### PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

<table>
<thead>
<tr>
<th>PEO No.</th>
<th>PEO Caption</th>
<th>PEOs</th>
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<tbody>
<tr>
<td>1.</td>
<td>Core competency</td>
<td><strong>To apply their basic knowledge in Mathematics, Science and Engineering and to expose to the recent Information Technologies to analyze and solve real world problems.</strong></td>
</tr>
<tr>
<td>2.</td>
<td>Innovation</td>
<td><strong>To be competent in the IT segments and to bring out novel ideas by exploring the multiple solutions for the given problem.</strong></td>
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<tr>
<td>3.</td>
<td>Adaptive Learning</td>
<td><strong>To engage in sustained learning for the career opportunities in industries, research divisions, and academics so that they can adapt to ever-changing technological and societal requirements.</strong></td>
</tr>
<tr>
<td>4.</td>
<td>Team spirit</td>
<td><strong>To mould the students to be ethically committed towards team work for producing quality output with the aim of developing our nation.</strong></td>
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### PROGRAMME OUTCOMES (POs)

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<tbody>
<tr>
<td>1.</td>
<td>An ability to apply knowledge of mathematics, science and information science in advance level</td>
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<tr>
<td>2.</td>
<td>An ability to design a Information system with components and processes to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability</td>
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<td>3.</td>
<td>An ability to identify and modify the functions of the internals of information processing system</td>
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<td>4.</td>
<td>An ability to apply Software Engineering principles, techniques and tools in software development</td>
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<tr>
<td>5.</td>
<td>An ability to create, collect, process, view, organize, store, mine and retrieve information both in local and remote locations in a secure and effective manner</td>
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<tr>
<td>6.</td>
<td>An ability to design and conduct experiments, as well as to analyze and interpret information to lay a foundation for solving complex problems</td>
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<tr>
<td>7.</td>
<td>An ability to engage in life-long learning to acquire knowledge of contemporary issues in IT domain to meet the challenges in the career</td>
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<tr>
<td>8.</td>
<td>An ability to apply the skills and techniques in information technology and interdisciplinary domains for providing solutions in a global, economic, environmental, and societal context</td>
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<tr>
<td>9.</td>
<td>An ability to develop IT research skills and innovative ideas</td>
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<td>10.</td>
<td>An ability to model the IT real world problems and to address and share the research issues</td>
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<tr>
<td>11.</td>
<td>An ability to share their IT knowledge and express their ideas in any technical forum</td>
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<tr>
<td>12.</td>
<td>An ability to present their ideas to prepare for a position to educate and guide others</td>
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### M.TECH. INFORMATION TECHNOLOGY

#### I TO IV SEMESTERS CURRICULA AND SYLLABI (FULL TIME)

#### SEMESTER I

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<tr>
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**TOTAL NO. OF CREDITS:74**
## LIST OF ELECTIVES

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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
Random variables - Probability function – Moments – Moment generating functions and their properties – Binomial, Poisson, Geometric, Uniform, Exponential, Gamma and Normal distributions – Functions of a Random Variable.

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, Chi-Square 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
Random Vectors and Matrices - Mean vectors and Covariance matrices - Multivariate Normal density and its properties - Principal components Population principal components - Principal components from standardized variables.

TOTAL 45+15:60 PERIODS

OUTCOMES:
- The student will 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 understand the principles of iterative and recursive algorithms.
- To learn the graph search algorithms.
- To study network flow and linear programming problems.
- To learn the hill climbing and dynamic programming design techniques.
- To develop recursive backtracking algorithms.
- To get an awareness of NP completeness and randomized algorithms.
- To learn the principles of shared and concurrent objects.
- To learn concurrent data structures.

UNIT I  ITERATIVE AND RECURSIVE ALGORITHMS  9

UNIT II  OPTIMISATION ALGORITHMS  9

UNIT III  DYNAMIC PROGRAMMING ALGORITHMS  9

UNIT IV  SHARED OBJECTS AND CONCURRENT OBJECTS  9

UNIT V  CONCURRENT DATA STRUCTURES  9

TOTAL: 45 PERIODS
OUTCOMES:
Upon completion of the course, the students will be able to
1. Design and apply iterative and recursive algorithms.
2. Design and implement optimisation algorithms in specific applications.
3. Design appropriate shared objects and concurrent objects for applications.
4. Implement and apply concurrent linked lists, stacks, and queues.

REFERENCES:

CP7103 MULTICORE ARCHITECTURES L T P C
3 0 0 3

OBJECTIVES:
- To understand the recent trends in the field of Computer Architecture and identify performance related parameters
- To appreciate the need for parallel processing
- To expose the students to the problems related to multiprocessing
- To understand the different types of multicore architectures
- To expose the students to warehouse-scale and embedded architectures

UNIT I FUNDAMENTALS OF QUANTITATIVE DESIGN AND ANALYSIS

UNIT II DLP IN VECTOR, SIMD AND GPU ARCHITECTURES
Vector Architecture - SIMD Instruction Set Extensions for Multimedia – Graphics Processing Units - Detecting and Enhancing Loop Level Parallelism - Case Studies.

UNIT III TLP AND MULTIPROCESSORS
Symmetric and Distributed Shared Memory Architectures – Cache Coherence Issues - Performance Issues – Synchronization Issues – Models of Memory Consistency - Interconnection Networks – Buses, Crossbar and Multi-stage Interconnection Networks.

UNIT IV RLP AND DLP IN WAREHOUSE-SCALE ARCHITECTURES
UNIT V  ARCHITECTURES FOR EMBEDDED SYSTEMS

TOTAL: 45 PERIODS

OUTCOMES:
Upon completion of the course, the students will be able to
- Identify the limitations of ILP and the need for multicore architectures
- Address the issues related to multiprocessing and suggest solutions
- Bring out the salient features of different multicore architectures and how they exploit parallelism
- Analyze the different types of inter connection networks
- Explore the architecture of GPUs, warehouse-scale computers and embedded processors

REFERENCES:

IF7101  INTERNETWORKING TECHNOLOGIES

OBJECTIVES:
- To study the design and implementation of a socket based application using either TCP, UDP and SCTP.
- To understand SCTP sockets and its options
- To study the features of Raw Sockets
- To learn to develop the DNS
- To study the security features in socket programming
- To explore the usage of sockets options and the system calls needed to support unicast, broadcast and multicast applications
- To explore the emerging technologies in socket programming.

UNIT I  APPLICATION DEVELOPMENT

UNIT II  ELEMENTARY SCTP SOCKETS AND SOCKET OPTIONS
UNIT III   RAW SOCKETS AND DNS

UNIT IV   ADVANCED SOCKETS-I

UNIT V   ADVANCED SOCKETS-II

TOTAL: 45 PERIODS

OUTCOMES:
Upon completion of the course, the students will be able to
• Design and develop network applications using sockets system calls.
• Compare IPv4 and IPv6
• Explore the features of Stream Control Transmission Protocol (SCTP)
• Design and develop network applications using raw socket
• Design and develop Domain Name Service
• Incorporate the security features in the socket programming
• Work with various networking tools such as ping, traceroute to investigate a traffic flow in the network.
• Extend network applications for broadcasting and multicasting
• Create innovative network design by applying advanced socket concepts.

REFERENCES:
OBJECTIVES:

- To provide information about wider engineering issues that form the background to develop complex, evolving (software-intensive) systems
- To gain basic knowledge about object-oriented analysis and to familiarize UML concepts
- To study the requirements of various domain applications
- To design, implement and test the software in object oriented approach
- To discuss the issues in managing the software projects
- To explore the standards related to life cycle process

UNIT I – INTRODUCTION

UNIT II – REQUIREMENT ELICITATION AND ANALYSIS
Requirements Elicitation Concepts – Requirements Elicitation Activities – Managing Requirements Elicitation – Analysis Concepts – Analysis Activities – Managing Analysis - Case Study

UNIT III – SYSTEM DESIGN

UNIT IV – OBJECT DESIGN, IMPLEMENTATION AND TESTING

UNIT V – MANAGING CHANGE

TOTAL: 45 PERIODS

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

- Apply Object Oriented Software Engineering approach in every aspect of software project
- Analyse the requirements from various domains
- Evaluate the relationships between Software Design and Software Engineering
- Adapt appropriate object oriented design aspects in the development process
- Implement and test the software project using object oriented approach
- Manage the issues regarding the decision making and changes in the different stage of software development
- Implement mini projects incorporating the principles of object oriented software engineering
REFERENCES:

CP7202 ADVANCED DATABASES

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 database
- To understand the principles of intelligent databases.
- To understand the usage of advanced data models.
- 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

UNIT III INTELLIGENT DATABASES

UNIT IV ADVANCED DATA MODELS

UNIT V EMERGING TECHNOLOGIES

TOTAL: 45 PERIODS
OUTCOMES:
Upon completion of the course, the students will be able to
- Select the appropriate high performance database like parallel and distributed database
- Model and represent the real world data using object oriented database
- Design a semantic based database to meaningful data access
- Embed the rule set in the database to implement intelligent databases
- Represent the data using XML database for better interoperability
- Handle Big data and store in a transparent manner in the cloud
- To solve the issues related to the data storage and retrieval

REFERENCES:

IF7111 ADVANCED DATA STRUCTURES LABORATORY L T P C
0 0 3 2

OBJECTIVES:
- To learn to implement iterative and recursive algorithms.
- To learn to design and implement algorithms using hill climbing and dynamic programming techniques.
- To learn to implement shared and concurrent objects.
- To learn to implement concurrent data structures.

