ANNA UNIVERSITY : : CHENNAI 600 025

AFFILIATED INSTITUTIONS

Regulations - 2009

M.E.COMPUTER SCIENCE AND ENGINEERING

II TO IV SEMESTERS (FULL TIME) CURRICULUM AND SYLLABI

SEMESTER II

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1	CS9221	Data Base Technology	3	0	0	3
2	CS9222	Advanced Operating Systems	3	0	0	3
3	CS9223	Advanced System Software	3	0	0	3
4	CS9224	Information Security	3	0	0	3
5	CS9225	Web Technology	3	0	0	3
6	E1	Elective I	3	0	0	3
PRACTICAL						
7	CS9227	Operating System Lab	0	0	3	2
8	CS9228	Web Technology Lab	0	0	3	2
		TOTAL	**18**	**0**	**6**	**22**

SEMESTER III

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1	E2	Elective II	3	0	0	3
2	E3	Elective III	3	0	0	3
3	E4	Elective IV	3	0	0	3
PRACTICAL						
4	CS9234	Project Work (Phase I)	0	0	12	6
		TOTAL	**9**	**0**	**12**	**15**

SEMESTER IV

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
PRACTICAL						
1	CS9241	Project Work (Phase II)	0	0	24	12
		TOTAL	**0**	**0**	**24**	**12**

TOTAL NO OF CREDITS TO BE EARNED FOR THE AWARD OF DEGREE: 20+22+15+12= 69

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

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
1	CS9251	Mobile Computing	3	0	0	3
2	CS9252	Grid Computing	3	0	0	3
3	CS9253	Theory of Computation	3	0	0	3
4	CS9254	Soft Computing	3	0	0	3
5	CP9264	Distributed Computing	3	0	0	3
6	CS9256	Multimedia Systems	3	0	0	3
7	CS9257	XML and Web Services	3	0	0	3
8	CS9258	Bio Informatics	3	0	0	3
9	CS9259	Network Security	3	0	0	3
10	CS9260	Embedded Systems	3	0	0	3
11	CS9261	Digital Imaging	3	0	0	3
12	CS9262	Software Quality Assurance	3	0	0	3
13	CS9263	Ad-hoc Networks	3	0	0	3
14	CS9264	Data Warehousing and Data Mining	3	0	0	3
15	CS9265	Performance Evaluation of Computer Systems and Networks	3	0	0	3
16	CS9266	Agent Based Intelligent Systems	3	0	0	3
17	CS9267	Visualization Techniques	3	0	0	3
18	CS9268	Advanced Databases	3	0	0	3
19	CS9269	Software Project Management	3	0	0	3
20	CS9270	Component Based Technology	3	0	0	3

CS9221   **DATABASE TECHNOLOGY**   **L T P C**
                                                                           3 0 0 3

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

                                                                TOTAL : 45 PERIODS

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.

CS9222   **ADVANCED OPERATING SYSTEMS**   **L T P C**
                                                                              3 0 0 3

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 Non-blocking 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.

                                                            TOTAL : 45 PERIODS

TEXT BOOK:
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.

CS9223   **ADVANCED SYSTEM SOFTWARE**   **L T P C**
                                                                                 3 0 0 3

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

                                                                          TOTAL : 45 PERIODS

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.

CS9224   **INFORMATION SECURITY**   **L T P C**
                                                                                       3 0 0 3

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

                                                                          TOTAL : 45 PERIODS

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.

CS9225   **WEB TECHNOLOGY**   **L T P C**
                                                                                3 0 0 3

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 schema – DOM – SAX – Xquery.

UNIT V 9
Building Web applications - cookies – sessions – open source environment – PHP – MYSQL – case studies.

TOTAL : 45 PERIODS

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.

CS9227	**OPERATING SYSTEM LAB**	**L T P C** **0 0 3 2**

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

TOTAL : 45 PERIODS

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

6.

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 ObjectStore'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 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.]

CS9228   **WEB TECHNOLOGY LAB**   **L T P C**
                                                                            0 0 3 2

1. Creation of HTML pages with frames, links, tables and other tags
2. Usage of internal and external CSS along with HTML pages
3. Client side Programming
    i. Java script for displaying date and comparing two dates
    ii. Form Validation including text field, radio buttons, check boxes, list box
       and other controls
4. Usage of ASP/JSP objects response, Request, Application, Session, Server, ADO etc
    i. Writing online applications such as shopping, railway/air/bus ticket
       reservation system with set of ASP/JSP pages
    ii. Using sessions and cookies as part of the web application
5. Writing Servlet Program using HTTP Servlet
6. Any online application with database access
7. Creation of XML document for a specific domain
8. Writing DTD or XML schema for the domain specific XML document
9. Parsing an XML document using DOM and SAX Parsers
10. Sample web application development in the open source environment

TOTAL : 45 PERIODS

CS9251   **MOBILE COMPUTING**   **L T P C**
                                                                             3 0 0 3

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.

TOTAL : 45 PERIODS

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.

CS9252   **GRID COMPUTING**   **L T P C**
                                                                          3 0 0 3

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 ARCHITURE   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.

                                                      TOTAL : 45 PERIODS

TEXT BOOK:
1. 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.

CS9253   **THEORY OF COMPUTATION**   **L T P C**
                                                                          3 0 0 3

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.

                                                      TOTAL : 45 PERIODS

TEXT BOOK:
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.

CS9254   **SOFT COMPUTING**   **L T P C**
                                                                    3 0 0 3

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.

TOTAL : 45 PERIODS

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.

REFERENCES:
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.

CP9264 **DISTRIBUTED COMPUTING** **L T P C**
3 0 0 3

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.

TOTAL : 45 PERIODS

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.

CS9256 **MULTIMEDIA SYSTEMS** **L T P C**
3 0 0 3

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.

TOTAL : 45 PERIODS

TEXT BOOK:
1. 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.

CS 9257 **XML AND WEB SERVICES** **L T P C**
3 0 0 3

UNIT I XML TECHNOLOGY FAMILY **9**
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 II 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

UNIT III WEB SERVICES BUILDING BLOCK **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 – Ad-Hoc Discovery – Securing web services.

UNIT IV IMPLEMENTING XML IN E-BUSINESS **9**
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 V XML AND CONTENT MANAGEMENT **9**
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: An Architect's Guide", Prentice Hall, 2004.

REFERENCES
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,2.

CS9258   **BIO INFORMATICS**   **L T P C**
                                                                                          3 0 0 3

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.

                                                                  TOTAL : 45 PERIODS

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.

CS9259   **NETWORK SECURITY**   **L T P C**
                                                                        3 0 0 3

UNIT I   INTRODUCTION   9
Attacks - Services - Mechanisms - Conventional Encryption - Classical And Modern Techniques
– Encryption Algorithms - Confidentiality.

UNIT II   PUBLIC KEY ENCRYPTION   9
RSA - Elliptic Curve Cryptography - Number Theory Concepts

UNIT III   MESSAGE AUTHENTICATION   9
Hash Functions - Digest Functions - Digital Signatures - Authentication Protocols.

UNIT IV   NETWORK SECURITY PRACTICE   9
Authentication, Applications - Electronic Mail Security - IP Security - Web Security.

UNIT V   SYSTEM SECURITY   9
Intruders – Viruses – Worms – Firewalls Design Principles – Trusted Systems.

                                                        TOTAL : 45 PERIODS

TEXT BOOK:
1. Stallings, Cryptography & Network Security - Principles & Practice, Prentice Hall, 3rd Edition
   2002.

REFERENCES:
1. Bruce, Schneier, Applied Cryptography, 2nd Edition, Toha Wiley & Sons, 1996.
2. Man Young Rhee, "Internet Security", Wiley, 2003.
3. Pfleeger & Pfleeger, "Security in Computing", Pearson Education, 3rd Edition, 2003.

CS9260   **EMBEDDED SYSTEMS**   **LT P C**
                                                                        3 0 0 3

UNIT I   EMBEDDED COMPUTING   9
Challenges of Embedded Systems – Embedded system design process. Embedded processors
– ARM processor – Architecture, ARM and Thumb Instruction sets

UNIT II   EMBEDDED C PROGRAMMING   9
C-looping structures – Register allocation – Function calls – Pointer aliasing – structure
arrangement – bit fields – unaligned data and endianness – inline functions   and   inline
assembly – portability issues.

UNIT III   OPTIMIZING ASSEMBLY CODE   9
Profiling and cycle counting – instruction scheduling – Register allocation – conditional
execution – looping constructs – bit manipulation – efficient switches –   optimized primitives.

UNIT IV   PROCESSES AND OPERATING SYSTEMS   9
Multiple tasks and processes – Context switching – Scheduling policies – Interprocess
communication mechanisms – Exception and interrupt handling - Performance issues.

UNIT V EMBEDDED SYSTEM DEVELOPMENT 9
Meeting real time constraints – Multi-state systems and function sequences. Embedded software development tools – Emulators and debuggers. Design methodologies – Case studies – Complete design of example embedded systems.

TOTAL : 45 PERIODS

REFERENCES:
1. Andrew N Sloss, D. Symes, C. Wright, " ARM System Developers Guide", Morgan Kaufmann / Elsevier, 2006.
2. Michael J. Pont, "Embedded C", Pearson Education , 2007.
3. Wayne Wolf, "Computers as Components : Principles of Embedded Computer System Design", Morgan Kaufmann / Elsevier, 2nd. edition, 2008.
4. Steve Heath, "Embedded System Design" , Elsevier, 2nd. edition, 2003.

CS9261	DIGITAL IMAGING	L T P C
		3 0 0 3

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.

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.

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..

TOTAL : 45 PERIODS

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.

CS9262   **SOFTWARE QUALITY ASSURANCE**   **L T P C**
                                                                                  3 0 0 3

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 – ad-hoc 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

                                                                         TOTAL : 45 PERIODS

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
4. Ron Patton, Software testing , second edition, Pearson education, 2007
5. Alan C Gillies, "Software Quality Theory and Management", Cengage Learning, Second edition, 2003

CS9263   **AD-HOC NETWORKS**   **L T P C**
                                                                                  3 0 0 3

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 : 45 PERIODS

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.

CS9264   DATA WAREHOUSING AND DATA MINING   LT P C
                                                                  3 0 0 3
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.

TOTAL : 45 PERIODS

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

CS9265	PERFORMANCE EVALUATION OF COMPUTER SYSTEMS AND NETWORKS	L T P C 3 0 0 3

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.

TOTAL : 45 PERIODS

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

CS9266   **AGENT BASED INTELLIGENT SYSTEMS**   **L T P C**
                                                                                  3 0 0 3

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.

                                                                   TOTAL : 45 PERIODS

TEXT BOOK:
1. 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.

CS9267   **VISUALIZATION TECHNIQUES**   **LT P C**
                                                                       3 0 0 3

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

                                                 TOTAL : 45 PERIODS

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, 2 nd Edition, 2007

REFERENCE:
1. Stuart.K.Card, Jock.D.Mackinlay and Ben Shneiderman, "Readings in Information Visualization Using Vision to think", Morgan Kaufmann Publishers.

CS9268   **ADVANCED DATABASES**   **LT P C**
                                                                  3 0 0 3

UNIT I   **PARALLEL AND DISTRIBUTED DATABASES**   **9**
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   9
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   9
XML Databases: XML Data Model – DTD - XML Schema - XML Querying – Web Databases – JDBC – Information Retrieval – Data Warehousing – Data Mining

UNIT IV   MOBILE DATABASES   9
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.

TOTAL : 45 PERIODS

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.

CS9269   SOFTWARE PROJECT MANAGEMENT   L T P C
3 0 0 3

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.

TOTAL : 45 PERIODS

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".
5. Wheelwright and Clark,"Revolutionising product development",The Free Press,1993.

CS9270	COMPONENT BASED TECHNOLOGY	LT P C
		3 0 0 3

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.

TOTAL : 45 PERIODS

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

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