NANDHA ENGINEERING COLLEGE

(An Autonomous Institution affiliated to Anna University Chennai and approved by AICTE, New Delhi) Erode-638 052, Tamilnadu, India, Phone: 04294 – 225585



Curriculum and Syllabi for M.E – Computer Science and Engineering [R13]

(This Curriculum and Syllabi are applicable to Students admitted from the academic year 2013-2014 onwards)

AUGUST 2013

Approved by first governing body

M.E. Computer Science and Engineering

SEMESTER I

THEORY					
Course Code	Course Title	L	Т	Р	С
13CP101	Operations Research	3	1	0	4
13CP102	Data Structures and Algorithms	3	1	0	4
13CP103	Object Oriented Software Engineering	3	0	0	3
13CP104	Network Engineering And Management	3	0	0	3
13CP105	Advanced Computer Architecture	3	0	0	3
13CP106	Distributed Systems	3	0	0	3

PRACTICAI	_				
Course Code	Course Title	L	Т	Р	С
13CP111	Data Structures laboratory	0	0	3	2
13CP112	Computer Networks laboratory	0	0	3	2
	TOTAL	18	2	6	24

SEMESTER II

THEORY					
Course Code	Course Title	L	Т	Р	С
13CP201	Operating Systems	3	1	0	4
13CP202	Web Technology	3	1	0	4
13CP203	Information and Network Security	3	0	0	3
13CP204	Advanced Database Technology	3	0	0	3
E1	Elective I	3	0	0	3
E2	Elective II	3	0	0	3

PRACTICAL					
Course Code	Course Title	L	Т	Р	С
13CP211	Operating Systems laboratory	0	0	3	2
13CP212	Database Technology laboratory	0	0	3	2
13CP213	Technical Term Paper	0	0	2	1
	TOTAL	18	2	8	25

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EMESTER III

THEORY					
Course Code	Course Title	L	Т	P	C
E3	Elective III	3	0	0	3
E4	Elective IV	3	0	0	3
E5	Elective V	3	0	0	3

PRACTICAI	_				
Course Code	Course Title	L	Т	Р	С
13CP311	Project phase I	0	0	12	6
	TOTAL	9	0	12	15

SEMESTER IV

PRACTICAI					
Course Code	Course Title	L	Т	Р	С
13CP411	Project phase II	0	0	24	12
	TOTAL	0	0	24	12

M.E. Computer Science and Engineering (Part Time)

SEMESTER I

THEORY					
Course Code	Course Title	L	Т	Р	С
13CP101	Operations Research	3	1	0	4
13CP102	Data Structures and Algorithms	3	0	0	3
13CP103	Object Oriented Software Engineering	3	0	0	3

PRACTICAI	_				
Course Code	Course Title	L	Т	Р	С
13CP111	Data Structures laboratory	0	0	3	2
	TOTAL	9	2	3	12

SEMESTER II

THEORY					
Course Code	Course Title	L	Т	Р	C
13CP201	Operating Systems	3	1	0	4
13CP202	Web Technology	3	1	0	4
13CP203	Information and Network Security	3	0	0	3

PRACTICAL

Course Code	Course Title	L	Т	Р	С
13CP211	Operating Systems laboratory	0	0	3	2
	TOTAL	9	2	3	13

SEMESTER III

THEORY					
Course Code	Course Title	L	Т	Р	С
13CP104	Network Engineering And Management	3	0	0	3
13CP105	Advanced Computer Architecture	3	0	0	3
13CP106	Distributed Systems	3	0	0	3

PRACTICAL					
Course Code	Course Title	L	Т	Р	С
13CP112	Computer Networks laboratory	0	0	3	2
TOTAL		9	0	3	11

SEMESTER IV

THEORY					
Course Code	Course Title	L	Т	Р	С
13CP204	Advanced Database Technology	3	0	0	3
E1	Elective I	3	0	0	3
E2	Elective II	3	0	0	3

PRACTICAL							
Course Code	Course Title	L	Т	Р	С		
13CP212	Database Technology laboratory	0	0	3	2		
13CP213	Technical Term Paper	0	0	2	1		
TOTAL		9	0	5	12		

SEMESTER V

THEORY					
Course Code	Course Title	L	Т	Р	С
E3	Elective III	3	0	0	3
E4	Elective IV	3	0	0	3
E5	Elective V	3	0	0	3

PRACTICAL					
Course Code	Course Title	L	Т	Р	С
13CP311	Project phase I	0	0	12	6
TOTAL		9	0	12	15

SEMESTER VI

PRACTICAI	_				
Course Code	Course Title	L	Т	Р	C
13CP411	Project phase II	0	0	24	12
TOTAL		0	0	24	12

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ELECTIVES

ELECTIVE I							
Course Code	Course Title	L	Т	Р	С		
13CPX01	Mobile Computing	3	0	0	3		
13CPX02	Data Warehousing and Data Mining	3	0	0	3		
13CPX03	Digital Image Processing and Application	3	0	0	3		
13CPX04	Adhoc Networks	3	0	0	3		
ELECTIVE I							
13CPX05	Grid Computing	3	0	0	3		
13CPX06	Software Project Management	3	0	0	3		
13CPX07	Semantic Web	3	0	0	3		
13CPX08	Network Optimization Techniques	3	0	0	3		
ELECTIVE II	Π						
13CPX09	Cloud Computing	3	0	0	3		
13CPX10	Bio Informatics	3	0	0	3		
13CPX11	Pattern Recognition	3	0	0	3		
13CPX12	High Speed Networks	3	0	0	3		
ELECTIVE Г	V						
13CPX13	Pervasive Computing	3	0	0	3		
13CPX14	Multimedia Systems	3	0	0	3		
13CPX15	Open Source Systems	3	0	0	3		
13CPX16	Wireless Sensor Networks	3	0	0	3		
ELECTIVE V	·						
13CPX17	Soft Computing	3	0	0	3		
13CPX18	Software Quality Assurance	3	0	0	3		
13CPX19	XML and Web services	3	0	0	3		
13CPX20	TCP/IP Technology	3	0	0	3		

OBJECTIVES:

To develop the student efficient in optimizing using limited resources by knowledge in building different mathematical modeling and finding optimal solutions.

LEARNING OUTCOMES:

On completion of the course the students are expected

- To understand the optimization techniques under limited resources for the engineering and business problems.
- To expose the basic characteristics features of a queuing system and acquires skills in analyzing queuing models

UNIT I: QUEUING MODELS

Poisson Process-Markovian Queues-Single and Multi-server Models-Little["] s formula-Machine Interference Model-Steady State analysis-Self Service Queue.

UNIT II: ADVANCE QUEUING MODELS

Non-Markovian Queues-Pollaczek Khintchine Formula-Queues in Series-Open Queueing Networks-Closed Queueing Networks.

UNIT III: SIMULATION

Discrete Even Simulation-Monte-Carlo Simulation-Stochastic Simulation-Applications to Queueing systems.

UNIT IV: LINEAR PROGRAMMING

Formulation-Graphical solution-Simplex method-Two phase method-Transportation and Assignment Problems.

UNIT V: NON- LINEAR PROGRAMMING

Lagrange multipliers-Equality constraints-Inequality constraints –Kuhn-Tucker conditions-Quadratic Programming.

TOTAL: 60 PERIODS

- 1. W.L Winston, "Operations Research", 4th ed., Thomson-Brooks/Cole, 2003.
- 2. H.A. Taha, "Operations Research: An Introduction", 9th ed., Pearson Education, New Delhi, 2002.

REFERENCES:

TEXT BOOKS:

- 1. T.G Robertazzi.. "Computer Networks and Systems-Queuing Theory and Performance Evaluation", 3rd ed., Springer, Reprint 2002.
- 2. S.M Ross, "Probability Models for Computer Science", Academic Press, 2002.

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13CP102 - DATA STRUCTURES AND ALGORITHMS

OBJECTIVES:

- To familiar with basic techniques of algorithm analysis. To understand the concepts of notations and analysis. To familiar with writing recursive methods.
- To understand the concepts of Heaps and Search structures.
- To familiar with advanced algorithms.

LEARNING OUTCOMES:

Upon completion of the subject, students will be able to:

- Analyze the efficiency of the designed algorithms. Use recursive design.
- Implement the main data structures and use them to solve computational problems.
- Master different algorithm design techniques.
- Ability to apply and implement learned algorithm design techniques to solve problems.

UNIT – 1: FUNDAMENTALS

Mathematical Induction - Asymptotic Notations – Properties of Big-oh Notation – Conditional Asymptotic Notation – Algorithm Analysis – Amortized Analysis – NP Completeness – NP-Hard – Recurrence Equations – Solving Recurrence Equations – Memory Representation of Multi-dimensional Arrays – Time-Space Tradeoff.

UNIT – 2: HEAP STRUCTURES

Min/Max heaps – Deaps – Leftist Heaps – Binomial Heaps – Fibonacci Heaps – Skew Heaps – Lazy-Binomial Heaps.

UNIT –3: SEARCH STRUCTURES

Binary Search Trees – AVL Trees – Red-Black trees – Multi-way Search Trees – B-Trees – Splay Trees – Tries.

UNIT - 4: ANALYSIS AND DESIGN OF ALGORITHMS

Sorting - Searching - Design Techniques - Greedy Methods – Dynamic Programming - Divide and Conquer - Back Tracking – Applications.

UNIT – 5: ADVANCED ALGORITHMS

Huffman Coding – Convex Hull – Topological Sort – Tree Vertex Splitting – Activity Networks – Flow Shop Scheduling – Counting Binary Trees – Introduction to Randomized Algorithms

1. E. Horowitz, S.Sahni and Dinesh Mehta, "Fundamentals of Data structures in C++", University Press, 2007.

REFERENCE BOOKS:

TEXT BOOKS:

- 2. E. Horowitz, S. Sahni and S. Rajasekaran, "Computer Algorithms/C++", 2nd ed., University Press, 2007.
- 3. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C++", Pearson Education, 2002.
- 4. G. Brassard and P. Bratley, "Algorithmics: Theory and Practice", Printice Hall, 1988.
- 5. Alfred .V. Aho, John .E. Hopcroft, and Jeffrey .D. Ullman, "Data Structures and Algorithms", Addison-Wesley Publications., 1985

TOTAL: 60 PERIODS

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13CP103 - OBJECT ORIENTED SOFTWARE ENGINEERING

OBJECTIVES:		Т	Р	С			
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 Learn basics of the software engineering (SE) process life cycle. Learn what the object-oriented (OO) approach to software development is, through OO principles and design patterns. Learn UML (Unified Modeling Language) 							
LEARNING OUTCOMES:							
 Students who have successfully completed this course will be able to: Work in a team to develop and present a software system, producing appropriate documenta a lifecycle model. Discuss techniques for gathering and analyzing users["] requirements. Construct static and dynamic models of software using UML. Develop an efficient and effective test plan from software requirements. Discuss issues related to the management of the software development process. 	tion	and	follo	wing			
UNIT I: INTRODUCTION (9)							
Introduction – Software Engineering Concepts – Development Activities – Managing Software Dev Modeling Language – Project Organization and Communication	elopı	nent	: – U	nified			
UNIT II: ANALYSIS				(9)			
Requirements Elicitation - Concepts - Activities - Management - Analysis concepts - Analysis Ac	tivitie	es					
UNIT III: SYSTEM DESIGN				(9)			
Decomposing the system – Overview of System Design – System Design Concepts – System Design – Addressing Design Goals – Managing System Design	1 Act	iviti	es				
UNIT IV: OBJECT DESIGN AND IMPLEMENTATION ISSUES				(9)			
Reusing Pattern Solutions – Specifying Interfaces – Mapping Models to Code – Testing							
UNIT V: MANAGING CHANGE				(9)			
Rationale Management - Configuration Management - Project Management - Software Life Cycle							
TEXT BOOK: TEXT BOOK:							
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- 1. Bernd Bruegge, Alan H Dutoit, "Object-Oriented Software Engineering", 3rd ed., Pearson Education, 2010.
- 2.

REFERENCES:

- 1. Timothy C.Lethbridge and Robert Laganiere, "Object-oriented software Engineering", Tata McGraw-Hill, 2004
- Craig Larman, "Applying UML and Patterns", 3rd ed., Pearson Education, 2005.
- 3. Stephen Schach, "Software Engineering" 7th ed., McGraw-Hill, 2007.

13CP104 - NETWORK ENGINEERING AND MANAGEMENT

OBJECTIVES:

• To learn how to provide the foundations for building, deploying and managing computer network systems.

LEARNING OUTCOMES:

Upon completion of the subject, students will be able to:

• The emphasis of this specialization is on applying proven and innovative practices for building industrystandard networking solutions.

UNIT I: FOUNDATIONS OF NETWORKING

Communication Networks - Network Elements - Switched Networks and Shared media Networks - Probabilistic Model and Deterministic Model – Datagrams and Virtual Circuits – Multiplexing – Switching – Error and Flow Control - Congestion Control - Layered Architecture - Network Externalities - Service Integration - Modern Applications

UNIT II: QUALITY OF SERVICE

Traffic Characteristics and Descriptors - Quality of Service and Metrics - Best Effort model and Guaranteed Service Model – Limitations of IP networks – Scheduling and Dropping policies for BE and GS models – Traffic Shaping algorithms - End to End solutions - Laissez Faire Approach - Possible improvements in TCP -Significance of UDP in inelastic traffic

UNIT III: HIGH PERFORMANCE NETWORKS

Integrated Services Architecture - Components and Services - Differentiated Services Networks - Per Hop Behaviour - Admission Control - MPLS Networks - Principles and Mechanisms - Label Stacking - RSVP -**RTP/RTCP**

UNIT IV: HIGH SPEED NETWORKS

Optical links - WDM systems - Optical Cross Connects - Optical paths and Networks - Principles of ATM Networks - B-ISDN/ATM Reference Model - ATM Header Structure - ATM Adaptation Layer - Management and Control - Service Categories and Traffic descriptors in ATM networks

UNIT V: NETWORK MANAGEMENT

ICMP the Forerunner – Monitoring and Control – Network Management Systems – Abstract Syntax Notation – CMIP - SNMP Communication Model - SNMP MIB Group - Functional Model - Major changes in SNMPv2 and SNMPv3 - Remote monitoring - RMON SMI and MIB

REFERENCES

- 1. Mahbub Hassan and Raj Jain, "High Performance TCP/IP Networking", Pearson Education, 2004.
- 2. Larry L Peterson and Bruce S Davie, "Computer Networks: A Systems Approach", 4th ed., Morgan Kaufman Publishers, 2007.
- 3. Jean Warland and Pravin Vareya, "High Performance Networks", Morgan Kauffman Publishers, 2002
- 4. William Stallings, "High Speed Networks: Performance and Quality of Service". 2nd ed., Pearson Education.2002.
- 5. Mani Subramaniam, "Network Management: Principles and Practices", Pearson Education, 2000
- 6. Kasera and Seth, "ATM Networks: Concepts and Protocols", Tata McGraw Hill, 2002.

TOTAL: 45 PERIODS

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13CP105 - ADVANCED COMPUTER ARCHITECTURE L T P

OBJECTIVES:

- Understand processor design concepts in modern computer architecture
- Understand Organization and Instruction Set Architecture Understand Main and cache memory organization and design issues Understand the ILP and TLP performance
- Understand different IO and Interconnection structures

LEARNING OUTCOMES:

Upon completion of the subject, students will be able to:

- Classify instruction set architectures.
- Describe the operation of performance enhancements such as pipelines, dynamic scheduling, branch prediction, caches, and vector processors.
- Anaylze the operation of virtual memory
- Compare the performance of different architectures.

UNIT I: FUNDAMENTALS OF COMPUTER DESIGN

Fundamentals of Computer Design – Measuring and reporting performance – Quantitative principles of computer design. Instruction set principles – Classifying ISA – Design issues. Pipelining – Basic concepts – Hazards – Implementation – Multicycle operations

UNIT II: INSTRUCTION LEVEL PARALLELISM

Concepts and challenges – Reducing branch costs with dynamic hardware prediction- Overcoming data hazards with dynamic scheduling – Examples- Hardware based speculation- multiple issues-Limitations of ILP-Case studies.

UNIT III: ILP 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 – Cross cutting issues-Intel IA64 Architecture.

UNIT IV: MEMORY AND I/O

Cache performance – Reducing cache miss penalty and miss rate – Reducing hit time – Main memory and performance – Memory technology. Types of storage devices – Buses – RAID – Reliability, availability and dependability – I/O performance measures – Designing an I/O system

UNIT V: MULTIPROCESSORS AND THREAD LEVEL PARALLELISM

Symmetric and distributed shared memory architectures – Performance issues – Synchronization issues – Models of memory consistency – Software and hardware multithreading.

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TEXT BOOK:

1. John L. Hennessey and David A. Patterson, "Computer Architecture – A quantitative / approach", Morgan Kaufmann / Elsevier, 4^{th} ed., 2007

REFERENCES:

- 1. David E. Culler, Jaswinder Pal Singh, "Parallel Computing Architecture: A hardware / software approach", Morgan Kaufmann / Elsevier, 1997.
- 2. William Stallings, "Computer Organization and Architecture Designing for Performance", Pearson Education, 7th ed., 2006. 3. Behrooz Parhami, "Computer Architecture", Oxford University Press, 2006.

OBJECTIVES:

• The main OBJECTIVES of distribution system is to minimize the duration of fault current and to minimize the number of customers affected by the fault system.

LEARNING OUTCOMES:

Upon completion of the subject, students will be able to:

• To learn how to eliminate the safety hazards as fast as possible, to limit the service outages and to protect the consumers apparatus.

UNIT I: INTRODUCTION

Definition of Distributed system – Goals- Hardware concepts: Multiprocessors, Homogeneous and Heterogeneous multicomputer systems– Software concepts: Distributed Operating Systems, Network operating systems and Middleware – Client server model.

UNIT II: COMMUNICATION AND PROCESSES

Layered Protocol – Remote procedure call – Remote object invocation – Message oriented communication – Processes: Threads in distributed systems- Code Migration-Software Agents.

UNIT III: SYNCHRONIZATION

Clock synchronization – Physical clocks- Logical clocks- Election algorithms- Mutual exclusion – Distributed transactions.

UNIT IV: FAULT TOLERANCE

Basic concepts –Design Issues- Reliable client server communication- Reliable group communication. Distributed object based systems: CORBA – Distributed COM – GLOBE – Comparison of CORBA, DCOM and GLOBE.

UNIT V: DISTRIBUTED FILE SYSTEM

Sun Network File system- CODA File system – XFS and SFS File system. Distributed document based systems: WWW – LOTUS NOTES.

TEXT BOOK:

1. Andrew S. Tanenbaum and Maarten Van Steen ,"Distributed Systems –Principles and paradigms", Prentice Hall of India Pvt Ltd, New Delhi, 2009.

REFERENCES:

- 1. George Coulouris, Tim Kindberg and Jean Dollimore, "Distributed Systems Concept and Design", Pearson Education, New Delhi, 2005.
- 2. Nancy A Lynch, "Distributed Algorithms", Morgan Kaufmann Publishers, New Delhi, 2000.

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OBJECTIVES:

- To design and code algorithms for problem solutions
- Understand the concept of linear structures.
- Understand applicability for the various data structures.

LEARNING OUTCOMES:

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

- Be able to design and analyze the time and space efficiency of the data structure
- Be capable to identity the appropriate data structure for given problem
- Have practical knowledge on the application of data structures
- 1. Implementation of the following Heap Structures Min Heap Deaps(Insertion, Delete Min, Delete Max) Skew Heap(Priority Queue operations) Fibonacci Heap(Priority Queue operations)
- 2. Implementation of the following Search Structures AVL Trees (Insertion, Deletion and Search) Splay Trees (Insertion, Deletion and Search) B-Trees (Insertion, Deletion and Search) Red- Black Trees
- 3. Implementation of Convex Hull
- 4. Implementation of Topological sort

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13CP112 - COMPUTER NETWORKS LABORATORY

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OBJECTIVES:

- They can understand how the data transferred from source to destination
- They can come to know that how the routing algorithms worked out in network layer

LEARNING OUTCOMES:

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

- To be familiar with contemporary issues in networking technologies, To be familiar with network tools and network programming
- 1. Simple topology creation.
- 2. Socket Programming.
 - a. TCP Sockets. b. UDP Sockets. c. Application using sockets.
- 3. Routing Algorithms (Shortest Path, Link State).
- 4. Simulation of Congestion Control Algorithms using NS.
- 5. Development of applications such as DNS/ HTTP/ E mail/ Multi user Chat.
- 6. Simulation of Network Management Protocols.

13CP201 - OPERATING SYSTEMS

OBJECTIVES:

- To learn how an operating system performs its duties is to garner insight into how a computer functions at its innermost levels.
- To learn a multiprogramming system, distributed operating systems
- To learn the the principles of managing the main memory, one of the most precious resources in mechanisms of synchronization, resource management, failure recovery and fault tolerance

LEARNING OUTCOMES:

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

- Able to understand about the potential benefits of distributed operating systems. To understand multiprogramming system, resource management.
- To understand the concepts of failure recovery, fault tolerance and Concurrency Control.

UNIT I: PROCESS SYNCHRONIZATION

Overview - Functions of an Operating System – Design Approaches – Types of Advanced Operating System -Synchronization Mechanisms – Concept of a Process, Concurrent Processes – The Critical Section Problem, Other Synchronization Problems – Language Mechanisms for Synchronization – Axiomatic Verification of Parallel Programs – Process Deadlocks - Preliminaries – Models of Deadlocks- Resources – A Graph-Theoretic model of System State – Necessary and Sufficient conditions for a Deadlock – Systems with Single-Unit Requests, Consumable Resources, Reusable Resources.

UNIT II: DISTRIBUTED OPERATING SYSTEMS

Issues – Communication Networks and Primitives – Theoretical Foundations - Inherent Limitations - Lamport[®] s Logical Clock- Vector Clock- Causal Ordering of Messages- Global State- Distributed Mutual Exclusion – Classification- Preliminaries - Non-Token Based Algorithms – Lamport[®] s Algorithm - Token-Based Algorithms – Suzuki-Kasami[®] s Broadcast Algorithm– Distributed Deadlock Detection– Preliminaries – Handling of Deadlocks -Issues –Centralized Deadlock-Detection Algorithms - Distributed Deadlock Detection Algorithms – Hierarchical Deadlock Detection Algorithms.

UNIT III: DISTRIBUTED RESOURCE MANAGEMENT (9+3)

Distributed file system - Architecture–Design issues-Distributed Shared Memory- Algorithms for implementing DSM – Memory Coherence and Coherence Protocols – Design Issues- Distributed Scheduling – Issues in Load Distributing – Components of a Load Distributing Algorithm – Stability – Load Distributing Algorithm – Performance Comparison – Selecting a Suitable Load Sharing Algorithm – Requirements for Load Distributing - Task Migration and Issues.

UNIT IV: FAILURE RECOVERY AND FAULT TOLERANCE (9+3)

Recovery : Introduction – Basic Concepts – Classification of Failures – Backward and Forward Error Recovery Approaches - Recovery in Concurrent Systems – Synchronous and Asynchronous Check Pointing and Recovery – Check Pointing for Distributed Database Systems - Recovery in Replicated Distributed Databases Systems – Fault Tolerance – Issues- Commit Protocol- Non Blocking Commit Protocol-Voting Protocol - Dynamic Voting Protocol – Dynamic Vote Reassignment Protocol – Failure Resilient Processes – Reliable Communication.

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UNIT V:DATABASE OPERATING SYSTEMS

system- Concurrency Control: Theoretical Aspects

Introduction- Requirements of a Database Operating System- Concurrency Control: Theoretical Aspects – Database Systems – The Problem of Concurrency Control – Serializability Theory- Distributed Database Systems-Concurrency Control Algorithms- Basic Synchronization Primitives – Lock Based Algorithms - Timestamp Based Algorithms - Optimistic Algorithms – Data Replication.

TOTAL 60 HOURS

1. Mukesh Singhal and N. G. Shivaratri, "Advanced Concepts in Operating Systems", McGraw-Hill, 2000

REFERENCES:

TEXT BOOK:

- 1. Abraham Silberschatz, Peter B. Galvin and G. Gagne, "Operating System Concepts", 6th ed., Addison Wesley Publishing Co., 2003.
- 2. Andrew S. Tanenbaum, "Modern Operating Systems", 2nd ed., Addison Wesley, 2001.
- 3. Pradeep K.Sinha, "Distributed operating system -Concepts and design", PHI, 2003
- 4. Andrew S.Tanenbaum, "Distr ibuted operating system", Pearson education, 2003

Approved by first governing body

OBJECTIVES:

- Understand the basic concepts of web
- Develop programs using JavaScript, PHP and MySQL Design and develop a simple interactive web application
- Employ basic XML specifications, technologies and applications
- Describe web service, supporting specifications and technologies including SOAP and UDDI

LEARNING OUTCOMES:

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

- Analyze a web page and identify its elements and attributes. Create web pages using XHTML and Cascading Styles sheets.
- Build interactive web applications using ASP.NET, PHP and JSP. Construct and manipulate web databases
- Build and consume web services.

UNIT I: INTRODUCTION

Web essentials – markup languages – XHTML – simple XHTML pages style sheets – CSS DHTML: Object models and collections – Event Model – Filters and transitions – Data binding with tabular data control – Scripting Languages: JavaScript.

UNIT II: ADVANCED JAVA PROGRAMMING

Java Swing: Introduction – Starting a swing application – Swing component basics – Labels and Icons – Buttons – Bounded range components – List and Combo Boxes – Swing Containers – Java Beans: Using Beans – Writing Beans – Building Bean Containers and Bridges.

UNIT III: XML AND WEB SERVICES

XML Basis – Working with DTD – XSL Transformations – Using Schema – XML Query. Web Services – UDDI – SOAP – Deploying and Managing Web Services

UNIT IV: SERVLETS, ASP AND JSP

Servlet life cycle – Servlet API – Simple Servlet – Cookies – Session Tracking – Database Connectivity - Servlet Chaining- Active Server Pages – Java Server Pages – Components of JSP – JSP Sessions – Using Cookies – Disabling Sessions

UNIT V: PHP AND MYSQL

Programming with PHP – Introduction, syntax, variables, strings, operators, statements, array, function, file handling and data storage, , Sending and receiving E-mails, PHP connectivity. MySQL: Setting up account – Writing your own SQL programs – MySQL and Web.

TOTAL: 60PERIODS

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- 1. Deitel, Deitel and Neito, "INTERNET and WORLD WIDE WEB How to program", Pearson Education Asia, 2002.
- 2. Elliotte Rusty Herold, "Java Network Programming", 3rd ed., O[®] Reilly Publications, 2004.
- 3. Norton D and Schildt H, "Java 2: The complete Reference", 5th ed., TMH.
- 4. R.Eckstein, Loy, Wood, "JAVA Swing", O" Reilly Publications, 2000.
- 5. Eric Ladd and Jim O[®] Donnell, et al, "USING HTML 4, XML, and JAVA1.2", PHI publications, 2003.
- 6. Heather Williamson, "The Complete Reference XML", TMH, 2001.
- 7. Steven Holzner, "PHP Complete Reference", 2nd ed., TMH,Indian Print 2009.
- Steve Suchring, "MySQL Bible", John Wiley, 2002.
 Anura Guruge, "Web Services Theory and Practices", ELSEVIER Digital Press.

OBJECTIVES:

- To know about information security Issues, laws, Policy.
- To learn the goals of secure computing: confidentiality, integrity, availability.
- To learn the threats to security in computing: interception, interruption, modification, fabrication.
- To learn Malicious code: viruses, worms, Trojan horses.
- To learn Protection features provided by general-purpose operating systems: protecting memory, files, and the execution environment.
- To learn User authentication, Security planning.

LEARNING OUTCOMES:

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

- Able to understand security Issues, laws, Policies, Risk management. To understand various Encryption algorithms
- To understand protection techniques in operating systems
- To understand User authentication, Security planning

UNIT I: INTRODUCTION TO INFORMATION SYSTEM

Introduction – The System Development Life Cycle – The need for Security – Business needs – Threats – Attacks – Issues - International Laws and Legal Bodies – Ethics and Information Security – Codes of Ethics and Professional Organizations.

UNIT II: RISK MANAGEMENT AND PLANNING FOR SECURITY (9)

An overview of Risk management – Risk Identification – Risk Assessment – Risk Control Strategies – Planning for Security – Information Security policy, standards and Practices – Blue Print – Security Education, Training and Awareness program – Continuity Strategies.

UNIT III: SECURITY IN COMPUTING AND CRYPTOGRAPHY (9)

Security Problem in Computing - Attacks -The Meaning of Computer Security- Computer Criminals-Methods of Defense- Terminology and Background- Substitution Ciphers-Transpositions (Permutations)- The Data Encryption Standard - The AES Encryption Algorithm- Public Key Encryption - The Uses of Encryption.

UNIT IV: PROGRAM SECURITY AND PROTECTION IN OPERATING SYSTEMS (9)

Secure Programs - Nonmalicious Program Errors - Viruses and Other Malicious Code - Targeted Malicious Code - Controls Against Program Threats – Protected Objects and Methods of Protection - Memory and Address Protection - Control of Access to General Objects - File Protection Mechanisms - User Authentication.

UNIT V: TRUSTED SYSTEMS AND DATABASE AND DATA MINING SECURITY (9)

Trusted System - Security Policies - Models of Security - Trusted Operating System Design - Assurance in Trusted Operating Systems. Database and Data Mining Security - Introduction - Security Requirements - Reliability and Integrity - Sensitive Data - Inference - Multilevel Databases - Proposals for Multilevel Security - Data Mining.

TOTAL: 45 PERIODS

Approved by first governing body

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TEXT BOOK:

- 1. Michael E. Whitman and Herbert J. Mattord "Principles of Information Security ", 2nd ed, Thomson Course Technology.
- Charles P. Pfleeger , Shari Lawrence Pfleeger and Deven N.Shah "Security in Computing ", 4th ed., Pearson Education, 2007.

REFERENCES:

- 1. William Stallings, "Cryptography & Network Security Principles & Practice", 5th ed., Prentice Hall of India.
- 2. Atul Kahate,"Cryptography & Network Security", Tata Mc GrawHill Ltd, 2003.
- 3. William Stallings, "Network Security Essentials, Applications and Standards", Dorling Kindersley I P. Ltd Delhi, 2008.
- 4. Wenbo Mao, "Modern Cryptography: Theory and Practice", Prentice Hall, New Delhi, 2003.

TOTAL: 45 PERIODS

13CP204 - ADVANCED DATABASE TECHNOLOGY

OBJECTIVES:

- To learn about Distributed Database Architecture and Design
- To familiar with Distributed Transactions
- To know about Object and Object Relational DBMS with examples
- To do the Advanced Normalization •
- To learn about Data Mining and Business Intelligence

LEARNING OUTCOMES:

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

- Assess and apply database functions and packages suitable for enterprise database development and database management
- Critically evaluate alternative designs and architectures for databases and data warehouses
- Analyse the background processes involved in queries and transactions, and explain how these impact on database operation and design

UNIT I: DISTRIBUTED DATABASES

Distributed Databases Vs Conventional Databases - Architecture - Fragmentation - Query Processing -Transaction Processing - Concurrency Control - Recovery.

UNIT II: OBJECT ORIENTED DATABASES

Introduction to Object Oriented Data Bases - Approaches - Modeling and Design - Persistence - Query Languages - Transaction - Concurrency - Multi Version Locks - Recovery.

UNIT III: EMERGING SYSTEMS

OLAP - Client/Server Model - Data Warehousing and Data Mining - XML - Mobile Databases.

UNIT IV: DATABASE DESIGN ISSUES

ER Model - Normalization - Security - Integrity - Consistency - Database Tuning - Query Optimization - Design of Temporal Databases – Spatial Databases

UNIT V: CURRENT ISSUES

Rules - Knowledge Bases - Active And Deductive Databases - Parallel Databases - Multimedia Databases - Image Databases – Text Database

TEXT BOOKS:

- 1. Henry F Korth, Abraham Silberschatz, S. Sudharshan, "Database System Concepts", 6th Ed., Mcgraw Hill. 2011.
- 2. Thomas Connolly, Carolyn Begg,"Database Systems" A practical Approach to Design, Implementation, and
- 3. Management,4th Ed.,Pearson Education, 2009.

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REFERENCES:

- 1. Elisa Bertino, Barbara Catania and Gian Piero Zarri, "Intelligent Database Systems", Addison-Wesley, 2001.
- 2. Carlo Zaniolo, Stefano Ceri, Christos Faloustsos, R.T.Snodgras and V.S.Subrahmanian, "Advanced Database Systems", Morgan Kaufman, 1997.
- 3. N.Tamer Ozsu, Patrick Valduriez, "Principles Of Distributed Database Systems", Prentic Hal International Inc., 1999.
- 4. C.S.R Prabhu, "Object-Oriented Database Systems", Prentice Hall Of India, 1998.
- 5. Abdullah Uz Tansel Et Al, "Temporal Databases: Theory, Design And Principles", Benjamin Cummings Publishers, 1993.
- 6. Raghu Ramakrishnan, Johannes Gehrke, "Database Management Systems", 3rd ed, Mcgraw Hill,2004.

OBJECTIVES:

- The OBJECTIVES of this lab is to teach students about various operating systems including Windows, Mac and Unix.
- Students learn about systems configuration and administration.

LEARNING OUTCOMES:

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

- The Student can able to point the problems related to process management and synchronization as well as is able to apply learned methods to solve basic problems.
- Student is capable of explaining the cause and effect related to deadlocks and is able to analyse them related to common circumstances in operating systems.
- Additionally, the student is able to explain the basics of memory management, the use of virtual memory in modern operating systems as well as the structure of the most common file-systems.
- 1. Given the list of processes, their CPU burst times and arrival times, display/print the Gantt chart for FCFS and SJF. For each of the scheduling policies, compute and print the average waiting time and average turnaround time
- 2. Given the list of processes, their CPU burst times and arrival times, display/print the Gantt chart for Priority and Round robin. For each of the scheduling policies, compute and print the average waiting time and average turnaround time
- 3. Implement the Producer Consumer problem using semaphores
- 4. Implement Best fit, First Fit Algorithm for Memory Management.
- 5. Implement BankerAlgorithm
- 6. Implement FIFO and LRU page replacement algorithms
- 7. Multiple sleeping barbers Multiprocessor operating systems

Write a multi-class multithreaded Java program that simulates multiple sleeping barbers, all in one barbershop that has a finite number of chairs in the waiting room. Each customer is instantiated from a single Customer class, each barber is instantiated from a single Barber class.

8. Real time operating systems

A real-time program implementing an alarm clock shall be developed.

[Alarm clock, using C and Simple_OS]. The program shall fulfill the following requirements:

Clock with alarm functionality shall be implemented, It shall be possible to set the time, It shall be possible to set the alarm time, the alarm shall be *enabled* when the alarm time is set, the alarm shall be *activated* when the alarm is enabled, and when the current time is equal to the alarm time, an activated alarm must be acknowledged. Acknowledgement of an alarm shall lead to the alarm being *disabled, the* alarm is enabled again when a new alarm time is set, an alarm which is not acknowledged shall be repeated every 10 seconds. The program shall communicate with a graphical user interface, where the current time shall be displayed, and where the alarm time shall be displayed when the alarm is enabled. It shall be possible to terminate the program, using a command which is sent from the graphical user interface.

9. Transactions and Concurrency -Database operating systems Exercises

Assume any application(e.g.banking) on your own and do the following exercises.

- 1. Investigate and implement the ObjectStore's concurrency options.
- 2. Implement the concurrency conflict that occurs between multiple client applications.
- 3. Observe and implement the implication of nested transactions.

10. Distributed operating systems

1. Design a RMI Lottery application. Each time you run the client program -- "java LotteryClient n", the server program "LotteryServer" will generate n set of Lottery numbers. Here n is a positive integer, representing the money you will spend on Lottery in sterling pounds. Write this program in a proper engineering manner, i.e. there should be specifications, design (flow chart, FD, or pseudo code), coding, test/debug, and documentation.

2. Consider a distributed system that consists of two processes which communicate with each other. Let P be a state predicate on the local state of one process and Q be a state predicate on the local state of the other process. Assume that neither P nor Q are stable (i.e. closed). Design a superimposed computation which detects that there exists an interleaving of underlying events in this system where at some state P Q holds. (A superposed computation is one that does not a_ect the underlying system; it may \read" but not \write" the state of the underlying system. Events in a superposed computation may occur in at the same instant as the underlying events and/or at di_erent instants.) State any assumptions you make. [Hint: Use vector clocks.]

OBJECTIVES:

- To develop an understanding of corporate data resources and their value for modern businesses
- To collect, analyze and consolidate relevant information from many sources and use it in supporting claims about the advantages and disadvantages of corporate data management tools and techniques.

LEARNING OUTCOMES:

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

- Evaluate and Apply Advanced Database Development Techniques. Evaluate Database Systems.
- Administer Database Systems.
- Design & Implement Advanced Database Systems.
- 1. Working with DDL, DML, TCL, DCL of SQL commands.
- 2. Working with Single-row functions and group functions in SQL.
- 3. Working with Joins and Integrity constraints.
- 4. Working with other database objects: Synonyms, Sequences, Views and Indexes.
- 5. Working with Locks and Partitions.
- 6. Working with Normalization
- 7. Working with PL/SQL blocks.
- 8. Working with Exception handling in PL/SQL.
- 9. High level language extension with cursors.
- 10. High level language extension with triggers.
- 11. Procedures, Function, Packages.
- 12. Embedded SQL.
- 13. Design and implementation of an application like payroll processing, banking system, library information system etc using PL/SQL.

OBJECTIVES:

• To provide exposure to the students to refer, read and review the research articles in referred journals and conference proceedings. To improve the technical report writing and presentation skills of the students.

LEARNING OUTCOMES:

At the end of the course the student will be able to read and review the research articles and publish a technical

paper			
METHODOLOGY	 Ea By sub The color The the color The the color The the color The the color The color <l< th=""><th>ch student is allotted to a faculty mutual discussions, the faculty oject area to the student. e students have to refer the Journ lect the published literature. e student is expected to collect a e last 5 years. ing OHP/Power Point, the stude nutes followed by 10 minutes di e student has to make two presen ar the end of the semester. e student has to write a Technica ge, one page Abstract, Review of obheadings, Concluding Remarks port has to be submitted to the He er the approval of the faculty gui</th><th>of the department by the HOD. guide will assign a topic in the general / nals and Conference proceedings and ttleast 20 such Research Papers published in nt has to make presentation for 15 -20 scussion. ntations, one at the middle and the other al Report for about 30 -50 pages (Title f Research paper under various and List of References). The technical OD one week before the final presentation, ide.</th></l<>	ch student is allotted to a faculty mutual discussions, the faculty oject area to the student. e students have to refer the Journ lect the published literature. e student is expected to collect a e last 5 years. ing OHP/Power Point, the stude nutes followed by 10 minutes di e student has to make two presen ar the end of the semester. e student has to write a Technica ge, one page Abstract, Review of obheadings, Concluding Remarks port has to be submitted to the He er the approval of the faculty gui	of the department by the HOD. guide will assign a topic in the general / nals and Conference proceedings and ttleast 20 such Research Papers published in nt has to make presentation for 15 -20 scussion. ntations, one at the middle and the other al Report for about 30 -50 pages (Title f Research paper under various and List of References). The technical OD one week before the final presentation, ide.
	Week	Activity	
	I	Allotment of Faculty Guide	by the HoD
	II	Finalizing the topic with the	approval of Faculty Guide
	III-IV	Collection of Technical pape	rs
EXECUTION	V-VI	Mid semester presentation	
	VII-VIII	Report writing	
	IX	Report submission	
	X-XI	Final presentation	
	100% by (3 Hrs/wee	Continuous Assessment k and 2 credits	
	Componen	t	Weightag <u>e</u>
	Mid semes	ter presentation	25%
EVALUATION	Final prese	ntation (Internal)	25%
	End Semes	ter Examination Report	30%
	Presentatio	n	20%
	Total		100%

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ELECTIVE I

13CPX01- MOBILE COMPUTING

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OBJECTIVES:

- An understanding of applications opportunities in relation to the mobile platform, research methods and Project issues.
- An appreciation of mobile platform project development issues, including design, development, communication, management, usability and related issues.
- To produce graduates who are equipped to both work in the software industry and pursue research in Mobile Computing.
- The research skills necessary to contribute to research in industry, or to carry out academic research.

LEARNING OUTCOMES:

At the end of the module, the student will be able to demonstrate:

- A working understanding of the characteristics and limitations of mobile hardware devices including their user-interface modalities
- The ability to develop applications that are mobile-device specific and demonstrate current practice in Mobile computing contexts.
- A comprehension and appreciation of the design and development of context-aware solutions for mobile devices.
- An awareness of professional and ethical issues, in particular those relating to security and privacy of user data and user behaviour.

UNIT I: WIRELESS COMMUNICATION FUNDAMENTALS

Introduction – Wireless transmission – Frequencies for radio transmission – Signals – Antennas– Signal Propagation – Multiplexing – Modulations – Spread spectrum – MAC – SDMA – FDMA– TDMA – CDMA – Cellular Wireless Networks.

UNIT II: TELECOMMUNICATION SYSTEMS

GSM – System Architecture – Protocols – Connection Establishment – Frequency Allocation –Routing – Handover – Security – GPRS.

UNIT III: WIRELESS NETWORKS

Wireless LAN - IEEE 802.11 Standards - Architecture - Services - HIPERLAN - Adhoc Network - Bluetooth.

UNIT IV: NETWORK LAYER

Mobile IP – Dynamic Host Configuration Protocol – Routing – DSDV – DSR – AODV – ZRP – ODMR.

UNIT V: TRANSPORT AND APPLICATION LAYERS

TCP over Wireless Networks – Indirect TCP – Snooping TCP – Mobile TCP – Fast Retransmit /Fast Recovery – Transmission/Timeout Freezing – Selective Retransmission – Transaction Oriented TCP – WAP – WAP Architecture – WDP – WTLS – WTP – WSP – WML – WML Script – WAE – WTA.

TOTAL: 45 PERIODS

Approved by first governing body

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TEXT BOOKS:

- 1. Jochen Schiller, "Mobile Communications", 2nd Ed., Pearson Education, 2003.
- 2. William Stallings, "Wireless Communications and Networks", Pearson Education, 2002.

REFERENCES:

- 1. Kaveh Pahlavan, Prasanth Krishnamoorthy, "Principles of Wireless Networks", 1st ed.,Pearson Education,2003.
- 2. Uwe Hansmann, Lothar Merk, Martin S. Nicklons and Thomas Stober, "Principles of Mobile Computing", Springer, 2003.
- 3. C.K.Toh, "AdHoc Mobile Wireless Networks", 1st ed., Pearson Education, 2002.
- 4. Burkhardt, "Pervasive Computing", 1st ed., Pearson Education, 2003.

OBJECTIVES:

- Compare and contrast different conceptions of data mining as evidenced in both research and application. Explain the role of finding associations in commercial market basket data.
- Characterize the kinds of patterns that can be discovered by association rule mining. Describe how to extend a relational system to find patterns using association rules.

LEARNING OUTCOMES:

Having successfully completed the course, student will be able to:

- Learn the concepts of database technology evolutionary path which has led to the need for data mining and its • applications.
- Evaluate and implement a wide range of emerging and newly-adopted methodologies and technologies to • facilitate the knowledge discovery
- Discover and measure interesting patterns from different kinds of databases. •
- Discuss the role of data warehousing and enterprise intelligence in industry and government. ٠
- Summarise the dominant data warehousing architectures and their support for quality attributes.

UNIT I:

Data Warehousing and Business Analysis: - Data warehousing Components -Building a Data warehouse -Mapping the Data Warehouse to a Multiprocessor Architecture - DBMS Schemas for Decision Support - Data Extraction, Cleanup, and Transformation Tools -Metadata - reporting - Query tools and Applications - Online Analytical Processing (OLAP) – OLAP and Multidimensional Data Analysis.

UNIT II:

Data Mining: - Data Mining Functionalities - Data Pre-processing - Data Cleaning - Data Integration and Transformation – Data Reduction – Data Discretization and Concept Hierarchy Generation. Association Rule Mining: - Efficient and Scalable Frequent Item set Mining Methods - Mining Various Kinds of Association Rules

- Association Mining to Correlation Analysis - Constraint- Based Association Mining.

UNIT III:

Classification and Prediction: - Issues Regarding Classification and Prediction - Classification by Decision Tree Introduction - Bayesian Classification - Rule Based Classification - Classification by Back propagation - Support Vector Machines - Associative Classification - Lazy Learners - Other Classification Methods - Prediction -Accuracy and Error Measures - Evaluating the Accuracy of a Classifier or Predictor - Ensemble Methods - Model Section.

UNIT IV:

Cluster Analysis: - Types of Data in Cluster Analysis - A Categorization of Major Clustering Methods - Partitioning Methods - Hierarchical methods - Density-Based Methods - Grid-Based Methods - Model-Based Clustering Methods - Clustering High-Dimensional Data - Constraint- Based Cluster Analysis - Outlier Analysis.

UNIT V:

Mining Object, Spatial, Multimedia, Text and Web Data-Multidimensional Analysis and Descriptive Mining of Complex Data Objects - Spatial Data Mining - Multimedia Data Mining - Text Mining - Mining the World Wide Web.

TOTAL: 45 PERIODS

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REFERENCES:

- 1. Jiawei Han and Micheline Kamber "Data Mining Concepts and Techniques" ,2nd ed., Elsevier, Reprinted 2008.
- 2. Alex Berson and Stephen J. Smith "Data Warehousing, Data Mining & OLAP", Tata McGraw Hill Edition, Tenth Reprint 2007.
- 3. K.P. Soman, Shyam Diwakar and V. Ajay "Insight into Data mining Theory and Practice", Easter Economy Edition, Prentice Hall of India, 2006.
- 4. G. K. Gupta "Introduction to Data Mining with Case Studies", Easter Economy Edition, Prentice Hall of India,2006.
- 5. Pang-Ning Tan, Michael Steinbach and Vipin Kumar "Introduction to Data Mining", Pearson Education, 2007.

13CPX03 - DIGITAL IMAGE PROCESSING AND APPLICATIONS L T P C

OBJECTIVES:

- Apply principles and techniques of digital image processing in applications related to digital imaging system design and analysis.
- Analyze and implement image processing algorithms.
- Gain hands-on experience in using software tools for processing digital images.

LEARNING OUTCOMES:

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

- 1. Apply principles and techniques of digital image processing in applications related to digital imaging system design and analysis.
- 1. Acquire the fundamental concepts of a digital image processing system.
- 2. Analyze and implement image processing algorithms.

UNIT I: FUNDAMENTALS OF IMAGE PROCESSING

Introduction – Image Processing System - Steps In Image Processing Systems –Sampling And Quantization – Color Fundamentals And Models, File Formats. Image Transforms: DFT, FFT, DCT, Walsh, Hadamard, Haar, Slant, KL and Radon Transforms.

UNIT: IMAGE ENHANCEMENT AND RESTORATION

Histogram processing – Fundamentals of Spatial Filtering – Histogram Processing– Smoothing and Sharpening Spatial Filters. Filtering in Frequency Domain: Image Smoothing and Sharpening using Frequency Domain Filters. Noise Models – Inverse Filtering – Geometric Spatial transformation – image rest ration technique.

UNIT III: IMAGE SEGMENTATION AND FEATURE ANALYSIS

Detection of Isolated Points – Line Detection – Edge Models – Edge Linking and Boundary Detection – Thresholding – Region based Segmentation – The use of motion in Segmentation – Feature analysis and Extraction.

UNIT IV: MULTI RESOLUTION ANALYSIS AND COMPRESSIONS

Multi Resolution processing: Image pyramids - Sub band Coding – Multiresolution Expansions – Wavelet Transform in one dimension and two dimensions – Wavelet Packets. Image Compression: Fundamentals – Models – Elements of Information Theory – Lossy compression – Compression Standards – JPEG/MPEG.

UNIT V: APPLICATIONS OF IMAGE PROCESSING

Representation and Description, Image Recognition – Image Understanding – Image Classification – Video Motion Analysis – Image Fusion – Image Steganography – Color Image Processing.

TOTAL: 45 PERIODS

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- 1. Rafael C. Gonzalez and Richard E. Woods, "Digital Image Processing", 3rd ed., Pearson Education, 2008.
- 2. Anil K. Jain, "Fundamental of Digital Image Processing", Prentice Hall, 1989.
- 3. B.Chanda, D.Dutta majumder, "Digital Image Processing and Analysis", 2nd ed., PHI, 2011
- 4. Annadurai. S, Shanmugalakshmi. R, "Fundamentals of Digital Image Processing", PearsonEducation (Singapore) Pvt. Ltd., 2007.
- 5. Milan Sonka, Vaclav Hlavac and Roger Boyle, "Image Processing, Analysis and MachineVision", 3rd ed., Brooks Cole, 2008.
- 6. S. Sridhar, "Digital Image Processing", OXFORD University press, 2011.
- 7. S. Jayaraman, S.Esakkirajan, T.Veerakumar, "Digital Image Processing", Tata McGraw Hill Education Pvt.Ltd., 2009

13CPX04 - AD-HOC NETWORKS

OBJECTIVES:

- This course covers fundamental principles of Adhoc Networks
- To develop a comprehensive understanding of Adhoc network protocols
- To understand current and emerging trends in Wireless Networks

LEARNING OUTCOMES:

After completion of the course students will have the following competence:

- Describe the unique issues in ad-hoc networks.
- Describe current technology trends for the implementation and deployment of ad-hoc networks.
- Insight in medium access mechanisms in WLAN and IEEE 802.11-based multi-hop ad-hoc networks
- Broad knowledge on future wireless networks
- Awareness of a few new trends within the area of ad-hoc networks.

UNIT I: AD-HOC MAC

Introduction – Issues in Ad-Hoc Wireless Networks, MAC Protocols – Issues, Classifications of MAC protocols, Multi channel MAC & Power control MAC protocol.

UNIT II: AD-HOC NETWORK ROUTING & TCP

Issues – Classifications of routing protocols – Hierarchical and Power aware. Multicast routing –Classifications, Tree based, Mesh based- Ad Hoc Transport Layer Issues. TCP Over Ad Hoc –Feedback based, TCP with explicit link, TCP-Bus, Ad Hoc TCP, and Split TCP.

UNIT III: WSN -MAC

Introduction – Sensor Network Architecture, Data dissemination, Gathering. MAC Protocols – self-organizing, Hybrid TDMA/FDMA and CSMA based MAC.

UNIT IV: WSN ROUTING, LOCALIZATION & QOS

Issues in WSN routing - OLSR, AODV- Localization - Indoor and Sensor Network Localization. QoS in WSN.

UNIT V: MESH NETWORKS

Necessity for Mesh Networks – MAC enhancements – IEEE 802.11s Architecture –Opportunistic routing – Self configuration and Auto configuration – Capacity Models – Fairness – Heterogeneous Mesh Networks – Vehicular Mesh Networks.

TOTAL: 45 PERIODS

REFERENCE BOOKS:

- 1. C.Siva Ram Murthy and B.Smanoj, "Ad Hoc Wireless Networks Architectures and Protocols", Pearson Education, 2004.
- 2. Feng Zhao and Leonidas Guibas, "Wireless Sensor Networks", Morgan Kaufman Publishers, 2004.
- 3. C.K.Toh, "Ad Hoc Mobile Wireless Networks", Pearson Education, 2002.
- 4. Thomas Krag and Sebastin Buettrich, "Wireless Mesh Networking", O" Reilly Publishers, 2007.

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ELECTIVE II

13CPX05- GRID COMPUTING L T P

OBJECTIVES:

- To provide an overview of the basic concepts of Grid Computing. To highlight the advantages of deploying Grid Computing.
- To illustrate the practical adoption of a Grid deployment through real life case studies.

LEARNING OUTCOMES:

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

- Providing a knowledge to (web-like) access to a variety of networked resources, e.g. large data stores and information repositories, expensive instruments, high-speed links, sensors networks, and multimedia services for a wide range of applications.
- Be able to evaluate enabling technologies such as high-speed links and storage area networks for building computer grids.
- Be able to utilize grid computing and clustering middleware, such as Parallel Virtual Machine (PVM), Message Passing Interface (MPI), HPC Portals and Peer-to-Peer networks for implementing virtual super computing resources.
- Be able to install a grid computing environment.

UNIT I: INTRODUCTION TO GRID COMPUTING

Introduction – The Grid – Past, Present and Future – Applications of grid computing organizations and their roles.

UNIT II: GRID COMPUTING ARCHITURE

Grid computing anatomy – Next generation of Grid computing initiatives–Merging the Gridservices architecture with Web services architecture.

UNIT III: GRID COMPUTING TECHNOLOGIES

OGSA – Sample use cases that drive the OGSA platform components – OGSI and WSRF–OGSA Basic Services – Security standards for grid computing.

UNIT IV: GRID COMPUTING TOOL KIT

Globus Toolkit – Versions – Architecture – GT Programming model – A sample grid service implementation.

UNITV: HIGH LEVEL GRID SERVICES

High level grid services - OGSI .NET middleware Solution Mobile OGSI.NET for Grid computing on Mobile devices.

TOTAL: 45 PERIODS

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TEXT BOOK:

1. Joshy Joseph & Craig Fellenstein, "Grid Computing", Pearson/PHI PTR-2003.

- 1. Fran Berman, Geoffrey Fox, Anthony J.G. Hey, "Grid Computing: Making the Global Infrastructure a reality ", John Wiley and sons, 2003.
- 2. Ahmar Abbas, "Grid Computing: A Practical Guide to Technology and Applications", Charles River media, 2003.

13CPX06 - SOFTWARE PROJECT MANAGEMENT

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OBJECTIVES:

- Deliver successful software projects that support organization's strategic goals
- Match organizational needs to the most effective software development model
- Plan and manage projects at each stage of the software development life cycle (SDLC) Create project plans that address real-world management challenges
- Develop the skills for tracking and controlling software deliverables

LEARNING OUTCOMES:

- Provide how different project contexts will impact upon all aspects of a software development project
- Able to identify and describe the key phases of project management and the key skills associated
- Be able to determine an appropriate project management approach through an evaluation of the business context and project scope and knowledge of agile and traditional project management approaches
- Can demonstrate through application, knowledge of the key project management skills, such as product and work break-down structure, schedule; governance including progress reporting, risk and quality management

UNIT I: BASIC CONCEPTS

Product, Process and Project – Definition – Product Life Cycle – Project Life Cycle Models.

UNIT II: FORMAT PROCESS MODELS AND THEIR USE

Definition and Format model for a process – The ISO 9001 and CMM Models and their relevance to Project Management – Other Emerging Models like People CMM.

UNIT III: UMBRELLA ACTIVITIES IN PROJECTS

Metrics – Configuration Management – Software Quality Assurance – Risk Analysis.

UNIT IV: IN STREAM ACTIVITIES IN PROJECTS

Project Initiation – Project Planning – Execution and Tracking – Project Wind up – Concept of Process/Project Database.

UNIT V: ENGINEERING AND PEOPLE ISSUES IN PROJECT MANAGEMENT

Phases (Requirements, Design, Development, Testing, Maintenance, Deployment) – Engineering Activities and Management Issues in Each Phase – Special Considerations in Project Management for India and Geographical Distribution Issues.

TOTAL: 45 PERIODS

- 1. Ramesh, Gopalaswamy, "Managing Global Projects", Tata McGraw Hill, 2001.
- 2. Humphrey, Watts," Managing the Software Process ", Addison Wesley, 1986.
- 3. Pressman, Roger, "Software Engineering", A Practitioner" s approach. McGraw Hill, 1997.
- 4. Bob Hughes and Mike Cotterell,"Software Project Management".
- 5. Wheelwright and Clark,"Revolutionising product development", The Free Press, 1993.

TOTAL: 45 PERIODS

13CPX07 - SEMANTIC WEB

OBJECTIVES:

- To explain the features, rationale, and advantages of Semantic Web technology. To analyze the requirements and features of web ontology language (OWL).
- To describe rule-based reasoned to implement both RDFS and OWL reasoners.
- Analyze application cases in data integration, data exchange, knowledge management, e-learning, and web services.

LEARNING OUTCOMES:

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

- Able to understand the concept structure of the semantic web technology and how this technology revolutionizes the World Wide Web and its uses.
- Understands the concepts of metadata, semantics of knowledge and resource, ontology, and their
- descriptions in XML-based syntax and web ontology language (OWL). Familiarity about logic semantics and inference with OWL.
- Use ontology engineering approaches in semantic applications
- Able to program semantic applications with Java API.

UNIT I: INTRODUCTION

History – Semantic Web Layers –Semantic Web technologies – Semantics in Semantic Web – XML:Structuring – Namespaces – Addressing – Querying – Processing.

UNIT II: RDF

RDF and Semantic Web – Basic Ideas - RDF Specification – RDF Syntax: XML and Non- XML – RDF elements –RDF relationship: Reification, Container, and collaboration – RDF Schema – Editing, Parsing, and Browsing RDF/XML- RQL-RDQL.

UNIT III: ONTOLOGY

Why Ontology – Ontology movement – OWL – OWL Specification - OWL Elements – OWL constructs: Simple and Complex – Ontology Engineering : Introduction – Constructing ontologies – Reusing ontologies – On-To-Knowledge Semantic Web architecture

UNIT IV: LOGIC AND INFERENCE

Logic – Description Logics - Rules – Monotonic Rules: Syntax, Semantics and examples – Non-Monotonic Rules – Motivation, Syntax, and Examples – Rule Mark-up in XML: Monotonic Rules, and Non-Monotonic Rules.

UNIT V: APPLICATIONS OF SEMANTIC WEB TECHNOLOGIES

RDF Uses: Commercial and Non-Commercial use – Sample Ontology – e-Learning – Web Services – Web mining – Horizontal information – Data Integration – Future of Semantic Web.

REFERENCE BOOKS:

- 1. Grigorous Antoniou and Van Hermelen, "A Semantic Web Primer", New Delhi: The MIT Press, 2004.
- 2. James Hendler, Henry Lieberman and Wolfgang Wahlster, "Spinning the Semantic Web:Bringing the world wide web to its full potential", New Delhi: The MIT Press, 2004.
- 3. Shelley Powers, "Practical RDF". Mumbai: O[®] Rreilly Publishers, 2003.

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13CPX08 - NETWORK OPTIMIZATION TECHNIQUES 3

OBJECTIVES:

- Analyze complexity of networking problems. Design approximation algorithms.
- Design meta-heuristic algorithms.
- Formulate optimization problems for complex network systems.
- Apply linear and non-linear optimization techniques to solve network problems. Design distributed algorithms and prove their convergence for networks systems.

LEARNING OUTCOMES:

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

- Ability to formulate a wide range of management problems that can be solved to optimality by classical combinatorial optimization techniques.
- The knowledge of alternative solution approaches such as meta-heuristics that can find nearly optimal solutions.
- Able to solve combinatorial optimization problems such as production planning and scheduling, operational management of distribution systems.

UNIT I: SHORTEST PATH PROBLEMS

Introduction -Graphs and Flows - Network Flow Models- Network Flow Algorithms- Problem Formulation and Applications- Shortest Path Algorithm- Label Setting (Dijkstra) Methods- Label Correcting Methods- Comparison of Label Setting and Label Correcting -Single Origin/Single Destination Methods- Auction Algorithms- Multiple Origin/Multiple Destination Methods.

UNIT II: MAX-FLOW AND MIN-COST FLOW PROBLEM

The Max-Flow and Min-Cut Problems - The Ford-Fulkerson Algorithm- Price-Based Augmenting Path Algorithms- Transformations and Equivalences- Duality.

UNIT III: SIMPLEX METHODS, DUAL ASCENT METHODS AND AUCTION ALGORITHMS FOR MIN-COST FLOW (9)

Main Ideas in Simplex Methods- The Basic Simplex Algorithm- Extension to Problems with Upper and Lower Bounds-Dual Ascent- Primal-Dual Method -Relaxation Method -Implementation Issues-Auction Algorithm for the Assignment Problem-Extensions of the Auction Algorithm-Pre flow-Push Algorithm for Max-Flow-Relaxation Method -Auction/Sequential Shortest Path Algorithm.

UNIT IV: NONLINEAR NETWORK

Convex and Separable Problems -Problems with Side Constraints-Multi commodity Flow Problems-Integer Constraints -Networks with Gains-Optimality Conditions-Duality-Algorithms and Approximations.

UNIT V: CONVEX SEPARABLE AND INTEGER CONSTRAINTS NETWORK PROBLEMS (9)

Convex Functions of a Single Variable -Optimality Conditions -Dual Function Differentiability-Algorithms for Differentiable Dual Problems - Auction Algorithms - Monotropic Programming-Integer-Constrained Problems - Branch-and-Bound - Lagrangian Relaxation-Local Search Methods-Rollout Algorithms.

TOTAL: 45 PERIODS

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- 1. Dimitri P. Bertsekas "Network optimization: Continuous & Discrete Models", Hardcover Athena Scientific, Belmont, Massachusetts May-1998
- 2. Ahuja.R.K. Magnanti.T.L., Orlin.J.B., "Network Flows: Theory, Algorithm and Applications", Prentice Hall, 1993
- 3. Cook.W.J., Cunningham.W.H., Pulleyblank.W.R., and Schrijver.A," Combinatorial Optimization", John Wiley&Sons, 1998.

TOTAL: 45 PERIODS

ELECTIVE III

13CPX09- CLOUD COMPUTING

OBJECTIVES:

To understand the evolution of the cloud and its ability to increase processing capacity in an elastic manner.

LEARNING OUTCOMES:

- Identify cloud computing models, characteristics, and technologies relevant to area of work •
- Identify appropriate programming tools that allow for the flexibility, scalability and interoperability required for a cloud application
- Evaluate reusable application components for usage in cloud solutions •
- Evaluate feasibility of migrating existing enterprise applications into a cloud environment
- Develop cloud applications based on functional and technical requirements and cloud application architecture

UNIT-1 INTRODUCTION TO CLOUD COMPUTING AND SERVICES

Cloud Computing - History of Cloud Computing - Cloud Architecture - Cloud Storage -Advantages and Disadvantages of Cloud Computing - Companies in the Cloud Today - Cloud Services- Developing Cloud Services

UNIT-2 CLOUD COMPUTING APPLICATIONS

Centralizing Email Communications - Collaborating on Schedules - Collaborating on To-Do Lists - Collaborating Contact Lists - Cloud Computing for the Community - Collaborating on Group Projects and Events - Cloud Computing for the Corporation

UNIT-3 CLOUD SERVICES

Collaborating on Calendars, Schedules and Task Management -Collaborating on Event Management - Collaborating on Contact Management -Collaborating on Databases - Storing and Sharing Files

UNIT-4 WEB BASED CLOUD COMPUTING

Collaborating via Web-Based Communication Tools - Evaluating Web Mail Services - Evaluating Web Conference Tools – Collaborating via Social Networks and Groupware – Collaborating via Blogs and Wikis

UNIT-5 SECURITY IN CLOUD AND CASE STUDIES

Infrastructure Security – Data Security – Security management in cloud – The impact of cloud computing on the role of corporate IT - Case Studies - Aneka - Comet cloud.

REFERENCE BOOKS:

- 1. Michael Miller,"Cloud Computing: Web-Based Applications that Change the Way YouWork and Collaborate Online". Que Publishing, August 2008.
- 2. Tim Mather, Subra Kumaraswamy, Shahed Latif, "Cloud Security & Privacy", O'Reilly Media, September 2009.
- 3. Haley Beard,"Cloud Computing Best Practices for Managing and Measuring Processes for on demand Computing, Applications and Data Centers in the Cloud with SLAS", Emereo Pvt Limited, July 2008.

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13CPX10 - BIO INFORMATICS

OBJECTIVES:

- To understand the basic concepts.
- To search information, visualize it.
- To learn various bioinformatics algorithms. •
- To understand data mining techniques. •
- To study various pattern matching techniques. •

LEARNING OUTCOMES:

- Will able to have basic idea of BioInformatics.
- Will able to retrieve information's using various algorithms and techniques.
- Will able to sequence the databases. •
- Will able to do modeling and simulation. •

UNIT I : INTRODUCTORY CONCEPTS

The Central Dogma – The Killer Application – Parallel Universes – Watson's Definition – Top DownVersus Bottom up - Information Flow - Convergence - Databases - Data Management - Data Life Cycle - Database Technology -Interfaces - Implementation - Networks - Geographical Scope - Communication Models - Transmissions Technology - Protocols - Bandwidth - Topology - Hardware - Contents - Security - Ownership - Implementation -Management.

UNIT II : SEARCH ENGINES, VISUALIZATION AND ALGORITHMS

The search process - Search Engine Technology - Searching and Information Theory - Computational methods -Search Engines and Knowledge Management - Data Visualization - sequence visualization - structure visualization user Interface - Animation Versus simulation - General Purpose Technologies - Exhaustive search - Greedy -Dynamic programming – divide and conquer – graph algorithms.

UNIT III STATISTICS AND DATA MINING

Statistical concepts - Microarrays - Imperfect Data - Randomness - Variability - Approximation - Interface Noise -Assumptions - Sampling and Distributions - Hypothesis Testing - QuantifyingRandomness - Data Analysis - Tool selectionstatistics of Alignment - Clustering and Classification -Data Mining - Methods -Selection and Sampling -Preprocessing and Cleaning - Transformation and Reduction - Data Mining Methods - Evaluation - Visualization -Designing new queries – PatternRecognition and Discovery – Machine Learning – Text Mining – Tools.

UNIT IV PATTERN MATCHING

Pairwise sequence alignment - Local versus global alignment - Multiple sequence alignment - Computational methods - Dot Matrix analysis - Substitution matrices - Dynamic Programming - Word methods - Bayesian methods - Multiple sequencealignment - Dynamic Programming - Progressive strategies - Iterative strategies - Tools -Nucleotide Pattern Matching - Polypeptide pattern matching- Utilities -Sequence Databases.

UNIT V MODELING AND SIMULATION

Drug Discovery - components - process - Perspectives - Numeric considerations - Algorithms - Hardware - Issues -Protein structure - AbInitio Methods - Heuristic methods - Systems Biology - Tools - Collaboration and Communications - standards -Issues - Security - Intellectual property.

TOTAL: 45 PERIODS

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TEXTBOOKS

- 1. S.C. Rastogi, "Bioinformatics- Concepts, Skills, and Applications", CBS Publishing, 2003.
- 2. S. Ignacimuthu and S.J., Basic "Bioinformatics", Narosa Publishing House, 1995.

- 1. T K Attwood and D J parry, "Smith,Introduction to Bioinformatics", 1st ed., Pearson Education, 2005.
- 2. C S V Murthy, "Bioinformatics", 1st ed., Himalaya Publishing House, 2003.
- 3. Stephen A. Krawetz and David D. Womble, "Introduction To Bioinformatics A Theoretical and Practical Approach", Humana Press, 2003.
- 4. Hooman H. Rashidi, Lukas K. Buehler, "Bioinformatics Basics-Applications in Biological Science and Medicine", CRC press, 2005.

13CPX11 - PATTERN RECOGNITION

OBJECTIVESS:

• To understand the pattern recognition and is to learn a how a computer can recognize patterns in data sets.

LEARNING OUTCOMES:

- The students should learn to choose an appropriate feature.
- Pattern classification algorithm for a pattern recognition problem, properly implement the algorithm using modern computing tools such as Matlab, OpenCV, C, C++ and correctly.
- Analyze, and report the results using proper technical terminology

UNIT: 1 LINEAR MODELS FOR REGRESSION AND CLASSIFICATION

Linear basics function models-The Bias-Variance Decomposition-Bayesian Linear Regression-Bayesian model comparison-The Evidence Approximation-Limitations-Fixed Basis Functions-Linear Models For Classification: Discriminant Functions- and multiple classes-Least squares-Fishers –Linear Discriminant -Probabilistic Generative models-probabilistic Discriminant models-The Laplace approximation-Bayesian logistic regression.

UNIT: 2 NEURAL NETWORK AND KERNEL METHODS

Feed Forward Network Functions-Network Training-Error Back Propagation-The Hessian Matrix-Regularization In Neural Networks-Mixture Density Networks-Bayesian Neural Networks-Kernel Methods: Dual Representations-Constructing Kernels-Radial Basis Function Networks-Gaussian Processes.

UNIT: 3 SPARSE KERNEL MACHINES AND GRAPHICAL MODELS

Maximum Margin Classifiers-Relevance Vector Machines-Graphical Models: Bayesian Networks-Conditional Independence-Markov Random Fields- Inference in Graphical Models.

UNIT: 4 MIXTURE MODELS, EM AND APPROXIMATE INFERENCE

K-Means Clustering-Mixtures Of Gaussian-Alternate View Of EM-Approximate Inference: Variational Inference-Variational Mixture Of Gaussian-Variational Linear Regression-Exponential Family Distribution-Local Variational Models- Variational Logistic Regression-Expectation Propagation.

UNIT: 5 SAMPLING METHODS AND CONTINUOUS LATENT VARIABLES SEQUENCE DATA AND COMBINING MODELS (9)

Basic Sampling Algorithms – Markov Chain Monte Carlo-Gibbs Sampling-Slice Sampling-Hybrid Montecarlo Algorithm-Estimating The Partition Function-Continuous Latent Variables: Principal Component Analysis-Probabilistic PCA- Kernel PCA-Non Linear Latent Variable Models- Sequential Data :Markov Models- Hidden MM -HMM Dynamical System-Combining Models: Bayesian Models: Bayesian Model Averaging-Committees-Boosting-Tree Based Model – Conditional Mixture Model.

TOTAL: 45PERIODS

- 1. Bishop, "Pattern recognition & machine learning", Springer 2nd ed., 2007.
- 2. Dud, Hart, "Pattern Classification", 2nd ed., Wiley 2001.

REFERENCE BOOKS:

- 3. Sergios Theodoridis,Konstantious kourtroumlas, "Pattern recognition",4th ed.,Elsevier Inc AcademicPress, 2009.
- 4. Sergios Theodoridis, Aggelos Pikrakis, Konstantious kourtroumlas and Dioriris cavmras," Introduction topattern recognition, A malloch Approach", Elsevier Inc Academic Press, 2010.

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13CPX12 - HIGH SPEED NETWORKS

OBJECTIVESS:

• To highlight the features of different technologies involved in High Speed Networking and their performance.

LEARNING OUTCOMES:

- Provided with an up-to-date survey of developments in High Speed Networks.
- Enable the students to know techniques involved to support real-time traffic and congestion control.
- Provided with different levels of quality of service (QoS) to different applications.

UNIT: 1 HIGH SPEED NETWORKS

Frame Relay Networks – Asynchronous Transfer Mode – ATM Protocol Architecture, ATM logical Connection, ATM Cell – ATM Service Categories – ATM Adaptation Layer AAL. High Speed LANs: Fast Ethernet, Gigabit Ethernet, Fiber Channel – Wireless LANs: Applications, Requirements–Architecture of 802.11

UNIT: 2 CONGESTION AND TRAFFIC MANAGEMENT

Queuing Analysis-Queuing Models–Single Server Queues–Effects of Congestion–Congestion Control – Traffic Management –Congestion Control in Packet Switching Networks–Frame Relay Congestion control.

UNIT: 3 TCP AND ATM CONGESTION CONTROL

TCP Flow control–TCP Congestion Control–Retransmission–Timer Management –Exponential RTO back off–KARN's Algorithm–Window management–Performance of TCP over ATM . Traffic and Congestion control in ATM– Requirements–Attributes–Traffic Management Frame work, Control – ABR traffic Management–ABR rate control, RM cell formats, ABR Capacity allocations– GFR traffic management.

UNIT: 4 INTEGRATED AND DIFFERENTIATED SERVICES

Integrated Services Architecture – Approach, Components, Services- Queuing Discipline , FQ, PS, BRFQ,GPS,WFQ– Random Early Detection, Differentiated Services.

UNIT: 5 PROTOCOLS FOR QOS SUPPORT

RSVP – Goals & Characteristics, Data Flow, RSVP operations, Protocol Mechanisms – Multiprotocol Label Switching – Operations, Label Stacking, Protocol details – RTP – Protocol Architecture, Data Transfer Protocol, RTCP.

TOTAL: 45 PERIODS

REFERENCE BOOKS:

- 1. William Stallings, "High Speed Networks and Internet", 2nd ed., Pearson Education, 2002.
- 2. Warland & Pravin Varaiya, "High Performance Communication Networks", Jean Harcourt Asia Pvt. Ltd., 2nd ed., 2001.
- 3. Irvan Pepelnjk, Jim Guichard and Jeff Apcar, "MPLS and VPN architecture", Cisco Press, Volume1and2, 2003.

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ELECTIVE IV

13CPX13- PERVASIVE COMPUTING

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OBJECTIVES:

This course aims is to introduce the characteristics, basic concepts and systems issues in pervasive computing, and to provide an opportunity for students to understand the emerging technologies and issues in a pervasive computing system.

LEARNING OUTCOMES:

- Describe the concept of pervasisve computing •
- Understand the concept of LANs, PAN, Mobile Networks and Sensor Networks. •
- Appreciate the positioning techniques and in depth understanding on location-based services and applications.

UNIT - 1 PERVASIVE ARCHITECTURE

Local area networks – Wireless LANS – Relationship of wireless, internet and ubiquitous computing – Pervasive computing and ubiquitous computing - Ambient computing - Pervasive web application architecture - Requirements of computational infrastructure – Failure management – Security – Performance – Dependability.

UNIT - 2 MOBILE DEVICE TECHNOLOGIES

Mobile computing devices characteristics – Adaptation – Data dissemination and management – Heterogeneity – Interoperability - Context awareness - Language localization issues - User interface design issues - Difference between UI design for mobile devices and conventional systems – Mobile agents – Mobile device technology overview – Windows CE – Symbian – 2ME – Pocket PC – BREW.

UNIT - 3 SENSOR NETWORKS AND RFIDS

Introduction to sensor networks - Sensor node architecture - Sensor network architecture - Types of sensor networks - Platforms for wireless sensor networks - Applications of wireless sensor networks - Introduction to RFID -Transponder and reader architecture - Types of tags and readers - Frequencies of operation - Application of RFID technologies.

UNIT - 4 LOCAL AREA AND WIDE AREA WIRELESS TECHNOLOGIES

IEEE 802.11 technologies – Infrared technologies – Bluetooth networks (OBEX Protocol) – Personal area networks – Mobility management – Mobile IP – Establishing wide area wireless networks – Concept and structure of "Cell" – Call establishment and maintenance – Channel management – Frequency assignment techniques.

UNIT - 5 PROTOCOLS AND APPLICATIONS

Networking protocols – Packet switched protocols – Routing protocols for sensor networks – Data centric protocols – Hierarchical protocols - Location - Based protocols - Multimedia Messaging Service (MMS) protocols - Wireless Application Protocol (WAP) - Applications of pervasive computing - Retail - Healthcare - Sales force automation -Tracking applications.

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- Burkhardt, Henn, Hepper, Rintdorff and Schaeck, "Pervasive Computing", Addison Wesley, 2002.
 Adelstein, F. and Gupta, S.K.S., "Fundamentals of Mobile and Pervasive Computing", TataMcGraw Hill, 2005.
- 3. Ashoke Talukdar and Roopa Yavagal, "Mobile Computing", Tata McGraw Hill, 2005.

13CPX14 - MULTIMEDIA SYSTEMS	L	Т	Р	С
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OBJECTIVESS:				
• To describe the ways in which multimedia information is captured, processed, a to introduce multimedia quality of service (QoS) and to compare subjective and OBJECTIVES methods.	and r 1	ender	ed,	
LEARNING OUTCOMES:				
 The ability to describe different realisations of multimedia tools and the way in used Analyse the structure of the tools in the light of low-level constraints imposed to of various OoS schemes 	which	ch the e ador	y are	
UNIT-1 INTRODUCTION AND QOS			(9)	
Introduction-QOS Requirements and Constraints-Concepts-Resources- Establishment P Phase-Management Architectures.	hase	-Run-'	Time	
UNIT -2 OPERATING SYSTEMS			(9)	
Real-Time Processing-Scheduling-Interprocess Communication-Memory and Management Server Architecture-Disk Management.	t-			
UNIT -3 FILE SYSTEMS AND NETWORKS			(9)	
Traditional and Multimedia File Systems-Caching Policy-Batching-Piggy backing-Etherne Gigabit Ethernet-Token Ring-100VG Any LAN-Fiber Distributed Data Interface Networks-MAN-WAN.	t- (FDI)	DI)- 1	ATM	
UNIT-4 COMMUNICATION			(9)	
Transport Subsystem-Protocol Support for QOS-Transport of Multimedia-Compu Cooperative Work-Architecture-Session Management-MBone Applications.	ıter	Supp	orted	
UNIT -5 SYNCHRONIZATION			(9)	
Synchronization in Multimedia Systems-Presentation-Synchronization Types-Multimedia Synchronization Methods-Case Studies-MHEG-MODE-ACME.				
TOTAL	: 45]	PERI	ODS	
TEXT BOOK:				

1. Ralf Steinmetz and Klara Nahrstedt, "Multimedia Systems", 1st ed., Springer, 2004.

- 1. Ralf Steinmetz and Klara Nahrstedt, Media Coding and Content Processing, Prentice Hall, 2002.
- 2. Vaughan T," Multimedia", Tata McGraw Hill, 1999.
- 3. Mark J.B. and Sandra K.M., "Multimedia Applications Development using DVI technology", McGraw Hill, 1992.
- 4. K. R. Rao, Zoran S. Bojkovic, Dragorad A and Milovacovic, D, "Multimedia Communication Systems: Techniques, Standards, and Networks", Prentice Hall, 1st ed,2002.
- 5. Ze-Nian Li and Mark S. Drew, "Fundamentals of Multimedia", Pearson, 2004.

13CPX15 - OPEN SOURCE SYSTEMS

OBJECTIVES:

• To expose students to FOSS environment and introduce them to use open source Packages.

LEARNING OUTCOMES:

- The practical OBJECTIVES of the course is to teach students how they can begin to participate in a FOSS project in order to contribute to and improve aspects of the software that they feel are wrong.
- Students will learn some important FOSS tools and techniques for contributing to projects and how to set up their own FOSS projects.

UNIT-1 INTRODUCTION

Introduction to Open sources – Need of Open Sources – Advantages of Open Sources– Application of Open Sources.GNU and linux installation – Boot process, Commands Using bash features, The man pages, files and file systems, File security, Partitions, Processes, Managing processes, I/O redirection, Graphical environment, Installing software, Backup techniques.

UNIT-2 MYSQL DATABASE

MySQL: Introduction – Setting up account – Starting, terminating and writing your own SQL programs – Record selection Technology – Working with strings – Date and Time– Sorting Query Results – Generating Summary – Working with metadata – Using sequences – MySQL and Web.

UNIT - 3 PHP PROGRAMMING

PHP: Introduction – Programming in web environment – variables – constants – data types – operators – Statements –Functions – Arrays – OOP – String Manipulation and regular expression – File handling and data storage – PHP and SQL database – PHP and LDAP – PHP Connectivity – Sending and receiving E-mails – Debugging and error handling – Security – Templates.

UNIT- 4 PYTHON PROGRAMMING

Syntax and Style – Python Objects – Numbers – Sequences – Strings – Lists and Tuples – Dictionaries – Conditionals and Loops – Files – Input and Output – Errors and Exceptions – Functions – Modules – Classes and OOP – Execution Environment.

UNIT -5 OPEN SOURCE TOOLS AND TECHNOLOGIES (9)

Web Server: Apache Web server – Working with Web Server – Configuring and Using apache web services Basics of the X Windows server architecture - Qt Programming - Gtk+ Programming.

TOTAL: 45 PERIODS

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- 1. Machtelt Garrels, ".Introduction to Linux- A Hands-On Guide", Third Edition, Fultus Corporation.
- 2. Steve Suchring, "MySQL Bible", John Wiley, 2002
- 3. Rasmus Lerdorf and Levin Tatroe, "Programming PHP", O'Reilly, 2002
- 4. Wesley J. Chun, "Core Phython Programming", Prentice Hall, 2001
- 5. Peter Wainwright, "Professional Apache", Wrox Press, 2002.
- 6. GTK+/GNOME, "Application Development", Havoc Pennington.
- 7. http://developer.gnome.org/doc/GGAD

13CPX16 - WIRELESS SENSOR NETWORKS

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OBJECTIVES:

• To obtain broad understanding of the technologies and applications for the emerging and exciting domain of wireless sensor networks.

LEARNING OUTCOMES:

- Describe and explain radio standards and communication protocols on the link and networking layers for wireless personal area networks, and inter-working with wireless local area networks and cellular networks.
- Describe and explain the function and use of sensors especially for medical and sports applications.
- Be familiar with architectures, functions and performance of wireless sensor networks systems and platforms.

UNIT -1 INTRODUCTION AND PHYSICAL LAYER

Overview of Wireless Sensor Networks – Applications and Motivation – Network Performance OBJECTIVESs – Development of Wireless Sensor Networks – Challenges – Wireless Data Networks – Wireless Sensor and Related Networks –Physical Layer – Example Physical Layers – Bluetooth – IEEE 802.11b – Practical Physical Layer for Wireless Sensor Networks.

UNIT -2 DATA LINK LAYER

Introduction – Medium Access Control – ALOHA – Carrier Sense Multiple Access (CSMA) – Polling – Access Techniques in Wireless Sensor Networks – WINS – Pico Radio – Mediation Device (MD) – The MD Protocol – The Distributed MD Protocol – "Emergency Mode" – Channel Access.

UNIT -3 NETWORK LAYER

Network Design Examples – Structure and Routing – Wireless Sensor Network Design Employing Cluster Tree Architecture – Network Design – Network Association – Network Maintenance – Routing.

UNIT -4 LOCALIZATION AND TRACKING

Tracking Scenario – Tracking Multiple Objects – Networking Sensors – General Issues –Geographic, Energy Aware Routing – Unicast Geographic Routing – Routing on a Curve – Energy Minimizing Broadcast Energy Aware Routing to a Region – Attribute Based Routing – Directed Diffusion – Rumour Routing – Geographic Hash Tables.

UNIT-5 SENSOR NETWORK PLATFORMS AND TOOLS

Sensor Node Hardware – Berkeley Motes, Programming Challenges, Node-level software platforms, Node-level Simulators, State-centric programming.

TOTAL: 45 PERIODS

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- 1. Kazem Sohraby, Daniel Minoli, & Taieb Znati, "Wireless Sensor Networks-Technology, Protocols, And Applications", John Wiley, 2007.
- 2. Anna Hac, "Wireless Sensor Network Designs", John Wiley, 2003.
- 3. Edgar H.Callaway, Jr., "Wireless Sensor Networks: Architecture and Protocols", Auerbach, Publications, 2004.
- 4. Fang Zhao and Leonidas Guibas, "Wireless Sensor Networks: An Information Processing Approach", Morgan Kaufman Publishers, 2004.

ELECTIVE V

13CPX17 - SOFT COMPUTING

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OBJECTIVES:

Introduce students to soft computing concepts and techniques and foster their abilities in ٠ designing and implementing soft computing based solutions for real-world problems.

LEARNING OUTCOMES:

- Identify and describe soft computing techniques and their roles in building intelligent machines. •
- Recognize the feasibility of applying a soft computing methodology for a particular problem.
- Apply fuzzy logic and reasoning to handle uncertainty and solve engineering problems. •

UNIT-1 INTRODUCTION TO SOFT COMPUTING AND NEURAL NETWORKS (9)

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

UNIT -2 GENETIC ALGORITHMS

Introduction to Genetic Algorithms (GA) – Applications of GA in Machine Learning - Machine Learning Approach to Knowledge Acquisition.

UNIT -3 NEURAL NETWORKS

Machine Learning Using Neural Network, Adaptive Networks – Feed forward Networks – Supervised Learning Neural Networks - Radial Basis Function Networks - Reinforcement Learning - Unsupervised Learning Neural Networks – Adaptive Resonance architectures – Advances in Neural networks.

UNIT -4 FUZZY LOGIC

Fuzzy Sets - Operations on Fuzzy Sets - Fuzzy Relations - Membership Functions- Fuzzy Rules and Fuzzy Reasoning – Fuzzy Inference Systems – Fuzzy Expert Systems – Fuzzy Decision Making.

UNIT -5 NEURO-FUZZY MODELING

Adaptive Neuro-Fuzzy Inference Systems - Coactive Neuro-Fuzzy Modeling - Classification and Regression Trees - Data Clustering Algorithms - Rulebase Structure Identification - Neuro-Fuzzy Control - Case studies.

TOTAL: 45 PERIODS

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TEXT BOOKS:

- 1. Jyh-Shing Roger Jang, Chuen-Tsai Sun, Eiji Mizutani, "Neuro-Fuzzy and Soft Computing", Prentice-Hall of India, 2003.
- 2. George J. Klir and Bo Yuan, "Fuzzy Sets and Fuzzy Logic-Theory and Applications", Prentice Hall, 1995.
- 3. James A. Freeman and David M. Skapura, "Neural Networks Algorithms, Applications, and Programming Techniques", Pearson Edn., 2003.

- 1. Mitchell Melanie, "An Introduction to Genetic Algorithm", Prentice Hall, 1998.
- 2. David E. Goldberg, "Genetic Algorithms in Search, Optimization and Machine Learning", Addison Wesley, 1997.
- 3. S. N. Sivanandam, S. Sumathi and S. N. Deepa, "Introduction to Fuzzy Logic using MATLAB", Springer, 2007.
- 4. S.N.Sivanandam · S.N.Deepa, "Introduction to Genetic Algorithms", Springer, 2007.
- 5. Jacek M. Zurada, "Introduction to Artificial Neural Systems", PWS Publishers, 1992.

13CPX18 - SOFTWARE QUALITY ASSURANCE L

OBJECTVIES:

• The goal is to confirm the confidentiality and integrity of private user data is protected as the data is handled, stored, and transmitted.

LEARNING OUTCOMES:

- Knows and applies quality models to identify and specify the quality attributes a software system must satisfy.
- Understands the mission of a quality system and knows the applicable standards and norms.
- Understands the interrelation between product quality and process quality.

UNIT -1

Introduction to software quality - challenges - OBJECTIVESs - quality factors - components of SQAcontract review – development and quality plans – SQA components in project life cycle –SQA defect removal policies – Reviews.

UNIT -2

Basics of software testing - test generation from requirements - finite state models - combinatorial designs - test selection, minimization and prioritization for regression testing - test adequacy, assessment and enhancement.

UNIT-3

Testing strategies – white box and black box approach – integration testing – system and acceptance testing – performance testing – regression testing - internationalization testing – adhoctesting – website testing – usability testing – accessibility testing -Test plan – management – execution and reporting – software test automation - automated testing tools.

UNIT-4

Hierarchical models of software quality - software quality metrics -function points -Software proc quality - software maintenance quality - effect of case tools - software quality infrastructure procedures - certifications - configuration management - documentation control.

UNIT-5

Project progress control – costs – quality management standards – project process standards – management and its role in SQA – SQA unit.

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- 1. Daniel Galin, Software quality assurance from theory to implementation, Pearson education, 2009.
- 2. Aditya Mathur, Foundations of software testing, Pearson Education, 2008
- 3. Srinivasan Desikan and Gopalaswamy Ramesh, Software testing principles and practices , Pearson education, 2006.
- 4. Ron Patton, Software testing, second edition, Pearson education, 2007
- 5. Alan C Gillies, "Software Quality Theory and Management", Cengage Learning, 2nd ed., 2003.

13CPX19 - XML AND WEB SERVICES

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OBJECTIVESS:

• The OBJECTIVESs of Web Services are to make it easier for companies to gain access to each other's applications, simplifying data exchange.

LEARNING OUTCOMES:

- Develop skills of creating documents using XML, XSL, XSLT and XPath; o creating XML schemas and validating XML documents against them; o describing Web Services using WSDL and UDDI.
- Develop in depth knowledge and understanding of XML, XSL, XSLT, XPath, XML Schema, Web Service Protocols, Web Service Security Protocols, Web Services Orchestration & Execution, Web Services Interoperability, relationship between XML & J2EE, MS.NET and XML Databases.

UNIT -1 XML TECHNOLOGY FAMILY

XML – benefits – Advantages of XML over HTML – EDL –Databases – XML based standards –DTD – XML Schemas – X- Files – XML processing – DOM –SAX- presentation technologies –XSL – XFORMS – XHTML – voice XML – Transformation – XSLT – XLINK – XPATH – XQ

UNIT -2 ARCHITECTING WEB SERVICES

Business motivations for web services – B2B – B2C- Technical motivations – limitations of CORBA and DCOM – Service – oriented Architecture (SOA) – Architecting web services – Implementation view – web services technology stack – logical view – composition of web services – deployment view – from application server to peer to peer – process view – life in theruntime

UNIT -3 WEB SERVICES BUILDING BLOCK

Transport protocols for web services – messaging with web services – protocols – SOAP – describing web services – WSDL – Anatomy of WSDL – manipulating WSDL – web service policy – Discovering web services – UDDI – Anatomy of UDDI- Web service inspection – Ad-Hoc Discovery – Securing web services.

UNIT -4 IMPLEMENTING XML IN E-BUSINESS

B2B - B2C Applications – Different types of B2B interaction – Components of e-business XML systems – ebXML – Rosetta Net Applied XML in vertical industry – Web services for mobile devices.

UNIT -5 XML AND CONTENT MANAGEMENT

Semantic Web – Role of Meta data in web content – Resource Description Framework – RDF schema – Architecture of semantic web – content management workflow – XLANG – WSFL.

TOTAL: 45 PERIODS

TEXT BOOKS:

- 1. Ron schmelzer et al, "XML and Web Services", Pearson Education, 2002.
- 2. Sandeep Chatterjee and James Webber, "Developing Enterprise Web Services: AnArchitect's Guide", Prentice Hall, 2004.

- 1. Frank P. Coyle, "XML, Web Services and the Data Revolution", Pearson Education, 2002.
- 2. Keith Ballinger, ".NET Web Services Architecture and Implementation", Pearson Education, 2003.
- 3. Henry Bequet and Meeraj Kunnumpurath, "Beginning Java Web Services", Apress, 2004.
- 4. Russ Basiura and Mike Batongbacal, "Professional ASP.NET Web Services", Apress, 2004.

13CPX20 - TCP/IP TECHNOLOGY	L	Т	P	C
OBJECTIVES:	3	1	0	4
• This course gives a complete understanding of TCP / IP Technology.				
LEARNING OUTCOMES:				
 To study the standards of TCP / IP protocol and addressing. Study of various protocols like ARP, RARP, UDP, ICMP, TGMP. Multicasting protocols, sockets. 				
UNIT – 1 INTRODUCTION				(9)
$\label{eq:protocols} Protocols and standards - OSI model - TCP / IP \ protocol \ suite - addressing - versions \ technologies.$	– un	derly	ing	
UNIT – 2 IP ADDRESSES, ROUTING, ARP AND RARP				(9)
Classful addressing – other issues – subnetting – super netting – classless addressing – delivery – table and modules – CIDR – ARP package – RARP	routi	ng m	ethod	s –
UNIT – 3 IP, ICMP, TGMP AND UDP				(9)
Datagram – fragmentation – options – checksum – IP package – ICMP – messages, for reporting – query – checksum – ICMP package – IGMP – messages, operation – encap package – UDP – datagram – checksum – operation – uses – UDP package.	mats sulat	– err ion –	or IGM	Р
UNIT –4 TCP, UNICAST AND MULTICAST ROUTING PROTOCOLS				(9)
Services – flow, congestion and error control – TCP package and operation – state tran unicast routing protocols – RIP – OSPF – BGP – multicast routing – trees – protocols – PIM	sitior - MC	n diag SPF	ram - – CB'	- Γ –
UNIT – 5 APPLICATION LAYER, SOCKETS				(9)

Client server model – concurrency – processes – sockets – byte ordering – socket system calls – TCP and UDP client-server programs – BOOTP -DHCP – DNS – name space, resolution – types of records – concept – mode of operation – Rlogin.

TOTAL: 45 PERIODS

TEXT BOOK:

1. Behrouz Forouzan, "TCP/IP protocol suite ", 2nd ed., Tata McGrawhill.

REFERENCE BOOK:

1. Douglas Comer, "Internetworking with TCP / IP", Vol – 1, PHI, 2000.