NATIONAL ENGINEERING COLLEGE

(An Autonomous Institution Affiliated to Anna University of Technology Tirunelveli)

K.R.NAGAR, KOVILPATTI – 628 503

REGULATIONS - 2011

DEPARTMENT OF

COMPUTER SCIENCE AND ENGINEERING

CURRICULUM AND SYLLABI OF

M.E. – COMPUTER SCIENCE AND ENGINEERING
I - YEAR

NATIONAL ENGINEERING COLLEGE

(An Autonomous Institution Affiliated to Anna University of Technology Tirunelveli)

M.E. (COMPUTER SCIENCE AND ENGINEERING)
SEMESTER I

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1	MME101	Operations Research	3	1	0	4
2	MCS101	Computer Architecture	3	0	0	3
3	MCS102	Data Structures and Algorithms	3	0	0	3
4	MCS103	Object Oriented Software Engineering	3	0	0	3
5	MCS104	Computer Networks and Management	3	0	0	3
PRACTICAL						
6	MCS131	Data Structures Lab	0	0	3	2
7	MCS132	Networking Lab	0	0	3	2
		TOTAL	**15**	**1**	**6**	**20**
SEMESTER - II						
THEORY						
1	MCS201	Data Base Technology	3	0	0	3
2	MCS202	Advanced Operating Systems	3	0	0	3
3	MCS203	Advanced System Software	3	0	0	3
4	MCS204	Information Security	3	0	0	3
5	MCS205	Web Technology	3	0	0	3
6	E1	Elective I	3	0	0	3
PRACTICAL						
7	MCS231	Operating System Lab	0	0	3	2
8	MCS232	Internet Programming Lab	1	0	3	3
		TOTAL	**19**	**0**	**6**	**23**

Approved by

Chairman of BOS	**Dean (Academic)**	**Chairman of Academic**
Dept. of CSE		**Council & Principal**
Dr.B.Paramasivan	Dr.B.sankaragomathi	Dr.P.Subburaj

M.E. COMPUTER SCIENCE AND ENGINEERING

LIST OF ELECTIVES FOR M.E.COMPUTER SCIENCE AND ENGINEERING

S.NO	COURSE CODE	COURSE TITLE	L	T	P	C
1	MCS001	XML and Web Services	3	0	0	3
2	MCS002	Distributed Computing	3	0	0	3
3	MCS003	Digital Image Processing	3	0	0	3
4	MCS004	Networking Routing Algorithms	3	0	0	3
5	MCS005	Internetworking multimedia	3	0	0	3
6	MCS006	Soft Computing	3	0	0	3
7	MCS007	Mobile Computing	3	0	0	3
8	MCS008	Theory of Computation	3	0	0	3
9	MCS009	Multimedia Systems	3	0	0	3
10	MCS010	Software Quality Assurance	3	0	0	3
11	MCS011	Software Project Management	3	0	0	3
12	MCS012	Grid Computing	3	0	0	3
13	MCS013	Pattern Recognition	3	0	0	3
14	MCS014	Bio Informatics	3	0	0	3
15	MCS015	Ontology and Semantic Web	3	0	0	3
16	MCS016	Pervasive Computing	3	0	0	3
17	MCS017	Digital Imaging	3	0	0	3
18	MCS018	Information Retrieval Techniques	3	0	0	3
19	MCS019	Data Warehousing and Data Mining	3	0	0	3
20	MCS020	Performance Evaluation of Computer Systems and Networks	3	0	0	3
21	MCS021	Agent Based Intelligent Systems	3	0	0	3
22	MCS022	Visualization Techniques	3	0	0	3
23	MCS023	Advanced Databases	3	0	0	3
24	MCS024	Component Based Technology	3	0	0	3
25	MCE001	Communication Network Security	3	0	0	3
26	MCE010	Embedded Systems	3	0	0	3
27	MCC007	Adhoc Networks	3	0	0	3

MME101 OPERATIONS RESEARCH

OBJECTIVES:

1. To introduce the various queuing models of Operations Research
2. Emphasize the important mathematical procedures of nonlinear programming search techniques
3. To study about advanced topics in linear and non-linear programming.
4. Relate the course material to research activities

Hours Required per week	Lecture	Tutorial	Practical	Credit
	3	1	Nil	4
Total	45	15	-	-

UNIT I QUEUEING MODELS 9

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

UNIT II ADVANCED QUEUEING MODELS 9

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

UNIT III SIMULATION 9

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

UNIT IV LINEAR PROGRAMMING 9

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

UNIT V NON-LINEAR PROGRAMMING 9

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

TEXT BOOKS:

1. Winston.W.L. "Operations Research", Fourth Edition, Thomson – Brooks/Cole, 2003.
2. Taha, H.A. "Operations Research: An Introduction", Ninth Edition, Pearson Education Edition, Asia, New Delhi, 2002.

REFERENCES:

1. Robertazzi. T.G. "Computer Networks and Systems – Queuing Theory and Performance Evaluation", Third Edition, Springer, 2002 Reprint.

2. Ross. S.M., "Probability Models for Computer Science", Academic Press, 2002.

MCS101 COMPUTER ARCHITECTURE

OBJECTIVES:

1. To have a thorough understanding of the basic structure and operation of a digital computer
2. To study in detail the different types of control and concept of pipelining
3. To study the different ways of communication with I/O devices and standard I/O interfaces

Hours Required per week	Lecture	Tutorial	Practical	Credit
	3	Nil	Nil	3
Total	45	-	-	-

UNIT I FUNDAMENTALS OF COMPUTER DESIGN AND PIPELINING 9

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 WITH DYNAMIC APPROACHES 9

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

UNIT III INSTRUCTION LEVEL PARALLELISM WITH SOFTWARE APPROACHES 9

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

UNIT IV MULTIPROCESSORS AND MULTICORE ARCHITECTURES 9

Symmetric and distributed shared memory architectures – Performance issues – Synchronisation issues – Models of memory consistency – Software and hardware multithreading – SMT and CMP architectures – Design issues – Case studies.

UNIT V MEMORY AND I/O 9

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.

REFERENCES:

1. John L. Hennessey and David A. Patterson, " Computer Architecture – A quantitative approach", Morgan Kaufmann / Elsevier, 4th. edition, 2007.
2. David E. Culler, Jaswinder Pal Singh, "Parallel Computing Architecture : A hardware/ software approach" , Morgan Kaufmann / Elsevier, 1997.
3. William Stallings, " Computer Organization and Architecture – Designing for Performance", Pearson Education, Seventh Edition, 2006.
4. Behrooz Parhami, "Computer Architecture", Oxford University Press, 2006.

MCS102 DATA STRUCTURES AND ALGORITHMS

OBJECTIVES:

1. To gain a solid understanding of the following topics:
2. The fundamental design, analysis, and implementation of basic data structures and algorithms;
3. Principles for good program design, especially the uses of data abstraction and modular program composition;
4. Basic concepts in the specification and analysis of programs

Hours Required per week	Lecture	Tutorial	Practical	Credit
	3	Nil	Nil	3
Total	45	-	-	-

UNIT I COMPLEXITY ANALYSIS & ELEMENTARY DATA STRUCTURES 9

Asymptotic notations – Properties of big oh notation – asymptotic notation with several parameters – conditional asymptotic notation – amortized analysis – NP-completeness – NPhard – recurrence equations – solving recurrence equations – arrays – linked lists – trees.

UNIT II HEAP STRUCTURES 9

Min-max heaps – Deaps – Leftist heaps –Binomial heaps – Fibonacci heaps – Skew heaps - Lazy-binomial heaps.

UNIT III SEARCH STRUCTURES 9

Binary search trees – AVL trees – 2-3 trees – 2-3-4 trees – Red-black trees – B-trees – splay trees – Tries.

UNIT IV GREEDY & DIVIDE AND CONQUER 9

Quicksort – Strassen's matrix multiplication – Convex hull - Tree-vertex splitting – Job sequencing with deadlines – Optimal storage on tapes

UNIT V DYNAMIC PROGRAMMING AND BACKTRACKING 9

Multistage graphs – 0/1 knapsack using dynamic programming – Flow shop scheduling – 8-queens problem – graph coloring – knapsack using backtracking

REFERENCES:

1. E. Horowitz, S.Sahni and Dinesh Mehta, Fundamentals of Data structures in C++, Galgotia, 1999.
2. E. Horowitz, S.Sahni and S. Rajasekaran, Computer Algorithms / C++, Galgotia, 1999.
3. Adam Drozdex, Data Structures and algorithms in C++, Second Edition, Thomson learning – vikas publishing house, 2001.
4. G. Brassard and P. Bratley, Algorithmics: Theory and Practice, Printice –Hall, 1988.
5. Thomas H.Corman, Charles E.Leiserson, Ronald L. Rivest, "Introduction to Algorithms", Second Edition, PHI 2003.

MCS103 OBJECT ORIENTED SOFTWARE ENGINEERING

OBJECTIVES:

1. To learn object-oriented (OO) analysis and design using UML and other techniques.
2. To learn how to OO languages support abstraction and polymorphism
3. To learn an agile software process, with multiple iterations, design patterns, test-driven development & pair programming
4. To improve analyzing skills in the context of software development

Hours Required per week	Lecture	Tutorial	Practical	Credit
	3	Nil	Nil	3
Total	45	-	-	-

UNIT I INTRODUCTION 9

System Concepts – Software Engineering Concepts – Development Activities – Managing Software Development – Unified Modeling Language – Project Organization – Communication

UNIT II ANALYSIS 9

Requirements Elicitation – Concepts – Activities – Management – Analysis Object Model – Analysis Dynamic Models

UNIT III SYSTEM DESIGN 9

Decomposing the system – Overview of System Design – System Design Concepts – System Design Activities – Addressing Design Goals – Managing System Design

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

REFERENCES:

1. Bernd Bruegge, Alan H Dutoit, Object-Oriented Software Engineering, 2nd ed, Pearson Education, 2004.
2. Craig Larman, Applying UML and Patterns, 3rd ed, Pearson Education, 2005.
3. Stephen Schach, Software Engineering 7th ed, McGraw-Hill, 2007.

MCS104 COMPUTER NETWORKS AND MANAGEMENT

OBJECTIVES:

1. To make the students to learn the basics of ATM and the features of Wireless LANs
2. To provide an up-to-date survey of developments in High Speed Networks
3. Enable the students to know techniques involved to support real-time traffic and congestion control
4. To provide different levels of quality of service (QOS) to different applications.

Hours Required per week	Lecture	Tutorial	Practical	Credit
	3	Nil	Nil	3
Total	45	-	-	-

UNIT I HIGH SPEED NETWORKS 9

Frame Relay Networks – Asynchronous transfer mode – ATM Protocol Architecture, ATM logical Connection, ATM Cell – ATM Service Categories – AAL. High Speed LAN's: Fast Ethernet, Gigabit Ethernet, Fibre Channel – Wireless LAN's.

UNIT II CONGESTION AND TRAFFIC MANAGEMENT 9

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 III TCP AND ATM CONGESTION CONTROL 10

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

UNIT IV INTEGRATED AND DIFFERENTIATED SERVICES 9

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

UNIT V PROTOCOLS FOR QoS SUPPORT 8

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

TEXT BOOKS:

William Stallings, "HIGH SPEED NETWORKS AND INTERNET", Pearson Education, Second Edition, 2002.

REFERENCES:

1. Warland & Pravin Varaiya, "HIGH PERFORMANCE COMMUNICATION NETWORKS", Jean Harcourt Asia Pvt. Ltd., II Edition, 2001.
2. Irvan Pepelnjk, Jim Guichard and Jeff Apcar, "MPLS and VPN architecture", Cisco Press, Volume 1 and 2, 2003.

MCS131 DATA STRUCTURES LAB

LAB OBJECTIVES:

1. Learn how to implement some useful concepts of data structures.
2. Understand the effect of data structures on an algorithm's complexity.

Hours Required per week	Lecture	Tutorial	Practical	Credit
	Nil	Nil	3	2
Total	-	-	45	-

LIST OF EXPERIMENTS:

1. Min Heap
2. Deaps
3. Leftist Heap
4. AVL Tree
5. B-Tree
6. Tries
7. Quick Sort
8. Convex hull
9. 0/1 Knapsack using Dynamic Programming
10. Graph coloring using backtracking

Required Software: Java, C++

MCS132 **NETWORKING LAB**

LAB OBJECTIVES:

1. To study about various network programming and socket system calls.
2. To understand the concepts of data transfer between client and server
3. To simulate various networking protocols

Hours Required per week	Lecture	Tutorial	Practical	Credit
	Nil	Nil	3	2
Total	-	-	45	-

LIST OF EXPERIMENTS:

1. Socket Programming
a. TCP Sockets
b. UDP Sockets
c. Applications using Sockets
2. Simulation of Sliding Window Protocol
3. Simulation of Routing Protocols
4. Development of applications such as DNS/ HTTP/ E – mail/ Multi - user Chat
5. Simulation of Network Management Protocols
6. Study of Network Simulator Packages – such as opnet, ns2, etc.

Required Software: C, Java

MCS201 DATABASE TECHNOLOGY

OBJECTIVES:

1. To know the different types of databases
2. To understand the emerging systems
3. To know the issues in database design
4. To make awareness about current issues related to databases

Hours Required per week	Lecture	Tutorial	Practical	Credit
	3	-	Nil	3
Total	45	-	-	-

UNIT I DISTRIBUTED DATABASES 5

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

UNIT II OBJECT ORIENTED DATABASES 10

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

UNIT III EMERGING SYSTEMS 10

Enhanced Data Models - Client/Server Model - Data Warehousing and Data Mining – Web Databases – Mobile Databases.

UNIT IV DATABASE DESIGN ISSUES 10

ER Model - Normalization - Security - Integrity - Consistency - Database Tuning - Optimization and Research Issues – Design of Temporal Databases – Spatial Databases.

UNIT V CURRENT ISSUES 10

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

REFERENCES:

1. Elisa Bertino, Barbara Catania, Gian Piero Zarri, “Intelligent Database Systems”, Addison-Wesley, 2001.
2. Carlo Zaniolo, Stefano Ceri, Christos Faloustsos, R.T.Snodgrass, V.S.Subrahmanian, “Advanced Database Systems”, Morgan Kaufman, 1997.
3. N.Tamer Ozsu, Patrick Valduriez, “Principles Of Distributed Database Systems”, Prentice 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”, Mcgraw Hill, Third Edition 2004.
7. Henry F Korth, Abraham Silberschatz, S. Sudharshan, “Database System Concepts”, Fourth Ediion, Mcgraw Hill, 2002.
8. R. Elmasri, S.B. Navathe, “Fundamentals of Database Systems”, Pearson Education, 2004.

MCS202 ADVANCED OPERATING SYSTEMS

OBJECTIVES:

1. To introduce mechanisms for synchronization
2. To study the distributed operating systems
3. To know the distributed file systems
4. To know how to recover the failures and basic approaches to recovery

Hours Required per week	Lecture	Tutorial	Practical	Credit
	3	-	Nil	3
Total	45	-	-	-

UNIT I INTRODUCTION 9

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, System State – Necessary and Sufficient conditions for a Deadlock – Systems with Single-Unit Requests, Consumable Resources, Reusable Resources**.**

UNIT II DISTRIBUTED OPERATING SYSTEMS 9

Introduction – Issues – Communication Primitives – Inherent Limitations - Lamport's Logical Clock; Vector Clock; Causal Ordering; Global State; Cuts; Termination Detection. Distributed Mutual Exclusion – Non-Token Based Algorithms – Lamport's Algorithm - Token-Based Algorithms – Suzuki-Kasami's Broadcast Algorithm – Distributed Deadlock Detection – Issues – Centralized Deadlock-Detection Algorithms - Distributed Deadlock-Detection Algorithms. Agreement Protocols – Classification - Solutions –Applications.

UNIT III DISTRIBUTED RESOURCE MANAGEMENT 9

Distributed File systems – Architecture – Mechanisms – Design Issues – Distributed Shared Memory – Architecture – Algorithm – Protocols - Design Issues. Distributed Scheduling – Issues – Components – Algorithms.

UNIT IV FAILURE RECOVERY AND FAULT TOLERANCE 9

Basic Concepts-Classification of Failures – Basic Approaches to Recovery; Recovery in Concurrent System; Synchronous and Asynchronous Checkpointing and Recovery; Check pointing in Distributed Database Systems; Fault Tolerance; Issues - Two-phase and Nonblocking Commit Protocols; Voting Protocols; Dynamic Voting Protocols;

UNIT V MULTIPROCESSOR AND DATABASE OPERATING SYSTEMS 9

Structures – Design Issues – Threads – Process Synchronization – Processor Scheduling – Memory Management – Reliability / Fault Tolerance; Database Operating Systems – Introduction – Concurrency Control – Distributed Database Systems – Concurrency Control Algorithms.

TEXT BOOKS:

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

REFERENCES: .

1. Abraham Silberschatz, Peter B. Galvin, G. Gagne, "Operating System Concepts", Sixth Edition, Addison Wesley Publishing Co., 2003.
2. Andrew S. Tanenbaum, "Modern Operating Systems", Second Edition, Addison Wesley, 2001.

MCS203 ADVANCED SYSTEM SOFTWARE

OBJECTIVES:

1. To study the basic compiler functions
2. To study the symbol table structure and various optimization techniques
3. To introduce virtual machines

Hours Required per week	Lecture	Tutorial	Practical	Credit
	3	-	Nil	3
Total	45	-	-	-

UNIT I **9**

Basic Compiler Functions – Grammars – Lexical Analysis – Syntactic Analysis – Code Generation – Heap Management – Parameter Passing Methods – Semantics of Calls and Returns – Implementing Subprograms – Stack Dynamic Local Variables – Dynamic binding of method calls to methods – Overview of Memory Management, Virtual Memory, Process Creation – Overview of I/O Systems, Device Drivers, System Boot

UNIT II **10**

Introduction and Overview – Symbol table structure – Local and Global Symbol table management Intermediate representation – Issues – High level, medium level, low level intermediate languages – MIR, HIR, LIR – ICAN for Intermediate code – Optimization – Early optimization – loop optimization

UNIT III **9**

Procedure optimization – in-line expansion – leaf routine optimization and shrink wrapping – register allocation and assignment – graph coloring – data flow analysis – constant propagation – alias analysis – register allocation – global references – Optimization for memory hierarchy - Code Scheduling – Instruction scheduling – Speculative scheduling – Software pipelining – trace scheduling – Run-time support – Register usage – local stack frame – run-time stack – Code sharing – position–independent code

UNIT IV **9**

Introduction to Virtual Machines (VM) – Pascal P-Code VM – Object-Oriented VMs – Java VM Architecture – Common Language Infrastructure – Dynamic Class Loading – Security – Garbage Collection – Optimization

UNIT V **8**

Emulation – Interpretation and Binary Translation – Instruction Set Issues – Process Virtual Machines – Profiling – Migration – Grids – Examples of real world implementations of system software

TEXT BOOKS:

1. Steven S. Muchnick, “Advanced Compiler Design Implementation”, Morgan Koffman – Elsevier Science, India, First Edition 2004
2. James E Smith and Ravi Nair, “Virtual Machines”, Elsevier, 2005. (Units 4, 5) (Sections 1.0-1.6, 2.0-2.5, 2.8, 3.0-3.6, 4.2, 5.0-5.3, 5.5-5.6, 6.0-6.3, 6.5-6.6, 10.2, 10.3)
3. Robert W. Sebesta, “Concepts of Programming Languages”, 7th ed., Pearson Education, 2006. (Unit 3) (Sections 6.9, 9.3, 9.5, 10.1-10.3, 12.10.2)

REFERENCES:

1. Alfred V Aho, Ravi Sethi, Jeffrey D Ullman, “Compilers”, Pearson Education, 1986.
2. Terrance W Pratt, Marvin V Zelkowitz, T V Gopal, “Programming Languages”, 4th ed., Pearson Education, 2006.
3. Carl Hamacher, Zvonko Vranesic, Safwat Zaky, “Computer Organization”, 5th ed., McGraw Hill, 2002.
4. Silberschatz, Galvin, Gagne, “Operating System Concepts”, 6th ed., Wiley, 2003.

MCS204 INFORMATION SECURITY

OBJECTIVES:

1. To know the various information security policies
2. To study the system design principles
3. To know about intrusion detection

Hours Required per week	Lecture	Tutorial	Practical	Credit
	3	-	Nil	3
Total	45	-	-	-

UNIT I **9**

An Overview of Computer Security, Access Control Matrix, Policy-Security policies, Confidentiality policies, Integrity policies and Hybrid policies.

UNIT II **9**

Cryptography- Key management – Session and Interchange keys, Key exchange and generation, Cryptographic Key Infrastructure, Storing and Revoking Keys, Digital Signatures, Cipher Techniques

UNIT III **9**

Systems: Design Principles, Representing Identity, Access Control Mechanisms, Information Flow and Confinement Problem.

UNIT IV **9**

Malicious Logic, Vulnerability Analysis, Auditing and Intrusion Detection

UNIT V **9**

Network Security, System Security, User Security and Program Security

TEXT BOOK:

1. Matt Bishop ,“Computer Security art and science ”, Second Edition, Pearson Education

REFERENCES:

1. Mark Merkow, James Breithaupt “ Information Security : Principles and Practices” First Edition, Pearson Education,
2. Whitman, “Principles of Information Security”, Second Edition, Pearson Education
3. William Stallings, “Cryptography and Network Security: Principles and Practices”, Third Edition, Pearson Education.
4. “Security in Computing”, Charles P.Pfleeger and Shari Lawrence Pfleeger, Third Edition.

MCS205 **WEB TECHNOLOGY**

OBJECTIVES:

1. To understand the client server concepts and study the markup languages
2. To know about client side and server side programming
3. To build web applications

Hours Required per week	Lecture	Tutorial	Practical	Credit
	3	-	Nil	3
Total	45	-	-	-

UNIT I **9**

Web essentials – clients – servers - communication – markup languages – XHTML – simple XHTML pages style sheets – CSS

UNIT II **9**

Client side programming – Java script language – java script objects – host objects: Browsers and the DOM

UNIT III **9**

Server side programming – java servlets – basics – simple program – separating programming and presentation – ASP/JSP - JSP basics ASP/JSP objects – simple ASP/JSP pages.

UNIT IV **9**

Representing Web data – data base connectivity – JDBC – Dynamic Web pages – XML – DTD – XML scheme – DOM – SAX – Xquery.

UNIT V **9**

Building Web applications - cookies – sessions – open source environment – PHP – MYSQL – case studies.

TEXT BOOKS:

1. Jeffrey C Jackson, "Web Technology – A computer Science perspective", Persoson Education, 2007.
2. Chris Bates, "Web Programming – Building Internet Applications, "Wiley India, 2006.

MCS231 OPERATING SYSTEM LAB

OBJECTIVES:

1. To implement semaphores and multithreading
2. To implement the concurrency conflict that occurs between multiple client applications.
3. To identifying Local Area Network Hardware
4. To explore Local Area Network Configuration Options

Hours Required per week	Lecture	Tutorial	Practical	Credit
	-	-	3	2
Total	-	-	45	-

LIST OF EXPERIMENTS:

MULTIPROCESSOR OPERATING SYSTEMS

PROGRAM 1 – SEMAPHORES - MULTIPROCESSOR OPERATING SYSTEMS

Assume there are three processes: Pa, Pb, and Pc. Only Pa can output the letter A, Pb B, and Pc C. Utilizing only semaphores (and no other variables) the processes are synchronized so that the output satisfies the following conditions:
a) A B must be output before any C's can be output.
b) B's and C's must alternate in the output string, that is, after the
first B is output, another B cannot be output until a C is output.
Similarly, once a C is output, another C cannot be output until a B is output.
c) The total number of B's and C's which have been output at any given point in the output string cannot exceed the number of A's which have been output up to that point.
Examples
AACB -- invalid, violates a)
ABACAC -- invalid, violates b)
AABCABC -- invalid, violates c)
AABCAAABC -- valid
AAAABCBC -- valid
AB -- valid

PROGRAM 2 – MULTITHREADING - MULTIPROCESSOR OPERATING SYSTEMS

THE CIGARETTE SMOKERS PROBLEM

Consider a simulation with three *smoker* threads and one *agent* thread. Each smoker continuously makes a cigarette and smokes it. But to make a cigarette, a smoker needs three ingredients: tobacco, paper, and matches. One of the smoker threads has only paper, another has only tobacco, and the third has only matches. The agent thread has an infinite supply of all three materials. The three smoker threads are initially blocked. The agent places two randomly chosen (different) ingredients on the table and unblocks the one smoker who has the remaining
ingredient. The agent then blocks. The unblocked smoker removes the two ingredients from the table, makes a cigarette, and smokes it for a random amount of time, unblocking the agent on completion of smoking the cigarette. The agent then puts out another random two of the three ingredients, and the cycle repeats.

Write a multi-class multithreaded Java program that uses a monitor to synchronize the agent thread and the three smoker threads. **Do not mechanically translate semaphore code into monitor code!** The agent thread executes in an agent object created from an agent class. Each smoker thread executes in a smoker object. All smoker objects are created from one smoker class whose constructor is used to specify the ingredient possessed by the smoker object. A driver class with a main method constructs the objects and starts the threads. Use a single monitor object instantiated from a class Control for synchronization. Each of the four threads invokes a synchronized monitor method for its synchronization. No semaphores are allowed. No synchronized blocks are allowed, only synchronized methods. No busy waiting is allowed. No calls to nap inside a synchronized method are allowed (do not nap while holding the monitor object's lock, that is, while inside a synchronized method or while inside a method called by a synchronized method).

PROGRAM 3 – 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.

NETWORK OPERATING SYSTEMS

PROGRAM 4 – NETWORK OPERATING SYSTEMS

Establish a Lab setup for the following network operating systems based programs based on the skills in networking on your own. E.g. for identifying networking hardware, identifying different kinds of network cabling and network interface cards can be done.

EXERCISES

1. Identifying Local Area Network Hardware
2. Exploring Local Area Network Configuration Options
3. Verifying TCP/IP Settings
4. Sharing Resources
5. Testing LAN Connections

REAL TIME OPERATING SYSTEMS

PROGRAM 5 – 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.

DATABASE OPERATING SYSTEMS

PROGRAM 6 – 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 Object Store's concurrency options.
2. Implement the concurrency conflict that occurs between multiple client applications.
3. Observe and implement the implication of nested transactions.

DISTRIBUTED OPERATING SYSTEMS

PROGRAM 7 – DISTRIBUTED OPERATING SYSTEMS

1. Design a RMI Lottery application. Each time you run the client program -- "**java Lottery Client 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 affect 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 different instants.) State any assumptions you make. [Hint: Use vector clocks.]

Required Software: Java

MCS232 INTERNET PROGRAMMING LAB

OBJECTIVES:

1. To design Web Pages using Client Side Scripting and DHTML.
2. To develop web services and E-business applications
3. To implement server side applications using JSP

Hours Required per week	Lecture	Tutorial	Practical	Credit
	1	-	3	2
Total	15	-	45	-

1. Designing Web Pages using Client Side Scripting and DHTML.
2. Client Server Scripting Programs.
3. Simulation of Email and File Transfer Protocols.
4. Development of Web Services.
5. XML and Databases.
6. Server Side Application Using JSP.
7. Web Customisation.
8. Development of E-Business Application.

Required Software: Java, XML, HTML, Scripting languages

MCS001 XML AND WEB SERVICES

OBJECTIVES:

1. To introduce the XML technology
2. To study and understand the web services technology
3. To implement XML in E-business
4. To know how to secure web services

Hours Required per week	Lecture	Tutorial	Practical	Credit
	3	-	Nil	3
Total	45	-	-	-

UNIT I XML TECHNOLOGY FAMILY 9

XML – Benefits – Advantages of XML over HTML – EDI – Databases – XML Based standards– Structuring with schemas – DTD – XML schemas – XML processing – DOM –SAX– Presentation technologies – XSL – XFORMS – XHTML – Transformation – XSLT–XLINK– XPATH–Xquery

UNITII ARCHITECTING WEB SERVICES 9

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 the runtime.

UNITIII WEB SERVICES BUILDING BLOCKS 9

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–Adhoc discovery–Securing web services.

UNITIV IMPLEMENTING XML IN E–BUSINESS 9

B2B – B2C applications – Different types of B2B interaction – Components of E –Business XML systems – EBXML – RosettaNet – Applied XML in vertical industry – Web services for mobile devices.

UNITV XML CONTENT MANAGEMENT AND SECURITY 9

Semantic web – Role of meta data in web content – Resource description framework – RDF schema–Architecture of semantic web – Content management workflow – XLANG –WSFL– Securing web services.

TEXTBOOKS

1. Ron Schmelzer and Travis Vandersypen, "XML and Web Services unleashed", Pearson Education, 2002.
2. Keith Ballinger, ".NET Web Services Architecture and Implementation", Pearson Education 2003

REFERENCES

1. David Chappell, "Understanding .NET A Tutorial and Analysis", Addison Wesley, 2002.
2. Kennard Scibner and Mark C. Stiver, "Understanding SOAP", SAMS Publishing, 2000.
3. Alexander Nakhimovsky and Tom Myers, "XML Programming: Web Applications and Web Services with JSP and ASP", Apress, 2002.

MCS002 **DISTRIBUTED COMPUTING**

OBJECTIVES:

1. To introduce the various paradigms in distributed environment
2. To know about distributed operating systems
3. To study the file systems.
4. To understand the concepts of fault tolerance system.

Hours Required per week	Lecture	Tutorial	Practical	Credit
	3	-	Nil	3
Total	45	-	-	-

UNIT I COMMUNICATION IN DISTRIBUTED ENVIRONMENT 8

Introduction – Various Paradigms in Distributed Applications – Remote Procedure Call – Remote Object Invocation – Message-Oriented Communication – Unicasting, Multicasting and Broadcasting – Group Communication.

UNIT II DISTRIBUTED OPERATING SYSTEMS 12

Issues in Distributed Operating System – Threads in Distributed Systems – Clock Synchronization – Causal Ordering – Global States – Election Algorithms –Distributed Mutual Exclusion – Distributed Transactions – Distributed Deadlock – Agreement Protocols .

UNIT III DISTRIBUTED RESOURCE MANAGEMENT 10

Distributed Shared Memory – Data-Centric Consistency Models – Client-Centric Consistency Models – Ivy – Munin – Distributed Scheduling – Distributed File Systems – Sun NFS.

UNIT IV FAULT TOLERANCE AND CONSENSUS 7

Introduction to Fault Tolerance – Distributed Commit Protocols – Byzantine Fault Tolerance – Impossibilities in Fault Tolerance.

UNIT V CASE STUDIES 8

Distributed Object-Based System – CORBA – COM+ – Distributed Coordination-Based System – JINI.

REFERENCES:

1. George Coulouris, Jean Dollimore, Tim Kindberg, “Distributed Systems Concepts and Design”, Third Edition, Pearson Education Asia, 2002.
2. Hagit Attiya and Jennifer Welch, “Distributed Computing: Fundamentals, Simulations and Advanced Topics”, Wiley, 2004.
3. Mukesh Singhal, “Advanced Concepts In Operating Systems”, McGrawHill Series in Computer Science, 1994.
4. A.S.Tanenbaum, M.Van Steen, “Distributed Systems”, Pearson Education, 2004.
5. M.L.Liu, “Distributed Computing Principles and Applications”, Pearson Addison Wesley, 2004.

MCE001 COMMUNICATION NETWORK SECURITY

OBJECTIVES:

1. To know about Various Networks problem
2. To study the Network Security
3. To understand the how to protect the data in Network

Hours Required per week	Lecture	Tutorial	Practical	Credit
	3	-	Nil	3
Total	45	-	-	-

UNIT I INTRODUCTION ON SECURITY 9

Security Goals, Types of Attacks: Passive attack, active attack, attacks on confidentiality, attacks on Integrity and availability. Security services and mechanisms, Techniques Cryptography, Steganography , Revision on Mathematics for Cryptography.

UNIT II SYMMETRIC & ASYMMETRIC KEY ALGORITHMS 9

Substitutional Ciphers, Transposition Ciphers, Stream and Block Ciphers, Data Encryption Standards (DES), Advanced Encryption Standard (AES), RC4, principle of asymmetric key algorithms, RSA Cryptosystem

UNIT III INTEGRITY, AUTHENTICATION AND KEY MANAGEMENT 9

Message Integrity, Hash functions : SHA, Digital signatures : Digital signature standards. Authentication : Entity Authentication: Biometrics, Key management Techniques.

UNIT IV NETWORK SECURITY , FIREWALLS AND WEB SECURITY 9

Introduction on Firewalls, Types of Firewalls, Firewall Configuration and Limitation of Firewall. IP Security Overview, IP security Architecture, authentication Header, Security payload, security associations, Key Management. Web security requirement, secure sockets layer, transport layer security, secure electronic transaction, dual signature

UNIT V WIRELESS NETWORK SECURITY 9

Security Attack issues specific to Wireless systems: Worm hole, Tunneling, DoS. WEP for Wi-Fi network, Security for 4G networks: Secure Ad hoc Network, Secure Sensor Network

TOTAL: 45

REFERENCES:

1. Behrouz A. Fourcuzan ," Cryptography and Network security" Tata McGraw- Hill, 2008
2. William Stallings, "Cryptography and Network Security", 3rd Edition, Pearson Education, New Delhi, 2003
3. Tom Karygiannis, Les Owens,"Wireless Network Security 802.11, Bluetooth and Handheld Devices", National Institute of Standards and Technology, US Dept. of Commerce Special Publication 800-48, 2002
4. B.A. Forouzan, "Cryptography & Network Security", TaTa McGrawHill, 2007
5. Eric Cole "Network Security Bible" , 2009
6. Mark D. Ciampa,"Security+ Guide to Network Security Fundamentals" , 2008.
7. William Stallings "Network Security Essentials: Applications and Standards" 4th Edition, 2010
8. Stuart McClure, Joel Scambray and George Kurtz "Hacking Exposed: Network Security Secrets and Solutions", Sixth Edition 2009
9. Chris McNab Network Security Assessment: Know Your Network 2007
10. Fahim Hussain Yusuf Bhaiji "Network Security Technologies and Solutions" CCIE Professional Development Series, 2008

MCE010 EMBEDDED SYSTEMS

OBJECTIVES:

1. To know about Various Networks problem
2. To study the Network Security
3. To understand the how to protect the data in Network

Hours Required per week	Lecture	Tutorial	Practical	Credit
	3	-	Nil	3
Total	45	-	-	-

UNIT I EMBEDDED PROCESSORS 9

Embedded Computers, Characteristics of Embedded Computing Applications, Challenges in Embedded Computing system design, Embedded system design process- Requirements, Specification, Architectural Design, Designing Hardware and Software Components, System Integration, Formalism for System Design- Structural Description, Behavioural Description, Design Example: Model Train Controller, ARM processorprocessor and memory organization.

UNIT II EMBEDDED PROCESSOR AND COMPUTING PLATFORM 9

Data operations, Flow of Control, SHARC processor- Memory organization, Data operations, Flow of Control, parallelism with instructions, CPU Bus configuration, ARM Bus, SHARC Bus, Memory devices, Input/output devices, Component interfacing, designing with microprocessor development and debugging, Design Example : Alarm Clock. Hybrid Architecture

UNIT III NETWORKS 9

Distributed Embedded Architecture- Hardware and Software Architectures, Networks for embedded systems- I2C, CAN Bus, SHARC link supports, Ethernet, Myrinet, Internet, Network-Based design- Communication Analysis, system performance Analysis, Hardware platform design, Allocation and scheduling, Design Example: Elevator Controller.

UNIT IV REAL-TIME CHARACTERISTICS 9

Clock driven Approach, weighted round robin Approach, Priority driven Approach, Dynamic Versus Static systems, effective release times and deadlines, Optimality of the Earliest deadline first (EDF) algorithm, challenges in validating timing constraints in priority driven systems, Off-line Versus On-line scheduling.

UNIT V SYSTEM DESIGN TECHNIQUES 9

Design Methodologies, Requirement Analysis, Specification, System Analysis and Architecture Design, Quality Assurance, Design Example: Telephone PBX- System Architecture, Ink jet printer- Hardware Design and Software Design, Personal Digital Assistants, Set-top Boxes.

TOTAL: 45

REFERENCES:

1. Wayne Wolf, “Computers as Components: Principles of Embedded Computing System Design”, Morgan Kaufman Publishers.
2. Jane.W.S. Liu, “Real-Time systems”, Pearson Education Asia.
3. C. M. Krishna and K. G. Shin, “Real-Time Systems” , McGraw-Hill, 1997
4. Frank Vahid and Tony Givargis, “Embedded System Design: A Unified Hardware/Software Introduction” , John Wiley & Sons.
5. Raj Kamal Embedded Systems: “Architecture, Programming and Design”, 2nd Edition (Volume 2) , 2009)
6. Dimitris Gizopoulos, A. Paschalis and Yervant Zorian,” Embedded Processor-Based Self-Test (Frontiers in Electronic Testing)”, 2011

MCC007 ADHOC NETWORKS

OBJECTIVES:

1. To learn about the MAC address spoofing concepts and basics of networks
2. To learn about the routing principles and adhoc network types.
3. To learn about the IEEE standards, MESH networks and its heterogeneous models

Hours Required per week	Lecture	Tutorial	Practical	Credit
	3	-	Nil	3
Total	45	-	-	-

UNIT I AD-HOC MAC **9**

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 **9**

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 **9**

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

UNIT IV WSN ROUTING, LOCALIZATION & QOS **9**

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

UNIT V MESH NETWORKS **9**

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 PERIODS: 45

REFERENCES:

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.

MCS003 DIGITAL IMAGE PROCESSING L T P C
3 0 0 3

UNIT I DIGITAL IMAGE FUNDAMENTALS 9

Elements of digital image processing systems, Vidicon and Digital Camera working principles, Elements of visual perception, brightness, contrast, hue, saturation, Mach Band effect, Image sampling, Quantization, Dither, Two dimensional mathematical preliminaries.

UNIT II IMAGE TRANSFORMS 9

1D DFT, 2D transforms - DFT, DCT, Discrete Sine, Walsh, Hadamard, Slant, Haar, KLT,SVD, Wavelet transform.

UNIT III IMAGE ENHANCEMENT AND RESTORATION 9

Histogram modification, Noise distributions, Spatial averaging, Directional Smoothing, Median, Geometric mean, Harmonic mean, Contraharmonic and Yp mean filters . Design of 2D FIR filters. Image restoration - degradation model, Unconstrained and Constrained restoration, Inverse filtering-removal of blur caused by uniform linear motion, Wiener filtering, Geometric transformations-spatial transformations, Gray Level interpolation.

UNIT IV IMAGE SEGMENTATION AND RECOGNITION 9

Image segmentation - Edge detection, Edge linking and boundary detection, Region growing, Region splitting and Merging, Image Recognition - Patterns and pattern classes, Matching by minimum distance classifier, Matching by correlation., Neural networks-Backpropagation network and training, Neural network to recognize shapes.

UNIT V IMAGE COMPRESSION 9

Need for data compression, Huffman, Run Length Encoding, Shift codes, Arithmetic coding, Vector Quantization, Block Truncation Coding, Transform coding, JPEG standard, JPEG 2000, EZW, SPIHT, MPEG. **TOTAL: 45**

REFERENCES:

1. Rafael C. Gonzalez, Richard E. Woods, " Digital Image Processing", Pearson Education, Inc., Second Edition, 2004
2. Rafael C. Gonzalez and Richard E. Woods "Digital Image Processing"(3rd Edition) 2007
3. Anil K. Jain, "Fundamentals of Digital Image Processing", Prentice Hall of India, 2002.
4. Rafael C. Gonzalez, Richard E. Woods, Steven Eddins," Digital Image Processing using MATLAB", Pearson Education, Inc., 2004.
5. D.E. Dudgeon and R.M. Mersereau, "Multidimensional Digital Signal Processing", Prentice Hall Professional Technical Reference, 1990.
6. William K. Pratt, " Digital Image Processing", John Wiley, New York, 2002.
7. S. Allen Broughton and Kurt M. Bryan, "Discrete Fourier Analysis and Wavelets: Applications to Signal and Image Processing", 2008;
8. Mark A. Haidekker "Advanced Biomedical Image Analysis" 2010
9. K. S. Thyagarajan "Still Image and Video Compression with MATLAB", 2011

MCS004 NETWORK ROUTING ALGORITHMS L T P C
3 0 0 3

UNIT I INTRODUCTION 7

ISO OSI Layer Architecture, TCP/IP Layer Architecture, Functions of Network layer, General Classification of routing, Routing in telephone networks, Dynamic Non hierarchical Routing (DNHR), Trunk status map routing (TSMR), real-time network routing (RTNR), Distance vector routing, Link state routing, Hierarchical routing.

UNIT II INTERNET ROUTING 10

Interior protocol : Routing Information Protocol (RIP), Open Shortest Path First (OSPF), Bellman Ford Distance Vector Routing. Exterior Routing Protocols: Exterior Gateway Protocol (EGP) and Border Gateway Protocol (BGP). Multicast Routing: Pros and cons of Multicast and Multiple Unicast Routing, Distance Vector Multicast Routing Protocol (DVMRP), Multicast Open Shortest Path First (MOSPF), MBONE, Core Based Tree Routing.

UNIT III ROUTING IN OPTICAL WDM NETWORKS 10

Classification of RWA algorithms, RWA algorithms, Fairness and Admission Control, Distributed Control Protocols, Permanent Routing and Wavelength Requirements, Wavelength Rerouting- Benefits and Issues, Lightpath Migration, Rerouting Schemes, Algorithms- AG, MWPG.

UNIT IV MOBILE - IP NETWORKS 9

Macro-mobility Protocols, Micro-mobility protocol: Tunnel based : Hierarchical Mobile IP, Intra domain Mobility Management, Routing based: Cellular IP, Handoff Wireless Access Internet Infrastructure (HAWAII).

UNIT V MOBILE AD –HOC NETWORKS 9

Internet-based mobile ad-hoc networking communication strategies, Routing algorithms – Proactive routing: destination sequenced Distance Vector Routing (DSDV), Reactive routing: Dynamic Source Routing (DSR), Ad hoc On-Demand Distance Vector Routing (AODV), Hybrid Routing: Zone Based Routing (ZRP).

TOTAL: 45

REFERENCES:

1. William Stallings, ‘ High speed networks and Internets Performance and Quality of Service’, IInd Edition, Pearson Education Asia. Reprint India 2002
2. M. Steen Strub, ‘ Routing in Communication network, Prentice –Hall International, Newyork,1995.
3. C.E Perkins, ‘Ad Hoc Networking’, Addison – Wesley, 2001
4. Ian F. Akyildiz, Jiang Xie and Shantidev Mohanty, “ A Survey of mobility Management in Next generation All IP- Based Wireless Systems”, IEEE Wireless Communications Aug.2004, pp 16-27.
5. A.T Campbell et al., “ Comparison of IP Micromobility Protocols,” IEEE Wireless Communications Feb.2002, pp 72-82.
6. Canhui (Sam) Ou and Biswanath Mukherjee “Survivable Optical WDM Networks (Optical Networks)” 2011

MCS005 INTERNETWORKING MULTIMEDIA L T P C
3 0 0 3

UNIT I INTRODUCTION 9

Digital sound, video and graphics, basic multimedia networking, multimedia characteristics, evolution of Internet services model, network requirements for audio/video transform, multimedia coding and compression for text, image, audio and video. Multimedia communication in wireless network.

UNIT II SUBNETWORK TECHNOLOGY 9

Broadband services, ATM and IP , IPV6, High speed switching, resource reservation, Buffer management, traffic shaping, caching, scheduling and policing, throughput, delay and jitter performance.

UNIT III MULTICAST AND TRANSPORT PROTOCOL 9

Multicast over shared media network, multicast routing and addressing, scaping multicast and NBMA networks, Reliable transport protocols, TCP adaptation algorithm, RTP, RTCP.

UNIT IV MEDIA - ON – DEMAND 9

Storage and media servers, voice and video over IP, MPEG-2 over ATM/IP, indexing synchronization of requests, recording and remote control.

UNIT V APPLICATIONS 9

MIME, Peer-to-peer computing, shared application, video conferencing, centralized and distributed conference control, distributed virtual reality, light weight session philosophy.

TOTAL: 45

REFERENCES:

1. Jon Crowcroft, Mark Handley, Ian Wakeman. “Internetworking Multimedia”, Harcourt Asia Pvt.Ltd.Singapore, 1998.
2. B.O. Szuprowicz, “Multimedia Networking”, McGraw Hill, NewYork. 1995
3. Tay Vaughan,Multimedia making it to work, 4ed,Tata McGrawHill, NewDelhi,2000.
4. Ellen kayata wesel, Ellen Khayata, “Wireless Multimedia Communication: Networking Video, Voice and Data”, Addison Wesley Longman Publication, USA, 1998.
5. Parag Havaldar and Gerard Medioni “Multimedia Systems: Algorithms, Standards, and Industry Practices” , 2009
6. Lawrence Harte “Introduction to Data Multicasting, IP Multicast Streaming for Audio and Video Media Distribution”, 2008

MCS006 SOFT COMPUTING

OBJECTIVES:

1. To introduce soft computing constituents
2. To study the applications of Genetic algorithms
3. To study the different classifications of neural networks
4. To understand the fuzzy logic

Hours Required per week	Lecture	Tutorial	Practical	Credit
	3	-	Nil	3
Total	45	-	-	-

UNIT I INTRODUCTION TO SOFT COMPUTING AND NEURAL NETWORKS 9

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

UNIT II GENETIC ALGORITHMS 9

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

UNIT III NEURAL NETWORKS 9

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 IV FUZZY LOGIC 9

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 V NEURO-FUZZY MODELING 9

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

TEXT BOOKS:

1. Jang J.S.R.,Sun C.T and Mizutami E - Neuro Fuzzy and Soft computing Prentice hall New Jersey,1998
2. Timothy J.Ross:Fuzzy Logic Engineering Applications. McGraw Hill,NewYork,1997.
3. Laurene Fauseett: Fundamentals of Neural Networks. Prentice Hall India, New Delhi,1994.
4. George J.Klir and Bo Yuan, Fuzzy Sets and Fuzzy Logic, Prentice Hall Inc., New Jersey,1995
5. Nih.J. Ndssen Artificial Intelligence, Harcourt Asia Ltd.,Singapore,1998.
6. Colin R. Tosh and Graeme D. Ruxton “Modelling Perception with Artificial Neural Networks”, 2010
7. Principles of Artificial Neural Networks (Advanced Series in Circuits and Systems) by Daniel Graupe (Apr 5, 2007)
8. Yaochu Jin “Advanced Fuzzy Systems Design and Applications”, 2011
9. S. N. Sivanandam and S. N. Deepa “Introduction to Genetic Algorithms” 201

MCS007 MOBILE COMPUTING

OBJECTIVES:

1. To know the fundamentals of wireless communication
2. To understand the telecommunication systems
3. To study the different network layers
4. To study about various protocols

Hours Required per week	Lecture	Tutorial	Practical	Credit
	3	-	Nil	3
Total	45	-	-	-

UNIT I WIRELESS COMMUNICATION FUNDAMENTALS 9

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 11

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

UNIT III WIRELESS NETWORKS 9

Wireless LAN – IEEE 802.11 Standards – Architecture – Services – HIPERLAN – Adhoc Network – Blue Tooth.

UNIT IV NETWORK LAYER 9

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

UNIT V TRANSPORT AND APPLICATION LAYERS 7

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.

TEXT BOOKS:

1. Jochen Schiller, “Mobile Communications”, Second Edition, Pearson Education, 2003.
2. William Stallings, “Wireless Communications and Networks”, Pearson Education, 2002.

REFERENCES:

1. Kaveh Pahlavan, Prasanth Krishnamoorthy, “Principles of Wireless Networks”, First Edition, 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”, First Edition, Pearson Education, 2002.
4. Burkhardt, “Pervasive Computing”, First Edition, Pearson Education, 2003.

MCS008 **THEORY OF COMPUTATION**

OBJECTIVES:

1. To know about the finite automata and transitions
2. To study about regular expressions and languages
3. To know the properties of context free grammar
4. To understand the programming techniques for turing machines

Hours Required per week	Lecture	Tutorial	Practical	Credit
	3	-	Nil	3
Total	45	-	-	-

UNIT I AUTOMATA 9

Introduction to formal proof – Additional forms of Proof – Inductive Proofs –Finite Automata – Deterministic Finite Automata – No deterministic Finite Automata – Finite Automata with Epsilon Transitions.

UNIT II REGULAR EXPRESSIONS AND LANGUAGES 9

Regular Expression – FA and Regular Expressions – Proving Languages not to be regular – Closure Properties of Regular Languages – Equivalence and Minimization of Automata.

UNIT III CONTEXT FREE GRAMMAR AND LANGUAGES 9

CFG – Parse Trees – Ambiguity in Grammars and Languages – Definition of the Pushdown Automata – Languages of a Pushdown Automata – Equivalence of Pushdown Automata and CFG, Deterministic Pushdown Automata.

UNIT IV PROPERTIES OF CONTEXT FREE LANGUAGES 9

Normal Forms for CFG – Pumping Lemma for CFL – Closure Properties of CFL – Turing Machines – Programming Techniques for TM.

UNIT V INDECIDABILITY 9

A Language That Is Not Recursive Enumerable – An Undecidable Problem that Is RE – Undecidable Problems about TM – Post's Correspondence Problem, The Class P And NP.

TEXT BOOKS:

1. J.E.Hopcroft, R.Motwani and J.D Ullman, "Introduction to Automata Theory, Languages and Computations", Second Edition, Pearson Education, 2003

REFERENCES:

1. H.R.Lewis and C.H.Papadimitriou, "Elements of the theory of Computation", Second Edition, PHI, 2003.
2. J.Martin, "Introduction to Languages and the Theory of Computation", Third Edition, TMH, 2003.
3. Micheal Sipser, "Introduction of the Theory and Computation", Thomson Brokecole, 1997.

MCS009 MULTIMEDIA SYSTEMS

OBJECTIVES:

1. To study the concepts of operating systems
2. To understand the traditional and multimedia file systems
3. To know about the MBone applications
4. To study the various Multimedia Synchronization Methods

Hours Required per week	Lecture	Tutorial	Practical	Credit
	3	-	Nil	3
Total	45	-	-	-

UNIT I INTRODUCTION AND QOS 9

Introduction-QOS Requirements and Constraints-Concepts-Resources- Establishment Phase-Run-Time Phase-Management Architectures.

UNIT II OPERATING SYSTEMS 9

Real-Time Processing-Scheduling-Interprocess Communication-Memory and Management-Server Architecture-Disk Management.

UNIT III FILE SYSTEMS AND NETWORKS 9

Traditional and Multimedia File Systems-Caching Policy-Batching-Piggy backing-Ethernet-Gigabit Ethernet-Token Ring-100VG Any LAN-Fiber Distributed Data Interface (FDDI)- ATM Networks-MAN-WAN.

UNIT IV COMMUNICATION 9

Transport Subsystem-Protocol Support for QOS-Transport of Multimedia-Computer Supported Cooperative Work-Architecture-Session Management-MBone Applications.

UNIT V SYNCHRONIZATION 9

Synchronization in Multimedia Systems-Presentation-Synchronization Types- Multimedia Synchronization Methods-Case Studies-MHEG-MODE-ACME.

TEXT BOOKS:

Ralf Steinmetz and Klara Nahrstedt, "Multimedia Systems", Springer, I Edition 2004.

REFERENCES:

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., Sandra K.M., Multimedia Applications Development using DVI technology, McGraw Hill, 1992.
4. K. R. Rao, Zoran S. Bojkovic, Dragorad A. Milovacovic, D. A. Milovacovic , Multimedia Communication Systems: Techniques, Standards, and Networks, Prentice Hall, 1st Edition, 2002
5. Ze-Nian Li and Mark S. Drew, Fundamentals of Multimedia, Pearson, 2004.

MCS010 SOFTWARE QUALITY ASSURANCE

OBJECTIVES:

1. To introduce the SQA components in project life cycle
2. To study the basics of software testing
3. To know about the testing strategies
4. To know the hierarchical models of software quality
5. To know the quality management standards

Hours Required per week	Lecture	Tutorial	Practical	Credit
	3	-	Nil	3
Total	45	-	-	-

UNIT I **9**

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

UNIT II **9**

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 III **9**

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

UNIT IV **9**

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

UNIT V **9**

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

REFERENCES

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

MCS011 SOFTWARE PROJECT MANAGEMENT

OBJECTIVES:

1. To study the product life cycle
2. To understand the emerging models relevance to project management
3. To know the engineering and people issues in project management

Hours Required per week	Lecture	Tutorial	Practical	Credit
	3	-	Nil	3
Total	45	-	-	-

UNIT I BASIC CONCEPTS 9

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

UNIT II FORMAT PROCESS MODELS AND THEIR USE 9

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 9

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

UNIT IV IN STREAM ACTIVITIES IN PROJECTS 9

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

UNIT V ENGINEERING AND PEOPLE ISSUES IN PROJECT MANAGEMENT 9

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.

REFERENCES:

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". Fourth Edition, Tata McGraw Hill, 2005
5. Wheelwright and Clark,"Revolutionising product development",The Free Press,1993.

MCS012 GRID COMPUTING

OBJECTIVES:

1. To introduce the grid computing
2. To study the technologies and tool kit for grid computing
3. To know the high level grid services

Hours Required per week	Lecture	Tutorial	Practical	Credit
	3	-	Nil	3
Total	45	-	-	-

UNIT I INTRODUCTION TO GRID COMPUTING 7

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

UNIT II GRID COMPUTING ARCHITECTURE 8

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

UNIT III GRID COMPUTING TECHNOLOGIES 11

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 10

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

UNIT V HIGH LEVEL GRID SERVICES 9

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

TEXT BOOKS:

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

REFERENCES:

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.

MCS013 PATTERN RECOGNITION

OBJECTIVES:

1. To introduce pattern recognition and its applications
2. To understand the clustering analysis, supervised and unsupervised learning
3. To study the neural networks

Hours Required per week	Lecture	Tutorial	Practical	Credit
	3	-	Nil	3
Total	45	-	-	-

UNIT-I INTRODUCTION TO PATTERN RECOGNITION 9

Patterns and pattern Recognition, Pattern Recognition System-significance, Configurations. Representation of Patterns and Machine recognition, Applications.

UNIT-II SUPERVISED LEARNING 9

Non-Parametric Classification: Decision theoretic Classification-Decision Surfaces, Discriminant Functions and their types, Potential Functions. Discriminant Fuction Training-Weight Space, Training Procedure, Training Methods, Statistical Discriminant Functions-Statistical Design Theory-Problem Formulation, Optimal functions, Training, Example of a Large Data-Set Problem.

UNIT-III CLUSTERING ANALYSIS AND UNSUPERVISED LEARNING, DIMENSIONALITY REDUCTION 9

Introduction to Clustering, Clustering with Unkown Number of Classes and Known Number of Classes, Evaluation of Clustering Results, Graph Theoritical Methods, Mixture Statistics and Unsupervised Learning. Dimensionality Reduction: Feature selection for Multivariate Gaussian Data, Feature Ordering , Canoncial Analysis,Optimum Classifiction, Non-Parametric feature Selection.

UNIT-IV NEURAL NETWORKS 9

Multilayer perception-Preliminaries, Pattern Mapping. Radial Basis Function Networks-Training, Formulation for Pattern Classification, Comparision of RBF with Multilayer Perception. Hamming Net and Kohonen Self – Organizing Feature Map,Hopfield Model.

UNIT – V IMAGE UNDERSTANDING 9

Image Understanding Control Strategies – Parallel and Serial Proceesing Control, Hierarchical Control , Bottom Up Control Strategies, Model Based Control Strategies, Combined Control Strategies, Non-hierarchical Control,Active Contour Models, Point Distribution Models, Pattern Recognition Methods in Image Understanding, Scene Labeling and constraint Propagation, Semantic Image Segmentation and Understanding.

REFERENCES

1. Sing-tze Bow , “Pattern Recognition and Image Preprocessing”,Marcel Dekker, Inc,2nd Edition, 2002.
2. Milan Sonka, Vaclav Hlavac, Roger Boyle, “Image Processing, Analysis and Machine Vision “,PWS publishing, 1999.
3. Earl Gose R.JohnsonBaugh and Steve Jost,”Pattern Recognition and Image Analysis”,PHI,2007.
4. Richard O.Duda, Peter E.Hart and David G.Stork, “Pattern Classification”,Wiley India,2nd Edition,2006.

MCS014 **BIO INFORMATICS**

OBJECTIVES:

1. To introduce the process of search engines and data visualization
2. To study the statistics concepts
3. To know about the pattern matching and data mining

Hours Required per week	Lecture	Tutorial	Practical	Credit
	3	-	Nil	3
Total	45	-	-	-

UNIT I INTRODUCTORY CONCEPTS 9

The Central Dogma – The Killer Application – Parallel Universes – Watson's Definition – Top Down Versus 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 AND DATA VISUALIZATION 9

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.

UNIT III STATISTICS AND DATA MINING 9

Statistical concepts – Microarrays – Imperfect Data – Randomness – Variability – Approximation – Interface Noise – Assumptions – Sampling and Distributions – Hypothesis Testing – Quantifying Randomness – Data Analysis – Tool selection statistics 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 – Pattern Recognition and Discovery – Machine Learning – Text Mining – Tools.

UNIT IV PATTERN MATCHING 9

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

UNIT V MODELING AND SIMULATION 9

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.

REFERENCES

1. Bryan Bergeron, "Bio Informatics Computing", Second Edition, Pearson Education, 2003.
2. T.K.Attwood and D.J. Perry Smith, "Introduction to Bio Informatics, Longman Essen, 1999.

MCS015 ONTOLOGY AND SEMANTIC WEB

OBJECTIVES:

1. To introduce the toplevel ontologies
2. To know the languages for semantic web
3. To introduce the tools for ontology
4. To understand the ontology management

Hours Required per week	Lecture	Tutorial	Practical	Credit
	3	-	Nil	3
Total	45	-	-	-

UNIT I INTRODUCTION 8

Components – Types – Ontological Commitments – Ontological Categories – Philosophical Background -Sample - Knowledge Representation Ontologies – Top Level Ontologies – Linguistic Ontologies – Domain Ontologies – Semantic Web – Need – Foundation – Layers – Architecture.

UNIT II LANGUAGES FOR SEMANTIC WEB AND ONTOLOGIES 12

Web Documents in XML – RDF - Schema – Web Resource Description using RDF- RDF Properties – Topic Maps and RDF – Overview – Syntax Structure – Semantics – Pragmatics - Traditional Ontology Languages – LOOM- OKBC – OCML - Flogic Ontology Markup Languages – SHOE – OIL - DAML + OIL- OWL

UNIT III ONTOLOGY LEARNING FOR SEMANTIC WEB 12

Taxonomy for Ontology Learning – Layered Approach – Phases of Ontology Learning – Importing and Processing Ontologies and Documents – Ontology Learning Algorithms - Evaluation

UNIT IV ONTOLOGY MANAGEMENT AND TOOLS 8

Overview – need for management – development process – target ontology – ontology mapping – skills management system – ontological class – constraints – issues. Evolution – Development of Tools and Tool Suites – Ontology Merge Tools – Ontology based Annotation Tools.

UNIT V APPLICATIONS 5

Web Services – Semantic Web Services - Case Study for specific domain – Security issues – current trends.

REFERENCES:

1. Asuncion Gomez-Perez, Oscar Corcho, Mariano Fernandez-Lopez, "Ontological Engineering: with examples from the areas of Knowledge Management, e-Commerce and the Semantic Web" Springer, 2004
2. Grigoris Antoniou, Frank van Harmelen, "A Semantic Web Primer (Cooperative Information Systems)", The MIT Press, 2004
3. Alexander Maedche, "Ontology Learning for the Semantic Web", Springer; 1 edition, 2002

4. John Davies, Dieter Fensel, Frank Van Harmelen, “Towards the Semantic Web: Ontology – Driven Knowledge Management”, John Wiley & Sons Ltd., 2003.
5. John Davies (Editor), Rudi Studer (Co-Editor), Paul Warren (Co-Editor) “Semantic Web Technologies: Trends and Research in Ontology-based Systems”Wiley Publications, Jul 2006
6. Dieter Fensel (Editor), Wolfgang Wahlster, Henry Lieberman, James Hendler, “Spinning the Semantic Web: Bringing the World Wide Web to Its Full Potential”, The MIT Press, 2002
7. Michael C. Daconta, Leo J. Obrst, Kevin T. Smith, “The Semantic Web: A Guide to the Future of XML, Web Services, and Knowledge Management”, Wiley, 2003
8. Steffen Staab (Editor), Rudi Studer, “Handbook on Ontologies (International Handbooks on Information Systems)”, Springer 1st edition, 2004
9. Dean Allemang (Author), James Hendler (Author) “Semantic Web for the Working Ontologist: Effective Modeling in RDFS and OWL” (Paperback), Morgan Kaufmann, 2008

MCS016 **PERVASIVE COMPUTING**

OBJECTIVES:

1. To introduce the pervasive computing devices and interfaces
2. To know the voice standards and speech applications
3. To know the issues in pervasive computing

Hours Required per week	Lecture	Tutorial	Practical	Credit
	3	-	Nil	3
Total	45	-	-	-

UNIT I **9**

Pervasive Computing Application - Pervasive Computing devices and Interfaces - Device technology trends, Connecting issues and protocols

UNIT II **9**

Pervasive Computing and web based Applications - XML and its role in Pervasive Computing - Wireless Application Protocol (WAP) Architecture and Security - Wireless Mark-Up language (WML) – Introduction

UNIT III **9**

Voice Enabling Pervasive Computing - Voice Standards - Speech Applications in Pervasive Computing and security

UNIT IV **9**

PDA in Pervasive Computing – Introduction - PDA software Components, Standards, emerging trends - PDA Device characteristics - PDA Based Access Architecture

UNIT V **9**

User Interface Issues in Pervasive Computing, Architecture - Smart Card- based Authentication Mechanisms - Wearable computing Architecture

TEXT BOOKS

1. Jochen Burkhardt, Horst Henn, Stefan Hepper, Thomas Schaec & Klaus Rindtorff. Pervasive Computing Technology and Architecture of Mobile Internet Applications, Addision Wesley, Reading, 2002.
2. Uwe Ha nsman, Lothat Merk, Martin S Nicklous & Thomas Stober: Principles of Mobile Computing, Second Edition, Springer- Verlag, New Delhi, 2003. Reference Books

REFERENCES

1. Rahul Banerjee: Internetworking Technologies: An Engineering Perspective, Prentice – Hall of India, New Delhi, 2003. (ISBN 81-203-2185-5)
2. Rahul Banerjee: Lecture Notes in Pervasive Computing, Outline Notes, BITS-Pilani, 2003.

MCS017 **DIGITAL IMAGING**

OBJECTIVES:

1. To study the fundamentals of image processing
2. To study the various image enhancement techniques
3. To know the various image compression standards
4. To know the applications of image processing

Hours Required per week	Lecture	Tutorial	Practical	Credit
	3	-	Nil	3
Total	45	-	-	-

UNIT I FUNDAMENTALS OF IMAGE PROCESSING 9

Introduction – Steps in Image Processing Systems – Image Acquisition – Sampling and Quantization – Pixel Relationships – Colour Fundamentals and Models, File Formats, Image operations – Arithmetic, Geometric and Morphological.

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UNIT II IMAGE ENHANCEMENT 9

Spatial Domain Gray level Transformations Histogram Processing Spatial Filtering – Smoothing and Sharpening.Frequency Domain : Filtering in Frequency Domain – DFT, FFT, DCT – Smoothing and Sharpening filters – Homomorphic Filtering.

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UNIT III IMAGE SEGMENTATION AND FEATURE ANALYSIS 9

Detection of Discontinuities – Edge Operators – Edge Linking and Boundary Detection – Thresholding – Region Based Segmentation – Morphological WaterSheds – Motion Segmentation, Feature Analysis and Extraction.

UNIT IV MULTI RESOLUTION ANALYSIS AND COMPRESSIONS 9

Multi Resolution Analysis : Image Pyramids – Multi resolution expansion – Wavelet Transforms. Image Compression : Fundamentals – Models – Elements of Information Theory – Error Free Compression – Lossy Compression – Compression Standards.

UNIT V APPLICATIONS OF IMAGE PROCESSING 9

Image Classification – Image Recognition – Image Understanding – Video Motion Analysis – Image Fusion – Steganography – Digital Compositing – Mosaics – Colour Image Processing.

REFERENCES:

1. Rafael C.Gonzalez and Richard E.Woods, “Digital Image Processing” Second Edition, Pearson Education, 2003.
2. Milan Sonka, Vaclav Hlavac and Roger Boyle, “Image Processing, Analysis and Machine Vision”, Second Edition, Thomson Learning, 2001
3. Anil K.Jain, “Fundamentals of Digital Image Processing”, Person Educaiton, 2003.
4. Ron Patton, Software testing , second edition, Pearson education, 2007
5. Alan C Gillies, “Software Quality Theory and Management”, Cengage Learning, Second edition, 2003

MCS018 INFORMATION RETRIEVAL TECHNIQUES

OBJECTIVES:

1. To introduce the various information retrieval models
2. To know about pattern matching
3. To study the Query languages and data models

Hours Required per week	Lecture	Tutorial	Practical	Credit
	3	-	Nil	3
Total	45	-	-	-

UNIT I INTRODUCTION 9

Basic Concepts – Retrieval Process – Modeling – Classic Information Retrieval – Set Theoretic, Algebraic and Probabilistic Models – Structured Text Retrieval Models – Retrieval Evaluation – Word Sense Disambiguation

UNIT II QUERYING 9

Languages – Key Word based Querying – Pattern Matching – Structural Queries – Query Operations – User Relevance Feedback – Local and Global Analysis – Text and Multimedia languages

UNIT III TEXT OPERATIONS AND USER INTERFACE 9

Document Preprocessing – Clustering – Text Compression - Indexing and Searching – Inverted files – Boolean Queries – Sequential searching – Pattern matching – User Interface and Visualization – Human Computer Interaction – Access Process – Starting Points –Query Specification - Context – User relevance Judgment – Interface for Search

UNIT IV MULTIMEDIA INFORMATION RETRIEVAL 9

Data Models – Query Languages – Spatial Access Models – Generic Approach – One Dimensional Time Series – Two Dimensional Color Images – Feature Extraction

UNIT V APPLICATIONS 9

Searching the Web – Challenges – Characterizing the Web – Search Engines – Browsing – Meta-searchers – Online IR systems – Online Public Access Catalogs – Digital Libraries – Architectural Issues – Document Models, Representations and Access – Prototypes and Standards

REFERENCES:

1. Ricardo Baeza-Yate, Berthier Ribeiro-Neto, “Modern Information Retrieval”, Pearson Education Asia, 2005.
2. G.G. Chowdhury, “Introduction to Modern Information Retrieval”, Neal-Schuman Publishers; 2nd edition, 2003.
3. Daniel Jurafsky and James H. Martin, “Speech and Language Processing”, Pearson Education, 2000
4. David A. Grossman, Ophir Frieder, “ Information Retrieval: Algorithms, and Heuristics”, Academic Press, 2000
5. Charles T. Meadow, Bert R. Boyce, Donald H. Kraft, “Text Information Retrieval Systems”, Academic Press, 2000

MCS019 DATA WAREHOUSING AND DATA MINING

OBJECTIVES:

1. To introduce the basics of data warehousing
2. To know the data mining functionalities
3. To study the various classification methods
4. To understand the concept of cluster analysis

Hours Required per week	Lecture	Tutorial	Practical	Credit
	3	-	Nil	3
Total	45	-	-	-

UNIT I **9**

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 **9**

Data Mining: - Data Mining Functionalities – Data Preprocessing – 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 **9**

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 **9**

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 **9**

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.

REFERENCES

1. Jiawei Han and Micheline Kamber “Data Mining Concepts and Techniques” Second Edition, 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.

MCS020 PERFORMANCE EVALUATION OF COMPUTER SYSTEMS AND NETWORKS

OBJECTIVES:

1. To study the queuing models
2. To know the mobile networks
3. To study the performance evaluation methods

Hours Required per week	Lecture	Tutorial	Practical	Credit
	3	-	Nil	3
Total	45	-	-	-

UNIT I **9**

Performance Characteristics – Requirement Analysis: Concepts –User, Device, Network Requirements – Process –Developing RMA ,Delay, Capacity Requirements – Flow Analysis – Identifying and Developing Flows –Flow Models –Flow Prioritization –Specification.

UNIT II **9**

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

UNIT III **9**

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

UNIT IV **9**

Multi-User Uplinks/Downlinks - Capacity Regions - Opportunistic Scheduling for Stability and Max Throughput - Multi-Hop Routing - Mobile Networks - Throughput Optimality and Backpressure

UNIT V **9**

Performance of Optimal Lyapunov Networking - Energy Optimality- Energy-Delay Tradeoffs - Virtual Cost Queues - Average Power Constraints - Flow Control with Infinite Demand – Auxiliary Variables - Flow Control with Finite Demand - General Utility Optimization.

TEXT BOOKS

1. James D.McCabe , Network Analysis , Architecture and Design , 2nd Edition,Elsevier,2003
2. Bertsekas & Gallager , Data Networks , second edition ,Pearson Education,2003
3. Introduction to Probability Models by Sheldon Ross (8th edition) Academic Press, New York , 2003

REFERENCES

1. D. Bertsekas, A. Nedic and A. Ozdaglar, Convex Analysis and Optimization, Athena Scientific, Cambridge , Massachusetts , 2003
2. Nader F.Mir Computer and Communication Networks,Pearson Education.2007
3. Paul J.Fortier, Howard E.Michel, Computer Systems Performance Evaluation and Prediction, Elsevier,2003

MCS021 AGENT BASED INTELLIGENT SYSTEMS

OBJECTIVES:

1. To study the constraint satisfaction problem
2. To know about the planning agents
3. To understand the process of higher level agents

Hours Required per week	Lecture	Tutorial	Practical	Credit
	3	-	Nil	3
Total	45	-	-	-

UNIT I INTRODUCTION 9

Definitions - Foundations - History - Intelligent Agents-Problem Solving-Searching - Heuristics - Constraint Satisfaction Problems - Game playing.

UNIT II KNOWLEDGE REPRESENTATION AND REASONING 9

Logical Agents-First order logic-First Order Inference-Unification-Chaining- Resolution Strategies-Knowledge Representation-Objects-Actions-Events

UNIT III PLANNING AGENTS 9

Planning Problem-State Space Search-Partial Order Planning-Graphs-Nondeterministic Domains-Conditional Planning-Continuous Planning-MultiAgent Planning.

UNIT IV AGENTS AND UNCERTAINITY 9

Acting under uncertainty – Probability Notation-Bayes Rule and use - Bayesian Networks-Other Approaches-Time and Uncertainty-Temporal Models- Utility Theory - Decision Network – Complex Decisions.

UNIT V HIGHER LEVEL AGENTS 9

Knowledge in Learning-Relevance Information-Statistical Learning Methods-Reinforcement Learning-Communication-Formal Grammar-Augmented Grammars- Future of AI.

TEXT BOOK :

Stuart Russell and Peter Norvig, "Artificial Intelligence - A Modern Approach", 2nd Edition, Prentice Hall, 2002

REFERENCES:

1. Michael Wooldridge, "An Introduction to Multi Agent System", John Wiley, 2002.
2. Patrick Henry Winston, Artificial Intelligence, III Edition, AW, 1999.
3. Nils.J.Nilsson, Principles of Artificial Intelligence, Narosa Publishing House, 1992.

MCS022 VISUALIZATION TECHNIQUES

OBJECTIVES:

1. To introduce the issues and foundations for visualization
2. To know the multidimensional visualization
3. To perform case studies using various analysis methods

Hours Required per week	Lecture	Tutorial	Practical	Credit
	3	-	Nil	3
Total	45	-	-	-

UNIT I VISUALIZATION 9

Introduction – Issues – Data Representation – Data Presentation – Interaction

UNIT II FOUNDATIONS FOR DATA VISUALIZATION 9

Visualization stages – Experimental Semiotics based on Perception Gibson‘s Affordance theory – A Model of Perceptual Processing – Types of Data.

UNIT III COMPUTER VISUALIZATION 9

Non-Computer Visualization – Computer Visualization: Exploring Complex Information Spaces – Fisheye Views – Applications – Comprehensible Fisheye views – Fisheye views for 3D data – Non Linear Magnificaiton – Comparing Visualization of Information Spaces – Abstraction in computer Graphics – Abstraction in user interfaces.

UNIT IV MULTIDIMENSIONAL VISUALIZATION 9

One Dimension – Two Dimensions – Three Dimensions – Multiple Dimensions – Trees – Web Works – Data Mapping: Document Visualization – Workspaces.

UNIT V CASE STUDIES 9

Small interactive calendars – Selecting one from many – Web browsing through a key hole – Communication analysis – Archival analysis

TEXT BOOKS:

1. Colin Ware, “Information Visualization Perception for Design” Margon Kaufmann Publishers, 2004, 2nd edition.
2. Robert Spence “Information visualization – Design for interaction”, Pearson Education, 2nd Edition, 2007

REFERENCES:

Stuart.K.Card, Jock.D.Mackinlay and Ben Shneiderman, “Readings in Information Visualization Using Vision to think”, Morgan Kaufmann Publishers.

MCS023 ADVANCED DATABASES

OBJECTIVES:

1. To understand the parallel and distributed databases and architectures
2. To study the concepts of object and relational databases
3. To study about XML, Mobile and multimedia databases

Hours Required per week	Lecture	Tutorial	Practical	Credit
	3	-	Nil	3
Total	45	-	-	-

UNIT I PARALLEL AND DISTRIBUTED DATABASES 10

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

UNIT II OBJECT AND OBJECT RELATIONAL DATABASES 10

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

UNIT III XML DATABASES 8

XML Databases: XML Data Model – DTD - XML Schema - XML Querying – Web Databases – JDBC – Information Retrieval – Data Warehousing – Data Mining

UNIT IV MOBILE DATABASES 8

Mobile Databases: Location and Handoff Management - Effect of Mobility on Data Management - Location Dependent Data Distribution - Mobile Transaction Models - Concurrency Control - Transaction Commit Protocols- Mobile Database Recovery Schemes

UNIT V MULTIMEDIA DATABASES 9

Multidimensional Data Structures – Image Databases – Text/Document Databases- Video Databases – Audio Databases – Multimedia Database Design.

REFERENCES

1 R. Elmasri, S.B. Navathe, “Fundamentals of Database Systems”, Fifth Edition, Pearson Education/Addison Wesley, 2007.
2. Thomas Cannolly and Carolyn Begg, “ Database Systems, A Practical Approach to Design, Implementation and Management”, Third Edition, Pearson Education, 2007.
3. Henry F Korth, Abraham Silberschatz, S. Sudharshan, “Database System Concepts”, Fifth Edition, McGraw Hill, 2006.
4. C.J.Date, A.Kannan and S.Swamynathan,”An Introduction to Database Systems”, Eighth Edition, Pearson Education, 2006.
5. V.S.Subramanian, “Principles of Multimedia Database Systems”, Harcourt India Pvt Ltd., 2001.
6. Vijay Kumar, “ Mobile Database Systems”, John Wiley & Sons, 2006.

MCS024 COMPONENT BASED TECHNOLOGY

OBJECTIVES:

1. To introduce the various software components and their fundamental properties
2. To know the java component technologies
3. To study the CORBA technologies
4. To understand the component frame works and the development

Hours Required per week	Lecture	Tutorial	Practical	Credit
	3	-	Nil	3
Total	45	-	-	-

UNIT I INTRODUCTION 9

Software Components – objects – fundamental properties of Component technology – modules – interfaces – callbacks – directory services – component architecture – components and middleware.

UNIT II JAVA COMPONENT TECHNOLOGIES 9

Threads – Java Beans – Events and connections – properties – introspection – JAR files – reflection – object serialization – Enterprise Java Beans – Distributed Object models – RMI and RMI-IIOP.

UNIT III CORBA TECHNOLOGIES 9

Java and CORBA – Interface Definition language – Object Request Broker – system object model – portable object adapter – CORBA services – CORBA component model – containers – application server – model driven architecture.

UNIT IV COM AND .NET TECHNOLOGIES 9

COM – Distributed COM – object reuse – interfaces and versioning – dispatch interfaces – connectable objects – OLE containers and servers – Active X controls – .NET components - assemblies – appdomains – contexts – reflection – remoting.

UNIT V COMPONENT FRAMEWORKS AND DEVELOPMENT 9

Connectors – contexts – EJB containers – CLR contexts and channels – Black Box component framework – directory objects – cross-development environment – component-oriented programming – Component design and implementation tools – testing tools - assembly tools.

TEXT BOOKS:

"Component Software: Beyond Object-Oriented Programming", Pearson Education publishers, 2003.

REFERENCES:

Ed Roman, "Enterprise Java Beans", Third Edition , Wiley , 2004.