LAB EXERCISES:
Each student has to work individually on assigned lab exercises. Lab sessions could be scheduled as one contiguous four-hour session per week or two two-hour sessions per week. There will be about 15 exercises in a semester. It is recommended that all implementations are carried out in Java. If C or C++ has to be used, then the threads library will be required for concurrency. Exercises should be designed to cover the following topics:
- Implementation of graph search algorithms.
- Implementation and application of network flow and linear programming problems.
- Implementation of algorithms using the hill climbing and dynamic programming design techniques.
- Implementation of recursive backtracking algorithms.
- Implementation of randomized algorithms.
- Implementation of various locking and synchronization mechanisms for concurrent linked lists, concurrent queues, and concurrent stacks.
- Developing applications involving concurrency.

TOTAL: 45 PERIODS
OUTCOMES:
Upon completion of the course, the students will be able to
1. Design and apply iterative and recursive algorithms.
2. Design and implement algorithms using the hill climbing and dynamic programming and recursive backtracking techniques.
3. Design and implement optimisation algorithms for specific applications.
4. Design and implement randomized algorithms.
5. Design appropriate shared objects and concurrent objects for applications.
6. Implement and apply concurrent linked lists, stacks, and queues.

REFERENCES:

IF7112 INTERNEtWORKING LABORATORY L T P C
0 0 3 2

OBJECTIVES:
• To learn network programming
• To establish connection among the system in the network.
• To analyze network traffic
• To acquire knowledge about various networking tools.

EXERCISES:
1. You are an employee of an XYZ company, working in its branch office and have been given the task to provide service for a valued enterprise customer. If you are unable to solve queries of the customer, obtain the help from your boss at head quarters. The nodes are installed at three different locations. One is at the customer’s headquarters, one is at their branch office and one is at a top secret R&D department. Implement the above scenario using TCP socket.

2. Develop a Client/server application in C/C++ for implementing the following scenario:
   Consider nodes A, B, C and D. Visualize Node A as the source, node B as the router. Nodes C and D are two nodes acting as two different networks connected with two interfaces of the router B. Node A should send an IP datagram to B. B extracts the network address from the destination IP of the datagram and forwards it to either C or D depending on the network address.

   Note: Construct IP header with proper fields. Use a static routing table in node B and suitable subnet masks for forwarding to C and D. Show the output for both Cases
   Case 1: IP datagram to node C.
   Case 2: IP datagram to node D.)
3. Simulation of DNS using UDP sockets. Consider a root server, three Top Level Domain (TLD) servers (say, corresponding to com, edu and gov), three Authoritative Servers. The client sends a DNS query to the root server. The root server sends the IP address of TLD server to the client. The client sends the DNS query to the TLD server. The TLD server sends the IP address of the authoritative server to the client. The client sends the DNS query to the authoritative server and gets the IP address of the required host. Implement this scenarios in C/C++ language

Note: A domain name consists of one or more parts, technically called labels. Each label may contain up to 63 characters. The full domain name may not exceed a total length of 253 characters. The characters allowed in a label follow the LDH rule (letters, digits, hyphen). Domain names are interpreted in case- independent manner. Labels should not start or end with a hyphen

4. Write a C/C++ code in TCP protocol stack, which sends a SYN packet with a randomly spoofed IP to avoid the firewall blocking. This will result in all the entries in the spoofed IP list, sending RST segments to the victim server, upon getting the SYN-ACK from the victim. This can choke the target server and often form a crucial part of a Denial Of Service (DOS) attack. Launch the DOS attack by many hosts from various location, all target the same victim to launch Distributed DOS (DDOS).

5. Develop a protocol for transmitting private documents via the Internet in an encrypted form. Ensure that the information is sent, unchanged, only to the server you intended to send it to. It has to encrypt TCP/IP traffic that also incorporates authentication and data integrity. It may run on top of TCP/IP. It is based on session-key encryption. It adds a number of extra features, including authentication based on X.509 certificates and integrity checking with message authentication codes. It is an extension of sockets, which allow a client and a server to establish a stream of communication with each other in a secured manner. They begin with a handshake, which allows identities to be established and keys to be exchanged. Show that the developed protocol protects a network from attacks such as IP spoofing, IP source routing, and DNS spoofing.

6. Simulation of HTTP protocol – The client sends a HTTP request (the request is sent in the actual format with request line, header lines). The server gets the HTTP request and understands what method is to be done and responds in a HTTP response message. The response message can have a status line and header lines followed by the data.
   - Client Request line format : method/ request http version
   - Server reply format : http version status code followed by requested page contents

7. Simulation of FTP – understanding control and data channels. The client initiates a TCP connection to the server and sends the required FTP command to the server. For example, “get filename”. The server reads the command, initiates a new TCP connection with the client using a different port number. The server then sends the result of the command to the client and closes the connection.

8. Consider software that resides in a system that reads the available main memory and hard disk at periodical intervals and pass this information on to another system on demand. This process is placed in more than one system so that network resource can be monitored. Implement a monitoring program and list out the time, IP address, available Hard disk and Main memory available in each system in a tabular form.

9. Use the software like wireshark in a LAN to capture the packet and do a statistical analysis such as: the number of packets (bits) flowing in/out of a designated system, a pair wise packet flow among the given IP addresses.

10. Use the packet capturing tool and measure the traffic from each node in a application wise, and pair wise traffic application

11. Repeat exercise 10 for protocol wise traffic analysis

TOTAL: 45 PERIODS
OUTCOMES:
At the end of the course, the students will be able to
• Design network applications using TCP and UDP
• Demonstrate the usage of various networking tools.
• Analyze network traffic
• Analyze packets transmitted over the network.

IF7113 MINI PROJECT

The objective of the mini project is to enable the students to apply the techniques they have learnt over the courses:
• The students can select any of the problem of their choice related to direct application
• A team can be formed with 2-3 members
• Should inculcate the software engineering methodologies
• At least two hours per week should be spent in doing this mini project
• The students should design and experiment using object oriented concept
• A database has to be designed and implemented
• The developed project must be web enabled
• The developed mini project must be tested for different cases of operations
• A documentation has to be prepared in the form of a report
• Evaluation pattern is like Lab examination

TOTAL :30 PERIODS

IF7201 WEB TECHNOLOGIES

OBJECTIVES:
• To understand the basics of web technology and design methods.
• To learn to design interactive web pages using Markup languages, CSS, Java Script.
• Understand the web platform for creating information sharing and functionality using PHP
• Learn to develop Enterprise Applications for Online communities in the Business World.
• To understand the representation of Web Data using XML technologies
• To understand the techniques of Server side programming

UNIT I WEB TECHNOLOGY AND DESIGN METHODS


UNIT II WEB APPLICATION DEVELOPMENT
UNIT III   REPRESENTING WEB DATA  

UNIT IV   ENTERPRISE APPLICATION DEVELOPMENT  

UNIT V   SERVER SIDE APPLICATIONS  
Overview of servlets – Servlet API – Servlet life cycle – Servlet configuration – Java Database Connectivity (JDBC) - Running Servlet with database connectivity - Servlet support for cookies – Session tracking- JSP – JSP with JDBC and applications

TOTAL: 45 PERIODS

OUTCOMES:
Upon completion of the course, the students will be able to
• Create interactive web pages using Markup languages, CSS, Java Script.
• Implement server-Side Programming for creating information sharing and functionality using PHP.
• Work on XML Technologies
• Develop Enterprise Applications for online communities in the business world.

REFERENCES:
8. Christopher D. Manning, Prabhakar Raghavan and Hinrich Schütze, “Introduction to Information Retrieval”, Cambridge University Press, 2008 (Unit – 5)

IF7202   CLOUD COMPUTING   L T P C
3 0 0 3

OBJECTIVES:
• To introduce the broad perceptive of cloud architecture and model
• To understand the concept of Virtualization
• To be familiar with the lead players in cloud.
• To understand the features of cloud simulator
• To apply different cloud programming model as per need.
• To be able to set up a private cloud.
• To understand the design of cloud Services.
• To learn to design the trusted cloud Computing system
UNIT I  CLOUD ARCHITECTURE AND MODEL  9

UNIT II  VIRTUALIZATION  9

UNIT III  CLOUD INFRASTRUCTURE  9

UNIT IV  PROGRAMMING MODEL  9
Parallel and Distributed Programming Paradigms – MapReduce , Twister and Iterative Map Reduce – Hadoop Library from Apache – Mapping Applications - Programming Support - Google App Engine, Amazon AWS - Cloud Software Environments - Eucalyptus, Open Nebula, OpenStack, Aneka, CloudSim

UNIT V  SECURITY IN THE CLOUD  9

TOTAL: 45 PERIODS

OUTCOMES:
• Compare the strengths and limitations of cloud computing
• Identify the architecture, infrastructure and delivery models of cloud computing
• Apply suitable virtualization concept.
• Choose the appropriate cloud player
• Choose the appropriate Programming Models and approach.
• Address the core issues of cloud computing such as security, privacy and interoperability
• Design Cloud Services
• Set a private cloud

REFERENCES:
5. George Reese, “Cloud Application Architectures: Building Applications and Infrastructure in the Cloud” O’Reilly
NE7202  NETWORK AND INFORMATION SECURITY  L T P C  3 0 0 3

OBJECTIVES:
- To understand the fundamentals of Cryptography
- To acquire knowledge on standard algorithms used to provide confidentiality, integrity and authenticity.
- To understand the various key distribution and management schemes.
- To understand how to deploy encryption techniques to secure data in transit across data networks
- To design security applications in the field of Information technology.

UNIT I  INTRODUCTION

UNIT II  CRYPTOSYSTEMS & AUTHENTICATION

UNIT III  PUBLIC KEY CRYPTOSYSTEMS
Introduction to Public key Cryptography- Number theory- The RSA Cryptosystem and Factoring Integer- Attacks on RSA-The ELGamal Cryptosystem- Digital Signature Algorithm-Finite Fields-Elliptic Curves Cryptography- Key management – Session and Interchange keys, Key exchange and generation-PKI

UNIT IV  SYSTEM IMPLEMENTATION

Secure Software Development: Secured Coding - OWASP/SANS Top Vulnerabilities - Buffer Overflows - Incomplete mediation - XSS - Anti Cross Site Scripting Libraries - Canonical Data Format - Command Injection - Redirection - Inference – Application Controls

UNIT V  NETWORK SECURITY
Secret Sharing Schemes-Kerberos- Pretty Good Privacy (PGP)-Secure Socket Layer (SSL)- Intruders – HIDS- NIDS - Firewalls - Viruses

TOTAL: 45 PERIODS.

OUTCOMES:
Upon completion of the course, the students will be able to
- Implement basic security algorithms required by any computing system.
- Analyze the vulnerabilities in any computing system and hence be able to design a security solution.
- Analyze the possible security attacks in complex real time systems and their effective countermeasures
- Identify the security issues in the network and resolve it.
- Evaluate security mechanisms using rigorous approaches, including theoretical derivation, modeling, and simulations
- Formulate research problems in the computer security field.

REFERENCES:

IF7203 DATA WAREHOUSING AND DATA MINING LTPC 3 0 0 3

OBJECTIVES:
- To expose the students to the concepts of Data warehousing Architecture and Implementation
- To Understand Data mining principles and techniques and Introduce DM as a cutting edge business intelligence
- To learn to use association rule mining for handling large data
- To understand the concept of classification for the retrieval purposes
- To know the clustering techniques in details for better organization and retrieval of data
- 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  

UNIT V  CLUSTERING

TOTAL: 45 PERIODS

OUTCOMES:
Upon Completion of the course, the students will be able to
- Store voluminous data for online processing
- Preprocess the data for mining applications
- Apply the association rules for mining the data
- Design and deploy appropriate classification techniques
- Cluster the high dimensional data for better organization of the data
- Discover the knowledge imbibed in the high dimensional system
- Evolve Multidimensional Intelligent model from typical system
- Evaluate various mining techniques on complex data objects

REFERENCES:
4. BERSON, ALEX & SMITH, STEPHEN J, Data Warehousing, Data Mining, and OLAP, TMH Pub. Co. Ltd, New Delhi, 2012
6. PRABHU Data Warehousing, PHI Learning Private Limited, New Delhi, 2012 ,
7. PONNIAH, PAULRAJ, Data Warehousing Fundamentals, John Wiley & Sons, New Delhi, 2011
8. MARAKAS, GEORGE M, Modern Data Warehousing, Mining, and Visualization, Pearson Education, 2011

IF7211  WEB TECHNOLOGY LABORATORY  LT P C
OBJECTIVES
- To learn how to create a simple web page using html along with the usage of style sheets, lists, creation or tables with borders, padding and colors.
- To get acquainted with JavaScript and how to embed JavaScript in HTML code.
- To learn to construct dynamic server-side web pages and integrate the web application with many of the other Java2 Enterprise Edition application server methodologies
- To learn to develop Java Enterprise Applications using EJB3 and other Java EE technology

20
EXPERIMENT

1. Web programming with HTML tags, CSS for styling, Page layout
   a. Create a tourist web site using HTML and embed an in a world map in it. Using image map fix hot spots for each continent and show all the related information when the hot spots are clicked.
   b. Design a HTML form for a railway ticket reservation system with various form controls.
   c. Create a web site for Online Shopping application. The home page must be divided into three frames. The top frame must be 15% and should display the logo and the moto of the Shopping application along with some pictures. The remaining 85% portion must be divided into two frames. The left frame must be 25% and is meant for appropriate navigation links. The right frame must take the remaining width and must be the target for all the hosted links in the left frame.
   d. Apply CSS property to a table with alternate rows displayed in different colors.
   e. Design the style rule which can be applied for hyperlinks using pseudo class properties.
   f. Write a style rule that will place a nice frame around an image element. Choose suitable color, design and size for the border.
   g. Design the style rule which can be applied for an online shopping application. The shopping application displays the image for each item and the details of the item. When the mouse over event occurs on the image of an item, the magnified image must be displayed dynamically.

2. Develop webpage using HTML forms and JavaScript for client side programming
   a. Design a registration page which accepts name, address, pin code, phone no., and e-mail Id. Write suitable JavaScript functions to validate the form whether
      - all fields are entered
      - e-mail Id is a valid one (check for @ and . symbol)
      - phone no. is a valid one (only 10 digits)
      - pin code is having only 6 digits.
   b. Using a Reg Exp instance, write a JavaScript function is Valid() that accepts a String argument and returns true if the argument matches one of the following phone-number formats and returns false otherwise:
      - (123)456-7890
      - (123) 456-7890
      - 123/456-7890
      - 123-456-7890
      - 123 456 7890
      - 123456789
   c. Date has to be printed in several common formats. Write a JavaScript that accepts a date from an XHTML form and convert it to a Date object. Use various methods of the Date object that convert the given date into string and display it in several formats.
   d. Write a JavaScript to simulate the rolling of two dice. The script should use Math.random() to roll the first die and again to roll the second die. The sum of the two values should then be calculated. [Note: Since each die can show an integer value from 1 to 6, the sum of the values will vary from 2 to 12, with 7 being the most frequent sum, and 2 and 12 the least frequent sums. Your program should roll the dice 36,000 times. Use a one-dimensional array to tally the number of times each possible sum appears. Display the results in an XHTML table. Also determine whether the totals are reasonable (e.g., there are six ways to roll a 7, so approximately 1/6 of all the rolls should be 7).

3. Using The DOM and the JavaScript object models.
   a. Create a decorative cursor trail which follows the cursor movement in the window.
   b. Design a dynamic dropdown menu in a web page
   c. Write a program to detect which browser is used by the user to host a web page.
4. Website optimization: crunching HTML, using CSS to replace HTML and light-weight graphics to speed up websites.
   a. Use DHTML to obtain different transition with different filters.
   b. Use sequencer control to create a slideshow of images.
   c. Use path control to have the logo of a webpage follow an Oval path around the page.

5. Creating XML document with XML DTD and XML schema, SAX, XSL
   a. Create an XML file for storing the book details in a library and write DTD for the same to validate the XML document.
   b. Create an XML file for storing the employee details in an organization and write XML Schema for the same.
   c. Write a program using SAX to count the number of employees in the organization from the above XML data.
   d. Write a program using SAX to list out the employees who are in the Manager designation.
   e. Write an XSL to display the XML document for book details and Employees in a HTML table.

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 PHP
   a. Write a test application to check an e-mail address. Verify that the input begins with series of characters, followed by @ character, another series of characters, a period (.) and a final series of characters.
   b. Write a program that logs the address information from the web server, using environment variables.

8. Working with PHP and MySQL for a ticket reservation system: Develop a client form to get the passenger queries such as timings, availability, fare and get it from the backend MySQL server.

9. Construct dynamic server-side web pages using JSF and integrate the Web application with Enterprise Java Beans, and SOAP.

10. Developing Java Enterprise Applications Using EJB3 Session beans, entity beans and message-driven beans for a simple inventory application.

11. Develop routines with JMS to receive message from different sources and store in the database using JDBC connectivity

TOTAL: 45 PERIODS

OUTCOMES:
- Develop Web application using HTML and scripting technologies.
- Work on Web application development using advanced features.
- Design and development of dynamic server-side web pages.
- Develop web services using J2EE and related technologies
- Design and development applications using JMS and JDBC

IF7212 CLOUD COMPUTING LABORATORY LT P C 0 0 3 2

OBJECTIVES
- To learn how to use Cloud Services.
- To implement Virtualization
- To implement Task Scheduling algorithms.
- Apply Map-Reduce concept to applications.
- To build Private Cloud.
EXPERIMENT

12. Create a Collaborative learning environment for a particular learning topic using Google Apps. Google Drive, Google Docs and Google Slides must be used for hosting e-books, important articles and presentations respectively. The instructor must use the Google Sheets to convey the timetable for different events and for analyzing the scores for individual assignment submission.

13. Modeling and simulation Cloud computing environments, including Data Centers, Hosts and Cloudlets and perform VM provisioning using CloudSim: Design a host with two CPU cores, which receives request for hosting two VMs, such that each one requires two cores and plans to host four tasks units. More specifically, tasks t1, t2, t3 and t4 to be hosted in VM1, while t5, t6, t7, and t8 to be hosted in VM2.
Implement space-shared allocation policy and time-shared allocation policy. Compare the results.

14. Model a Cloud computing environment having Data center that had 100 hosts. The hosts are to be modeled to have a CPU core (1000 MIPS), 2 GB of RAM and 1 TB of storage. Consider the workload model for this evaluation included provisioning requests for 400 VMs, with each request demanding 1 CPU core (250 MIPS), 256 MB of RAM and 1 GB of storage. Each VM hosts a web-hosting application service, whose CPU utilization distribution was generated according to the uniform distribution. Each instance of a web-hosting service required 150,000 MIPS or about 10 minutes to complete execution assuming 100% utilization.

Simulate Energy-conscious model for power consumption and power management techniques such as Dynamic Voltage and Frequency Scaling (DVFS).

Initially, VMs are to be allocated according to requested parameters (4 VMs on each host). The Cloud computing architecture that is to be considered for studying energy-conscious resource management techniques/policies included a data center, CloudCoordinator, and Sensor component. The CloudCoordinator and Sensor perform their usual roles. Via the attached Sensors (which are connected with every host), CloudCoordinator must periodically monitor the performance status of active VMs such as load conditions, and processing share. This real time information is to be passed to VMM, which can use it for performing appropriate resizing of VMs and application of DVFS and soft scaling. CloudCoordinator continuously has to adapt allocation of VMs by issuing VM migration commands and changing power states of nodes according to its policy and current utilization of resources.

15. Model and simulate the environment consisting of a data center with 10,000 hosts where each host was modeled to have a single CPU core (1200MIPS), 4GB of RAM memory and 2TB of storage. Consider the provisioning policy for VMs as space-shared, which allows one VM to be active in a host at a given instance of time. Make a request from the end-user (through the DatacenterBroker) for creation and instantiation of 50 VMs that had following constraints: 1024MB of physical memory, 1 CPU core and 1 GB of storage. The application granularity was modeled to be composed of 300 task units, with each task unit requiring 1,440,000 million instructions (20 minutes in the simulated hosts) to be executed on a host. Minimal data transfer (300 KB) overhead can be considered for the task units (to and from the data center). After the creation of VMs, task units were submitted in small groups of 50 (one for each VM) at inter-arrival delay of 10 minutes.

16. Implement Map Reduce concept for
   a. Strassen's Matrix Multiplication for a huge matrix.
   b. Computing the average number of citation index a researcher has according to age among some 1 billion journal articles.

17. Consider a network of entities and relationships between them. It is required to calculate a state of each entity on the basis of properties of the other entities in its neighborhood. This state can represent a distance to other nodes, indication that there is a neighbor with the certain properties, characteristic of neighborhood density and so on. A network is stored as a set of nodes and each node contains a list of adjacent node IDs. Mapper emits messages for
each node using ID of the adjacent node as a key. Reducer must recompute state and rewrite
node with the new state. Implement this scenario.

18. Setup a Private Cloud Using OpenStack or Eucalyptus. Develop a simple applications and
make it available to the intended user

19. Install and configure OpenStack Object Storage - Swift in Ubuntu. Consider a huge storage
requirements and store it in the cloud in a transparent manner

20. Install and configure OpenStack Nova-Compute. Enable a connected user to get a virtual
machine of a selected performance such as CPU, Memory

21. Install and configure Stack Image services to query for information on available disk images,
and use the Image Service’s client library for streaming virtual disk images.

TOTAL: 45 PERIODS

OUTCOMES:
• Demonstrate and experiment simple Cloud Applications
• Apply resource allocation, scheduling algorithms.
• Implement Map-Reduce concept.
• Create virtual machines from available physical resources.
• Setup a private cloud.
• Familiarize with Open Stack.

IF7213 TECHNICAL SEMINAR L T P C
0 0 2 1

The objective of this technical seminar is to enable the students to read technical article,
comprehend and to share with others

The students should read a recent technical article from any of the leading reputed journals like:
• IEEE Transactions
• ACM
• Springer
• Elsevier publications

In the area of
• Web Technology
• Cloud Computing
• Security
• Data mining

and present to the fellow students with a technical report. External assessment should be
conducted along with web technology lab.

TOTAL:30 PERIODS
OBJECTIVES:
• To learn the key aspects of Soft computing
• To know about the components and building block hypothesis of Genetic algorithm.
• To understand the features of neural network and its applications
• To study the fuzzy logic components
• To gain insight onto Neuro Fuzzy modeling and control.
• To gain knowledge in machine learning through Support vector machines.

UNIT I INTRODUCTION TO SOFT COMPUTING
Evolution of Computing - Soft Computing Constituents – From Conventional AI to Computational Intelligence - Machine Learning Basics

UNIT II GENETIC ALGORITHMS
Introduction, Building block hypothesis, working principle, Basic operators and Terminologies like individual, gene, encoding, fitness function and reproduction, Genetic modeling: Significance of Genetic operators, Inheritance operator, cross over, inversion & deletion, mutation operator, Bitwise operator, GA optimization problems, JSPP (Job Shop Scheduling Problem), TSP (Travelling Salesman Problem). Differences & similarities between GA & other traditional methods, Applications of GA.

UNIT III NEURAL NETWORKS

UNIT IV FUZZY LOGIC

UNIT V NEURO-FUZZY MODELING

TOTAL: 45 PERIODS

OUTCOMES:
• Implement machine learning through neural networks.
• Write Genetic Algorithm to solve the optimization problem
• Develop a Fuzzy expert system.
• Model Neuro Fuzzy system for clustering and classification.

REFERENCES:
11. ROSS TIMOTHY J, Fuzzy Logic with Engineering Applications, Wiley India Pvt Ltd, New Delhi, 2010

IF7001 SOFTWARE METRICS AND RELIABILITY L T P C 3 0 0 3

OBJECTIVES:

- To gain basic knowledge about metrics, measurement theory and related terminologies
- To measure the quality level of internal and external attributes of the software product
- To introduce the basics of software reliability and to illustrate how to perform planning, executing and testing for software reliability
- To explore various metrics and models of software reliability
- To compare various models of software reliability based on its application

UNIT I FUNDAMENTALS OF MEASUREMENTS

UNIT II METRICS AND MODELS

UNIT III INTRODUCTION TO SOFTWARE RELIABILITY

UNIT IV SOFTWARE RELIABILITY MODELING
Concepts – General Model Characteristic – Historical Development of models – Model Classification scheme – Markovian models – General concepts – General Poisson Type Models – Binomial Type Models – Poisson Type models – Fault reduction factor for Poisson Type models.

UNIT V COMPARISON OF SOFTWARE RELIABILITY MODELS

TOTAL: 45 PERIODS
OUTCOMES:
Upon Completion of the course, the students should be able to:

- Identify and apply various software metrics, which determines the quality level of software
- Identify and evaluate the quality level of internal and external attributes of the software product
- Compare and Pick out the right reliability model for evaluating the software
- Evaluate the reliability of any given software product
- Design new metrics and reliability models for evaluating the quality level of the software based on the requirement

REFERENCES:
7. Steven R.Rakitin, Software Verification and Validation for Practitioners and Managers, Artech House, Inc. Norwood, MA, USA, 2001

NE7007       NETWORK MANAGEMENT       L   T   P   C
            3       0       0       3

OBJECTIVES
The objective of this course is to
- To understand the need for interoperable network management
- To learn to the concepts and architecture behind standards based network management
- To understand the concepts and terminology associated with SNMP and TMN
- To understand network management as a typical distributed application
- To study the current trends in network management technologies

UNIT I     FUNDAMENTALS OF COMPUTER NETWORK TECHNOLOGY

UNIT II     OSI NETWORK MANAGEMENT
OSI Network management model-Organizational model-Information model, communication model. Abstract Syntax Notation - Encoding structure, Macros Functional model CMIP/CMIS

UNIT III     INTERNET MANAGEMENT(SNMP)
SNMP(V1 and V2)-Organizational model-System Overview, The information model, communication model-Functional model, SNMP proxy server, Management information, protocol remote monitoring- , RMON SMI and MIB, RMON1,RMON2 - A Case Study of Internet Traffic Using RMON.
UNIT IV  BROADBAND NETWORK MANAGEMENT  

UNIT V  NETWORK MANAGEMENT APPLICATIONS  

TOTAL: 45 PERIODS

OUTCOMES: 
Upon completion of this course, the students will be able to
• Analyze the issues and challenges pertaining to management of emerging network technologies such as wired/wireless networks and high-speed internets.
• Apply network management standards to manage practical networks.
• Formulate possible approaches for managing OSI network model.
• Use on SNMP for managing the network
• Use RMON for monitoring the behavior of the network
• Explore the possibilities of improving the speed of the network and managing them
• Identify the various components of network and formulate the scheme for the managing them

REFERENCES: 
UNIT II DATAWAREHOUSING AND DATAMINING IN BIOINFORMATICS

Bioinformatics data – Data ware housing architecture – data quality – Biomedical data analysis – DNA data analysis – Protein data analysis – Machine learning – Neural network architecture- Applications in bioinformatics

UNIT III MODELING FOR BIOINFORMATICS

Hidden markov modeling for biological data analysis – Sequence identification – Sequence classification – multiple alignment generation – Comparative modeling – Protein modeling – genomic modeling – Probabilistic modeling – Bayesian networks – Boolean networks - Molecular modeling – Computer programs for molecular modeling

UNIT IV PATTERN MATCHING AND VISUALIZATION


UNIT V MICROARRAY ANALYSIS


TOTAL: 45 PERIODS

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

- Deploy the data warehousing and data mining techniques in Bioinformatics
- Model bioinformatics based applications
- Deploy the pattern matching and visualization techniques in bioinformatics
- Work on the protein sequences
- Use the Microarray technologies for genome expression

REFERENCES:
OBJECTIVES:
To provide an in-depth knowledge of XML and Web Services.
- To understand the fundamental concepts of Web services.
- To Understand the fundamental concepts of XML Technology.
- To design Web service Architecture.
- To Study Building Blocks of Web services.
- To understand the XML security issues.

UNIT I WEB FUNDAMENTALS

UNIT II XML TECHNOLOGY
XML-XML DTD-W3C XML Schema-Parsing XML - X path- XML Transformation-Other XML Technologies..

UNIT III ARCHITECTING WEB SERVICES

UNIT IV WEB SERVICES BUILDING BLOCK

UNIT V XML SECURITY

OUTCOMES:
Upon Completion of the course, the students will be able
- To Know the fundamental elements in Web Technology and XML services.
- To design the Architecture of Web Services.
- To construct building blocks of Web services.
- To analyze security in XML.

REFERENCES:
OBJECTIVES:
- Describe approaches to enterprise application integration
- Understand the integration middleware
- Evaluate the integration approaches suitable for a given problem

UNIT I INTRODUCTION
Requirements for EAI - Challenges in EAI – Integration with legacy systems – Integration with partners - Heterogeneous environment – Implementation approaches – Web services, messaging, ETL, direct data integration – Middleware requirements – Approaches to integration – services oriented and messaging.

UNIT II INTEGRATION PATTERNS
Introduction to integration patterns – Architecture for application integration – Integration patterns – Point to point, broker, message bus, publish/subscribe, Challenges in performance, security, reliability - Case studies

UNIT III SERVICE ORIENTED INTEGRATION
Business process integration - Composite applications-services – Web services – Service choreography and orchestration - Business process modeling - BPMN, Business process execution - BPEL – Middleware infrastructure - Case studies

UNIT IV MESSAGING BASED INTEGRATION

UNIT V ENTERPRISE SERVICE BUS
Enterprise Service Bus – routing, scalable connectivity, protocol and message transformations, data enrichment, distribution, correlation, monitoring – Deployment configurations – Global ESB, Directly connected, Federated, brokered ESBs – Application server based – Messaging system based – Hardware based ESBs – Support to SOA, message based and event based integrations - Case studies.

TOTAL: 45 PERIODS

OUTCOMES:
Upon Completion of the course, the students will be able to
- Describe different approaches to integration enterprise applications
- Analyze specifications and identify appropriate integration approaches
- Develop a suitable integration design for a given problem
- Identify appropriate integration middleware for a given problem
- Evaluate the integration approaches against specified requirements

REFERENCES:
3. GHohpe and B Woolf, "Enterprise Integration Patterns: Designing, Building, and Deploying Messaging Solutions", Addison Wesley Professional, 2003
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 & DATA ANALYSIS

UNIT II
MINING DATA STREAMS

UNIT III
VIDEO ANALYTICS

UNIT IV
BEHAVIOURAL ANALYSIS & ACTIVITY RECOGNITION
Event Modelling- Behavioural Analysis- Human Activity Recognition-Complex Activity Recognition- Activity modelling using 3D shape, Video summarization, shape based activity models- Suspicious Activity Detection

UNIT V
HUMAN FACE RECOGNITION & GAIT ANALYSIS
Introduction: Overview of Recognition algorithms – Human Recognition using Face: Face Recognition from still images, Face Recognition from video, Evaluation of Face Recognition Technologies- Human Recognition using gait: HMM Framework for Gait Recognition, View Invariant Gait Recognition, Role of Shape and Dynamics in Gait Recognition

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

REFERENCES:
OBJECTIVES:
- To define and highlight importance of software project management.
- To formulate strategy in managing projects
- To estimate the cost associated with a project
- To plan, schedule and monitor projects for the risk management
- To define the software management metrics
- To train software project managers and other individuals involved in software project planning and tracking and oversight in the implementation of the software project management process

UNIT I PROJECT MANAGEMENT CONCEPTS 9

UNIT II SOFTWARE ESTIMATION & COSTING 9

UNIT III RISK MANAGEMENT 9
Risk Definition – Risk Categories – Risk Assessment (Identification / Analysis / Prioritization) – Risk Control (Planning / Resolution / Monitoring) – Failure Mode and Effects Analysis (FMEA)

