MEPCO SCHLENK ENGINEERING COLLEGE, SIVAKASI
(AUTONOMOUS)
AFFILIATED TO ANNA UNIVERSITY, CHENNAI 600 025
REGULATIONS: MEPCO - R2013 (FULL TIME)
M.TECH INFORMATION TECHNOLOGY

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<th>Department Vision</th>
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<td>To emerge as Realm of Preeminence that empowers the students to reach the zenith, as assertive IT professionals by offering quality technical education and research environment to best serve the nation.</td>
<td>To develop dynamic IT professionals with globally competitive learning experience by providing high class education.</td>
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**Programme Educational Objectives**

After 3 Years of Graduation, our graduates will

1. Flourish as eminent researchers, academicians or IT practitioners.
2. Create, apply and disseminate cognitive ideas related to IT field and advance in their profession.
3. Nurture continuous self learning to update the latest developments in IT industries.

**Programme Outcomes**

The graduates will be able to

1. Conceptualize and apply the basic engineering techniques studied in their under graduation.
2. Identify and formulate current research problems related to IT industry.
3. Design system, service or component to meet desired economic, social and ethical needs within realistic IT constraints.

4. Interpret, analyze and synthesize complex data to provide valid conclusions.

5. Employ modern tools and techniques to solve research issues related to Information and Communication Technology.

6. Comprehend and evaluate existing research avenues on their own.

7. Orally communicate ideas clearly in an organized manner.

8. Write concise system documentation, user manual and research articles.

9. Apply IT principles in the construction of software systems of varying complexity.

10. Engage in lifelong learning to adapt in their professional work or graduate studies.
# CURRICULUM I TO IV SEMESTERS (FULL TIME)
## SEMESTER I

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<td>18</td>
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<td>21</td>
<td>13MI420</td>
<td>Ontology and Semantic Web</td>
<td>3 0 0 3</td>
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<td>3 0 0 3</td>
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<td>25</td>
<td>13MI424</td>
<td>Building Enterprise Application</td>
<td>3 0 0 3</td>
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COURSE OBJECTIVES:

- To give the idea about mathematical models related to Engineering problems
- To understand the various methods of solving linear programming problems
- To provide information about optimization techniques related to constrained and unconstrained non linear programming

Course Outcomes:

Upon completion of the course the students will be able

- To formulate mathematical models in engineering applications
- To determine the solution of LPP including transportation and assignment problems
- To apply various search methods to identify the optimum solution for NLPP
- To identify the unconstrained and constrained problems in optimization and their solution

UNIT I  LINEAR PROGRAMMING

UNIT II TRANSPORTATION AND ASSIGNMENT PROBLEM


UNIT III NON-LINEAR PROGRAMMING


UNIT IV UNCONSTRAINED OPTIMIZATION TECHNIQUES


UNIT V CONSTRAINED OPTIMIZATION TECHNIQUES


TUTORIAL: 15 PERIODS

TOTAL: 45+15=60 PERIODS
REFERENCE BOOKS:


13MC101: ADVANCED DATA STRUCTURES AND ALGORITHMS

(Common to M.E CSE / M.Tech IT) 3 0 0 3

COURSE OBJECTIVES:

- To recall elementary data structures and the significance of writing efficient algorithms
- To study data structures for concurrency
- To study advanced data structures such as search trees, hash tables, heaps and operations on them
- To expose various distributed data structures
To understand the principles of efficient algorithm design and learn various advanced algorithms

Course Outcomes:

- Implement and apply concurrent linked lists, stacks, and queues
- Perform operations on search trees and hash tables
- Perform operations on different types of heap
- Implement and apply data structures for strings
- Implement advanced concurrent structures
- Explain design techniques for algorithms and advanced algorithm

UNIT I DATA STRUCTURES AND CONCURRENCY


UNIT II SEARCH TREES, HASH TABLES AND STRINGS


UNIT III HEAPS

UNIT IV  ADVANCED CONCURRENT STRUCTURES  9

Concurrent hashing – closed-address hash sets – lock-free hash sets –
open-addressed hash sets – lock-based concurrent skip lists – lock-free
concurrent skip lists – concurrent priority queues – bounded priority
queue – unbounded priority queue – concurrent heap – skip list based
unbounded priority queues.

UNIT V  ADVANCED ALGORITHMS  9

Introduction to Approximation algorithms – job scheduling on a single
machine – knapsack problem – minimizing weighted sum of completion
time on a single machine – MAX SAT and MAX CUT. Introduction to
Randomized algorithms – min cut. Introduction to Parallel algorithms –
parallel sorting algorithms.

TOTAL: 45 PERIODS

REFERENCE BOOKS:

   Morgan Kaufmann, 2012.

2. Peter Brass, “Advanced Data Structures”, Cambridge University

3. A. V. Aho, J. E. Hopcroft, and J. D. Ullman, “The Design and


5. Edited by S.K. Chang, “Data Structures and Algorithms – Series of
   Software Engineering and Knowledge Engineering”, Vol. 13, World


7. David P. Williamson, David B. Shmoys, “The Design of


WEB REFERENCES:


13MI101: MODERN COMPUTER ARCHITECTURE

COURSE 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 analyze and use techniques that guarantee cache coherence and correct sequential memory access across multiprocessor systems.

COURSE OUTCOMES:
• Compare and evaluate the performance of various architectures.
• Develop a framework for evaluating design decisions in terms of application requirements and performance measurements.
• Identify the limitations of ILP and the need for multicore architectures.
• Address the issues related to multiprocessing and suggest solutions.
• Utilize the complex architecture involved in multicore processors for parallel computing.
• Analyze design of computer systems, including modern architectures and suggest the suitable architecture according to the application.

UNIT I  FUNDAMENTALS OF COMPUTER DESIGN AND ANALYSIS


UNIT II  INSTRUCTION LEVEL PARALLELISM WITH DYNAMIC APPROACHES

Concepts – Dynamic Scheduling – Dynamic hardware prediction – Multiple issue – Hardware based speculation – Limitations of ILP – Case
studies.

UNIT III INSTRUCTION LEVEL PARALLELISM WITH SOFTWARE APPROACHES

Compiler techniques for exposing ILP – Static branch prediction – VLIW – Advanced compiler support – Hardware support for exposing more parallelism – Hardware versus software speculation mechanisms – Case studies.

UNIT IV MULTIPROCESSORS AND MULTICORE ARCHITECTURES


UNIT V MEMORY AND I/O


TOTAL: 45 PERIODS

REFERENCE BOOKS:


13MI102 : ADVANCED DATABASE TECHNOLOGY

COURSE OBJECTIVES:

• To learn the modeling and design of emerging 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 advanced data models.
• To acquire inquisitive attitude towards research topics in databases.
COURSE OUTCOMES:

- Design and implement parallel databases using inter and intra
  query parallelism concepts
- Analyze and apply suitable query and transaction processing
  techniques for distributed databases
- Develop object oriented and object relational database real time
  applications using suitable tools
- Expertise and implement intelligent databases using DB2/SQL
- Build advanced data models for web, multimedia and mobile
  computing services.

UNIT I PARALLEL AND DISTRIBUTED DATABASES

Database System Architectures: Centralized and Client-Server
Architectures – Server System Architectures – Parallel Systems-
Distributed Systems – Parallel Databases: I/O Parallelism – Inter and
Intra Query Parallelism – Inter and Intra operation Parallelism – Design of
Parallel Systems - Distributed Database Concepts - Distributed Data
Storage – Distributed Transactions – Commit Protocols – Concurrency
Control – Distributed Query Processing – Case Studies

UNIT II OBJECT AND OBJECT RELATIONAL DATABASES

Concepts for Object Databases: Object Identity – Object structure – Type
Constructors – Encapsulation of Operations – Methods – Persistence –
Type and Class Hierarchies – Inheritance – Complex Objects – Object
Database Standards, Languages and Design: ODMG Model – ODL –
OQL – Object Relational and Extended – Relational Systems: Object
Relational features in SQL/Oracle – Case Studies.
UNIT III  INTELLIGENT DATABASES


UNIT IV  ADVANCED DATA MODELS


UNIT V  EMERGING TECHNOLOGIES

Geographic Information System, Design and Representation of Geographic Data, Spatial Databases- Spatial Data Types- Spatial Indexes - Spatial Relationships- Spatial Data Structures- R-Trees, Spatial Queries, Genome Databases, Introduction to Big Data, Twig Pattern Queries, Handling Partial Information in Relational Databases, Domain Specific Querying. Entity Mining High Utility Dataset Mining.

TOTAL: 45 PERIODS

REFERENCE BOOKS:


2. Thomas Cannolly and Carolyn Begg, “Database Systems, A


7. Maria Vanina Martinez, Cristian Molinaro, John Grant, and V.S. Subrahmanian, “Customized Policies for Handling Partial Information in Relational Databases”, IEEE Transactions on Knowledge and Data Engineering, Vol. 25, No. 6, June 2013

8. Shasha Li, Chin-Yew Lin, Young-In Song, and Zhoujun Li, “Comparable Entity Mining from Comparative Questions”, IEEE Transactions on Knowledge and Data Engineering, Vol. 25, No. 7, July 2013

**13MI103: NETWORK PROGRAMMING AND MANAGEMENT**

**COURSE 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 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 network management.

COURSE OUTCOMES:

- Design and develop network applications using sockets system calls.
- Explore the features of Stream Control Transmission Protocol (SCTP)
- 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.
- Analyze the network management protocols and practical issues involved in it.

UNIT I APPLICATION DEVELOPMENT


UNIT II ELEMENTARY SCTP SOCKETS AND SOCKET OPTIONS

Introduction to SCTP- Interface Modules – SCTP functions- sctp_bindx, sctp_connectx, sctp_getpaddrs, sctp_freepaddrs,

UNIT III ADVANCED SOCKETS I


UNIT IV ADVANCED SOCKETS II

UNIT V NETWORK MANAGEMENT


TOTAL: 45 PERIODS

REFERENCE BOOKS:

WEB REFERENCES:


13MI104 : SOFT COMPUTING TECHNIQUES

L T P C

3 1 0 4

COURSE OBJECTIVES:

- To give students knowledge of soft computing theories fundamentals, i.e. fundamentals of non-traditional technologies and approaches to solving hard real-world problems, namely fundamentals of artificial neural networks, fuzzy sets and fuzzy logic and genetic algorithms.
- To introduce the ideas of fuzzy sets, fuzzy logic and use of heuristics based on human experience
- To become familiar with neural networks that can learn from available examples and generalize to form appropriate rules for inference systems
- To provide the mathematical background for carrying out the optimization associated with neural network learning
- To familiarize with genetic algorithms and other random search procedures useful while seeking global optimum in self-learning
situations

- To introduce case studies utilizing the above and illustrate the intelligent behavior of programs based on soft computing

**COURSE OUTCOMES:**

- Apply the tolerance of imprecision and uncertainty for design of robust and low-cost intelligent machines.
- Acquire knowledge of soft computing theories fundamentals and so to design program systems using approaches of these theories for solving various real-world problems.
- Implement soft computing techniques in building intelligent machines
- Apply a soft computing methodology for a particular problem
- Apply fuzzy logic and reasoning to handle uncertainty and solve engineering problems
- Apply genetic algorithms to combinatorial optimization problems and apply neural networks to pattern classification and regression problems
- Evaluate and compare solutions by various soft computing approaches for a given problem.

**UNIT I  NEURAL NETWORKS**

UNIT II  UNSUPERVISED LEARNING  9


UNIT III  FUZZY LOGIC  9


UNIT IV  FUZZY MODELLING & APPLICATIONS  9


UNIT V  GENETIC ALGORITHM & APPLICATIONS  9


TUTORIAL :15 PERIODS
TOTAL: 45+15=60 PERIODS

63
REFERENCE BOOKS:


13MC151: ADVANCED DATA STRUCTURES
LABORATORY
(Common to M.E CSE / M.Tech IT) 0 0 3 2

COURSE OBJECTIVES:

- To learn implementation of data structures for concurrency
- To learn implementation of advanced data structures such as search trees, hash tables, heaps and operations on them
- To learn to implement advanced concurrent data structures
- To learn to apply principles of efficient algorithm design and learn various advanced algorithms

COURSE OUTCOMES:

- Implement and apply concurrent linked lists, stacks, and queues
- Perform operations on search trees and hash tables
- Perform operations on different types of heaps
- Implement and apply data structures for strings
- Implement advanced concurrent structures
- Apply design techniques for algorithms and advanced algorithms

SYLLABUS FOR THE LAB:

Each student has to work individually on assigned lab exercises. Lab sessions could be scheduled as one contiguous three-hour session per
week. The students have to complete a minimum of 12 exercises. 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.

- Implementation and applications of classic linear data structures, namely, linked lists, queues, and stacks.
- Implementation of various locking and synchronization mechanisms for concurrent linked lists, concurrent queues, and concurrent stacks.
- Implementation of weight balanced search trees and skip lists.
- Implantation of suffix trees and pattern matching
- Implementation of various heap structures.
- Implementation of concurrent hashing, concurrent skip lists, and concurrent priority queues.
- Implementation of approximation and randomized algorithms.
- Implementation of parallel sorting algorithms.
- Developing an application involving concurrency and data structures.

TOTAL: 45 PERIODS

REFERENCE BOOKS:


WEB REFERENCES:

1. http://www.w3schools.in/c-programming-language


List of Sample Exercises

1. A file consists of a list of CD titles with information such as category(in alphanumeric form maximum of 25 characters)and
title (in alphanumeric form maximum of 25 characters characters). Duplicate entries are allowed. Example Categories are: Education, Entertainment, Examinations, Soft skill, Games etc.

Design a system to get new entries to add, search for an entry, delete the existing entries and view the titles. The system does not know the number of titles in advance. The system may keep the information either in order or unordered. Compare the efficiency of the above two approaches.

2. An electronics goods dealer has 50 different types of item and for each item he has a maximum of 5 branded company products for sale. Read and store the monthly sales (day wise) of the shop in a multi list and produce the following reports.
   - List the day wise total sales amount of all goods
   - List the weekly sale details of refrigerator.
   - List the monthly sale details of all LG brand electronic good
   - Make the list as empty at the end of seventh day of the week after taking appropriate back up.

3. Construct concurrent bi-stack in a single array and perform the following operation for string manipulation such as:
   i) Search for a character and Replace it by a new one if available
   ii) Reverse a String
   iii) Test for palindrome
   iv) Count the occurrences of the given character

4. A deque is a data structure consisting of a list of items, on which the following operations are possible:
Push(X,D): Insert item X on the front end of the deque D.
Pop(D): Remove the front item from the deque D and return it
Inject(X,D): Insert an item X on the rear end of the deque D.
Eject(D): Remove the rear item from the deque D and return it.
Implement the above concurrent double ended queue.

5. Suppose that an advertising company maintain a database and needs to generate mailing labels for certain constituencies. A typical request might require sending out a mailing to people who are between the ages of 34 and 49 and whose annual income is between $100000 and $200000. This problem is known as a two dimensional range query. To solve such range queries a two dimensional search tree namely 2-D tree can be used which has the simple property that branching on odd levels is done with respect to the first key and branching on even levels is done with respect to the second key. Implement a 2-D tree with company database consist of the following fields such as mail-ID, Age, Gender, Annual Income and Occupation.

6. Using weight balanced search tree construct a Telephone directory with the Information such as: Phone Number, Name and address then perform the following
a) Search for a phone number and print the customer name and address
b) Remove a Phone number from the directory
c) Change the address of the customer whose phone number is given.
d) Print the content of the directory
7. Construct a Red-Black tree with the database containing Book detail such as access Number, Title, Author name, Department and price. Perform the following operations
   
i) Search for a book based on Book title
   
ii) Add a new book entry into the database
   
iii) Remove the lost book entry from the database
   
Note: Arrange the list of records based on book title to improve the performance of the frequent search operations.

8. The details of employees (Emp.Id, Name, Department and Total Years of experience) of a company are to be maintained. The list indicates both alphabetical ordering of names, ascending order of Emp.Id Number and alphabetical ordering of department names. Perform the following by using Skip List structure:
   
   - Insert a new employee detail in the appropriate position
   - Remove an employee detail where Emp.Id is given
   - Find an employee detail whose ID is given.
   - Find employee information whose name in a particular department is given.
   - List all employee detail in order of their name.

9. Construct a Suffix Tree data structure to construct a Telephone directory with the Information such as: Phone Number, Name and address then perform the following operation
   
   - Insert a new customer information into the directory
   - Disable a connection and Delete that phone number from the directory
   - Print all customer addresses that starts with name “AN*”.
   - Print all customer addresses and phone numbers whose name
starts with alphabets A-E.

10. Construct double ended priority queue using Min-Max heaps and perform the following
   a) Find 3rd minimum
   b) Delete an item (with random priority)
   c) Delete maximum element
   d) Heap sort in descending order
   e) Modify the priority of an item

11. Online dictionary implementation using Hashing
    Implement a dictionary which contains the meaning of different words. Both the word and the meaning can be in the same language. Your program should read a word and should give the meaning. If the word is a new one (not available in the dictionary) then include the word into its correct position with its meaning.
    Implement the same problem using concurrent Hashing technique.

12. Implementation of Approximation algorithm: Solve the 0-1 Knapsack problem
    Given a knapsack with maximum weight capacity C and a set S consisting of n items, each item i with weight w_i and profit p_i (all w_i, p_i and W are integer values). The problem is to pack the knapsack to achieve maximum total profit of packed items with items total weight less than or equal to C.

    In the project selection problem, there are n projects and m equipments. Each project pi yields revenue r(pi) and each equipment qi costs c(qi) to purchase. Each project requires a number of equipments and each equipment can be shared by
several projects. The problem is to determine which projects and equipments should be selected and purchased respectively, so that the profit is maximized.

14. Implement the following parallel sorting and compare the performance of those algorithms.

   i) Parallel Quick sort
   ii) Parallel merge sort
   iii) Batcher’s Bitonic sort

Note:
Batcher’s Bitonic sort is a parallel sorting algorithm whose main operation is a technique for merging two bitonic sequences. A bitonic sequence is the concatenation of an ascending and a descending sequence. For example 2, 4, 6, 8, 23, 8, 5, 3, 0 is a bitonic sequences.

13MI151: NETWORK PROGRAMMING     L T P C
LABORATORY                   0 0 3 2

COURSE OUTCOMES:

- Design network applications using TCP and UDP
- Demonstrate the usage of various networking tools.
- Analyze network traffic
- Analyze packets transmitted over the network.
- Simulate the given scenario and analyze the happenings.
List of Exercises

1. Write a socket program to implement the following for desired application.
   a. Iterative and Reliable client Servers
   b. Iterative and Unreliable Client Servers
   c. Concurrent and Reliable Client Servers using fork and thread
   d. Concurrent and Unreliable Client Servers using select and poll.
   e. Add reliability to UDP protocol.
   f. Multiplexing both TCP and UDP.
   g. SCTP protocol
2. 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
3. Use the packet capturing tool and measure the traffic from each node in a application wise, and pair wise traffic application
4. Repeat exercise 8 for protocol wise traffic analysis.
5. Simulate the transmission of ping messages over a network topology and do the following.
   a. Find the number of packets dropped due to congestion.
   b. Analyze the performance of the different congestion control algorithms (Old Tahoe, Tahoe, and Reno).
6. Simulate a network using n nodes and set multiple traffic nodes and do the following.
   a. Plot congestion window for different source / destination.
SEMESTER II

13MI201 WEB MINING AND INFORMATION RETRIEVAL

COURSE 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 analyze the use of probabilistic models for web mining
- To analyze the current trends in Web mining
- To understand the various applications of Information Retrieval giving emphasis to Multimedia IR, Web Search

COURSE OUTCOMES:

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

- Identify and differentiate between application areas for web content mining, web structure mining and web usage mining.
- Analyze various key concepts such as deep web, surface web, semantic web, web log, hypertext, social network, information synthesis, corpora and evaluation measures such as precision and recall.
- Use different methods and techniques such as word frequency and co-occurrence statistics, normalization of data, machine learning, clustering, vector space models and lexical semantics.
• Analyze various algorithms commonly used by web mining applications.
• Apply different approaches and techniques of web mining for e.g. sentiment analysis, targeted marketing, linguistic forensics, topic/trend-detection-tracking and multi-document summarization (information aggregation).
• Design an efficient search engine.

UNIT I INTRODUCTION
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 WEB SEARCH

UNIT III REPRESENTING WEB DATA

UNIT IV LEARNING
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  INFORMATION RETRIEVAL


TOTAL: 45 PERIODS

REFERENCE BOOKS:

5. K.P.Soman,Shyam Diwakar, V.Ajay “ Insight into Data Mining Theory and Practice “ Prentice Hall of India Private Ltd 2006
7. Christopher D. Manning, Prabhakar Raghavan and Hinrich

8. Web Mining Research: A Survey- SIGKDD Explorations ACM SIGKDD, July 2000 IEEE Transactions on Knowledge and Data Engineering, Vol. 20, No. 11, November 2008


13MI202 CLOUD COMPUTING TECHNOLOGIES
(Common to M.E CSE / M.Tech IT) 3 0 0 3

COURSE OBJECTIVES:

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

COURSE OUTCOMES:

- Recognize the strengths and limitations of cloud computing
- Discuss on various virtual machine products
• Identify the architecture, infrastructure and delivery models of cloud computing Applications.

• Suggest solutions for the core issues of cloud computing such as security, privacy and interoperability

• Decide the appropriate technologies, algorithms and approaches for the related issues

UNIT I  OVERVIEW OF VIRTUALIZATION


UNIT II  VIRTUALIZATION STRUCTURES


UNIT III  CLOUD INFRASTRUCTURE

Resources.

Case Study: Amazon Web Service reference, GoGrid, Rackspace.

UNIT IV PROGRAMMING MODEL


UNIT V SECURITY IN THE CLOUD AND RESOURCE MANAGEMENT


TOTAL: 45 PERIODS

REFERENCE BOOKS:


4. George Reese, “Cloud Application Architectures: Building Applications and Infrastructure in the Cloud” O'Reilly


COURSE OBJECTIVES:

- To know the concepts of Cyber security and create awareness about this field in the society.
- To familiarize with the fundamental concepts Cyber security and Hacking
- To understand the concept of Forensic science, Ethical Hacking, Mobile hacking and Cryptography

COURSE OUTCOMES:

- Able to use tools for preserving the privacy of confidential data
- Analyze security threats, vulnerabilities, and attacks
- Demonstrate exploits of systems and networks
- Select proper risk analysis methods for protecting infrastructure.
- Explain major advantages and disadvantages of different security methods
- Design small and large-scale protection mechanisms

UNIT I  CYBER SECURITY FUNDAMENTALS  8


UNIT II  ATTACKER TECHNIQUES AND MOTIVATIONS  8

How Hackers Cover Their Tracks (Anti-forensics) - How and Why
Attackers Use Proxies - Tunneling Techniques - Fraud Techniques - Phishing, Smishing, Vishing and Mobile Malicious Code - Rogue Anti-Virus - Click Fraud - Threat Infrastructure - Botnets - Fast-Flux - Advanced Fast-Flux

UNIT III EXPLOITATION


UNIT IV MALICIOUS CODE


UNIT V DEFENSE AND ANALYSIS TECHNIQUES


TOTAL: 45 PERIODS
REFERENCE BOOKS:

1. Cyber Security Essentials, James Graham, Ryan Olson, Rick Howard Auerbach Publications

13MI204: BIG DATA ANALYTICS          L T P C
                                     (Common to M.E CSE / M.Tech IT)  3 0 0 3

COURSE OBJECTIVES:

- To Explore the fundamental concepts of big data and analytics
- To apply various techniques for mining data stream.
- To analyze the big data using intelligent techniques.
• To apply search methods and Visualization.
• To design applications using Map Reduce Concepts.

COURSE OUTCOMES:

• 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.
• Analyze the big data for useful business applications.
• Implement search methods and Visualization

UNIT I INTRODUCTION TO BIG DATA


UNIT II DATA ANALYSIS


UNIT III SEARCH METHODS AND VISUALIZATION

UNIT IV MINING DATA STREAMS


UNIT V FRAMEWORKS

MapReduce – Hadoop, Hive, MapR – Sharding – NoSQL Databases - S3 - Hadoop Distributed File Systems – Case Study- Preventing Private Information Inference Attacks on Social Networks- Grand Challenge: Applying Regulatory Science and Big Data to Improve Medical Device Innovation

TOTAL: 45 PERIODS

REFERENCE BOOKS:


7. Raymond Heatherly, Murat Kantarcioglu and Bhavani
Thuraisingham “Preventing Private Information Inference Attacks on Social Networks” IEEE Transaction on Knowledge and Data Engineering, Vol 25, No.8, August 2013.


13MI251: BIG DATA ANALYTICS LABORATORY

COURSE OBJECTIVES:

- To explore the fundamental concepts of big data and analytics
- To apply various programming techniques for mining data stream.
- To apply search methods and Visualization.
- To design applications using Map Reduce Concepts
- To apply various data mining concepts in Weka tool.

COURSE OUTCOMES

- Work with big data platform and its analysis techniques.
- Design efficient algorithms for mining the data from large volumes.
- Analyze the big data for useful business applications.
- Implement search methods and Visualization.
- Implement various application using Map Reduce concepts.
- Implement various data mining concepts in Weka tool.
List of Exercises

1. Creating an interactive Hadoop MapReduce job flow.
2. Querying Hadoop MapReduce jobs using Hive.
3. Loading unstructured data into Hadoop Distributed File System (HDFS).
4. Simplifying Big Data processing and communicating with Pig Latin.
5. Creating and customizing applications to analyze data.
6. Implementing a targeted Big Data strategy.
7. Using weka tool to exploring the data.
8. Preprocess the given data using weka tool.
9. Apply different classification techniques to classify the given data set.
10. Apply various clustering techniques to cluster the data.
11. Apply various association rule mining algorithms.

13MI252: CLOUD COMPUTING LABORATORY

(Common to M.E CSE & M.Tech IT)

COURSE OBJECTIVES:

- To learn how to use Cloud Services.
- To implement Virtualization
- To implement Task Scheduling algorithms.
- To implement Energy-conscious model.
- To build Private Cloud.
COURSE OUTCOMES:

- Analyze the use of Cloud Applications
- Apply resource allocation, scheduling algorithms.
- Implement Energy-conscious model.
- Create virtual machines from available physical resources.
- Setup a private cloud.
- Familiarize with Open Source Cloud computing Software.

SYLLABUS FOR THE LAB:

List Of Exercises:

1. Study and Usage of Google Apps.
2. Implement Virtual OS using virtual box.
3. Simulate VM allocation algorithm using cloudSim.
4. Simulate Task Scheduling algorithm using CloudSim.
5. Simulate Energy-conscious mode006C using CloudSim.
6. Setup a Private Cloud Using Open Stack or Eucalyptus.
7. Install and configure Open Stack Object Storage - Swift in Ubuntu.
8. Implement Open Stack Nova-Compute.
9. Implement Open Stack Image services – Glance.
COURSE OBJECTIVES:

- To present the state-of-the-art developments in medical informatics, public health informatics and bioinformatics
- To demonstrate a thorough understanding of creation, interpretation, storage and usage of medical information
- To understand the case study of computerized patient record
- To study and use different tools for clinical information system
- To apply the knowledge of bioinformatics for systems

COURSE OUTCOMES:

- Design and develop clinical and hospital management system on his own
- Design computerized information systems for use in health care
- Assure confidentiality of protected patient health information when using health information system
- Conceive and design effective user-centered systems to support medical work and decision-making
- Work with different medical imaging techniques
- Apply the knowledge of bioinformatics for biological databases
- Evaluate outcomes of the use of information in clinical practice

UNIT I  MEDICAL INFORMATICS  9

Introduction - Structure of Medical Informatics –Internet and Medicine - Security Issues Computer based Medical Information Retrieval, Hospital Management and Information System - Functional Capabilities of a
Computerized HIS - E-Health Services - Health Informatics – Medical Informatics – Bioinformatics

UNIT II  HEALTHCARE INFORMATICS  9

Strategic Planning - Selecting a Health Care Information System - Systems Integration and Maintenance - Systems Integration - Regulatory and Accreditation Issues - Contingency Planning and Disaster Recovery

UNIT III  COMPUTERISED PATIENT RECORD  9

Introduction - History taking by Computer, Dialogue with the Computer - Components and Functionality of CPR - Development Tools – Intranet - CPR in Radiology - Application Server Provider - Clinical Information System - Computerized Prescriptions for Patients

UNIT IV  COMPUTERS IN CLINICAL LABORATORY AND MEDICAL IMAGING  9


UNIT V  BIO-INFORMATICS  9


TOTAL: 45 PERIODS
REFERENCES BOOKS:


13MI402: XML AND WEB SERVICES

COURSE OBJECTIVES:

- To explore the basics of XML technology
- To analyze the background of distributed information system
- To analyze and design a web service based application
- To apply the security features of web services and service composition
COURSE OUTCOMES:

- Create, validate, parse, and transform XML documents
- Design a middleware solution based application
- Develop web services using different technologies
- Design secured web data transmission
- Compose set of web services using BPEL

UNIT I  XML FUNDAMENTALS  
XML – structuring with schema DTD – XML Schema – XML Processing

UNIT II  DISTRIBUTED INFORMATION SYSTEM  
Distributed information system – Design of IB – Architecture of IB –
Communication in an IS – Middleware RPC – TP monitors – Object
brokers – Message oriented middleware – EAI – EAI Middleware –
Workflow –Management – benefits and limitations – Web technologies for
Application Integration

UNIT III  WEB SERVICES  
Web Services – Definition – Web Services and EAI – Web Services
invocation framework web services using java – WS using .NET mobile
web service

UNIT IV  XML SECURITY  
XML Security and meta framework - XML signature – XML Encryption –
UNIT V SERVICE COMPOSITION


Case Study : Service-Centric Framework for a Digital Government Application

TOTAL: 45 PERIODS

REFERENCE BOOKS:


2. Ron Schmelzer etal “XML and Web Services”, Pearson Education, 2002


COURSE OBJECTIVES:

- To know the fundamental principles energy efficient devices
- To study the concepts of Energy efficient storage
- To introduce energy efficient algorithms
- To enable the students to know energy efficient techniques involved to support real-time systems
- To study energy aware applications

COURSE OUTCOMES:

- 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

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

Scheduling of Parallel Tasks – Task level Dynamic voltage scaling – Speed Scaling – Processor optimization- Memetic Algorithms – Online job scheduling Algorithms

UNIT IV  REAL TIME SYSTEMS


UNIT V  ENERGY AWARE APPLICATIONS

On chip network – Video codec Design – Surveillance camera- Low power mobile storage

TOTAL: 45 PERIODS

REFERENCE BOOKS:


WEB REFERENCES:

COURSE 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

COURSE 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 Wi-Fi / Bluetooth
- Manage the internet resources
- Model the Internet of things to business

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

The Meaning of DiY in the Network Society- Sensor-actuator Technologies and Middleware as a Basis for a DiY Service Creation Framework - Device Integration - Middleware Technologies Needed for a DiY Internet of Things - Semantic Interoperability as a

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

Resource-oriented Architecture and Best Practices- Designing RESTful Smart Things - Web-enabling Constrained Devices - The Future Web of Things - Set up cloud environment – send data from microcontroller to cloud – Case study –CAM:cloud Assisted Privacy- Other recent projects

TOTAL: 45 PERIODS

REFERENCE BOOKS:

1. Charalampos Doukas , “Building Internet of Things with the Arduino”, Create space, April 2002
5. Pengwei Hu; Fangxia Hu, “An optimized strategy for cloud computing architecture”, 3rd IEEE Transactions on Computer Science and Information Technology (ICCSIT), 2010
WEB REFERENCES:


13MI404: PERFORMANCE EVALUATION AND RELIABILITY OF INFORMATION SYSTEMS

COURSE OBJECTIVES:

- Gain a basic understanding of probability theory and its applications to networks
- Gain an understanding of Markov chains, including Multi-dimensional chains and their applications in the analysis of computer networks
- Gain an understanding of queuing system models such as M/M/1, M/M/m/m and M/G/1 and their applications in the analysis of computer networks
- Gain an appreciation for the challenges in the analysis of network of queues and some of the fundamental results in the field including Burke’s theorem, Jackson’s theorem etc
- Gain an understanding of the reliability basics, modeling and analysis

COURSE OUTCOMES:

- Apply the probability concepts in Networks
- Demonstrate the usage of Markov Chains for the analysis of networks
• Able to select opt Queuing discipline for the real time network applications
• Appreciate the importance of Reliability concepts for Network modeling
• Solve research problems related to Computer networks and evaluate its performance
• Design of network of queues and analyze using Burke’s theorem, Jackson’s theorem

UNIT I


UNIT II

Random variables - Stochastic process – Link Delay components – Queuing Models – Little’s Theorem – Birth & Death process – Queuing Disciplines

UNIT III

Markovian FIFO Queuing Systems – M/M/1 – M/M/a – M/M/∞ - M/G/1 – M/M/m/m and other Markov- Non-Markovian and self-similar models – Network of Queues –Burke’s Theorem – Jackson’s Theorem

UNIT IV

Reliability and Availability concepts-failure Containment and redundancy-Robust Design principles-Error detection-Analysing and modelling reliability and robustness
UNIT V


TOTAL: 45 PERIODS

REFERENCE BOOKS:
13MI405: NEXT GENERATION WIRELESS NETWORKS

COURSE 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

COURSE OUTCOMES:

- Acquaint with the latest 3G/4G and WiMAX networks and its architecture
- Illustrate the implications of various layers in Wireless networks
- Able to design and implement wireless network environment for any application using latest wireless protocols and standards
- Analyze the performance of networks
- Exploit various diversity schemes in LTE
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


UNIT III 4G LTE NETWORKS

LTE- Introduction- Radio interface architecture- Physical layer- Access procedures- System Architecture Evolution(SAE) - Algorithms for Enhanced Inter-Cell Interference Coordination

UNIT IV WIMAX NETWORKS

WiMax- Introduction – IEEE 802.16- OFDM- MIMO- IEEE 802.20- Burst Construction Algorithm for IEEE 802.16

UNIT V SPECTRUM & PERFORMANCE


TOTAL: 45 PERIODS

REFERENCE BOOKS:


13MI406 : PERVERSIVE COMPUTING L T P C
3 0 0 3

COURSE OBJECTIVES:

• To understand the basics of Pervasive Computing
• To learn the role of Sensor & Mesh networks in Pervasive Computing
• To realize the Scope of Context Aware & Wearable Computing
• To Address the Security issues in Pervasive networks
• To develop Mobile applications using Programming

COURSE OUTCOMES:
• Exploit the usage of Pervasive Computing in real time applications
• Analyze the implications of various layers in Sensor & Mesh networks
• Develop Pervasive computing environment using sensor and mesh networks
• Develop applications based on the paradigm of context aware computing & wearable computing
• Master the security violations and issues in Pervasive Networks
• Design applications using android & iOS

UNIT I PERVERSIVE COMPUTING AND SYSTEMS 9

UNIT II SENSOR AND MESH NETWORKS 9

UNIT III CONTEXT AWARE COMPUTING & WEARABLE COMPUTING 9
Adaptability – Mechanisms for Adaptation - Functionality and Data –

UNIT IV PERVERSIVE NETWORKING SECURITY


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

TOTAL: 45PERIODS

REFERENCE BOOKS:


13MI407: MULTIMEDIA TECHNOLOGIES L T P C

3 0 0 3

COURSE OBJECTIVES:

- To familiarize with various elements of multimedia
- To analyse various multimedia systems
- To use various tools for developing multimedia
- To develop a multimedia application
COURSE OUTCOMES:

- Apply MPEG and CD standards in multimedia creation
- Use various authoring and editing tools
- Develop animation, images, Sound using Multimedia Tools
- Develop a multimedia application

UNIT I  INTRODUCTION


UNIT II  ELEMENTS OF MULTIMEDIA

Multimedia Building Blocks: Text - Graphics - Video Capturing - Sound Capturing - Editing - Introduction to 2D & 3D Graphics - surface characteristics and texture - lights - Animation: key frames & Tweening, techniques - principles of animation - 3D animation - file formats

UNIT III  MULTIMEDIA SYSTEMS


UNIT IV  MULTIMEDIA TOOLS

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 modelling and animation tools - image editing tools – sound editing tools - digital movie tools – plug-ins and delivery vehicles for www
UNIT V  MULTIMEDIA APPLICATION DEVELOPMENT  


TOTAL: 45 PERIODS

REFERENCE BOOKS:

6. David Pizzi, Jean-Luc Lugrin, Alex Whittaker, and Marc Cavazza, ”Automatic Generation of Game Level Solutions as Storyboards” IEEE Transactions on Computational Intelligence and AI in Games, Vol. 2, No. 3, September 2010
8. 7. Cui-Xia Ma, Yong-Jin Liu, Hong-An Wang, Dong-Xing Teng, and Guo-Zhong Dai “Sketch-Based Annotation and Visualization in Video

109
COURSE 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

COURSE OUTCOMES:

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 optimization algorithms for better analysis and recognition of objects in a scene
5. Model a framework for Human Activity Recognition

UNIT I  INTRODUCTION TO BIG DATA & DATA ANALYSIS

UNIT II  MINING DATA STREAMS  
Introduction to Stream 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

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 - Factorial HMM and Parallel HMM for Gait Recognition- Face Recognition Performance- Role of Demographic Information

TOTAL: 45 PERIODS
REFERENCE BOOKS:


COURSE OBJECTIVES:

- To understand the basics of Sensor Networks
- To learn various fundamental and emerging protocols of all layers
- To study about the issues pertaining to major obstacles in establishment and efficient management of sensor networks
- To understand the nature and applications of sensor networks
- To understand various security practices and protocols of Sensor Networks

COURSE OUTCOMES:

- Analyze various protocols and its issues
- Implement various routing protocols for Sensor networks
- Use various security techniques in WSN
- Create a Sensor network environment for different type of applications

UNIT I  SENSOR NETWORKS FUNDAMENTALS AND 9 ARCHITECTURE


UNIT II  NETWORKING SENSORS 9

Fundamentals of (Wireless) MAC Protocols - Low duty cycle protocols and wakeup concepts - Contention based Protocols Naming and Addressing – Fundamentals - Address and Name Management in WSN-
Assignment of MAC Addresses - Content based and geographic addressing

UNIT III  SENSOR NETWORK MANAGEMENT AND PROGRAMMING


UNIT IV  SENSOR NETWORK DATABASES, PLATFORMS AND TOOLS


UNIT V  SENSOR NETWORK SECURITY


TOTAL: 45 PERIODS

REFERENCE BOOKS:

13MI410: IMAGE PROCESSING AND PATTERN ANALYSIS

COURSE 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

COURSE OUTCOMES:

• Enhance 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

UNIT I   INTRODUCTION


UNIT II   MATHEMATICAL MORPHOLOGY and IMAGE SEGMENTATION


UNIT III   IMAGE REPRESENTATION AND DESCRIPTION and FEATURE EXTRACTION

Run-Length Coding - Binary Tree and Quadtree - Contour Representation - Skeletonization by Thinning - Medial Axis
Transformation-Object Representation and Tolerance - Fourier Descriptor and Moment Invariants-Shape Number and Hierarchical Features-Corner Detection- Hough Transform-Principal Component Analysis-Linear Discriminate Analysis- Feature Reduction in Input and Feature Spaces

UNIT IV PATTERN RECOGNITION

The Unsupervised Clustering Algorithm - Bayes Classifier - Support Vector Machine - Neural Networks - The Adaptive Resonance Theory Network - Fuzzy Sets in Image Analysis - Document image processing and classification - Block Segmentation and Classification - Rule-Based Character Recognition system - Logo Identification - Fuzzy Typographical analysis for Character Pre-classification - Fuzzy Model for Character Classification

UNIT V APPLICATIONS


TOTAL: 45 PERIODS

REFERENCE BOOKS:


13MI411 : MACHINE LEARNING

L T P C

3 0 0 3

COURSE 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
COURSE OUTCOMES:

- Examine the basic concepts of machine learning
- Apply supervised learning algorithms for given application
- Implement unsupervised learning algorithms for any application
- Use probabilistic graphical model for a sequence type of application
- Analyse different types of emerging machine learning algorithms

UNIT I  INTRODUCTION


UNIT II  SUPERVISED LEARNING


UNIT III  UNSUPERVISED LEARNING

UNIT IV PROBABILISTIC GRAPHICAL MODELS


UNIT V ADVANCED LEARNING


TOTAL: 45 PERIODS

REFERENCES:


WEB REFERENCES :


13MI412 : VIRTUALIZATION TECHNIQUES  L T P C

3 0 0 3

COURSE 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

COURSE OUTCOMES :

• Identify different VM types and enumerate on Virtual File Systems
• Apply Dynamic Binary Optimization
• Identify network virtualization techniques
• Apply virtualization for storage
• Use various virtual machine products

UNIT I VIRTUAL MACHINES 9


UNIT II BINARY TRANSLATION AND OPTIMIZATION 9


UNIT III NETWORK VIRTUALIZATION 10

Design of Scalable Enterprise Networks - Virtualizing the Campus WAN Design – WAN Architecture - WAN Virtualization - Virtual Enterprise Transport Virtualization–VLANs and Scalability - Theory Network Device Virtualization Layer 2 - VLANs Layer 3 VRF Instances Layer 2 - VFIs Virtual Firewall Contexts Network

UNIT IV VIRTUALIZING STORAGE


UNIT V VIRTUAL MACHINES PRODUCTS


TOTAL: 45Periods

REFERENCES:

13MI413: SOFTWARE AGENTS

COURSE OBJECTIVES:

• To understand the basic concepts of software agents
• To learn the software agents for cooperative learning
• To have an understanding of multi agent systems
• To know how software agents communicates and collaborates with each other
• To learn the mobile agents and its security

COURSE OUTCOMES:

• Analyze how the transformation occurs from direct manipulation to delegation
• Apply the software agents for cooperative learning
• Analyze the interaction between various agents
• Develop a Intelligent agent-based system using a contemporary agent development platform
• Apply black box security to authenticate the agents

UNIT I  AGENT AND USER EXPERIENCE

Interacting with Agents - Agent from Direct Manipulation to Delegation - Interface Agent Metaphor with Character - Designing Agents - Direct
Manipulation versus Agent Path to Predictable

UNIT II AGENTS FOR LEARNING IN INTELLIGENT ASSISTANCE


UNIT III MULTIAGENT SYSTEMS


UNIT IV INTELLIGENT SOFTWARE AGENTS

Interface Agents – Agent Communication and Collaboration - Overview of Agent Oriented Programming - Agent Communication Language - Agent Based Framework of Interoperability – Agent Knowledge Representation – Agent Adaptability – Belief Desire Intention

UNIT V MOBILE AGENTS AND SECURITY


TOTAL: 45 PERIODS
REFERENCES


WEB REFERENCES

1. www.csdl.tamu.edu
2. www.csc.ncsu.edu
3. www.cs.cmu.edu
4. www.cse.fau.edu
COURSE OBJECTIVES:

- To understand the basic properties of formal languages and formal grammars
- To understand the relation between types of languages and types of finite automata
- To understand basic properties of Turing machines and computing with Turing machines
- To enrich the knowledge in various phases of compiler and its use
- To extend the knowledge of parser

COURSE OUTCOMES:

- Design finite automata for a given language
- Construct a Turing machine for a given input
- Construct the LR and SLR parser for the given grammar
- Analyze type checking system and run time environments
- Apply code optimization techniques to improve the program performance

UNIT I AUTOMATA

Introduction to formal proof – Additional forms of proof – Inductive proofs – Finite Automata (FA) – Deterministic Finite Automata (DFA) – Nondeterministic Finite Automata (NFA) – Finite Automata with Epsilon transitions- Equivalence and minimization of Automata
UNIT II CONTEXT-FREE GRAMMARS AND LANGUAGES


UNIT III BASICS OF COMPILES


UNIT IV TYPE CHECKING AND RUNTIME ENVIRONMENTS


UNIT V CODE GENERATION AND OPTIMIZATION

Issues in the design of a code generator- -A simple code generator-The DAG representation of basic blocks - Generating code from DAG – Dynamic programming code generation algorithm – Code generators - The principle sources of optimization-Peephole optimization- Optimization of basic blocks-Loops in flow graphs - Code improving transformations- Kachroo Formal Language Modelling and Simulations of Incident Management

TOTAL: 45 PERIODS
REFERENCES:


WEB REFERENCES:

2. http://citeseer.ist.psu.edu/Programming/CompilerDesign/hubs.html
5. http://dinosaur.complertools.net/

13MI415 : SOCIAL NETWORK ANALYSIS L T P C
3 0 0 3

COURSE OBJECTIVES:

• To gain knowledge about the current Web development and emergence of Social Web
• To study about the modelling, aggregating and knowledge representation of Semantic Web
• To learn about the extraction and mining tools for Social networks
• To understand and predict human behaviour for social communities
• To learn how text mining can be done in social networks

COURSE OUTCOMES:

• Acquire knowledge to analyze social networks
• Model, aggregate and represent knowledge for Semantic Web
• Use extraction and mining tools for Social networks
• Apply reality mining to predict human behaviour for social communities
• Apply various algorithms for text mining in social networks
UNIT I INTRODUCTION TO SOCIAL NETWORK ANALYSIS


UNIT II MODELLING, AGGREGATING AND KNOWLEDGE REPRESENTATION

Ontology and their role in the Semantic Web - Ontology-based Knowledge Representation - Ontology languages for the Semantic Web – RDF and OWL - Modelling 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, Advanced Representations

UNIT III EXTRACTION AND MINING COMMUNITIES IN WEB SOCIAL NETWORKS

Extracting evolution of Web Community from a Series of Web Archive - Detecting Communities in Social Networks - Definition of Community - Evaluating Communities - Methods for Community Detection & Mining - Applications of Community Mining Algorithms - Tools for Detecting Communities Social Network Infrastructures and Communities - Decentralized Online Social Networks- Multi-Relational Characterization of Dynamic Social Network Communities
UNIT IV PREDICTING HUMAN BEHAVIOR AND PRIVACY ISSUES

Understanding and Predicting Human Behaviour for Social Communities
- User Data Management, Inference and Distribution - Enabling New Human Experiences - Reality Mining - Context-Awareness - Privacy in Online Social Networks - Trust in Online Environment - Trust Models Based on Subjective Logic - Trust Network Analysis - Trust Transitivity Analysis - Combining Trust and Reputation - Trust Derivation Based on Trust Comparisons - Attack Spectrum and Countermeasures

UNIT V TEXT MINING IN SOCIAL NETWORKS

Introduction – Keyword Search – Query Semantics and Answer Ranking
- Keyword search over XML and relational data - Keyword search over graph data - Classification Algorithms - Clustering Algorithms - Transfer Learning in Heterogeneous Networks - Application – Gephi Tool

TOTAL: 45 Periods

REFERENCES:


WEB REFERENCES:

1. www.utdallas.edu
2. ibook.ics.uci.edu
3. www.ebmtools.org

13MI416: HUMAN COMPUTER INTERACTION AND HUMAN FACTOR

COURSE OBJECTIVES:

- To learn the principles, fundamentals and developments 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 think and understand user interface design principles to design and evaluate interactive technologies

COURSE OUTCOMES:

- Interpret the contributions of human factors and technical constraints on human-computer interaction
- Evaluate the usability of human computer interaction system
- Analyze various models of HCI
- Describe how a development system can include dialog and rich interaction
- Acquire knowledge on recent issues in HCI for real time applications

UNIT I  INTRODUCTION TO HCI & HUMAN FACTOR


UNIT II  DESIGN, IMPLEMENTATION AND EVALUATION


UNIT III  MODELS


UNIT IV  DIALOG AND RICH INTERACTION


UNIT V EXPERIMENTAL DESIGN AND RESEARCH ISSUES IN HCI


TOTAL: 45 PERIODS

REFERENCES:


Web References:


13MIT417: GPU ARCHITECTURE AND PROGRAMMING

COURSE OBJECTIVES:

- To study the evolution and importance of GPUs
- To program using GPU programming frameworks such as CUDA C and OpenCL
- To analyze the impact of the hardware architecture on the execution of the CUDA application, and implement solutions that will optimize performance
• To implement a substantial parallel program exhibiting significant parallel speedup

**COURSE OUTCOMES:**

• Examine the architecture and capabilities of modern GPUs
• Write programs using CUDA
• Develop simple OpenCL software applications for GPU
• Implement concurrency using OpenCL
• Analyze the performance of GPU Vs CPU

**UNIT I  GPU ARCHITECTURES**


**UNIT II  CUDA**


**UNIT III  OPENCL BASICS**


**UNIT IV  OPENCL CONCURRENCE AND EXECUTION MODEL**

Introduction – Kernels - Work items – Work groups and Execution domain-
UNIT V PERFORMANCE AND CASE STUDY

CPU / GPU performance and design challenges-GPU Computing – Parallel GPU Architecture and Performance – Memory Performance Consideration – Case Studies

TOTAL: 45 PERIODS

REFERENCES:


8. Sangpil Lee, Seoul, Won Woo Ro “Parallel GPU architecture simulation


WEB REFERENCES:

2. https://www.khronos.org/opencl/

13MI418: KNOWLEDGE ENGINEERING

COURSE OBJECTIVES

• To learn about first order logics
• To acquire knowledge about reasoning
• To apply object oriented concepts for various expert systems
• To assess uncertainty using non monotonic logic
• To understand various action and planning strategies for problem solving

COURSE OUTCOMES

• Formulate problem in first order logic and ontologies
• Improve resolution and reasoning with horn clauses
• Apply object oriented abstractions for knowledge representation
• Solve problems with uncertainty using fuzzy rules
• Design and develop applications with action and planning

UNIT I     INTRODUCTION


UNIT II     RESOLUTION AND REASONING


UNIT III     REPRESENTATION

Object Oriented Representations – Frame Formalism – Structured Descriptions – Meaning and Entailment - Taxonomies and Classification – Inheritance – Networks – Strategies for Defeasible Inheritance – Formal Account of Inheritance Networks

UNIT IV     DEFAULTS, UNCERTAINTY AND EXPRESSIVENESS

UNIT V ACTIONS AND PLANNING


TOTAL: 45 PERIODS

REFERENCES:


WEB REFERENCES


13MI419: PARALLEL COMPUTING

COURSE OBJECTIVES:

- To understand the basic concepts in parallel computing architecture
- To be familiar with the taxonomies and parallel programming models
- To be able to identify promising applications of parallel computing
- To develop parallel algorithms and implement prototype parallel programs using MPI and OpenMP
- To evaluate the performance metrics of parallel programs with various measures

COURSE OUTCOMES:

- Express the need for parallel computing with its issues
- Acquire knowledge to design a parallel algorithm using decomposition and mapping techniques
• Interpret message passing paradigm for a parallel algorithm
• Design a parallel algorithm for an existing sequential problem
• Analyze the complexity and performance metrics of code when parallelization is done

UNIT I  INTRODUCTION TO PARALLEL COMPUTING AND ARCHITECTURES


UNIT II  PARALLEL ALGORITHM DESIGN


UNIT III  MESSAGE PASSING PARADIGM


UNIT IV  PARALLEL PROGRAMMING

UNIT V PERFORMANCE ANALYSIS AND APPLICATIONS


TOTAL: 45 PERIODS

REFERENCES:


5. Ian Foster, "Designing and Building Parallel Programs", Addison Wesley, 1995


WEB REFERENCES:


13MI420 : ONTOLOGY AND SEMANTIC WEB

COURSE OBJECTIVES:

- To learn the importance of semantic web
- To apply various semantic knowledge representation strategies
- To analyze various ontology techniques

COURSE OUTCOMES:

- Articulate the concepts of ontology
- Represent semantic knowledge using RDF
- Generate semantic rules using OWL
- Analyze different ontology development methods
- Familiarize different tools for ontology construction
UNIT I  INTRODUCTION  9

The Future of the Internet - The Syntactic Web - The Semantic Web - Ontology in Computer Science - Term Ontology - Taxonomies - Thesauri and Ontologies - Classifying Ontologies - Web Ontologies - Web Ontology Description Languages- Ontology – Categories - Intelligence

UNIT II  SEMANTIC KNOWLEDGE REPRESENTATION  9


UNIT III  RULE LANGUAGES  9


UNIT IV  ONTOLOGY DEVELOPMENT  9


146
UNIT V SOFTWARE TOOLS


TOTAL: 45 PERIODS

REFERENCE BOOKS:


7. Lixin Duan, Wen Li, Ivor Wai,Hung Tsang, Dong Xu, Member, IEEE “Improving Web Image Search by Bag-Based Reranking”, IEEE
Transactions On Image Processing, Vol. 20, No.11, November 2011


WEB REFERENCES:


COURSE OBJECTIVES:

- To learn the basics and advanced concepts of Prolog
- To explain the basic concepts of knowledge representation
- To explain the fundamentals of expert systems and knowledge representation with uncertainty
- To represent a problem using constraint and inductive logic programming
- To understand the relation between prolog, modal and temporal logic

COURSE OUTCOMES:

- Write simple program using Prolog language
• Construct Prolog programs using different data structures and databases
• Use Prolog for problem solving
• Develop prolog programs for an expert system shell
• Extrapolate the concepts of modal and temporal logic

UNIT I  THE PROLOG LANGUAGE  9


UNIT II  PROGRAMMING STYLE AND TECHNIQUE  9


UNIT III  PROLOG IN ARTIFICIAL INTELLIGENCE  9

Basic Problem-Solving Strategies – Depth first search – Breadth first search – Analysis of basic search techniques - Best First Heuristic Search –Best first search – Eight Puzzle – Scheduling – Space saving techniques for best first search- Problem Decomposition and AND/OR Graphs
UNIT IV  CONSTRAINT AND INDUCTIVE LOGIC PROGRAMMING

Constraint satisfaction and logic programming – CLP over real numbers – Scheduling with CLP – A simulation programs with constraints – CLP over finite domains - Knowledge Representation and Expert Systems – Functions and structure of an expert system – Representing knowledge with if then rules – Forward and backward chaining in rule based system- An Expert System Shell- Knowledge representation format - Designing the inference engine - Inductive Logic Programming – Introduction – Constructing Prolog programs from examples – Program Hyper

UNIT V  MODAL AND TEMPORAL LOGIC


TOTAL: 45 PERIODS

REFERENCES

3. Fred Kroger, Stephen Merz,“Temporal Logic and State


WEB REFERENCES

1. www.csie.ntnu.edu.tw

2. www.cs.tau.ac.il

3. www.cse.msu.edu

4. www.cs.jhu.edu
13MI422: VLSI DESIGN

COURSE OBJECTIVES:

- To understand and experience VLSI Design Flow
- To study the Transistor-Level CMOS Logic Design
- To understand VLSI Fabrication and Experience CMOS Physical Design
- To learn Gate Function and Timing Characteristics

COURSE OUTCOMES:

- Illustrate the characteristics of MOS circuits
- Explore the various steps involved in VLSI Fabrication Techniques
- Investigate the Layout Design Rules
- Design various logic devices like Inverter, NAND gate, NOR gate, combinational logic design
- Design various system devices like 4bit shifter, ALU subsystem, Carry look ahead adders, Multipliers, etc

UNIT I OVERVIEW OF VLSI DESIGN METHODOLOGY

VLSI design process - Architectural design - Logical design - Physical design - Layout styles - Full custom - Semicustom approaches - MOS transistor - Threshold voltage - Threshold voltage equations - MOS device equations - Basic DC equations - Second order effects - MOS models - Small signal AC characteristics - NMOS inverter - Depletion mode and enhancement mode pull ups – CMOS inverter - DC characteristics - Inverter delay - Pass transistor - Transmission gate – Power consumption in CMOS gates – Static dissipation – Dynamic Dissipation
UNIT II  VLSI FABRICATION TECHNIQUES

An overview of wafer fabrication – Wafer processing - Oxidation - Patterning - Diffusion - Ion implantation - Deposition – Silicon gate NMOS process - CMOS processes - NWell - PWell - Twintub - Silicon on insulator - CMOS process enhancements - Interconnect - Circuit elements- Latch up -Latchup prevention techniques

UNIT III  LAYOUT DESIGN RULES

Need for design rules - Mead Conway design rules for the silicon gate NMOS process - CMOS based design rules -Simple layout examples - Sheet resistance - Area capacitance - Wiring capacitance - Driving large capacitive loads

UNIT IV  LOGIC DESIGN

Switch logic - Pass transistor and transmission gate based design - Gate logic - Inverter - Two input NAND gate - NOR gate - Other forms of CMOS logic – Dynamic CMOS logic - Clocked CMOS logic - Precharged domino CMOS logic - Structured design - Simple combinational logic design examples - Parity generator - Multiplexers – Clocked sequential circuits - Two phase clocking - Charge storage - Dynamic register element - NMOS and CMOS - Dynamic shift register - Semistatic register - JK flip flop circuit

UNIT V  SUBSYSTEM DESIGN PROCESS


TOTAL: 45 PERIODS

REFERENCES:


5. Amar Mukherjee, "Introduction to nMOS and CMOS VLSI System Design", Prentice Hall, USA, 1986


13MI423: NETWORK ENGINEERING AND MANAGEMENT

COURSE OBJECTIVES:

- To understand the fundamental concepts of network engineering with IPv6 issues
- To explore knowledge on Quality of service
- To analyze, design and document computer network specifications to meet client needs
- To apply problem solving approaches to work challenges and make decisions using network engineering methodologies and its management

COURSE OUTCOMES:

- Develop an basic understanding in the fundamental concepts of network engineering
- Expertise knowledge on Quality of Service of networks
• Analyze the infrastructures in high performance networks
• Explore the features of high speed networks
• Manage the operation, administration, maintenance, and provisioning of networked systems

UNIT I INTRODUCTION TO NETWORKING & IPv6


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

UNIT IV  HIGH SPEED NETWORKS


UNIT V  NETWORK MANAGEMENT


TOTAL: 45 Periods

REFERENCES:

WEB REFERENCES:

7. http://www.itcom.itd.umich.edu/atm/

13MI434: BUILDING ENTERPRISE APPLICATION  L T P C
3 0 0 3

COURSE OBJECTIVES:

- To explore the fundamental concepts of Enterprise application
- To develop skills that will enable them to construct application of high quality
- To understand the process of developing new technology and the role of experimentation
- To introduce ethical and professional issues in developing application
- To understand the concepts of different testing strategies

COURSE OUTCOMES:

- Identify functional and non-functional requirements for the given scenario
• Analyze different concepts of software architectures
• Architect the software product as per the requirements
• Construct different solution layers for an enterprise application
• Apply different testing strategies while developing enterprise application

UNIT I INTRODUCTION TO ENTERPRISE APPLICATIONS AND REQUIREMENTS

Introduction to enterprise applications and their types - software engineering methodologies - life cycle of raising an enterprise application - introduction to skills required to build an enterprise application - key determinants of successful enterprise applications - measuring the success of enterprise applications - Inception of enterprise applications - enterprise analysis - business modelling - requirements elicitation - use case modelling - prototyping - non functional requirements - requirements validation - planning and estimation

UNIT II ANALYSIS, DESIGN CONCEPTS AND PRINCIPLES

Concept of architecture - views and viewpoints - enterprise architecture - logical architecture - technical architecture - design - different technical layers - best practices - data architecture and design – relational - XML - and other structured data representations

UNIT III ARCHITECTURAL DESIGN CONCEPTS

Infrastructure architecture and design elements - Networking - Internetworking - and Communication Protocols - IT Hardware and Software - Middleware - Policies for Infrastructure Management - Deployment Strategy - Documentation of application architecture and design

UNIT IV CONSTRUCTION

Construction readiness of enterprise applications - defining a construction plan - defining a package structure - setting up a configuration management
plan- setting up a development environment- introduction to the concept of Software Construction Maps- construction of technical solutions layers-methodologies of code review- static code analysis- build and testing-dynamic code analysis – code profiling and code coverage.

UNIT V TESTING

Types and methods of testing an enterprise application- testing levels and approaches- testing environments- integration testing- performance tests-penetration testing- usability testing- globalization testing and interface testing- user acceptance testing- rolling out an enterprise application.

TOTAL: 45 Periods

REFERENCE BOOKS:
2. Brett Mclaughlin “Building Java Enterprise Applications”, O'reilly Media, 2002
WEB REFERENCES: