PROGRAM EDUCATIONAL OBJECTIVES:

1. To provide students with strong foundational concepts in Computer Science and Engineering and Mathematics to understand the advances in this field.
2. To enable students to critically analyze, design and create innovative products and solutions for the real life problems.
3. To prepare students to critically analyze existing literature in an area of specialization and ethically develop innovative and research oriented methodologies to tackle gaps identified.
4. To enable students to pursue lifelong multidisciplinary learning as professional computer engineers and scientists and effectively communicate technical information, function effectively on teams, and develop and apply computer engineering solutions within a global, societal, and environmental context.

PROGRAM OUTCOMES

On successful completion of the course, the students will be able to:

a. Apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer based systems of varying complexity.
b. Critically analyze a problem, identify, formulate and solve problems in the field of Computer Science and Engineering considering current and future trends.
c. Design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, ethical, health and safety, and sustainability in the field of computer engineering.
d. Function effectively on teams to accomplish a common goal.
e. Communicate effectively with a range of audiences and prepare technical documents and make effective oral presentations.
f. Analyze the local and global impact of computing on individuals, organizations, and society.
g. Demonstrate an ability to engage in lifelong learning for professional development.
h. Use current techniques, skills, and tools necessary for computing practice.
i. Demonstrate advanced knowledge of a selected area within the computer science discipline.
j. Critically analyze existing literature in an area of specialization and develop innovative and research oriented methodologies to tackle gaps identified.
A broad relation between the programme objective and the outcomes is given in the following table.

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### VI SEMESTER

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# EMPLOYABILITY ENHANCEMENT COURSES (EEC)

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OBJECTIVES:
- To understand the basics of random variables and standard distributions
- To understand the arrival process and various queueing and server models
- To appreciate the use of simulation techniques
- To apply testing of hypothesis to infer outcome of experiments
- To apply mathematical linear programming techniques to solve constrained problems.

UNIT I RANDOM VARIABLES

UNIT II QUEUING MODELS

UNIT III SIMULATION
Discrete Event Simulation – Monte Carlo Simulation – Stochastic Simulation – Applications to Queuing systems.

UNIT IV TESTING OF HYPOTHESIS
Sampling distributions – Estimation of parameters - Statistical hypothesis – Tests based on Normal, t, Chi-square and F distributions for mean, variance and proportion.

UNIT V LINEAR PROGRAMMING

OUTCOMES:
Upon completion of the course, the student will be able to
- Identify the type of random variable and distribution for a given operational conditions/scene
- Design appropriate queueing model for a given problem/system situation
- Simulate appropriate application/distribution problems
- Differentiate/infer the merit of sampling tests.
- Formulate and find optimal solution in the real life optimizing/allocation/assignment problems involving conditions and resource constraints.

REFERENCES:
OBJECTIVES:
- To extend the students’ knowledge of algorithms and data structures
- To enhance their expertise in algorithmic analysis and algorithm design techniques.
- To learn a variety of useful algorithms and techniques
- To extrapolate from them in order to apply those algorithms and techniques to solve problems

UNIT I FUNDAMENTALS

UNIT II HEAP STRUCTURES
Min/Max heaps – Deaps – Leftist Heaps – Binomial Heaps – Fibonacci Heaps – Skew Heaps – Lazy-Binomial Heaps

UNIT III SEARCH STRUCTURES

UNIT IV GEOMETRIC ALGORITHMS

UNIT V PARALLEL ALGORITHMS
Flynn’s Classifications – List Ranking – Prefix computation – Array Max – Sorting on EREW PRAM – Sorting on Mesh and Butterfly – Prefix sum on Mesh and Butterfly – Sum on mesh and butterfly – Matrix Multiplication – Data Distribution on EREW, Mesh and Butterfly

TOTAL : 45 PERIODS

OUTCOMES
Upon completion of this course, the student should be able to
- Have a basic ability to analyze algorithms and to determine algorithm correctness and time efficiency
- Master a variety of advanced data structures and their implementations and different algorithm design techniques in computational geometry and in parallel algorithms
- Apply and implement the learnt algorithm design techniques and data structures to solve problems

REFERENCES:
OBJECTIVES:
- To comprehend software development process and formal specifications
- To know advanced software development techniques and its application in real world context
- To understand how to manage complex projects
- To use advanced software testing techniques
- To understand process improvement and reengineering

UNIT I SOFTWARE ENGINEERING PROCESS AND FORMAL METHODS

UNIT II AGILE AND ASPECT ORIENTED SOFTWARE ENGINEERING

UNIT III COMPONENT-BASED SOFTWARE ENGINEERING
Engineering of component-based systems, the CBSE process – Designing class based components – component design for Web Apps – Component-based development – Component-level design patterns – Classifying and retrieving components, and economics of CBSE.

UNIT IV ADVANCED SOFTWARE TESTING TECHNIQUES

UNIT V SOFTWARE PROCESS IMPROVEMENT AND REENGINEERING

TOTAL : 45 PERIODS

OUTCOMES:
Upon completion of this course, the student should be able to
- Analytically apply general principles of software development in the development of complex software and software-intensive systems
- Discuss methods and techniques for advanced software development and also to be able to use these in various development situations
- Apply testing techniques for object oriented software and web-based systems
REFERENCES:

CP7153 ADVANCES IN OPERATING SYSTEMS

OBJECTIVES:
- To understand the concepts of distributed systems
- To get an insight into the various issues and solutions in distributed operating systems
- To learn about mobile and real-time operating systems
- To gain knowledge on the design concepts of mainframe operating systems

UNIT I BASICS OF OPERATING SYSTEMS

UNIT II DISTRIBUTED OPERATING SYSTEMS

UNIT III DISTRIBUTED RESOURCE MANAGEMENT

UNIT IV MOBILE AND REAL TIME OPERATING SYSTEMS
UNIT V  MAINFRAME AND LINUX OPERATING SYSTEMS


OUTCOMES:
Upon completion of this course, the student should be able to
- Demonstrate the various protocols of distributed operating systems
- Identify the different features of mobile and real-time operating systems
- Discuss the various features of mainframe operating systems

REFERENCES

CP7154  MULTI CORE ARCHITECTURES

OBJECTIVES:
- To introduce the students to the recent trends in the field of Computer Architecture and identify performance related parameters
- To understand the different multiprocessor issues
- To expose the different types of multicore architectures
- To understand the design of the memory hierarchy

UNIT I  FUNDAMENTALS OF COMPUTER DESIGN AND ILP


UNIT II  MEMORY HIERARCHY DESIGN

UNIT III MULTIPROCESSOR ISSUES

UNIT IV MULTICORE ARCHITECTURES

UNIT V VECTOR, SIMD AND GPU ARCHITECTURES

OUTCOMES:
Upon completion of this course, the student should be able to
- Identify the limitations of ILP and the need for multicore architectures
- Discuss the issues related to multiprocessing and suggest solutions
- Point out the salient features of different multicore architectures and how they exploit parallelism
- Critically analyze the different types of interconnection networks
- Design a memory hierarchy and optimize it

REFERENCES:

CP7161 ADVANCED DATA STRUCTURES AND ALGORITHMS LAB

OBJECTIVES:
- To understand heap and various tree structures like AVL, Red-black, B and Segment trees
- To understand the problems such as line segment intersection, convex shell and Voronoi diagram

1. Min/Max Heap
2. Leftist Heap
3. AVL Trees
4. Red-Black Trees
5. B-Trees
6. Segment Trees
7. Line segment intersection
8. Convex Hull
9. Voronoi Diagram

TOTAL: 60 PERIODS

OUTCOMES:
Upon completion of this course, the student should be able to
- Implement heap and various tree structure like AVL, Red-black, B and Segment trees
- Solve the problems such as line segment intersection, convex shell and Voronoi diagram

CP7162

PROFESSIONAL PRACTICES

OBJECTIVES:
- To facilitate analysis, design and problem solving skills
- To have a thorough domain knowledge
- To understand the best Industry practices by reading case studies
- To kindle innovative and professional thinking
- To explore possible alternative solutions
- To estimate feasibility, cost, risk and ROI

Identify an application (may be of social relevance) – Understand customer requirements – analyze and understand customers and stakeholders – value additions – innovations and research component – preparing plan / SRS document indicating feasibility, cost, risk, ROI and related design – suggest implementation methodology – perform risk assessment and management

TOTAL: 30 PERIODS

OUTCOMES:
Upon completion of this course, the student should be able to
- Identify and formulate the problem
- Describe the background of the problem
- Assess the needs of stakeholders
- Make estimates like cost, risk, ROI etc., to justify the business opportunity.
- Describe the industry standards and procedures
- Predict the business opportunity
- Suggest system implications
OBJECTIVES
- To understand different forms of intermediate languages and analyzing programs
- To understand optimizations techniques for single program blocks
- To apply optimizations on procedures and low level code
- To explore and enhance inter procedural optimizations
- To enhance resource utilization

UNIT I  INTERMEDIATE REPRESENTATION OF PROGRAMS AND ANALYSIS  9

UNIT II  LOCAL AND LOOP OPTIMIZATIONS  9

UNIT III  PROCEDURE OPTIMIZATION AND SCHEDULING  9

UNIT IV  INTER PROCEDURAL OPTIMIZATION  9

UNIT V  OPTIMIZING FOR MEMORY  9
Register Allocation: Register Allocation and Assignment - Local Methods - Graph Coloring – Priority Based Graph Coloring - Other Approaches to Register Allocation. Optimization for the Memory Hierarchy: Impact of Data and Instruction Caches - Instruction-Cache Optimization - Scalar Replacement of Array Elements - Data-Cache Optimization - Scalar vs. Memory-Oriented Optimizations.

TOTAL : 45 PERIODS

OUTCOMES:
Upon completion of this course, the student should be able to
- Identify the different optimization techniques that are possible for a sequence of code
- Design performance enhancing optimization techniques
- Manage procedures with optimal overheads
- Ensure better utilization of resources
REFERENCES:

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

UNIT I INTRODUCTION
8+6

UNIT II SUPERVISED LEARNING
10+6

UNIT III UNSUPERVISED LEARNING
8+6

UNIT IV PROBABILISTIC GRAPHICAL MODELS
10+6
Graphical Models - Undirected graphical models - Markov Random Fields - Directed Graphical Models -Bayesian Networks - Conditional independence properties - Inference – Learning- Generalization - Hidden Markov Models - Conditional random fields(CRFs)

UNIT V ADVANCED LEARNING
9+6

TOTAL : 45 + 30 : 75 PERIODS
OUTCOMES:
Upon completion of this course, the student should be able to
- Design a neural network for an application of your choice
- Implement probabilistic discriminative and generative algorithms for an application of your choice and analyze the results
- Use a tool to implement typical clustering algorithms for different types of applications
- Design and implement an HMM for a sequence model type of application
- Identify applications suitable for different types of machine learning with suitable justification

REFERENCES:

CP7251 CLOUD COMPUTING TECHNOLOGIES L T P C 3 0 0 3

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

UNIT I INTRODUCTION 9

UNIT II VIRTUALIZATION 9

UNIT III VIRTUALIZATION INFRASTRUCTURE 9
UNIT IV PROGRAMMING MODEL
Map Reduce Hadoop Distributed File Systems – Hadoop I/O – Developing Map Reduce Applications – Working of Map Reduce – Types and Formats – Setting up Hadoop Cluster

UNIT V CLOUD INFRASTRUCTURE AND SECURITY

TOTAL : 45 PERIODS

OUTCOMES:
Upon completion of this course, the student should be able to
- Articulate the main concepts, key technologies, strengths and limitations of cloud computing
- Identify the architecture, infrastructure and delivery models of cloud computing
- Explain the core issues of cloud computing such as security, privacy and interoperability
- Choose the appropriate technologies, algorithms and approaches for the related issues

REFERENCES:

CP7155 NETWORKING TECHNOLOGIES L T P C 3 0 0 3

OBJECTIVES
- To learn about integrated and differentiated services architectures
- To understand the working of wireless network protocols
- To study the evolution made in cellular networks
- To get familiarized with next generation networks

UNIT I NETWORK ARCHITECTURE AND QoS
UNIT II  WIRELESS NETWORKS

UNIT III  CELLULAR NETWORKS

UNIT IV  4G NETWORKS

UNIT V  SOFTWARE DEFINED NETWORKS

TOTAL : 45 PERIODS

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

• Identify the different features of integrated and differentiated services
• Demonstrate various protocols of wireless and cellular networks
• Discuss the features of 4G and 5G networks

REFERENCES:
OBJECTIVES:

- To understand the underlying principles of Relational Database Management System.
- To understand and implement the advanced features of DBMS.
- To develop database models using distributed databases.
- To implement and maintain an efficient database system using emerging trends.

UNIT I  RELATIONAL MODEL  9

UNIT II  PARALLEL AND DISTRIBUTED DATABASES  9

UNIT III  XML DATABASES  9

UNIT IV  MULTIMEDIA DATABASES  9

UNIT V  CURRENT ISSUES  9
Active Databases – Deductive Databases – Data Warehousing – Data Mining – Database Tuning – Database Security

TOTAL : 45 PERIODS

OUTCOMES:
On successful completion of this course, the student will be able to:

- Design and implement relational databases, distributed databases, XML databases and multimedia databases.
- Implement the concept of database connectivity with the applications.

REFERENCES
CP 7211  CLOUD COMPUTING LAB  LTCP 0042

OBJECTIVES
- To understand the installation of hypervisors
- To understand the installation of different cloud simulation tools and cloud setup tools
- To deploy cloud services

1. Installation of various hypervisors and instantiation of VMs with image file using open source hypervisors such as Virtual Box, VMWare Player, Xen and KVM.
2. Client server communication between two virtual machine instances, execution of chat application.
3. Creation of simple network topology using open source network virtualization tools (like mininet and others).
5. Implementation of various scheduling mechanisms using open source cloud simulator.
6. Familiarization and usage of the following cloud services with open source cloud tools (like Eucalyptus, Openstack, Open Nebula and others)
   a) scheduling mechanisms
   b) load balancing mechanisms
   c) hashing and encryption mechanisms
7. Familiarization and usage of collaborative applications (SaaS).
8. Implementing applications using Google App Engine (PaaS).
9. Develop MapReduce application (example-URL Pattern count and others) using Hadoop cluster set up (Single node and multi node).

TOTAL : 60 PERIODS

OUTCOMES:
Upon completion of this course, the student should be able to
- Run their application on the instantiated VMs over different hypervisors
- Simulate their sample proposed systems
- Setup a private cloud with open source cloud tools and deploy simple cloud services
- Develop MapReduce Application using Hadoop setup

CP 7254  SECURITY PRINCIPLES AND PRACTICES  LTCP 3003

OBJECTIVES
- To understand the mathematical foundations of security principles
- To appreciate the different aspects of encryption techniques
- To understand the role played by authentication in security
- To appreciate the current trends of security practices
UNIT I CLASSICAL CIPHERS
Classical Cryptography - Shift Cipher - Substitution Cipher - Affine Cipher - Cryptanalysis of the Affine Cipher - Cryptanalysis of the Substitution Cipher - Cryptanalysis of the Vigenere Cipher - Shannon’s Theory

UNIT II SYMMETRIC CIPHERS AND HASH FUNCTIONS

UNIT III PUBLIC-KEY ENCRYPTION TECHNIQUES
Introduction to Public-key Cryptography - Number theory - RSA Cryptosystem - Attacks on RSA - El-Gamal Cryptosystem - Shanks’ Algorithm - Elliptic Curves over the Reals - Elliptical Curves Modulo a Prime - Signature Scheme - Digital Signature Algorithm

UNIT IV KEY MANAGEMENT
Identification Scheme and Entity Attenuation - Challenge and Response in the Secret-key Setting - Challenge and Response in the Public Key Setting - Schnorr Identification Scheme - Key distribution - Diffie-Hellman Key - Pre-distribution - Unconditionally Secure key Pre-distribution - Key Agreement Scheme - Diffie-Hellman Key agreement - Public key infrastructure - PKI, Certificates, Trust Models

UNIT V SECURITY PRACTICES

TOTAL : 45 PERIODS

OUTCOMES:
Upon completion of this course, the student should be able to
- Use the mathematical foundations in security principles
- Identify the features of encryption and authentication
- Discuss available security practices

REFERENCES:
OBJECTIVES:
- To understand the basics of quantum computing, membrane computing, molecular computing, DNA computing and nano computing.
- To understand the models and the theory involved in the biologically inspired computing techniques.
- To explore the applications of these computing models.

UNIT I  INTRODUCTION
Nanoscale Science and Technology- Implications for Physics, Chemistry, Biology and Engineering-Classifications of nanostructured materials- nano particles- quantum dots, nanowires-ultra-thinfilms-multilayered materials. Length Scales involved and effect on properties: Mechanical, Electronic, Optical, Magnetic and Thermal properties. Introduction to properties and motivation for study (qualitative only).

UNIT II  DNA COMPUTING
Structure of DNA – Operation on DNA molecules – Adleman’s experiments – Other DNA solutions to NP problems – Two dimensional generalization – Computing by carving – Sticker systems – Extended H systems – Controlled H systems – distributed H systems

UNIT III  MEMBRANE COMPUTING

UNIT IV  QUANTUM COMPUTING

UNIT V  NANO AND MOLECULAR COMPUTING
Defect tolerant nano computing – error detection – Non-traditional computing models – Reliability trade off for nano architecture – Molecular recognition – storage and processing of molecular information.

TOTAL : 45 PERIODS

OUTCOMES:
Upon completion of this course, the student should be able to
- Comprehend the different computing paradigms
- Write Grammar rules for the different models of computing
- Design applications to incorporate one or more computing models
- Solve problems and prove the application of the computing models

REFERENCES:
OBJECTIVES

- To introduce the student to the notion of a game, its solutions concepts, and other basic notions and tools of game theory, and the main applications for which they are appropriate, including electronic trading markets
- To formalize the notion of strategic thinking and rational choice by using the tools of game theory, and to provide insights into using game theory in modeling applications
- To draw the connections between game theory, computer science, and economics, especially emphasizing the computational issues
- To introduce contemporary topics in the intersection of game theory, computer science, and economics

UNIT I

INTRODUCTION


UNIT II

GAMES WITH PERFECT INFORMATION

Games with Perfect Information - Strategic games - prisoner's dilemma, matching pennies-Nash equilibria- theory and illustrations - Cournot's and Bertrand's models of oligopoly- auctions-mixed strategy equilibrium- zero-sum games- Extensive Games with Perfect Information-repeated games (prisoner's dilemma)- subgame perfect Nash equilibrium; computational issues.

UNIT III

GAMES WITH IMPERFECT INFORMATION


UNIT IV

NON-COOPERATIVE GAME THEORY


UNIT V

MECHANISM DESIGN

Aggregating Preferences-Social Choice – Formal Model- Voting - Existence of social functions - Ranking systems - Protocols for Strategic Agents: Mechanism Design - Mechanism design with unrestricted preferences- Efficient mechanisms - Vickrey and VCG mechanisms (shortest paths) - Combinatorial auctions - profit maximization Computational applications of mechanism design - applications in Computer Science - Google's sponsored search - eBay auctions

TOTAL : 45 PERIODS

OUTCOMES:

Upon completion of this course, the student should be able to
- Discuss the notion of a strategic game and equilibria, and identify the characteristics of main applications of these concepts.
- Do a literature survey on applications of Game Theory in Computer Science and Engineering.
• Discuss the use of Nash Equilibrium for other problems.
• Identify key strategic aspects and based on these be able to connect them to appropriate game theoretic concepts given a real world situation.
• Identify some applications that need aspects of Bayesian Games
• Implement a typical Virtual Business scenario using Game theory

REFERENCES:

CP7075  COMPUTATIONAL GEOMETRY  L  T  P  C
3  0  0  3

OBJECTIVES
• To understand geometric problems.
• To learn the algorithmic solutions for geometric problems.
• To map problems in various application domains to a geometric problem.
• To learn to solve problems in various application domains.

UNIT I  INTRODUCTION
Introduction – Application Domains – Line Segment Intersection – Intersection of Convex Polygons – Polygon Triangulation

UNIT II  GEOMETRIC SEARCHING

UNIT III  CONVEX HULL PROBLEM

UNIT IV  PROXIMITY PROBLEMS
Proximity Problems – Fundamental Algorithms (Closest Pair – All Nearest Neighbours – Euclidean Minimum Spanning Tree – Nearest Neighbour Search) – Lower bounds – Closest Pair Problem : A Divide-and-Conquer Approach

UNIT V  VORONOI DIAGRAM
Voronoi Diagram – Proximity Problems Solved by the Voronoi Diagram – Planar Applications

TOTAL : 45 PERIODS
OUTCOMES:
Upon completion of this course, the student should be able to
- Identify problems that can be mapped to geometric problems
- Transform problems in different applications to geometric problems
- Use the algorithms learnt for solving the transformed problems

REFERENCES

CP7087 PARALLEL ALGORITHMS

OBJECTIVES:
- To learn parallel algorithms development techniques for shared memory and DCM models
- To study the main classes of fundamental parallel algorithms
- To study the complexity and correctness models for parallel algorithms.

UNIT I INTRODUCTION

UNIT II SORTING & SEARCHING
Sorting Networks – Sorting on a Linear Array – Sorting on CRCW, CREW, EREW – Searching a sorted sequence – Searching a random sequence – Bitonic Sort

UNIT III ALGEBRAIC PROBLEMS
Permutations and Combinations – Matrix Transpositions – Matrix by Matrix multiplications – Matrix by vector multiplication.

UNIT IV GRAPH & GEOMETRY
Connectivity Matrix – Connected Components – All Pair Shortest Paths – Minimum Spanning Trees – Point Inclusion – Intersection, Proximity and Construction Problems

UNIT V OPTIMIZATION & BIT COMPUTATIONS
Prefix Sums – Job Sequencing – Knapsack - Adding two integers – Adding n integers – Multiplying two integers – Selection.

TOTAL : 45 PERIODS
OUTCOMES:
Upon completion of this course, the student should be able to
- Familiarize with design of parallel algorithms in various models of parallel computation
- Familiarize with the efficient parallel algorithms related to many areas of computer science: expression computation, sorting, graph-theoretic problems, computational geometry, etc
- Familiarize with the basic issues of implementing parallel algorithms

REFERENCES:

CP7095 VIRTUALIZATION TECHNIQUES AND APPLICATIONS

OBJECTIVES
- To understand the concepts of virtualization and virtual machines
- To understand the implementation of process and system virtual machines
- To explore the aspects of high level language virtual machines
- To gain expertise in server, network and storage virtualization.
- To understand and deploy practical virtualization solutions and enterprise solutions

UNIT I OVERVIEW OF VIRTUALIZATION

UNIT II PROCESS VIRTUAL MACHINES

UNIT III HIGH LEVEL LANGUAGE VIRTUAL MACHINES AND SERVER VIRTUALIZATION

UNIT IV NETWORK AND STORAGE VIRTUALIZATION
UNIT V APPLYING VIRTUALIZATION


TOTAL : 45 PERIODS

OUTCOMES:

Upon completion of this course, the student should be able to
- Deploy legacy OS on virtual machines.
- Analyze the intricacies of server, storage and network virtualizations
- Design and develop applications on virtual machine platforms

REFERENCES:

CP7081 FAULT TOLERANT SYSTEMS

OBJECTIVES

- To provide and appreciate a comprehensive view of fault tolerant systems
- To expose the students to the methods of hardware fault tolerance
- To understand the different ways of providing information redundancy and the ways of providing software fault tolerance.
- To expose the students to concept of check pointing and their role in providing fault tolerance.
- To understand how to handle security attacks.

UNIT I INTRODUCTION

Fault Classification, Types of Redundancy, Basic Measures of Fault Tolerance, Hardware Fault Tolerance, The Rate of Hardware Failures, Failure Rate, Reliability, and Mean Time to Failure, Canonical and Resilient Structures, Other Reliability Evaluation Techniques, Processor level Techniques

UNIT II INFORMATION REDUNDANCY

UNIT III SOFTWARE FAULT TOLERANCE


UNIT IV CHECKPOINTING


UNIT V FAULT DETECTION IN CRYPTOGRAPHIC SYSTEMS


TOTAL : 45 PERIODS

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

- Define the traditional measures of fault tolerance
- Point out the processor level fault tolerance techniques
- Critically analyze the different types of RAID levels
- Discuss techniques like recovery blocks and N-version programming
- Identify techniques for check pointing in distributed and shared memory systems.
- Provide techniques to detect injected faults in ciphers.

REFERENCES:

CP7077 DATABASE ADMINISTRATION AND TUNING

OBJECTIVES

- To design and implement relational database solutions for general applications
- To develop database scripts for data manipulation and database administration
- To understand and perform common database administration tasks such as database monitoring, performance tuning, data transfer, and security
- To balance the different types of competing resources in the database environment so that the most important applications have priority access to the resources

UNIT I INTRODUCTION TO DATABASE ADMINISTRATION

Database Administration - DBA Tasks - DBMS Release Migration - Types of DBAs - Creating the Database Environment – Defining the organizations DBMS strategy - Installing the DBMS - Upgrading DBMS Versions and Releases
UNIT II DATABASE SECURITY, BACKUP AND RECOVERY


UNIT III FUNDAMENTALS OF TUNING


UNIT IV INDEX TUNING AND QUERY OPTIMIZATION


UNIT V TROUBLESHOOTING


TOTAL : 45 PERIODS

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

- Apply advanced features of databases in design, administration, and applications
- Provide techniques to improve the performance of a database
- Optimize the use of existing resources within the database environment

REFERENCES:
OBJECTIVES:
- To learn real time operating system concepts and the associated issues & techniques.
- To understand design and synchronization problems in Real Time System.
- To understand the evaluation techniques present in Real Time System.

UNIT I  REAL TIME SPECIFICATION AND DESIGN TECHNIQUES  9

UNIT II  SOFTWARE REQUIREMENTS ENGINEERING  9

UNIT III  INTERTASK COMMUNICATION AND MEMORY MANAGEMENT  9

UNIT IV  REAL TIME DATABASES  9
Real time Databases – Basic Definition, Real time Vs General Purpose Databases, Main Memory Databases, Transaction priorities, Transaction Aborts, Concurrency control issues, Disk Scheduling Algorithms, Two – phase Approach to improve Predictability – Maintaining Serialization Consistency – Databases for Hard Real Time Systems

UNIT V  PROGRAMMING LANGUAGES  9

TOTAL : 45 PERIODS

OUTCOMES
Upon completion of this course, the student should be able to
- Apply principles of real time systems design.
- Make use of architectures and behavior of real time operating systems and database in real time applications.

REFERENCES:
OBJECTIVES:

- To learn bio-informatics algorithms

UNIT I

UNIT II

UNIT III

UNIT IV

UNIT V

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

- To design and implement bio-informatics algorithms

REFERENCES

OBJECTIVES

- To understand computation and computability concepts.
- To study different approaches to facilitate computing
- To learn the abstractions of computation and their implementations

UNIT I  TURING MACHINE MODEL  9
Turing Machine Logic, Proof, Computability

UNIT II  QUANTUM COMPUTATION  9
Quantum Computing History, Postulates of Quantum Theory, Dirac Notation, the Quantum Circuit Model, Simple Quantum Protocols: Teleportation, Superdense Coding, Foundation Algorithms

UNIT III  NATURE INSPIRED COMPUTING  9
Nature-Inspired Computing Optimization and Decision Support Techniques, Evolutionary Algorithms, Swarm Intelligence, Benchmarks and Testing

UNIT IV  SOCIAL COMPUTING  9
Social Computing Online communities, Online discussions, Twitter, Social Networking Systems, Web 2.0, social media, Crowdsourcing, Facebook, blogs, wikis, social recommendations, Collective intelligence

UNIT V  EVOLUTIONARY COMPUTING  9

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

- Identify the terminology of the theory of computing
- Predict the major results in computability and complexity theory.
- Prepare the major models of computations

REFERENCES

OBJECTIVES:

- To learn the basics of Cognitive Science with focus on acquisition, representation, and use of knowledge by individual minds, brains, and machines
- To study the mind and intelligence, embracing psychology, artificial intelligence, neuroscience and linguistics
- To understand the role of neuroscience in the cognitive field

UNIT I  INTRODUCTION TO COGNITIVE SCIENCE  9

UNIT II  COGNITIVE PSYCHOLOGY  9

UNIT III  COGNITIVE NEUROSCIENCE  9
Brain and Cognition Introduction to the Study of the Nervous System – Neural Representation – Neuropsychology- Computational Neuroscience - The Organization of the mind - Organization of Cognitive systems - Strategies for Brain mapping – A Case study: Exploring mindreading

UNIT IV  LANGUAGE ACQUISITION, SEMANTICS AND PROCESSING MODELS  9

UNIT V  HIGHER-LEVEL COGNITION  9

TOTAL : 45 PERIODS

OUTCOMES:

Upon completion of this course, the student should be able to
- Explain and analyze the major concepts, philosophical and theoretical perspectives, empirical findings, and historical trends in cognitive science, related to cultural diversity and living in a global community.
- Use cognitive science knowledge base to create their own methods for answering novel questions of either a theoretical or applied nature, and to critically evaluate the work of others in the same domain
- Be proficient with basic cognitive science research methods, including both theory-driven and applied research design, data collection, data analysis, and data interpretation
REFERENCES:

CP7082 INFORMATION RETRIEVAL TECHNIQUES

OBJECTIVES:
- To understand the basics of information retrieval with pertinence to modeling, query operations and indexing
- To get an understanding of machine learning techniques for text classification and clustering.
- To understand the various applications of information retrieval giving emphasis to multimedia IR, web search
- To understand the concepts of digital libraries

UNIT I INTRODUCTION: MOTIVATION

UNIT II MODELING

UNIT III INDEXING
Static and Dynamic Inverted Indices – Index Construction and Index Compression. Searching - Sequential Searching and Pattern Matching. Query Operations -Query Languages – Query Processing - Relevance Feedback and Query Expansion - Automatic Local and Global Analysis – Measuring Effectiveness and Efficiency

UNIT IV CLASSIFICATION AND CLUSTERING
Text Classification and Naïve Bayes – Vector Space Classification – Support vector machines and Machine learning on documents. Flat Clustering – Hierarchical Clustering –Matrix decompositions and latent semantic indexing – Fusion and Meta learning

UNIT V SEARCHING THE WEB

TOTAL : 45 PERIODS
OUTCOMES:
Upon completion of this course, the student should be able to
- Build an Information Retrieval system using the available tools
- Identify and design the various components of an Information Retrieval system
- Apply machine learning techniques to text classification and clustering which is used for efficient Information Retrieval
- Design an efficient search engine and analyze the Web content structure

REFERENCES:
UNIT V APPLICATIONS
The Role of the Internet of Things for Increased Autonomy and Agility in Collaborative Production Environments - Resource Management in the Internet of Things: Clustering, Synchronisation and Software Agents. Applications - Smart Grid – Electrical Vehicle Charging

TOTAL : 45 PERIODS

OUTCOMES:
Upon completion of this course, the student should be able to
- Identify and design the new models for market strategic interaction
- Design business intelligence and information security for WoB
- Analyze various protocols for IoT
- Design a middleware for IoT
- Analyze and design different models for network dynamics

REFERENCES

CP7086 NETWORK ON CHIP L T P C
3 0 0 3

OBJECTIVES
- To understand the various classes of Interconnection networks
- To learn about different routing techniques for on-chip network
- To know the importance of flow control in on-chip network.
- To learn the building blocks of routers
- To provide an overview of the current state-of-the-art research

UNIT I ICN ARCHITECTURES
Introduction - Classification of ICNs - Topologies - Direct networks - Indirect networks-Performance analysis.

UNIT II SWITCHING TECHNIQUES
Basic switching techniques - Virtual channels - Hybrid switching techniques Optimizing switching techniques - Comparison of switching techniques - Deadlock, livelock and Starvation

UNIT III ROUTING ALGORITHMS
UNIT IV NETWORK-ON-CHIP
NoC Architectures - Router architecture - Area, energy and reliability constraints - NoC design alternatives - Quality-of Service (QoS) issues in NoC architectures

UNIT V EMERGING TRENDS
Fault-tolerance issues - Emerging on-chip interconnection technologies - 3D NoC - Simulation

OUTCOMES:
Upon completion of this course, the student should be able to
- Identify the major components required to design an on-chip network
- Compare different switching techniques
- Evaluate the performance and the cost of the given on-chip network
- Demonstrate deadlock-free and live lock free routing protocols
- Simulate and assess the performance of a given on-chip network

REFERENCES:

CP7090 SECURE NETWORK SYSTEM DESIGN L T P C
3 0 0 3

OBJECTIVES
- To understand best security practices and how to take advantage of the networking gear that is already available
- To learn design considerations for device hardening, Layer 2 and Layer 3 security issues, denial of service, IPSec VPNs, and network identity
- To understand security design considerations for common applications such as DNS, mail and web
- To identify the key security roles and placement issues for network security elements such as firewalls, intrusion detection systems, VPN gateways, content filtering, as well as for traditional network infrastructure devices such as routers and switches
- To understand the various testing and optimizations strategies to select the technologies and devices for secure network design
UNIT I NETWORK SECURITY FOUNDATIONS

Secure network design through modeling and simulation, A fundamental framework for network security, need for user level security on demand, Network Security Axioms, security policies and operations life cycle, security networking threats, network security technologies, general and identity design considerations, network security platform options and best deployment practices, secure network management and network security management

UNIT II IDENTIFYING SYSTEM DESIGNER’S NEEDS AND GOALS

Evolution of network security and lessons learned from history, Analyzing top-down network design methodologies, technical goals and tradeoffs – scalability, reliability, availability, Network performance, security, Characterizing the existing internetwork, characterizing network traffic, developing network security strategies

UNIT III PHYSICAL SECURITY ISSUES AND LAYER 2 SECURITY

Control physical access to facilities, Control physical access to data centers, Separate identity mechanisms for insecure locations, Prevent password-recovery mechanisms in insecure locations, awareness about cable plant issues, electromagnetic radiation and physical PC security threats, L2 control protocols, MAC flooding considerations, attack mitigations, VLAN hopping attacks, ARP, DHCP, PVLAN security considerations, L2 best practice policies

UNIT IV IP ADDRESSING AND ROUTING DESIGN CONSIDERATIONS

Route summarizations, ingress and egress filtering, Non routable networks, ICMP traffic management, Routing protocol security, Routing protocol authentication, transport protocol management policies, Network DoS/flooding attacks

UNIT V TESTING AND OPTIMIZING SYSTEM DESIGN

Selecting technologies and devices for network design, testing network design – using industry tests, building a prototype network system, writing and implementing test plan, tools for testing, optimizing network design – network performance to meet quality of service (QoS), Modeling, simulation and behavior analysis of security attacks, future issues in information system security

TOTAL : 45 PERIODS

OUTCOMES:

Upon completion of this course, the student should be able to

- Follow the best practices to understand the basic needs to design secure network
- Satisfy the need for user and physical level security on demand for various types of network attacks
- Use best practice policies for different network layer protocols
- Apply the network analysis, simulation, testing and optimizing of security attacks to provide Quality of Service

REFERENCES:

OBJECTIVES

- To understand big data analytics as the next wave for businesses looking for competitive advantage
- To understand the financial value of big data analytics and to explore tools and practices for working with big data
- To understand how big data analytics can leverage into a key component
- To learn about stream computing
- To know about the research that requires the integration of large amounts of data

UNIT I  INTRODUCTION TO BIG DATA


UNIT II  LAMBDA CALCULUS AND DATA ANALYSIS


UNIT III  STREAM COMPUTING


UNIT IV  PREDICTIVE ANALYTICS AND VISUALIZATION


UNIT V  FRAMEWORKS AND APPLICATIONS


TOTAL : 45 PERIODS

OUTCOMES:

Upon completion of this course, the student should be able to

- Use Hadoop, Map Reduce Framework
- Suggest areas to apply big data to increase business outcome
- Contextually integrate and correlate large amounts of information automatically to gain faster insights
REFERENCES:


CP7079   DOMAIN ENGINEERING

OBJECTIVES

- To maximize the satisfaction of the requirements of its stakeholders
- To include the core set of concepts and terminology understood by practitioners in a given area
- To include the knowledge of how to build software systems (or parts of software systems) in a given area
- To evolve consensus amongst the stakeholders

UNIT I   DOMAIN ANALYSIS AND SCOPING


UNIT II   DOMAIN ENGINEERING METHODS

UNIT III  FEATURE MODELING

UNIT IV  GENERATIVE PROGRAMMING

UNIT V  LANGUAGES AND TOOLS
Hume, DSL Paradigm, Stratego/XT, Run-time Code Generation in C++

TOTAL : 45 PERIODS

OUTCOMES
Upon completion of this course, the student should be able to
- Collect, organize, and store past experience in building systems or parts of systems in a particular domain in the form of reusable assets
- Reuse assets when building new systems
- Develop an architecture for family of systems in a domain and provide production plan

REFERENCES:

CP7076 DATA MINING TECHNIQUES

OBJECTIVES
- To understand data mining principles and techniques and Introduce DM as a cutting edge business intelligence
- To expose the students to the concepts of data warehousing architecture and implementation
- To study the overview of developing areas – web mining, text mining and ethical aspects of data mining
- To identify business applications and trends of data mining

UNIT I  INTRODUCTION TO DATA WAREHOUSING
Evolution of Decision Support Systems- Data warehousing Components – Building a Data warehouse, Data Warehouse and DBMS, Data marts, Metadata, Multidimensional data model, OLAP vs OLTP, OLAP operations, Data cubes, Schemas for Multidimensional Database: Stars, Snowflakes and Fact constellations
UNIT II DATA WAREHOUSE PROCESS AND ARCHITECTURE
Types of OLAP servers, 3—Tier data warehouse architecture, distributed and virtual data warehouses. Data warehouse implementation, tuning and testing of data warehouse. Data Staging (ETL) Design and Development, data warehouse visualization, Data Warehouse Deployment, Maintenance, Growth, Business Intelligence Overview- Data Warehousing and Business Intelligence Trends - Business Applications- tools-SAS

UNIT III INTRODUCTION TO DATA MINING
Data mining-KDD versus data mining, Stages of the Data Mining Process-task primitives, Data Mining Techniques -Data mining knowledge representation – Data mining query languages, Integration of a Data Mining System with a Data Warehouse – Issues, Data preprocessing – Data cleaning, Data transformation, Feature selection, Dimensionality reduction, Discretization and generating concept hierarchies-Mining frequent patterns- association-correlation

UNIT IV CLASSIFICATION AND CLUSTERING
Decision Tree Induction - Bayesian Classification – Rule Based Classification – Classification by Back propagation – Support Vector Machines – Associative Classification – Lazy Learners – Other Classification Methods – Clustering techniques – , Partitioning methods- k-means- Hierarchical Methods – distance based agglomerative and divisive clustering, Density-Based Methods – expectation maximization -Grid Based Methods – Model-Based Clustering Methods – Constraint – Based Cluster Analysis – Outlier Analysis

UNIT V PREDICTIVE MODELING OF BIG DATA AND TRENDS IN DATAMINING

TOTAL : 45 PERIODS

OUTCOMES:
Upon completion of this course, the student should be able to
- Evolve multidimensional intelligent model from typical system
- Discover the knowledge imbibed in the high dimensional system
- Evaluate various mining techniques on complex data objects

REFERENCES
1. Jiawei Han, Micheline Kamber, “Data Mining: Concepts and Techniques”, Morgan Kaufmann, Third edition, 2011.
OBJECTIVES

- To gain knowledge about the current web development and emergence of social web
- To study about the modeling, aggregating and knowledge representation of semantic web
- To appreciate the use of machine learning approaches for web content mining
- To learn about the extraction and mining tools for social networks
- To gain knowledge on web personalization and web visualization of social networks

UNIT I  INTRODUCTION TO SOCIAL NETWORK ANALYSIS AND KNOWLEDGE REPRESENTATION  9


UNIT II  SOCIAL MEDIA MINING  9


UNIT III  EXTRACTION AND MINING COMMUNITIES IN WEB SOCIAL NETWORKS  9

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  HUMAN BEHAVIOR ANALYSIS AND PRIVACY ISSUES  9

Understanding and Predicting Human Behavior 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  VISUALIZATION AND APPLICATIONS OF SOCIAL NETWORKS  9


TOTAL : 45 PERIODS

OUTCOMES:

Upon completion of this course, the student should be able to

- Apply knowledge for current Web development in the era of social Web
- Model, aggregate and represent knowledge for Semantic Web
- Use machine learning approaches for Web Content Mining
- Design extraction and mining tools for Social networks
- Develop personalized web sites and visualization for Social networks
REFERENCES:


CP7078 DIGITAL IMAGE PROCESSING AND APPLICATIONS

OBJECTIVES

- To understand the basic concepts of digital image processing and various image transforms
- To familiarize the student with the image processing facilities in Matlab
- To expose the student to a broad range of image processing techniques and their applications, and to provide the student with practical experience using them
- To appreciate the use of current technologies those are specific to image processing systems
- To expose the students to real-world applications of Image Processing

UNIT I FUNDAMENTALS OF IMAGE PROCESSING


UNIT II IMAGE ENHANCEMENT AND RESTORATION


UNIT III MULTI RESOLUTION ANALYSIS AND IMAGE COMPRESSION


UNIT IV IMAGE SEGMENTATION AND DESCRIPTION

Image Segmentation: Detection of Discontinuities, Edge Linking and Boundary Detection, Thresholding, Region Based Segmentation, Basic Morphological Algorithms, Morphological Water Sheds - Description: Boundary Descriptors, Regional Descriptors
UNIT V CURRENT TRENDS AND APPLICATIONS OF IMAGE PROCESSING

Applications: Image Classification, Object Recognition, Image Fusion, Steganography – Current Trends: Color Image Processing, Wavelets in Image Processing

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of this course, the student should be able to

- Have a clear impression of the breadth and practical scope of digital image processing and have arrived at a level of understanding that is the foundation for most of the work currently underway in this field
- Implement basic image processing algorithms using MATLAB tools
- Explore advanced topics of Digital Image Processing, Ability to Apply and develop new techniques in the areas of image enhancement-restoration segmentation-compression-wavelet processing and image morphology
- Make a positive professional contribution in the field of Digital Image Processing

REFERENCES:


CP7071 ADHOC AND WIRELESS SENSOR NETWORKS

OBJECTIVES:

- To learn about the issues in the design of wireless ad hoc networks
- To understand the working of protocols in different layers of mobile ad hoc and sensor networks
- To expose the students to different aspects in sensor networks
- To understand various security issues in ad hoc and sensor networks and solutions to the issues

UNIT I MAC & ROUTING IN AD HOC NETWORKS


UNIT II TRANSPORT & QOS IN AD HOC NETWORKS

UNIT III  MAC & ROUTING IN WIRELESS SENSOR NETWORKS  

UNIT IV  TRANSPORT & QOS IN WIRELESS SENSOR NETWORKS  

UNIT V  SECURITY IN AD HOC AND SENSOR NETWORKS  

TOTAL : 45 PERIODS

OUTCOMES:
Upon completion of this course, the student should be able to
- Identify different issues in wireless ad hoc and sensor networks
- Analyze protocols developed for ad hoc and sensor networks
- Identify different issues in wireless ad hoc and sensor networks
- Identify and critique security issues in ad hoc and sensor networks

REFERENCES:

CP7080  ETHICAL HACKING  
OBJECTIVES
- To learn about the importance of information security
- To learn different scanning and enumeration methodologies and tools
- To understand various hacking techniques and attacks
- To be exposed to programming languages for security professionals
- To get familiarized with the different phases in penetration testing
UNIT I  INTRODUCTION TO HACKING  9

UNIT II  SCANNING AND ENUMERATION  9

UNIT III  SYSTEM HACKING  9

UNIT IV  PROGRAMMING FOR SECURITY PROFESSIONALS  9

UNIT V  PENETRATION TESTING  9

TOTAL : 45 PERIODS

OUTCOMES
Upon completion of this course, the student should be able to
- Defend hacking attacks and protect data assets
- Defend a computer against a variety of security attacks using various tools
- Practice and use safe techniques on the World Wide Web

REFERENCES:

CP7088  PARALLEL AND DISTRIBUTED DATABASES  L T P C
3 0 0 3

OBJECTIVES
- To realize the need of parallel processing
- To cater to applications that require a system capable of sustaining trillions of operations per second on very large data sets
- To understand the need of data integration over data centralization
UNIT I  INTRODUCTION TO PARALLEL DATABASES  9
Need of Parallelism - Forms of parallelism – architecture – Analytical models. Basic Query Parallelism – Parallel Search - Parallel sort and Group By- Parallel Join

UNIT II  ADVANCED QUERY PROCESSING IN PARALLEL DATABASES  9
Parallel indexing. Parallel Universal Qualification – Collection Join Queries. Parallel Query Scheduling – Optimization, Applications

UNIT III  INTRODUCTION TO DISTRIBUTED DATABASES  9
Overview - Promises of DDB –Design Issues – DDB Design – DDB Integration – Data and Access Control

UNIT IV  QUERY PROCESSING IN DISTRIBUTED DATABASES  9
Overview- of Query Processing – Query Decomposition and Data Localization – Optimization of Distributed Queries, Multi-database Query Processing

UNIT V  TRANSACTION MANAGEMENT AND OTHER ADVANCED SYSTEMS  9

TOTAL : 45 PERIODS

OUTCOMES:
Upon completion of this course, the student should be able to
• Get good knowledge on the need, issues, design and application of both parallel and distributed databases
• Know how to write optimal queries to cater to applications that need these forms of databases
• Fragment, replicate and localize their data as well as their queries to get their work done faster
• Get idea on other similar trends of optimal data processing

REFERENCES:

CP7094  STATISTICAL NATURAL LANGUAGE PROCESSING  3 0 0 3

OBJECTIVES
• To understand the representation and processing of Morphology and Part-of Speech Taggers
• To appreciate various techniques used for speech synthesis and recognition
• To understand different aspects of natural language syntax and the various methods used for processing syntax and disambiguating word senses
• To appreciate the various representations of semantics and discourse
• To know about various applications of natural language processing
UNIT I  MORPHOLOGY AND PART-OF SPEECH PROCESSING  9

UNIT II  SPEECH PROCESSING  9

UNIT III  SYNTAX ANALYSIS  9

UNIT IV  SEMANTIC AND PRAGMATIC INTERPRETATION  9

UNIT V  APPLICATIONS  9

TOTAL : 45 PERIODS

OUTCOMES
Upon completion of this course, the student should be able to:
- Identify the different linguistic components of given sentences
- Design a morphological analyser for a language of your choice using finite state automata concepts
- Implement the Earley algorithm for a language of your choice by providing suitable grammar and words
- Use a machine learning algorithm for word sense disambiguation
- Build a tagger to semantically tag words using Word Net
- Design a business application that uses different aspects of language processing
REFERENCES:

CP7091 SERVICE ORIENTED ARCHITECTURE AND DESIGN

OBJECTIVES
- To understand the SOA architecture
- To understand the service oriented analysis and design
- To understand the development of deployment of web services
- To understand the security issues of SOA

UNIT I SOA FUNDAMENTALS

UNIT II SOA AND WEB SERVICES

UNIT III SERVICE ORIENTED ANALYSIS AND DESIGN
Design principles - Business Centric SOA - Deriving Business services - Service Modeling - Coordination - Atomic Transaction - Business activities - Web Service Orchestration Business Process Execution Language (BPEL) - Choreography - Metadata Management - Entity centric business service design - Application Service design - Task centric business service design

UNIT IV WEB SERVICES DEVELOPMENT AND DEPLOYMENT
XML and Web Services - WSDL basics - SOA support in J2EE - Java API for XML-based Web Services (JAX-WS) - Java Architecture for XML Binding (JAXB) - Java API for XML Registries (JAXR) - Web Services Interoperability Technologies - SOA support in .NET - Common Language Runtime - ASP.NET - Web forms - ASP.NET Web Services - Web Services Enhancements
UNIT V SOA APPLICATIONS AND SECURITY


TOTAL : 45 PERIODS

OUTCOMES:

Upon completion of this course, the student should be able to

- Develop and deploy simple and composite web services with SOA design principles considering the security issues
- Use the standards and technologies of modern web service implementations
- Efficiently use leading development tools to create and consume web services
- Implement a service oriented application

REFERENCES:


CP7093 SOFT COMPUTING

OBJECTIVES:

- To learn the key aspects of Soft computing and Neural networks
- To study the fuzzy logic components
- To gain insight onto neuro fuzzy modeling and control
- To know about the components and building block hypothesis of genetic algorithm
- To gain knowledge in machine learning through Support Vector Machines

UNIT I INTRODUCTION TO SOFT COMPUTING

Evolution of Computing - Soft Computing Constituents – From Conventional AI to Computational Intelligence - Machine Learning Basics

UNIT II GENETIC ALGORITHMS


UNIT III NEURAL NETWORKS

UNIT IV  FUZZY LOGIC  9

UNIT V  NEURO-FUZZY MODELING  9

TOTAL : 45 PERIODS

OUTCOMES:
Upon completion of this course, the student should be able to
- Discuss on machine learning through neural networks
- Apply knowledge in developing a Fuzzy expert system
- Model Neuro Fuzzy system for clustering and classification
- Discover knowledge to develop Genetic Algorithm and Support vector machine based machine learning system

REFERENCES

CP7001  INTELLECTUAL PROPERTY RIGHTS  L  T  P  C
3  0  0  3

OBJECTIVES
- To understand the difference between intellectual and conventional property
- To learn how to value intangible assets, taking into account their commercial potential and legal status
- To explore the legal and business issues surrounding marketing of new products related to technology
- Review an intellectual property portfolio and comprehend the extent of their protection

UNIT I  INTRODUCTION  9
Intellectual Property Rights and their usefulness for Engineers - Intellectual Property vs. Physical or conventional Property- Patents - Usefulness of Patents for Engineers- Practical aspects of filing a Patent in India - and Practical aspects of filing a Patent in Abroad
UNIT II  COPY RIGHTS  9
Copyright and its usefulness in Engineering - Practical aspects of Copyright Registration and Transfer - Design registration - Industrial Design Registration and its usefulness in Engineering - Practical aspects of Industrial Design Registration in India and Abroad

UNIT III  TRADE SECRETS AND TRADEMARKS  9
Trade Secrets- Importance for Engineers – Trademarks- Importance in Engineering

UNIT IV  AGREEMENTS AND LEGISLATION  9
International Agreements and Organizations related to Intellectual Property - Legislations and Policy

UNIT V  DIGITAL PRODUCTS AND LAW  9
Digital Innovations and Developments as Knowledge Assets - IP Laws, Cyber laws and Digital Content Protection - Case studies - Preparation of a prior art search map-Downloading and filing of granted patents and published patent applications – Maintaining a patent file - Filing a copyright application for a software - Filing an industrial design application for an innovative design of machine-Generating a ‘patent infringement clearance report’ for a client

TOTAL : 45 PERIODS

OUTCOMES
Upon completion of this course, the student should be able to

- Apply for patents in India and Abroad
- Develop a business plan that advances the value of their intellectual property portfolio
- Develop a strategy of marketing their intellectual property and understand some negotiation basics
- Explain some of the limits of their intellectual property rights and comprehend some basic legal pitfalls

REFERENCES

CP7002  VIDEO ANALYTICS  L T P C
3 0 0 3

OBJECTIVES:
- To know the fundamental concepts of big data and analytics
- To learn various techniques for mining data streams
- To acquire the knowledge of extracting information from surveillance videos
- To learn Event Modeling for different applications
- To understand the models used for recognition of objects in videos
UNIT I  INTRODUCTION TO BIG DATA & DATA ANALYSIS  9

UNIT II  MINING DATA STREAMS  9
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  9

UNIT IV  BEHAVIOURAL ANALYSIS & ACTIVITY RECOGNITION  9
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  9
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

TOTAL : 45 PERIODS

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

REFERENCES