UNIT IV METRICS 9

UNIT V MANAGING PEOPLE AND ORGANIZING TEAMS 9

TOTAL : 45 PERIODS

OUTCOMES:
At the end of this course students will be able to:
- Evaluate a project to develop the scope of work, provide accurate cost estimates and to plan the various activities
- Apply risk management analysis techniques that identify the factors that put a project at risk and to quantify the likely effect of risk on project timescales
- Identify the resources required for a project and to produce a work plan and resource schedule
- Monitor the progress of a project and to assess the risk of slippage, revising targets counteract drift
- Use appropriate metrics to management the software development outcome
- Engage and motivate the stakeholders of the project
- Develop research methods and techniques appropriate to defining, planning and carrying out a research project within your chosen specialist area within the management of software projects.
REFERENCES:


NE7002 MOBILE AND PERVERSIVE COMPUTING L T P C 3 0 0 3

OBJECTIVES:
- To understand the basics of Mobile Computing and Personal Computing
- To learn the role of cellular networks in Mobile and Pervasive Computing
- To expose to the concept of sensor and mesh networks
- To expose to the context aware and wearable computing
- To learn to develop applications in mobile and pervasive computing environment

UNIT I INTRODUCTION

UNIT II 3G AND 4G CELLULAR NETWORKS

UNIT III SENSOR AND MESH NETWORKS
UNIT IV CONTEXT AWARE COMPUTING & WEARABLE COMPUTING

UNIT V APPLICATION DEVELOPMENT
Three tier architecture - Model View Controller Architecture - Memory Management – Information Access Devices – PDAs and Smart Phones – Smart Cards and Embedded Controls – J2ME – Programming for CLDC – GUI in MIDP – Application Development ON Android and iPhone

OUTCOMES:
At the end of the course the student should be able to
- Design a basic architecture for a pervasive computing environment
- Design and allocate the resources on the 3G-4G wireless networks
- Analyze the role of sensors in Wireless networks
- Work out the routing in mesh network
- Deploy the location and context information for application development
- Develop mobile computing applications based on the paradigm of context aware computing and wearable computing

REFERENCES:

CP7203 PRINCIPLES OF PROGRAMMING LANGUAGES

OBJECTIVES:
1. To understand and describe syntax and semantics of programming languages
2. To understand data, data types, and basic statements
3. To understand call-return architecture and ways of implementing them
4. To understand object-orientation, concurrency, and event handling in programming languages
5. To develop programs in non-procedural programming paradigms
UNIT I SYNTAX AND SEMANTICS

UNIT II DATA, DATA TYPES, AND BASIC STATEMENTS

UNIT III SUBPROGRAMS AND IMPLEMENTATIONS

UNIT IV OBJECT-ORIENTATION, CONCURRENCY, AND EVENT HANDLING

UNIT V FUNCTIONAL AND LOGIC PROGRAMMING LANGUAGES
Introduction to lambda calculus – fundamentals of functional programming languages – Programming with Scheme – Programming with ML – Introduction to logic and logic programming – Programming with Prolog – multi-paradigm languages

TOTAL: 45 PERIODS

OUTCOMES:
Upon Completion of the course, the students will be able to
1. Describe syntax and semantics of programming languages
2. Explain data, data types, and basic statements of programming languages
3. Design and implement subprogram constructs
4. Apply object-oriented, concurrency, and event handling programming constructs
5. Develop programs in Scheme, ML, and Prolog
6. Understand and adopt new programming languages

REFERENCES:
OBJECTIVES:
• To familiarize with various elements of multimedia
• To understand the functions of the various elements in multimedia
• To understand the various multimedia systems
• To learn to use various tools for developing multimedia
• To learn to develop a multimedia application

UNIT I INTRODUCTION 7

UNIT II ELEMENTS OF MULTIMEDIA 11
Multimedia Building Blocks: Text, Graphics, Video Capturing, Sound Capturing, and Editing-Intro to 2D & 3D Graphics -surface characteristics and texture - lights – Animation :key frames & Tweening, techniques, principles of animation, 3Danimation, file formats.

UNIT III MULTIMEDIA SYSTEMS 9

UNIT IV MULTIMEDIA TOOLS 9
Authoring tools – features and types - card and page based tools - icon and object based tools - time based tools - cross platform authoring tools – Editing tools - text editing and word processing tools - OCR software - painting and drawing tools - 3D modeling and animation tools - image editing tools –sound editing tools - digital movie tools – plug -ins and delivery vehicles for www

UNIT V MULTIMEDIA APPLICATION DEVELOPMENT 9

OUTCOMES:
Upon Completion of the course, the students should be able to:
• Design a multimedia architecture for handling the stream
• Work with the various elements of multimedia system
• Develop multimedia stream for the various standards
• Develop animation, images, Sound using Multimedia Tools.
• Develop a multimedia application

REFERENCES:
6. BANERJI ASHOK & GHOSH ANANDA MOHAN, Multimedia Technologies, TMH, New Delhi, 2010
OBJECTIVES:
- To understand a finite automata for a given language.
- To understand the principle of a Turing machine.
- To understand the relation between grammar and language.
- To understand the basic principles of working of a compiler.
- To study about the type checking procedure during the compilation.
- To understand the storage structure of the running program.
- To understand the various scope of optimization techniques used in compiler design.

UNIT I AUTOMATA

UNIT II CONTEXT FREE GRAMMARS AND LANGUAGES

UNIT III BASICS OF COMPILATION

UNIT IV TYPE CHECKING AND RUNTIME ENvironments

UNIT V CODE GENERATION AND OPTIMIZATION

TOTAL: 45 PERIODS

OUTCOMES:
Upon completion of the course, the students should be able to:
- Design a finite automaton for a specific language.
- Design a Turing machine.
- Select appropriate grammar for the implementation of compiler phases.
- Design a lexical analyzer.
- Design a simple parser.
- Design and implement techniques used for optimization by a compiler.
- Write a very simple code generator.
REFERENCES:


SE7204 BIG DATA ANALYTICS L T P C 3 0 0 3

OBJECTIVES
- To explore the fundamental concepts of big data analytics
- To learn to analyze the big data using intelligent techniques.
- To understand the various search methods and visualization techniques.
- To learn to use various techniques for mining data stream.
- To understand the applications using Map Reduce Concepts.

UNIT I INTRODUCTION TO BIG DATA

UNIT II DATA ANALYSIS

UNIT III SEARCH METHODS AND VISUALIZATION

UNIT IV MINING DATA STREAMS
OUTCOMES:
At the end of this course the students will be able to:
- Work with big data platform and its analysis techniques.
- Analyze the big data for useful business applications.
- Select visualization techniques and tools to analyze big data
- Implement search methods and visualization techniques
- Design efficient algorithms for mining the data from large volumes.
- Explore the technologies associated with big data analytics such as NoSQL, Hadoop and MapReduce.

REFERENCES:

OBJECTIVES:
- To explore the basics and goals of software testing.
- To discuss various types of software testing and its techniques
- To list out various tools which can be used for automating the testing process
- To introduce various software quality standards for establishing quality environment
- To discuss various methods and evaluation procedures for improving the quality models

UNIT I INTRODUCTION
UNIT II  SOFTWARE TESTING METHODOLOGY  


UNIT III  EMERGING SPECIALIZED AREAS IN TESTING  


UNIT IV  SOFTWARE QUALITY MODELS  


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).

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

- Compare and pick out the right type of software testing process for any given real world problem
- Carry out the software testing process in efficient way
- Automate the testing process by using several testing tools
- Establish a quality environment as specified in standards for developing quality software
- Analyze and improve the quality procedures based on the past experience

REFERENCES:
UNIT I  ADHOC NETWORKS AND ROUTING PROTOCOLS 9

UNIT II  MULTICAST ROUTING AND SECURITY 9

UNIT III  QoS AND ENERGY MANAGEMENT 9

UNIT IV  SENSOR NETWORKS – ARCHITECTUREAND MACPROTOCOLS 9
Single node architecture – Hardware components, energy consumption of sensor nodes, Network architecture – Sensor network scenarios, types of sources and sinks, single hop versus multi-hop networks, multiple sinks and sources, design principles, Development of wireless sensor networks. , physical layer and transceiver design consideration in wireless sensor networks, Energy usage profile, choice of modulation, Power Management - MAC protocols – fundamentals of wireless MAC protocols, low duty cycle protocols and wakeup concepts, contention-based protocols, Schedule-based protocols - SMAC, BMAC, Traffic-adaptive medium access protocol (TRAMA), Link Layer protocols – fundamentals task and requirements, error control, framing, link management.

UNIT V  SENSOR NETWORKS – ROUTING PROTOCOLS AND OPERATING SYSTEMS 9

TOTAL: 45 PERIODS
REFERENCES:

IF7008 WEB MINING L T P C 3 0 0 3

OBJECTIVES:
- To understand the different knowledge discovery issues in data mining from the world wide web.
- To analyze the different algorithms commonly used by Web application.
- To apply the role played by Web mining in Information retrieval and extraction
- To learn the documents structures and grouping
- To learn to use the probabilistic model for web mining
- To learn to develop applications using Web mining

UNIT I INTRODUCTION 9
Overview of Data mining – Data mining from a Business Perspective – Data types, Input and output of data mining algorithms- Decision Tree- Classification and Regression Trees – Preprocessing and Post processing in Data mining

UNIT II INFORMATION RETRIEVAL 9

UNIT III WEB SEARCH 9
Crawling the web – HTML and HTTP Basics – Crawling Basics – Engineering Large Scale Crawlers- Putting together a Crawler- Boolean Queries and the Inverted Index – Relevance Ranking – Similarity Search

UNIT IV LEARNING 9
Similarity and Clustering – Formulations and approaches- Bottom up and Top down Partitioning Paradigms – Clustering and Visualization via Embeddings – Probabilistic Approaches to clustering – Collaborative Filtering – Supervised Learning – Semi Supervised Learning
UNIT V APPLICATIONS


TOTAL: 45 PERIODS

OUTCOMES:
At the end of the course the student should be able to:

- Identify the application areas for web content mining, web structure mining and web usage mining.
- Design to retrieval the web data
- Develop schemes to crawl the web data, organize and index
- Cluster the documents for fast access
- Develop algorithms used by web mining applications.
- Select between different approaches and techniques of web mining

REFERENCES:
4. Soumen Chakrabarti “ Mining the Web : Discovery Knowledge from Hypertext Data” Elsevier Science 2003
5. K.P.Soman,Shyam Diwakar, V.Ajay “ Insight into Data Mining Theory and Practice “ Prentice Hall of India Private Ltd 2006

IF7009 IMAGE PROCESSING AND PATTERN ANALYSIS

OBJECTIVES:
To introduce the student to various Image processing and Pattern recognition techniques.

- To study the Image fundamentals.
- To study the mathematical morphology necessary for Image processing and Image segmentation.
- To study the Image Representation and description and feature extraction.
- To study the principles of Pattern Recognition.
- To know the various applications of Image processing.

UNIT I INTRODUCTION
UNIT II  MATHEMATICAL MORPHOLOGY and IMAGE SEGMENTATION  9

UNIT III  IMAGE REPRESENTATION AND DESCRIPTION and FEATURE EXTRACTION  9

UNIT IV  PATTERN RECOGNITION  9

UNIT V  APPLICATIONS:  9

OUTCOMES:
Upon Completion of the course, the students will be able to:
- Process the image for better appearance.
- Segment the image using different techniques
- Represent the images in different forms
- Develop algorithms for Pattern Recognition
- Extract and deploy the features in various Image processing applications

REFERENCES:
OBJECTIVES:

- To understand the basics of User Interface Design.
- To design the user interface, design, menu creation and windows creation.
- To understand the concept of menus, windows, interfaces, business functions, various problems in windows design with color, text, Non-anthropomorphic Design.
- To study the design process and evaluations.

UNIT I : AGENTS – OVERVIEW
Agent Definition – Agent Programming Paradigms – Agent Vs Object – Aglet – Mobile Agents – Agent Frameworks – Agent Reasoning.

UNIT II : JAVA AGENTS

UNIT III : MULTIAGENT SYSTEMS

UNIT IV : INTELLIGENT SOFTWARE AGENTS
Interface Agents – Agent Communication Languages – Agent Knowledge Representation – Agent Adaptability – Belief Desire Intension – Mobile Agent Applications.

UNIT V : MOBILE AGENTS AND SECURITY

TOTAL: 45 PERIODS

OUTCOMES:

- Understand the notion of an agent, how agents are distinct from other software paradigms
- Knowledge on the characteristics of applications that lend themselves to an agent-oriented solution.
- Know the key issues associated with constructing agents capable of intelligent autonomous actions.
- Learn the main application areas of agent-based solutions, and be able to develop a meaningful agent-based system using a contemporary agent development platform.

REFERENCES:
OBJECTIVES:
- To learn the basic issues, policy and challenges in the Internet
- To understand the components and the protocols in Internet
- To build a small low cost embedded system with the internet
- To understand the various modes of communications with internet
- To learn to manage the resources in the Internet
- To deploy the resources into business
- To understand the cloud and internet environment.

UNIT I INTRODUCTION

UNIT II PROGRAMMING THE MICROCONTROLLER FOR IOT
Basics of Sensors and actuators – examples and working principles of sensors and actuators – Cloud computing and IOT – Arduino/Equivalent Microcontroller platform – Setting up the board - Programming for IOT – Reading from Sensors
Communication: Connecting microcontroller with mobile devices – communication through bluetooth and USB – connection with the internet using wifi / ethernet

UNIT III RESOURCE MANAGEMENT IN THE INTERNET OF THINGS
Clustering - Software Agents - Data Synchronization - Clustering Principles in an Internet of Things Architecture - The Role of Context - Design Guidelines -Software Agents for Object - Data Synchronization- Types of Network Architectures - Fundamental Concepts of Agility and Autonomy-Enabling Autonomy and Agility by the Internet of Things-Technical Requirements for Satisfying the New Demands in Production - The Evolution from the RFID-based EPC Network to an Agent based Internet of Things- Agents for the Behaviour of Objects

UNIT IV BUSINESS MODELS FOR THE INTERNET OF THINGS

UNIT V FROM THE INTERNET OF THINGS TO THE WEB OF THINGS:

OUTCOMES:
At the end of this course the students will be able to:
- Identify the components of IOT
- Design a portable IOT using appropriate boards
- Program the sensors and controller as part of IOT
- Develop schemes for the applications of IOT in real time scenarios
- Establish the communication to the cloud through wifi/ Bluetooth
- Manage the internet resources
- Model the Internet of things to business

TOTAL: 45 PERIODS
REFERENCES:
1. Charalampos Doukas, Building Internet of Things with the Arduino, Create space, April 2002

NE7003 WEB ENGINEERING
LTPC 3 0 0 3

OBJECTIVES:
- To understand the issues and process of Web design.
- To learn the concepts of Web design patterns and page design.
- To understand and learn the scripting languages with design of web applications.
- To learn the maintenance and evaluation of web design management.

UNIT I INTRODUCTION TO WEB ENGINEERING

UNIT II INFORMATION ARCHITECTURE

UNIT III HTML & DHTML
HTML Basic Concept, Static & dynamic HTML, Structure of HTML documents, HTML Elements, Linking in HTML, Anchor Attributes, Image Maps, Meta Information, Image Preliminaries, Layouts, backgrounds, Colors and Text, Fonts, Tables, Frames and layers, Audio and Video Support with HTML Database integration, CSS, Positioning with Style sheets, Forms Control, Form Elements, Introduction to CGI PERL, JAVA SCRIPT, PHP, ASP, Cookies Creating and Reading Cookies.

UNIT IV XML

UNIT V APPLICATIONS AND SECURITY

TOTAL: 45 PERIODS
OUTCOMES:
Upon completion of the course, the students will be able to
- Identify the various issues of web design process and evaluation.
- Determine templates for web pages and layout.
- Develop simple web applications using scripting languages.
- Determine the various issues of web project development.
- Address the core issues of web page maintenance and evaluation.

REFERENCES:
4. NEIL GRAY, “Web server Programming” Wiley
5. CHIRS BATES Web Programming :Building Internet applications, Wiley

CP7006 PARALLEL PROGRAMMING PARADIGMS L T P C
3 0 0 3

OBJECTIVES:
- To understand models of and issues in concurrency in computing
- To develop message-passing parallel programs using MPI
- To develop shared-memory parallel programs using Pthreads
- To develop shared-memory parallel programs using OpenMP
- To use GPU for parallel programming using OpenCL and CUDA

UNIT I FOUNDATIONS OF PARALLEL PROGRAMMING

UNIT II MESSAGE PASSING PARADIGM

UNIT III SHARED MEMORY PARADIGM: PTHREADS

UNIT IV SHARED MEMORY PARADIGM: OPENMP
UNIT V  GRAPHICAL PROCESSING PARADIGMS: OPENCL AND CUDA


TOTAL: 45 PERIODS

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

- Explain models of parallel programming
- Explain hardware level support for concurrency
- Explain issues in parallel programming
- Develop message-passing parallel programs using MPI framework
- Develop shared-memory parallel programs using Pthreads
- Develop shared-memory parallel programs using OpenMP
- Develop CUDA programs
- Develop OpenCL programs

REFERENCES:

NE7012  SOCIAL NETWORK ANALYSIS  L T P C

3 0 0 3

OBJECTIVES:
- To understand the concepts of Social networks and Web Social Networks
- To appreciate the modeling and visualizing techniques associated with Social Networks
- To understand the different techniques used to mine communities from Web Social Networks
- To appreciate concepts of evolution and prediction in Social Networks
- To understand the application of text mining techniques for Content and Opinion mining

UNIT I  INTRODUCTION
UNIT II MODELING AND VISUALIZATION

UNIT III MINING COMMUNITIES
Aggregating and reasoning with social network data, Advanced Representations - Extracting evolution of Web Community from a Series of Web Archive - Detecting Communities in Social Networks - Evaluating Communities – Core Methods for Community Detection & Mining - Applications of Community Mining Algorithms - Node Classification in Social Networks.

UNIT IV EVOLUTION

UNIT V TEXT AND OPINION MINING
Text Mining in Social Networks - Opinion extraction – Sentiment classification and clustering - Temporal sentiment analysis - Irony detection in opinion mining - Wish analysis - Product review mining – Review Classification – Tracking sentiments towards topics over time.

TOTAL: 45 PERIODS

OUTCOMES:
Upon Completion of the course, the students will be able to
• Build a social network data set from existing social networking sites
• Identify the different components of a web social network that can be used for analyzing and mining
• Identify the different data structures and graph algorithms that can be used for web social network mining
• Implement a community detection algorithm
• Process Social Network data using MapReduce paradigm
• Design an application that uses various aspects of Social Network Mining to improve its functionality and to harvest information available on the web to build recommender systems
• Analyze social media data using appropriate data/web mining techniques

REFERENCES:
OBJECTIVES:
- To learn about proposition logic and predicate logics.
- To acquire knowledge about modal and non monotonic logics.
- To understand object oriented abstractions for various expert systems.
- To understand various planning strategies for problem solving.
- To explain the basic knowledge representation and problem solving techniques of Artificial Intelligence.
- To understand the uncertainties and expressiveness associated with the knowledge representation.
- To study the various actions taken on the knowledge that is represented.

UNIT I  INTRODUCTION

UNIT II  RESOLUTION AND REASONING

UNIT III  REPRESENTATION

UNIT IV  Defaults, Uncertainty and Expressiveness

UNIT V  Actions and Planning

TOTAL: 45 PERIODS

OUTCOMES:
- Identify the various components in a knowledge system.
- Apply the Ontology in the representation of knowledge.
- Resolve the problem by logical reasoning.
- Select appropriate strategies for representing the knowledge.
- Resolve uncertainties associated with the knowledge representation.
- Deploy the context information for the better interpretation of knowledge.
REFERENCES:
1. Ronald Brachman, Hector Levesque “Knowledge Representation and Reasoning” The
    Morgan Kaufmann Series in Artificial Intelligence 2004
2. John F. Sowa, “ Knowledge Representation: Logical, Philosophical, and
    Associates, 1998
5. Thomas B.Cross, Knowledge Engineering 2010, Techtionary Corporation, 2010
6. Fred, A., Dietz J.L.G., Liu K., Filipe J., Knowledge Discovery, Knowledge Engineering and
    Knowledge Management, Springer Publications,2011

IF7013          ENERGY AWARE COMPUTING                    LT P C
                                3 0 0 3
OBJECTIVES:
This course examines the design of power efficient architecture, power and performance tradeoffs,
restructuring of software and applications and standards for energy aware Hardware and
Software. The objective of this course is:
• To know the fundamental principles energy efficient devices
• To study the concepts of Energy efficient storage
• To introduce energy efficient algorithms
• Enable the students to know energy efficient techniques involved to support real-time
  systems.
• To study Energy aware applications.

UNIT I          INTRODUCTION                9
Energy efficient network on chip architecture for multi core system-Energy efficient MIPS CPU
core with fine grained run time power gating – Low power design of Emerging memory
   technologies.

UNIT II         ENERGY EFFICIENT STORAGE   9
Disk Energy Management-Power efficient strategies for storage system-Dynamic thermal
management for high performance storage systems-Energy saving technique for Disk storage
systems

UNIT III        ENERGY EFFICIENT ALGORITHMS 9
Scheduling of Parallel Tasks – Task level Dynamic voltage scaling – Speed Scaling – Processor

UNIT IV         REAL TIME SYSTEMS          9
Multi processor system – Real Time tasks- Energy Minimization – Energy aware scheduling-
Dynamic Reconfiguration- Adaptive power management-Energy Harvesting Embedded system.

UNIT V          ENERGY AWARE APPLICATIONS   9

TOTAL: 45 PERIODS

OUTCOMES:
Upon Completion of the course, the students will be able to
• Design Power efficient architecture Hardware and Software.
• Analyze power and performance trade off between various energy aware storage devices.
• Implement various energy aware algorithms.
• Restructure the software and Hardware for Energy aware applications.
• Explore the Energy aware applications
REFERENCES:

IF7014 4G TECHNOLOGIES L T P C
3 0 0 3

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 WiMAX networks, protocol stack and standards
• To Study about Spectrum characteristics & Performance evaluation

UNIT I INTRODUCTION 9
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 9

UNIT III 4G LTE NETWORKS 9

UNIT IV WiMAX NETWORKS 9
WiMax: Introduction – IEEE 802.16, OFDM, MIMO, IEEE 802.20

UNIT V SPECTRUM & PERFORMANCE 9
Spectrum for LTE-Flexibility-Carrier Aggregation-Multi standard Radio base stations-RF requirements for LTE-Power level requirements-Emission requirements-Sensitivity and Dynamic range-Receiver susceptibility. Performance Assessment-Performance Evaluation

TOTAL:45 PERIODS

OUTCOMES:
Upon completion of the course, the students should be able to:
• Acquaint with the latest 3G/4G and WiMAX networks and its architecture.
• Interpret the various protocols and standards in various layers in Wireless networks.
• Design and implement wireless network environment for any application using latest wireless protocols and standards
• Analyze the performance of networks
• Explore the benefits of WiMax networks
• Exploit various diversity schemes in LTE
REFERENCES:

CP7001 PERFORMANCE EVALUATION OF COMPUTER SYSTEMS L T P C
3 0 0 3
OBJECTIVES:
- To understand the mathematical foundations needed for performance evaluation of computer systems
- To understand the metrics used for performance evaluation
- To understand the analytical modeling of computer systems
- To enable the students to develop new queuing analysis for both simple and complex systems
- To appreciate the use of smart scheduling and introduce the students to analytical techniques for evaluating scheduling policies

UNIT I OVERVIEW OF PERFORMANCE EVALUATION

UNIT II MARKOV CHAINS AND SIMPLE QUEUES
Discrete-Time Markov Chains – Ergodicity Theory – Real World Examples – Google, Aloha – Transition to Continuous-Time Markov Chain – M/M/1 and PASTA.

UNIT III MULTI-SERVER AND MULTI-QUEUE SYSTEMS
Server Farms: M/M/k and M/M/k/k – Capacity Provisioning for Server Farms – Time Reversibility and Burke’s Theorem – Networks of Queues and Jackson Product Form – Classed and Closed Networks of Queues.

UNIT IV REAL-WORLD WORKLOADS

UNIT V SMART SCHEDULING IN THE M/G/1

TOTAL: 45 PERIODS
OUTCOMES:
Upon completion of the course, the students will be able to
1. Identify the need for performance evaluation and the metrics used for it
2. Discuss open and closed queueing networks
3. Deploy Little's law and other operational laws
4. Apply the operational laws to open and closed systems
5. Use discrete-time and continuous-time Markov chains to model real world systems
6. Develop analytical techniques for evaluating scheduling policies

REFERENCES: