foundation in computing, communication and information technologies that is required to become a successful IT professional or a researcher in the field of computer science and information technology.

III. To train students with good computing and communication knowledge so as to comprehend, analyze, design, and create novel software products and communication protocols for the real life problems.

IV. To inculcate students in professional and ethical attitude, effective communication skills, teamwork skills, multidisciplinary approach, and an ability to relate information technology issues to broader social context.

V. To provide student with an academic environment aware of excellence, leadership, written ethical codes and guidelines, and the life-long learning needed for a successful professional career.

PROGRAMME OUTCOMES (POs):

On successful completion of the programme,

1. Graduates will demonstrate knowledge of information technology, computer science and communication engineering.

2. Graduates will demonstrate an ability to identify, formulate and solve computing and communication problems.

3. Graduate will demonstrate an ability to design effective and useful software and carry out research in the fields of computing and communication.

4. Graduates will demonstrate an ability to implement a system, component or process as per needs and specifications.

5. Graduates will demonstrate an ability to implement the projects that require knowledge from related fields like electronics and communication.

6. Graduate will demonstrate skills to use modern computing paradigms and computing platforms to develop products and projects that are useful to the society.

7. Graduates will demonstrate knowledge of professional and ethical responsibilities.

8. Graduate will be able to communicate effectively in both verbal and written form.

9. Graduate will show the understanding of impact of information technology solutions on the society and also will be aware of contemporary issues.

10. Graduate will develop confidence for self education and ability for life-long learning.
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|        |       | Elective III |     |     |     |     |     |     |     |     |     |       |
|        |       | Elective IV |     |     |     |     |     |     |     |     |     |       |
|        |       | Project Work Phase I |     |     |     |     |     |     |     |     |     |       |
|        |       | Technical Seminar and Report Writing |     |     |     |     |     |     |     |     |     |       |
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### THEORY MARKS: 12

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## VI SEMESTER

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### PRACTICAL MARKS: 3

### THEORY MARKS: 12

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OBJECTIVES:
- To learn the modeling and design of databases.
- To acquire knowledge on parallel and distributed databases and its applications.
- To study the usage and applications of Object Oriented and Intelligent databases.
- To understand the usage of Mobile Databases.
- To learn emerging databases such as XML, Cloud and Big Data.
- To acquire inquisitive attitude towards research topics in databases.

UNIT I PARALLEL AND DISTRIBUTED DATABASES

UNIT II OBJECT AND OBJECT RELATIONAL DATABASES
Overview of Object Database concepts - Object-Relational features: Object Database extensions to SQL - The ODMG Object Model and the Object Definition Language ODL-Object Database Conceptual Design - Object Query Language OQL - Overview of C++ Language Binding in the ODMG Standard

UNIT III INTELLIGENT DATABASES

UNIT IV MOBILE DATABASES
Mobile Databases: Location and Handoff Management - Effect of Mobility on Data Management - Location Dependent Data Distribution - Mobile Transaction Models -Concurrency Control - Transaction Commit Protocols

UNIT V EMERGING TECHNOLOGIES

OUTCOMES:
Upon Completion of the course, the students will be able,
- To develop in-depth understanding of relational databases and skills to optimize database performance in practice.
- To discuss and critique on each type of databases.
- To design faster algorithms in solving practical database problems.
- To implement intelligent databases and various data models.

REFERENCES:
OBJECTIVES:
- To understand the evolution of computer architecture.
- To understand the state-of-the-art in computer architecture.
- To understand the design challenges in building a system.

UNIT I  PIPELINING AND ILP  11

UNIT II  THREAD-LEVEL PARALLELISM  8

UNIT III  SIMD AND GPU ARCHITECTURES  8

UNIT IV  MEMORY HIERARCHY DESIGN  9
Introduction - Optimizations of Cache Performance - Memory Technology and Optimizations – Name Mapping Implementations - Virtual Memory and Virtual Machines - Design of Memory Hierarchies - Case Studies.

UNIT V  INTERCONNECT AND STORAGE  9
Interconnection Networks – Buses, Crossbar and Multi-Stage Switches – Multi-Core Processor Architectures - Case Study. Warehouse- Scale Computers - Programming Models and Workloads – Storage Architectures – Physical Infrastructure – Case Study

TOTAL: 45 PERIODS

OUTCOMES:
At the end of the course, the student will be able to:
- Compare and evaluate the performance of various architectures.
- Design sub-systems to meet specific performance requirements.
- Analyze the requirements of large systems to select and build the right infrastructure.

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
- To learn UML models and tools
- To apply design patterns on various applications

UNIT I  SOFTWARE PRODUCT AND PROCESS  9

UNIT II  SOFTWARE REQUIREMENTS  9

UNIT III  DESIGN CONCEPTS AND PRINCIPLES  9

UNIT IV  SOFTWARE TESTING  9

UNIT V  SOFTWARE PROJECT MANAGEMENT  9

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
• Familiarize with the topics of object oriented System designs
• Design patterns using UML
• Apply design patterns to various applications

REFERENCES:

IF 7151 ADVANCES IN DATA STRUCTURES AND ALGORITHMS

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 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

UNIT IV ALGORITHM DESIGN TECHNIQUES
UNIT V    NP COMPLETE AND NP HARD


TOTAL: 45 PERIODS

OUTCOMES:
Upon the completion of the course the student should be able to
- Design data structures and algorithms to solve computing problems.
- Design algorithms using graph structure and various string matching algorithms to solve real-life problems.
- Apply suitable design strategy for problem solving

REFERENCES:

MA 7159    PROBABILITY AND STATISTICAL METHODS

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

UNIT II    TWO DIMENSIONAL RANDOM VARIABLES
Joint Distributions – Marginal and Conditional Distributions – Functions of Two Dimensional Random Variables – Regression Curve – Correlation.

UNIT III    ESTIMATION THEORY

UNIT IV    TESTING OF HYPOTHESES
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

TOTAL= 45+15=60 PERIODS
OUTCOMES:
The course provides the basic concepts of Probability and Statistical techniques for solving mathematical problems which is useful in solving Engineering problems.

REFERENCES:

IF 7111  DATA STRUCTURES LABORATORY  L T P C
0 0 4 2

OBJECTIVES:
- To acquire the knowledge of using advanced tree structures.
- To learn the usage of heap structures.
- To understand the usage of graph structures and spanning trees.

EXPERIMENTS:
1. Implementation of Merge Sort and Quick Sort - Analysis
2. Implementation of a Binary Search Tree
3. Red-Black Tree Implementation
4. Heap Implementation
5. Fibonacci Heap Implementation
6. Graph Traversals
7. Spanning Tree Implementation
8. Shortest Path Algorithms (Dijkstra’s algorithm, Bellmann Ford Algorithm)
9. Implementation of Matrix Chain Multiplication
10. Activity Selection and Huffman Coding Implementation.

TOTAL: 60 PERIODS

OUTCOMES:
Upon Completion of the course, the students will be able to:
- Design and implement basic and advanced data structures extensively.
- Design algorithms using graph structures
- Design and develop efficient algorithms with minimum complexity using design techniques.

IF 7202  DATA SCIENCE AND ANALYTICS  L T P C
3 2 0 4

OBJECTIVES:
- To know the fundamental concepts of data science and analytics
- To learn various techniques for mining data streams
- To learn Event Modelling for different applications.
- To know about Hadoop and Map Reduce procedure
UNIT I  INTRODUCTION TO DATA SCIENCE AND BIG DATA  9
Introduction to Data Science – Applications - Data Science Process – Exploratory Data analysis –
Collection of data – Graphical presentation of data – Classification of data – Storage and retrieval
of data – Big data – Challenges of Conventional Systems - Web Data – Evolution Of Analytic
Scalability - Analytic Processes and Tools - Analysis vs Reporting - Modern Data Analytic Tools -
Statistical Concepts: Sampling Distributions - Re-Sampling - Statistical Inference - Prediction
Error.

UNIT II  DATA ANALYSIS  9
Correlation – Regression – Probability – Conditional Probability – Random Variables – Analysis
using Mean, Median, Mode, Standard Deviation, Skewness, Kurtosis- Regression Modeling -
Multivariate Analysis - Bayesian Modeling - Inference and Bayesian Networks - Support Vector
and Kernel Methods - Analysis of Time Series: Linear Systems Analysis - Nonlinear Dynamics –

UNIT III  DATA MINING TECHNIQUES  9
Rule Induction - Neural Networks: Learning and Generalization - Competitive Learning - Principal
Component Analysis and Neural Networks - Fuzzy Logic: Extracting Fuzzy Models from Data -
Fuzzy Decision Trees - Stochastic Search Methods- Neuro-Fuzzy Modelling – Association rule
mining – Clustering – Outlier Analysis – Sequential Pattern Mining – Temporal mining – Spatial
mining – Web mining.

UNIT IV  MINING DATA STREAMS  9
Introduction To Streams Concepts – Stream Data Model and Architecture - Stream Computing -
Sampling Data in a Stream – Filtering Streams – Counting Distinct Elements in a Stream –
Estimating Moments – Counting Oneness in a Window – Decaying Window - Real time Analytics
Platform(RTAP) Applications - Case Studies - Real Time Sentiment Analysis, Stock Market
Predictions.

UNIT V  FRAMEWORKS AND VISUALIZATION  9
Map Reduce – Hadoop, Hive, MapR – Sharding – NoSQL Databases – Cloud databases - S3 -
Hadoop Distributed File Systems – Visualizations - Visual Data Analysis Techniques - Interaction
Techniques – Social Network Analysis – Collective Inferencing – Egonets - Systems and
Applications.

OUTCOMES:
Upon the completion of the course the student should be able to
- Work with big data platform and its analysis techniques.
- Design efficient algorithms for mining the data from large volumes.
- Model a framework for Human Activity Recognition
- Development with cloud databases

TOTAL:75 PERIODS

REFERENCES
3. Bill Franks, “Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with
4. Jiawei Han, Micheline Kamber “Data Mining Concepts and Techniques”, Second Edition,
8. S. N. Sivanandam, S. N Deepa, “Introduction to Neural Networks Using Matlab 6.0”, Tata
OBJECTIVES:

- To understand the Java environment
- To learn Java application development using Swings and Middleware technology
- To explore advanced Java concepts
- To learn the Internet Programming

UNIT I - JAVA BASICS AND ADVANCED FEATURES

JAVA basics - Inheritance - Inner Classes - Interfaces - New Interfaces - Streams - File and I/O - Threads - Packages - JAR files - Reflection - Ref objects - Logging - Concurrency utilities - JVM Tool Interface - Java VisualVM

UNIT II - AWT, SWING AND MIDDLEWARES

AWT - Event Handling - SWING - Applets and Applications - JAVA Networking - Image I/O - Print Service - Collection Classes - JDBC - RMI - CORBA IDL - Scripting for the JAVA platform - Input method framework - JAVA beans

UNIT III - ADVANCED JAVA CONCEPTS

Java management Extensions (JMX) - Java Native Interface (JNI) - JConsole - Java Mission Control (JMC) - Java Flight Recorder (JFR) - Java Platform Debugger Architecture (JPDA) - Java2D -

UNIT IV - MARKUP LANGUAGES AND INTERNET PROGRAMMING

Hyper-Text Markup Language (HTML) - Cascading Style Sheets (CSS) - Extensible Markup Language (XML) and API - Java API for XML Processing (JAXP) - Extensible Style Sheet Language (XSL) - Document Type Definition (DTD) - XML schema - Document Object Model (DOM) Parser - SAX parser - JAXR - Java Architecture for XML binding (JAXB) - Java API for XML web services (JAX-WS) - Java Authentication and Authorization service (JAAS)

UNIT V - INTERNET PROGRAMMING FRAMEWORKS


TOTAL: 75 PERIODS

OUTCOMES:

Upon the completion of the course the student should be able

- To become familiar with the Java environment
- To develop Java application using Swings and Middleware technology
- To practice advanced Java concepts
- To work in the Internet frameworks

REFERENCES

2. http://docs.oracle.com/javase/7/docs/
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 & MOBILE OPERATING SYSTEMS

UNIT V CASE STUDIES

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

- A complete overview of process management & memory management of Operating system.
- Ability to demonstrate the Mutual exclusion, Deadlock detection and agreement protocols of Distributed operating system.

REFERENCES:
OBJECTIVES:

- To learn distributed communication
- To understand distributed resource management
- To study the basics of cloud computing
- To study about virtualization and cloud resource management

UNIT I DISTRIBUTED COMMUNICATION


UNIT II DISTRIBUTED RESOURCE MANAGEMENT


UNIT III INTRODUCTION TO CLOUD


UNIT IV VIRTUALIZATION TECHNIQUES


UNIT V CLOUD RESOURCES MANAGEMENT AND ISSUES


OUTCOMES:

Upon the completion of the course the student should be able

- To appreciate distributed communication
- To design distributed resource management
- To become familiar with the basics of cloud computing
- To implement virtualization and cloud resource management

REFERENCES:

6. Kai Hwang, Geoffrey C. Fox and Jack J. Dongarra, Distributed and Cloud Computing,
   Morgan Kaufmann, 2012.
7. Boris Lublinsky, Kevin T. Smith, Alexey Yakubovich, Professional Hadoop Solutions, Wrox,

IF 7204 NETWORK ENGINEERING

OBJECTIVES:
- To provide an introduction to the principles and practices of Network Engineering.
- To understand the architecture of the network devices.
- To learn QoS related methodologies.
- To explore the emerging technologies in network engineering.

UNIT I  FOUNDATIONS OF NETWORKING
Communication Networks – Network Elements – Switched Networks and Shared media Networks –
Probabilistic Model and Deterministic Model – Datagrams and Virtual Circuits – Multiplexing –
Switching – Error and Flow Control – Congestion Control – Layered Architecture – Network
Externalities – Service Integration.

UNIT II  QUALITY OF SERVICE
Traffic Characteristics and Descriptors – Quality of Service and Metrics – Best Effort model and
guaranteed Service Model – Limitations of IP networks – Scheduling and Dropping Policies for BE
and GS models – Traffic Shaping Algorithms – End to End Solutions – Laissez Faire Approach –
Possible improvements in TCP – Significance of UDP in Inelastic Traffic

UNIT III  HIGH PERFORMANCE NETWORKS
Integrated Services Architecture – Components and Services – Differentiated Services Networks –
Per Hop Behavior – Admission Control – MPLS Networks – Principles and Mechanisms – Label
Stacking – RSVP – RTP/RTCP.

UNIT IV  NETWORK DEVICE ARCHITECTURE
Multiplexers, Modems and Internet Access Devices – Switching and Routing Devices – Router
Multicast Architecture.

UNIT V  SOFTWARE DEFINED NETWORKING
Evolution of SDN – Control Plane – Control and data plane separation – Network Virtualization –

TOTAL: 45 PERIODS

OUTCOMES:
Upon Completion of the course, the students will be able to:
- Explain the of the principles of network engineering.
- Knowledge of network engineering concepts and techniques.
- recent development in network engineering
REFERENCES:

IF 7211 DISTRIBUTED SYSTEMS LABORATORY

OBJECTIVES:
- This laboratory is focused on developing web applications in the cloud. By the end of this module the student will have a detailed overview of the design and development process involved in creating a cloud based application.
- Student would do any four of the following exercises

DISTRIBUTED SYSTEMS IMPLEMENTATIONS:
1. Connect a minimum of 3 nodes and implement a group chat amongst them.
2. Implement any one of the message ordering algorithms on the previously implemented system.
3. Implement an election algorithm to elect a co-ordinator for the system.
4. Perform clock synchronization on the system, with the co-ordinator node's time as reference.

CLOUD EXPERIMENTS:
5. Create a VM image which has a C compiler along with an operating system and do the following experiments
   a. Fibonacci Series
   b. File Operations
6. Install Virtualbox with different flavours of linux or windows OS on top of windows7 or 8
7. Install GAE and run a quicksort using python.
8. Install and run EucalyptusFaststart.
9. Create two nodes in Eucalyptus and exchange data.

MINI PROJECT
1. Simulate a cloud scenario using Cloud Sim and run a scheduling algorithm not present in Cloud Sim
   or
2. Install hadoop and manipulate a large dataset and run on Hadoop

OUTCOME:
- To be able to develop distributed and cloud based applications

TOTAL: 60 PERIODS
OBJECTIVES:
- To understand the mathematics behind Cryptography.
- To understand the standard algorithms used to provide confidentiality, integrity and authenticity.
- To get the knowledge of various security practices applied in the field of information technology.

UNIT I  FUNDAMENTALS AND MATHEMATICS OF CRYPTOGRAPHY  9

UNIT II  ENCRYPTION TECHNIQUES  9

UNIT III  HASH FUNCTIONS AND SIGNATURES  9

UNIT IV  INFORMATION SECURITY PRINCIPLES  9

UNIT V  APPLICATIONS  9

OUTCOMES:
Upon Completion of the course, the students should be able to,
- Apply the basic security algorithms required by any computing system.
- Predict the vulnerabilities across any computing system and hence be able to design a security solution for any computing system.

REFERENCES:
OBJECTIVES

- To become familiar with the prevailing wireless environment
- To understand 3G and 4G cellular networks
- To study about WiFi and WiMax standards
- To learn about the two types of ad hoc networks in practice
- To explore mobile computing architecture and mobile application development

UNIT I  WIRELESS SCENARIO

UNIT II  3G AND 4G CELLULAR NETWORKS

UNIT III  WIRELESS DATA NETWORKS

UNIT IV  WIRELESS AD HOC NETWORKS

UNIT V  MOBILE COMPUTING ARCHITECTURE
Three tier Architecture - Presentation Tier - Application Tier - Middleware , ICAP, Web Services - Data Tier - Database Middleware , Sync ML - Content Aware System - Client Context Manager - Composite Capabilities / Preferences Profile (CC/PP) - Policy and Security Managers - Pervasive Application Architecture with MVC Pattern - Secure Pervasive Access Architecture

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

- To have awareness of the existing wireless scenario
- To deploy 3G networks
- To design and implement wireless ad hoc networks
- To design and implement mobile applications efficiently

REFERENCES:
OBJECTIVES:
• To learn various generations of wireless and cellular networks.
• To study about fundamentals of 3G Services, its protocols and applications.
• To study about evolution of 4G Networks, its architecture and applications.
• To study about Wi MAX networks, protocol stack and standards.
• To understand about the emerging trends of smart phones and evolution of latest standards like DLNA, NFC and femtocells

UNIT I  INTRODUCTION
Introduction: History of Mobile Cellular Systems - First Generation - Second Generation - Generation 2.5 - Overview of 3G & 4G. 3GPP and 3GPP2 standards

UNIT II  3G NETWORKS
Evolution from GSM, 3G Services and Applications - UMTS network structure - Core network - UMTS Radio access - HSPA – HSUPA- HSDPA- CDMA 1X – WCDMA

UNIT III  4G LTE

UNIT IV  WIMAX NETWORKS

UNIT V  DLNA & NFC REVOLUTION

OUTCOMES:
Upon the completion of the course the student should be able
• To appreciate the evolution of cellular networks.
• To deploy 3G Services.
• To explore the developments in 4G Networks.
• To implement Wi MAX networks, protocol stack and standards.

REFERENCES:
OBJECTIVES:
- To understand the fundamentals of Internet of Things.
- To build a small low cost embedded system using Arduino / Raspberry Pi or equivalent boards.
- To apply the concept of Internet of Things in the real world scenario

UNIT I FUNDAMENTALS OF IOT
Introduction-Characteristics-Physical design - Protocols – Logical design – Enabling technologies – IoT Levels – Domain Specific IoTs – IoT vs M2M.

UNIT II IOT DESIGN METHODOLOGY
IoT systems management – IoT Design Methodology – Specifications Integration and Application Development.

UNIT III BUILDING IOT WITH RASPBERRY PI
Physical device – Raspberry Pi Interfaces – Programming – APIs / Packages – Web services -

UNIT IV BUILDING IOT WITH GALILEO/ARDUINO
Intel Galileo Gen2 with Arduino Interfaces - Arduino IDE – Programming - APIs and Hacks

UNIT V CASE STUDIES and ADVANCED TOPICS
Various Real time applications of IoT- Connecting IoT to cloud – Cloud Storage for IoT – Data Analytics for IoT – Software & Management Tools for IoT

TOTAL: 45 PERIODS

OUTCOMES:
Upon the completion of the course the student should be able to
- Design a portable IoT using Arduino/ equivalent boards and relevant protocols.
- Develop web services to access/control IoT devices.
- Deploy an IoT application and connect to the cloud.
- Analyze applications of IoT in real time scenario

REFERENCES:

OBJECTIVES:
- To understand the basics of geometry processing.
- To understand the fundamentals of pipelined rasterization rendering of meshed objects and curved surfaces.
- To understand and work with advanced rendering methods such as radiosity.
- To design programs for advanced animation methods and
- To become proficient at graphics programming using OpenGL

REFERENCES:
(No references listed in the document)
UNIT I  INTRODUCTION  9

UNIT II  TRANSFORMATIONS  9
Affine Transformations (2D & 3D): Translation, Rotation, Scaling, Reflection and Shearing; Hierarchical Modeling & viewing: The Camera Transformation – Perspective, orthographic and Stereographic views;

UNIT III  FRACTALS  9
Fractals and Self similarity – Peano curves – Creating image by iterated functions – Mandelbrot sets – Julia Sets – Random Fractals – Overview of Ray Tracing – Intersecting rays with other primitives — Reflections and Transparency – Boolean operations on Objects - its applications

UNIT IV  ADVANCED RENDERING TECHNIQUE  9
Curves and Surfaces: Bezier, B-Splines and NURBS; Color models; Photorealistic rendering; Global Illumination; Ray tracing; Monte Carlo algorithm; Adding Surface texture- Texture Synthesis – Bump Mapping, Environmental mapping; Advanced Lighting and Shading,

UNIT V  ANIMATION  9
Overview of Animation Techniques – Keyframing, Computer Animation; Motion capture and editing; forward/Inverse Kinematics; Deformation models; Facial animation. Raster methods – Design of animation sequences – animation techniques – Key-frame systems – motion specification – direct, dynamics – rigid body animation — radiosity – collision detection – Graphics file format – OpenGl animation procedures

OUTCOMES:
Upon completion of this course, the student will:
- Analyze the fundamentals of 2D and 3D computer graphics.
- Discuss the basic algorithms commonly used in 3D computer graphics.
- Describe advanced computer graphics techniques and applications.
- Analyze computer graphics and solid modelling techniques for various applications.

TEXT BOOKS:
OBJECTIVES:
- To study the fundamentals of computer forensics.
- To have an overview of techniques for Data Recovery and Evidence Collection.
- To study various threats associated with security and information warfare.
- To study the tools and tactics associated with cyber forensics.

UNIT I  INTRODUCTION

UNIT II  COMPUTER FORENSICS EVIDENCE AND CAPTURE

UNIT III  COMPUTER FORENSIC ANALYSIS

UNIT IV  INFORMATION WARFARE

UNIT V  COMPUTER FORENSIC CASES

TOTAL: 45 PERIODS

OUTCOMES:
Upon Completion of the course, the students should be able to
- To apply the concepts of computer forensics.
- To handle threats associated with security and information warfare.
- To design tools and tactics associated with cyber forensics.

REFERENCES:
2. Learning, 2005.
OBJECTIVES:
To understand:
- The background of an agent
- The reasoning aspect of agents
- The communication and cooperation of agents
- The application of agent and decision making of multi-agent

UNIT I  INTRODUCTION AND INTELLIGENT AGENTS  9
Agents as a paradigm for software engineering - Agents as a tool for understanding human societies- Intelligent Agent: Agents and Objects - Agents and Expert Systems - Agents as Intentional Systems - Abstract Architectures for Intelligent Agents - How to Tell an Agent What to Do

UNIT II  REASONING  9
Deduction reasoning agent - Agents as theorem provers - Agent oriented programming - Practical reasoning agent - Means end reasoning- Implementation - Procedural reasoning system- Reactive agent - Hybrid agent

UNIT III  COMMUNICATION AND COOPERATION  9
Software tools for ontology - OWL - XML - KIF - Speech acts - Cooperative Distributed Problem Solving - Task Sharing and Result Sharing - Result Sharing - Combining Task and Result Sharing - Handling Inconsistency - Coordination - Multiagent Planning and Synchronization

UNIT IV  METHODOLOGIES AND APPLICATIONS  9

UNIT V  MULTIAGENT DECISION MAKING  9
Multiagent Interactions - Making Group decisions - Forming coalitions - Allocating Scarce Resources - Bargaining - Arguing - Logical Foundations

OUTCOMES:
At the end of the course, the student will be able
- To analyze agent based computing
- To design the reasoning aspects of agents
- To implement communication and cooperation of agents
- To implement multi-agent systems.

REFERENCES:
OBJECTIVES:
- To learn the basics of e-learning
- To understand the design issues in E-Content creation
- To study about interactive E-Learning
- To learn managing E-Content

UNIT I  INTRODUCTION  9
Developing e-learning-E-learning approaches-E-learning components-Synchronous and asynchronous e-learning-Quality of e-learning-Blended learning-Need to develop an e-learning course-The activities, The team, The technology-work flow to produce and deliver e-learning content

UNIT II  DESIGNING AN E-LEARNING CONTENT/COURSE  9
Identifying and organizing course content-Needs analysis-Analysing the target audience-Identifying course content-Defining learning objectives-Defining the course sequence-Defining instructional methods, media, evaluation and delivery strategies-Defining instructional methods, Defining the delivery strategy, Defining the evaluation strategy

UNIT III  CREATING INTERACTIVE CONTENT  9
Preparing content-Creating storyboards-Structure of an interactive e-lesson-Techniques for presenting content-Integrating media elements-Courseware development-Authoring tools-Types of authoring tools-Selecting an authoring tool

UNIT IV  MANAGING AND EVALUATING LEARNING ACTIVITIES  9
Course delivery and evaluation-Components of an instructor led or facilitated course-Planning and documenting activities-Facilitating learners’ activities-Using communication tools for e-learning-Learning platforms-Proprietary vs. open-source LMS

UNIT V  MANAGEMENT AND IMPLEMENTATION OF E-LEARNING  9
Collaborative learning-Moodle and other open-source solutions-E-learning methods and delivery formats-Evaluating the impacts of e-learning

TOTAL: 45 PERIODS

OUTCOMES:
At the end of the course, the student will be able
- To appreciate the basics of e-learning
- To create the E-Content
- To implement interactive E-Learning
- To manage E-Content

REFERENCES:
OBJECTIVES:
- To understand Grid Architecture.
- To understand different types of grids.
- To know Grid standards.
- To acquire the knowledge of Grid computing in various areas.

UNIT I INTRODUCTION

UNIT II FRAMEWORK

UNIT III DATA AND KNOWLEDGE GRID

UNIT IV GRID MIDDLEWARE

UNIT V APPLICATIONS

COURSE OUTCOMES:
Upon Completion of the course, the students should be able to,
- Create Grid Middleware architecture.
- Explain the services offered by grid.
- To utilize grid for various applications.

REFERENCES
IF 7013 KNOWLEDGE ENGINEERING

OBJECTIVES:
• To understand knowledge representation and reasoning techniques.
• To understand the application of knowledge representation and reasoning in actions and planning.

UNIT I INTRODUCTION
Data, information and knowledge. Model of an intelligent system. Models of knowledge representations.

UNIT II REPRESENTATION
Semantic representations: semantic networks, frames; Frame/script systems; Conceptual dependency and conceptual graphs. Ontologies.

UNIT III COMPUTATIONAL LOGIC
Proposition and predicate logic - reasoning about knowledge - Temporal reasoning.

UNIT IV DEFAULTS, UNCERTAINTY
Default Logic - Inference under uncertainty - Bayesian techniques, Fuzzy reasoning, Case-based reasoning, Description logic.

UNIT V ACTIONS
Actions - Situational calculus - Frame problem - Complex actions - Planning - STRIPS - Planning as reasoning - Hierarchical and Conditional Planning.

TOTAL: 45 PERIODS

OUTCOMES:
At the end of the course, the student will be able
• To implement knowledge representation and reasoning techniques.
• To apply knowledge engineering for the development of intelligent applications

REFERENCES:

IF 7016 SEMANTIC WEB

OBJECTIVES:
• To learn the importance of semantic web.
• To understand various semantic knowledge representation strategies.
• To learn the concepts of ontology.
• To learn the ontology related tools.
UNIT I INTRODUCTION

UNIT II SEMANTIC KNOWLEDGE REPRESENTATION

UNIT III RULE LANGUAGES

UNIT IV ONTOLOGY DEVELOPMENT

UNIT V SOFTWARE TOOLS

TOTAL:45 PERIODS

OUTCOMES:
Upon completion of the course, the students will be able to
- Compare conventional web with semantic web.
- Analyze and design semantic knowledge representation modes.
- Construct ontology using different tools.
- Use semantic web services with web applications.

REFERENCES:
3. Grigoris Antoniou, Frank Van,“Semantic Web Primer”,
5. John Davis, Dieter Fensal, Frank Van Harmelen,J. Wiley ,"Towards the Semantic Web: Ontology Driven Knowledge Management".
OBJECTIVES:
- To understand the basic issues and types of text mining
- To appreciate the different aspects of text categorization and clustering
- To understand the role played by text mining in Information retrieval and extraction
- To appreciate the use of probabilistic models for text mining
- To appreciate the current trends in text mining

UNIT I INTRODUCTION
Overview of text mining - Definition - General Architecture - Algorithms - Core Operations - Pre-processing - Types of Problems - basics of document classification - information retrieval - clustering and organizing documents - information extraction - prediction and evaluation - Textual information to numerical vectors - Collecting documents - document standardization - tokenization - lemmatization - vector generation for prediction - sentence boundary determination - evaluation performance

UNIT II TEXT CATEGORIZATION AND CLUSTERING
Text Categorization - Definition - Document Representation - Feature Selection - Decision Tree Classifiers - Rule-based Classifiers - Probabilistic and Naive Bayes Classifiers - Linear Classifiers - Classification of Linked and Web Data - Meta-Algorithms - Clustering - Definition - Vector Space Models - Distance-based Algorithms - Word and Phrase-based Clustering - Semi-Supervised Clustering - Transfer Learning

UNIT III TEXT MINING FOR INFORMATION RETRIEVAL AND INFORMATION EXTRACTION

UNIT IV PROBABILISTIC MODELS

UNIT V RECENT TRENDS
Visualization Approaches - Architectural Considerations - Visualization Techniques in Link Analysis - Example - Mining Text Streams - Text Mining in Multimedia - Text Analytics in Social Media - Opinion Mining and Sentiment Analysis - Document Sentiment Classification - Opinion Lexicon Expansion - Aspect-Based Sentiment Analysis - Opinion Spam Detection - Text Mining Applications and Case studies

OUTCOMES:
Upon Completion of the course, the students will be able to
- Identify the different features that can be mined from text and web documents
- Use available open source classification and clustering tools on some standard text data sets
- Modify existing classification/clustering algorithms in terms of functionality or features used
- Design a system that uses text mining to improve the functions of an existing open source search engine
- Implement a text mining system that can be used for an application of your choice

TOTAL: 45 PERIODS
REFERENCES:
3. Charu C. Aggarwal ,ChengXiang Zhai,Mining Text Data, Springer; 2012

OBJECTIVES:
- To learn bio-informatics algorithms

UNIT I

UNIT II

UNIT III

UNIT IV

UNIT V

TOTAL:45 PERIODS

OUTCOMES:
Upon the completion of this course the student should be able
- To design and implement bio-informatics algorithms
REFERENCES

IF 7014 MACHINE LEARNING

OBJECTIVES:
- To understand the concepts of machine learning.
- To appreciate supervised and unsupervised learning and their applications.
- To understand the theoretical and practical aspects of Probabilistic Graphical Models.
- To appreciate the concepts and algorithms of reinforcement learning.
- To learn aspects of computational learning theory.

UNIT I INTRODUCTION

UNIT II SUPERVISED LEARNING

UNIT III UNSUPERVISED LEARNING

UNIT IV PROBABILISTIC GRAPHICAL MODELS
UNIT V       ADVANCED LEARNING
Sampling – Basic sampling methods – Monte Carlo - Reinforcement Learning - K-Armed Bandit-
Elements - Model-Based Learning - Value Iteration- Policy Iteration - Temporal Difference
Learning- Exploration Strategies- Deterministic and Non-deterministic Rewards and Actions-
Eligibility Traces- Generalization- Partially Observable States- The Setting- Example - Semi-
Supervised Learning - Computational Learning Theory - Mistake Bound Analysis – Sample
Complexity Analysis - VC Dimension - Occam Learning - Accuracy and Confidence Boosting.

OUTCOMES:
Upon completion of the course, the students will be able to
• To implement a neural network for an application of your choice using an available tool.
• To implement probabilistic discriminative and generative algorithms for an application of
your choice and analyze the results.
• To use a tool to implement typical clustering algorithms for different types of applications.
• To design and implement an HMM for a sequence model type of application
• To identify applications suitable for different types of machine learning with suitable
justification.

REFERENCES:

IF 7017       SOCIAL NETWORK ANALYSIS                  L T P C
                                                           3 0 0 3

OBJECTIVES:
The student should be made to:
• Understand the concept of semantic web and related applications.
• Learn knowledge representation using ontology.
• Understand human behavior in social web and related communities.
• Learn visualization of social networks.

UNIT I       THE SEMANTIC WEB AND SOCIAL NETWORKS
Introduction to Semantic Web: Limitations of current Web – Development of Semantic Web -
Emergence of the Social Web – Social Network analysis: Development of Social Network Analysis
- Key concepts and measures in network analysis.

UNIT II       SEMANTIC TECHNOLOGY FOR SOCIAL NETWORK ANALYSIS
Electronic sources for network analysis: Electronic discussion networks, Blogs and online
communities – Web-based networks- Ontology-based knowledge Representation –Resource
Description Framework – Web Ontology Language-Modeling and aggregating social network data:
State-of-the-art in network data representation - Ontological representation of social individuals –
Ontological representation of social relationships - Aggregating and reasoning with social network data
UNIT III  EXTRACTION AND MINING COMMUNITIES IN WEB SOCIAL NETWORKS

UNIT IV  PREDICTING HUMAN BEHAVIOUR AND PRIVACY ISSUES

UNIT V  VISUALIZATION AND APPLICATIONS OF SOCIAL NETWORKS

OUTCOMES:
Upon completion of the course, the student should be able to:
- Develop semantic web related applications.
- Represent knowledge using ontology.
- Predict human behaviour in social web and related communities.
- Visualize social networks.

REFERENCES:

IF 7003  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

OUTCOMES:
Upon completion of the course, the students will be able to
- Provides a basic exposition to the goals and methods of Artificial Intelligence.
- Study the design of intelligent computational agents.
- The knowledge acquired through learning can be used both for problem solving and for reasoning
- Improves problem solving, reasoning, planning, natural language understanding, computer vision, automatic programming and machine learning.

REFERENCES:
### OBJECTIVES:
- To learn the fundamentals of a translator
- To study about intermediate code generation
- To understand the memory handling
- To explore code optimization techniques

### UNIT I  
**FRONT END ANALYSIS**
- Modules and interfaces
- Tools and software
- Data structures for tree languages
- Lexical Analysis
- Parsing
- Abstract Syntax
- Semantic Analysis
- Overview

### UNIT II  
**INTERMEDIATE CODE AND INSTRUCTION SELECTION**
- Activation Records
- Stack frames
- Translation to Intermediate Code
- Intermediate representation trees
- Translation into trees
- Declarations
- Basic Blocks and Traces
- Canonical trees
- Taming conditional branches
- Instruction Selection
- Algorithms for instruction selection

### UNIT III  
**LIVENESS ANALYSIS AND REGISTER ALLOCATION**
- Liveness Analysis
- Solution of dataflow equations
- Register Allocation
- Coloring by simplification
- Coalescing
- Precolored nodes
- Graph coloring implementation
- Register allocation for trees

### UNIT IV  
**DATAFLOW ANALYSIS AND LOOP OPTIMIZATIONS**
- Dataflow Analysis
- Intermediate representation for flow analysis
- Various dataflow analyses
- Transformations using dataflow analysis
- Speeding up dataflow analysis
- Alias analysis
- Loop Optimizations
- Dominators
- Loop-invariant computations
- Induction variables
- Array-bounds checks
- Loop unrolling
- Static Single-Assignment Form

### UNIT V  
**PIPELINING AND SCHEDULING**
- Converting to SSA form
- Efficient computation of the dominator tree
- Optimization algorithms using SSA
- Arrays, pointers, and memory
- The control-dependence graph
- Converting back from SSA form
- A functional intermediate form
- Pipelining and Scheduling
- Loop scheduling without resource bounds
- Resource-bounded loop pipelining
- Branch prediction

### OUTCOMES:
At the end of the course, students will be able
- To explain the fundamentals of a translator
- To implement intermediate code generation
- To devise the memory handling techniques
- To design code optimization techniques

### REFERENCES:
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 compute 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
IMAGE FEATURES

UNIT III
CAMERA CALIBRATION AND STEREO GEOMETRY
Camera Parameters – Intrinsic and Extrinsic parameters – Direct Parameter Calibration – Extraction from Projection matrix, Stereopsis – Correspondence Problem – RANSAC and Alignment - Epipolar Geometry

UNIT IV
MOTION DETECTION AND SHAPE FROM CUES

UNIT V
HIGH LEVEL VISION
Interpretation trees, Invariants – Appearance and Shape based Classification – 3D object modeling – Matching from Intensity Data – Matching from Range Data – Visual Recognition – AdaBoost and Random Decision Forests.

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

REFERENCES:
OBJECTIVES:
- To understand data mining principles and techniques and introduce DM 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
Data warehousing - operational database systems vs data warehouses - multidimensional data model - schemas for multidimensional databases – OLAP operations – data warehouse architecture – indexing – OLAP queries & tools.

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

UNIT IV  CLASSIFICATION & PREDICTION  10

UNIT V  CLUSTERING  10

OUTCOMES:
Upon completion of the course, the students should 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.

REFERENCES:
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 SIGNALS AND SYSTEMS

UNIT II DISCRETE FOURIER TRANSFORMS

UNIT III IIR FILTER DESIGN

UNIT IV FIR FILTER DESIGN

UNIT V SIGNAL PROCESSING

OUTCOMES:
At the end of the course, the student will be able to
- Explain the basics of signals and systems.
- Analyze various frequency transforms and to determine their use to DSP.
- Design and analyze various digital filters.
- Exposure on signal processing like musical sound processing and image processing.

REFERENCES:
OBJECTIVES:
- To introduce open technologies
- To develop applications using python
- To provide an exposure to open hardware

UNIT I  INTRODUCTION  9
Need for free and open source software – Overview of linux – Distributions Development
environment tools and systems - using collaborative version control system - FOSS practices -
programming guidelines

UNIT II  SYSTEM ADMINISTRATION  9
GNU and linux installation – Boot process, Commands Using bash features, The man pages - files
and file systems - Partitions - Processes - Graphical environment - Installing software - git
commands

UNIT III  PYTHON  9
Conditionals/Loops - Functions - List - Strings - Recursion - tuples - Classes - Inheritance

UNIT IV  DJANGO  9
Introduction to Django - templates - models - forms - deploying django - caching - Integrating with
legacy databases and applications – security

UNIT V  OPEN SOURCE HARDWARE  9
Raspberry pi - Arduino – building embedded applications with raspberry pi and arduino- open
source 3-d printing

OUTCOMES:
At the end of the course, the student will be able to:
- Explain the internal structure of linux
- Write desktop and web applications using python
- Design for extendibility and code reuse
- To develop applications for open source hardware

REFERENCES:
1. Jesús M. González-Barahona, JoaquínSeoanePascual, Gregorio Robles, Introduction to Free
   Software, Free Technology Academy, Europe, 2009 (http://ftacademy.org/materials/fsm/1#1 ).
5. Adrian Holovaty, Jacob Kaplan–Moss, The Definitive Guide to Django: Web Development Done
   Right, Apress, 2009
8. J Pearce, Open-Source Lab - How to Build Your Own Hardware and Reduce Research Costs,
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:

MM 7152 DIGITAL IMAGE PROCESSING AND PATTERN RECOGNITION L T P C

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

UNIT I FUNDAMENTALS OF IMAGE PROCESSING 9

UNIT II IMAGE ENHANCEMENT AND RESTORATION 9

UNIT III IMAGE SEGMENTATION AND MORPHOLOGY 9

UNIT IV INTRODUCTION TO PATTERN RECOGNITION 9
UNIT V IMAGE PATTERN RECOGNITION CASE STUDIES

TOTAL: 45 PERIODS

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 implements mini projects
- Explore the possibility of applying image processing concepts in various domains

REFERENCES:

IF 7012 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
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
UNIT III METRICS

UNIT IV CATEGORIZATION AND CLUSTERING

UNIT V EXTRACTION AND INTEGRATION

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:

IF 7077 SERVICE ORIENTED ARCHITECTURE

OBJECTIVES:
• To learn SOA fundamentals
• To understand SOAD
• To study about service composition
• To explore RESTful services and SOA security

UNIT I SOA FUNDAMENTALS

TOTAL : 45 PERIODS

ATTENDED

DIRECTOR
UNIT II 
**SERVICE-ORIENTED ANALYSIS AND DESIGN**

9

SOA Terminology and Concepts - REST Design Constraints and Goals - RESTful Service-Oriented - Service Contracts with REST - Service-Oriented and REST Service-Oriented Analysis and Design with REST - Mainstream SOA Methodology - Analysis and Service Modeling with REST - Service-Oriented Design with REST

UNIT III 
**SERVICE COMPOSITION**

9

Service Composition with REST - Fundamental Service Composition with REST - Advanced Service Composition with REST - Service Composition with REST Case Study - Design Patterns for SOA with REST - Service Versioning with REST - Uniform Contract Profiles

UNIT IV 
**RESTFUL SERVICES AND THE RESOURCE-ORIENTED ARCHITECTURE**

9


UNIT V 
**SOA TRANSACTION AND SECURITY**

9

SOA and performance - SOA and security - Service Management - Model driven service deployment - Establishing SOA and SOA governance

TOTAL: 45 PERIODS

OUTCOMES:

At the end of the course, the student will be able

- To appreciate SOA fundamentals
- To implement SOAD
- To compose the web services
- To deploy RESTful services and SOA security

REFERENCES

1. Nicolai M. Josuttis, SOA in design - The art of distributed system design, O'REILLY publication, 2007.
3. Leonard Richardson and Sam Ruby, RESTful Web Services, O'REILLY publication, 2007.

IF 7018

**SOFT COMPUTING AND APPLICATION**

L T P C

3 0 0 3

OBJECTIVES:

- To understand the concept and applications of fuzzy logic, neural networks, genetic algorithms and hybrid systems.

UNIT I 
**INTRODUCTION AND FUZZY LOGIC**

9


UNIT II 
**NEURAL NETWORKS**

9

UNIT III  GENETIC ALGORITHMS  9
Basic concepts of genetic algorithms - encoding - genetic modeling - Evolutionary Strategies - Optimization techniques

UNIT IV  HYBRID SYSTEMS  9

UNIT V  APPLICATIONS  9
Applications of Fuzzy Logic - Applications of Neural Network - Application of Genetic Algorithm - Applications in Image processing - Applications in Data mining - Applications in other domains.

OUTCOMES:
Upon completion of the course, the student should be able

- To implement the concept and applications of fuzzy logic, neural networks, genetic algorithms and hybrid systems.

REFERENCES:

IF 7019  SOFTWARE QUALITY ASSURANCE AND TESTING  L T P C
3 0 0 3

OBJECTIVES:

- To give a clear picture on quality management, documentation and controlling for software quality
- Provide knowledge on standards, models and tools used for quality management
- How to perform measurement and assessment of software quality
- To introduce the basics and necessity of Software testing
- To introduce various testing techniques along with software production
- To introduce the concepts of Software bugs and its impact

UNIT I  BASICS OF SOFTWARE QUALITY and CONTROLLING  9

UNIT II  QUALITY STANDARDS  9
UNIT III  QUALITY METRICS AND ASSESSEMENT  
Fundamentals of Measurement Theory - Software quality Metrics overview – Availability Metrics – Conducting In-Process quality assessment - Conducting software project Assessments.

UNIT IV  SOFTWARE TESTING CONCEPTS  

UNIT V  SOFTWARE TESTING TECHNIQUES and TOOLS  

OUTCOMES:
Upon Completion of the course, the students should be able to:
- Learned how to document, control and manage software quality with the aid of tools and standards.
- The process of measurement and assessment would be practiced to ensure Software Quality
- Perform automated testing using test tools
- Document the testing procedures

REFERENCES:
OBJECTIVES:
- To understand the design of the UNIX operating system.
- To become familiar with the various data structures used.
- To learn the various low-level algorithms used in UNIX.

UNIT I OVERVIEW

UNIT II FILE SUBSYSTEM
Internal representation of files – Inodes – Structure of a regular file – Directories – Conversion of a path name to an Inode – Super block – Inode assignment to a new file – Allocation of disk blocks.

UNIT III SYSTEM CALLS FOR THE FILE SYSTEM

UNIT IV PROCESSES

UNIT V MEMORY MANAGEMENT AND I/O

TOTAL:45 PERIODS

OUTCOMES:
Upon completion of the course, the student should be able
- To analyze the internals of the unix operating system.
- To make use of the various data structures
- To implement various low-level algorithms used in UNIX.

REFERENCES:
OBJECTIVES:
- To learn about the issues in the design of ad hoc and wireless sensor networks
- To understand the working of protocols in different layers of ad hoc and sensor networks
- To expose the students to different aspects in ad hoc and sensor networks
- To understand various standards and applications in ad hoc and sensor networks

UNIT I  FUNDAMENTALS
Introduction to ad hoc networks- Differences between cellular and ad hoc wireless networks-
Challenges and issues in ad hoc networks-Introduction to WSN-Single node architecture-Network
architecture- Localization and positioning-Operating systems for WSN.

UNIT II  MAC AND LINK MANAGEMENT
Fundamentals of wireless MAC protocols- Classification of MAC protocols for ad hoc networks-
MAC for WSN-Low duty cycle protocols and wakeup concepts- Contention and schedule based
protocols-WSN link layer-Error control-Framing-Link management.

UNIT III  ROUTING
Design issues of routing protocols for ad hoc networks- Classification of routing protocols-
Proactive, Reactive and Hybrid routing protocols-Routing in WSN-Naming and addressing-
Gossiping and agentbased unicast forwarding- Energy efficient unicast- Broadcast and multicast-
Geographic routing-Data-centric and content-based networking.

UNIT IV  TRANSPORT LAYER AND QoS
Challenges of transport layer protocol in wireless environments- TCP’s challenges and design
issues in ad hoc networks-Transport protocols for ad hoc networks-Transport control protocols for
WSNs-Issues and challenges in providing QoS in ad hoc networks-Network layer QoS solutions-

UNIT V  STANDARDS AND APPLICATIONS
Wireless sensor network standards- Standards on wireless mesh networks-Applications of ad hoc
and WSNs-Case study: Building military border area surveillance system, Forest fire detection
system and tsunami early warning system with wireless sensor networks.

TOTAL : 45 PERIODS

OUTCOMES:
Upon completion of this course students should be able to
- Identify different issues in wireless ad hoc and sensor networks
- To analyze the protocols developed for ad hoc and sensor networks
- To identify and discuss the standards and applications of ad hoc and sensor networks

REFERENCES:
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  GPU COMPUTING AND CUDA
Introduction – Parallel Programming Languages and models – Evolution of Graphic pipelines – GPGPUs - CUDA Program Structure – Device memories – Data Transfer – Kernel Functions

UNIT III  CUDA DETAILS
CUDA Threads – Thread Organization – Synchronization & Scalability – CUDA memories – Performance – Imaging Case study

UNIT IV  OPENCL BASICS

UNIT V  OPENCL CONCURRENCY & EXECUTION MODEL
OpenCL Synchronization – Kernels – Fences – Barriers – Queueing – Global Synchronization – Memory Consistency – Events – Host side memory model – Device Side memory Model – Case study

OUTCOMES:
At the end 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 massively parallel architectures.

REFERENCES:
OBJECTIVES:
- To understand the concept of virtualization.
- To understand the various issues in virtualization.
- To familiarize themselves with the types of virtualization.
- To compare and analyze various virtual machines products.

UNIT I	OVERVIEW OF VIRTUALIZATION	10

UNIT II	SERVER CONSOLIDATION	8

UNIT III	NETWORK VIRTUALIZATION	10

UNIT IV	VIRTUALIZING STORAGE	8

UNIT V	VIRTUAL MACHINES PRODUCTS	9

OUTCOMES:
Upon Completion of the course, the students should be able to
- Create a virtual machine and to extend it to a virtual network.
- Discuss on various virtual machine products.
- Compile all types of virtualization techniques and utilize them in design of virtual machines.

REFERENCES:
OBJECTIVES:
The student should be able to
This course aims at providing the necessary basic concepts of a few deterministic optimization techniques, queuing theory, simulation and applies them to various engineering problems.

UNIT I  QUEUEING MODELS

UNIT II  LINEAR PROGRAMMING
Formulation - Graphical Solution - Simplex Method - Two-Phase Method - Transportation and Assignment Models.

UNIT III  NON-LINEAR PROGRAMMING

UNIT IV  DYNAMIC PROGRAMMING

UNIT V  SIMULATION MODELLING
Monte Carlo Simulation - Types of Simulation - Elements of Discrete Event Simulation - Generation of Random Numbers - Applications to Queueing systems.

OUTCOMES:
Upon completion of this course, the student will:
- Have a clear perception of the power of mathematical programming tools and acquire skills to analyze queuing models.
- Demonstrate the application of the operations research techniques to problems drawn from industry, management and other engineering fields.

REFERENCES:
UNIT I  FUNDAMENTALS OF VIDEO PROCESSING  9

UNIT II  DIGITAL VIDEO ENHANCEMENT AND SEGMENTATION  9

UNIT III  VIDEO ANALYSIS AND TRACKING  9

UNIT IV  MOTION ESTIMATION  9
Two-Dimensional Motion Estimation - Optical Flow. General Methodologies - Motion Representation, Motion Estimation Criteria, Optimization Methods. Pixel-Based Motion Estimation - Block-Matching Algorithm - Exhaustive Block-Matching Algorithm - Phase Correlation Method and Multiresolution Motion Estimation.

UNIT V  VIDEO CLASSIFICATION AND RECOGNITION  9
Video Classification – Classification and Clustering models – Video Annotation – Video Summarization – Action Recognition - Visual Event Detection.

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.

REFERENCES:
OBJECTIVES:
- To have a better knowledge about videos
- To enrich students with data analytics
- To understand the video content analysis
- To expose the student to various applications and case studies of Video analytics.

UNIT I VIDEO FUNDAMENTALS

UNIT II VIDEO SEGMENTATION AND VIDEO FEATURES
Fundamentals of Motion Estimation – Optical flow - Pixel Video Features - colour, shape features, Textural features - Feature selection and Dimensionality Reduction .

UNIT III INTRODUCTION TO ANALYTICS
Big-Data - Descriptive data analysis - Analytic Processes and Tools - Regression - Classification - Clustering algorithms - Validation - Multimodal approach to Image and Video data mining - Probabilistic semantic mode - Model based annotation and video mining.

UNIT IV VIDEO CONTENT ANALYSIS AND ANALYTICS
Introduction- Detecting Shot Boundaries in Video – Parsing a Video into Semantic Segments – Video Indexing and Abstraction for Retrievals – Affective Video Content Analysis - Automatic Video Trailer Generation - Video database - Video categorization - Video query categorization

UNIT V EMERGING TRENDS
Object Segmentation and Tracking in the Presence of Complex Background – Video Inpainting – Video Summarization – Forensic video analysis

OUTCOMES:
Upon completion of the course, the student should be able to:
- Discuss video processing fundamentals
- Analyze video features
- Formulate various application of video processing

REFERENCES:
UNIT I INTRODUCTION

UNIT II DESIGN METHODOLOGIES

UNIT III ARCHITECTURE DESCRIPTION DOCUMENTATION AND EVALUATION
Early Architecture Description Languages – Domain and Style Specific ADLs – Extensible ADLs – Documenting Software architecture - Architecture Evaluation – ATAM

UNIT IV ARCHITECTURE DESIGN

UNIT V CREATING AN ARCHITECTURE

TOTAL : 45 PERIODS

OUTCOMES:
At the end the student will be able to
- Develop Software applications starting from software architecture and design.
- Learn and evaluate existing software architectures.
- Design methods for improving software quality from the perspective of software architecture.

REFERENCES:
OBJECTIVES:
- To learn the characteristics of mobile applications.
- To understand the intricacies of UI required by mobile applications.
- To study about the design aspects of mobile application.
- To learn development of mobile applications.

UNIT I INTRODUCTION

UNIT II USER INTERFACE

UNIT III APPLICATION DESIGN

UNIT IV APPLICATION DEVELOPMENT

UNIT V TOOLS

OUTCOMES:
Upon Completion of the course, the students should be able
- To design and implement the user interfaces for mobile applications.
- To design the mobile applications that is aware of the resource constraints of mobile devices.
- To develop advanced mobile applications that accesses the databases and the web.
- To develop useful mobile applications in the current scenario using Google Android and Eclipse simulator.

REFERENCES: