ANNA UNIVERSITY COIMBATORE
REGULATIONS 2008

B.Tech (INFORMATION TECHNOLOGY)

SEMESTER V

Code No.	Course Title	L	T	P	C
THEORY					
	Numerical Methods	3	1	0	4
	Theory of Computation	3	1	0	4
	Signals and Linear Systems	3	1	0	4
	Client Server Computing	3	0	0	3
	Computer Networks	3	0	0	3
	Design and Analysis of Algorithms	3	0	0	3
PRACTICAL					
	Computer Networks Lab	0	0	3	2
	Design and Analysis of Algorithms Lab	0	0	3	2
	Communication Skill & Seminar**	0	0	3	2
	TOTAL	**18**	**3**	**9**	**27**

SEMESTER VI

Code No.	Course Title	L	T	P	C
THEORY					
	Digital Signal Processing	3	1	0	4
	Principles of Compiler Design	3	1	0	4
	Enterprise Computing	3	0	0	3
	Object Oriented Analysis and Design	3	0	0	3
	Communication Switching techniques	3	1	0	4
	Elective – I	3	0	0	3
PRACTICAL					
	Enterprise Computing Lab	0	0	3	2
	Compiler Design Lab	0	0	3	2
	Case Tools Lab	0	0	3	2
	TOTAL	**18**	**3**	**9**	**27**

SEMESTER VII

Code No.	Course Title	L	T	P	C
THEORY					
	Web Technology	3	0	0	3
	Mobile Computing	3	0	0	3
	Principles of Management	3	0	0	3
	Elective II	3	0	0	3
	Elective III	3	0	0	3
PRACTICAL					
	Web Technology Lab	0	0	3	2
	Mobile Computing Lab	0	0	3	2
	TOTAL	**15**	**0**	**6**	**19**

SEMESTER VIII

Code No.	Course Title	L	T	P	C
THEORY					
	Cryptography & Network Security	3	1	0	4
	Elective IV	3	0	0	3
	Elective V	3	0	0	3
PRACTICAL					
	Project Work	0	0	12	6
	TOTAL	**9**	**1**	**12**	**16**

LIST OF ELECTIVES FOR B.E. INFORMATION TECHNOLOGY

SEMESTER VI

Code No.	Course Title	L	T	P	C
	Resource Management Techniques	3	0	0	3
	UNIX Internals	3	0	0	3
	Multimedia Systems	3	0	0	3
	Data Warehousing and Data Mining	3	0	0	3
	E-Commerce	3	0	0	3
	Advanced Database	3	0	0	3
	Intellectual Property Rights	3	0	0	3
	Indian Constitution and Society	3	0	0	3

SEMESTER VII

Code No.	Course Title	L	T	P	M
	TCP/IP Design and Implementation	3	0	0	3
	C# and .NET Framework	3	0	0	3
	Pervasive Computing	3	0	0	3
	Grid Computing	3	0	0	3
	Neural Networks	3	0	0	3
	Service Oriented Architecture	3	0	0	3
	Mainframe Technologies	3	0	0	3
	Advanced JAVA Programming	3	0	0	3
	Software Testing	3	0	0	3
	Cyber Law and Information Act	3	0	0	3

SEMESTER VIII

Code No.	Course Title	L	T	P	M
	Parallel Computing	3	0	0	3
	Genetic Algorithms and Applications	3	0	0	3
	High Speed Networks	3	0	0	3
	Digital Image Processing	3	0	0	3
	Component Based Technology	3	0	0	3
	Software Project Management	3	0	0	3
	Cloud Computing	3	0	0	3
	Bio Informatics	3	0	0	3
	Professional Ethics	3	0	0	3
	Embedded Systems	3	0	0	3

SEMESTER V
NUMERICAL METHODS

L	T	P	M	C
3	1	0	100	4

UNIT I SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS 9+3

Introduction – Direct method – Gauss Elimination Method - Gauss Jordan elimination method- Solution of simultaneous equations – Method of triangular decomposition or factorization – crouts reduction method - Iterative methods: Gauss Jacobi and Gauss-Seidel methods

UNIT II INTERPOLATION AND APPROXIMATION 9+ 3

Gregary Newton Forward interpolation - Backward interpolation – striling interpolation - Lagrangian Interpolation – Hermites Interpolation - Interpolating with a cubic spline –

UNIT III NUMERICAL DIFFERENTIATION AND INTEGRATION 9+ 3

Derivatives based on Newton's forward and backward interpolation – Partial derivatives based on Finite differences - Numerical integration by Newton Cote's Quadrature formulae - Romberg's method – Lobatto Integration method – Double integrals using trapezoidal and Simpson's rules.

UNIT IV INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS 9+ 3

Single step methods: Taylor series method – Euler and modified Euler methods – Fourth order Runge – Kutta method for solving first and second order equations – Multistep methods: Milne's and Adam's predictor and corrector methods.

UNIT V BOUNDARY VALUE PROBLEMS IN ORDINARY AND PARTIAL DIFFERENTIAL EQUATIONS 9+ 3

Finite difference solution of second order ordinary differential equation – Finite difference solution of one dimensional heat equation by explicit and implicit methods – One dimensional wave equation and two dimensional Laplace and Poisson equations.

TOTAL : 60

TEXT BOOKS:

1. Veerajan T., Ramachnadran T., "Numerical Methods", Tata McGraw-Hill Education Pvt. Ltd., New Delhi, 2009.
2. Steven C Chapra, Raymond P Canale, "Numerical Methods for Engineers", Fifth Edition, Tata McGraw-Hill Education Pvt. Ltd., New Delhi, 2007.
3. Sankar Rao, "Numerical Methods for Scientists and Engineers", Second Edition, PHILearning, New Delhi, 2004

REFERENCE BOOKS:

1.Kandasamy, P., Thilagavathy, K. and Gunavathy, K., "Numerical Methods", S.Chand Co. Ltd., New Delhi, 2003.
2. Burden, R.L and Faires, T.D., "Numerical Analysis", Seventh Edition, Thomson Asia Pvt. Ltd., Singapore, 2002.

THEORY OF COMPUTATION

L T P M C

3 1 0 100 4

UNIT I INTRODUCTION 9+3

Sets – functions – relations – Languages – Principle of mathematical Induction – Recursive definition, Chomsky hierarchy of languages – Recognizers - Basic Machines - Finite State Automata, Regular languages and Regular Expressions – Basic definitions – NFA, DFA – Finite automata with output – Applications of finite automata - Properties of regular sets – Pumping Lemma for regular languages

UNIT II CONTEXT FREE LANGUAGES AND PUSH DOWN AUTOMATA 9+3

Context Free Grammar – Derivation trees – ambiguity, Chomsky and Griebach Normal form – PDA definition – Equivalence of PDA and context free language – Properties of context free languages, Pumping Lemma for context free languages

UNIT III TURING MACHINES 9+3

Definitions of Turing machines – Models – Computable languages and functions – Techniques for Turing machine construction – The Halting problem – Partial Solvability – Problems about Turing machine

UNIT IV UNSOLVABLE PROBLEMS AND COMPUTABLE FUNCTIONS 9+3

Unsolvable Problems and Computable Functions – primitive recursive functions – Recursive and recursively enumerable languages – Universal Turing machine, Rice theorem, Post Correspondence Problems

UNIT V COMPUTATIONAL COMPLEXITY 9+3

Measuring and classifying complexity, Tractable and Intractable problems- Polynomial time reductions and NP completeness

TOTAL : 45

TEXT BOOK:

1. John C. Martin, “Introduction to Languages and the Theory of Computation”, Third edition, Tata McGraw-Hill Education Pvt. Ltd., New Delhi, 2009.
2. M. Chandrasekaran, and K.L.P. Mishra, “Theory of Computer Science: Automata, Language and Computation”, Third Edition, PHI Learning, New Delhi, 2006

REFERENCE BOOKS:

1. John E. Hopcroft and Rajeev Motwani and Jeffrey D. Ullman, “Introduction to Automata Theory, Languages and Computation”, third edition, Pearson Education, New Delhi, 2006.
2. Peter Linz, “An Introduction to Formal Language and Automata”, fourth edition, Narosa Publishers, New Delhi, 2006.
3. Michael Sipser, “Introduction to the Theory of Computation”, second edition, PWS Publications, Boston, 2005.
4. Harry R. Lewis, Chris H Papadimitriou, “Elements of the Theory of Computation”, second edition, PHI/ Pearson Education, New Delhi, 1997.

SIGNALS AND LINEAR SYSTEMS

L T P M C

3 1 0 100 4

UNIT 1 SIGNALS 9+3

Representation of signals – commonly used signals – operation of signals , Continuous Time Signals - Linear time invariant (LTI) systems, convolution integral, causality and stability, CT system representation by differential equations

UNIT II FOURIER ANALYSIS OF THE CT SIGNALS AND SYSTEMS 9+3

Linear Independence, bases and dimensions – Orthogonal and Ortho normal sets – sequences – convergence limits - continuous Time Fourier Series (CTFS) and Fourier transform (CTFT), using impulses - properties, inverse CTFT, frequency domain characterization of linear time invariant systems

UNIT III SAMPLING AND RECONSTRUCTION OF SIGNALS 9+3

Sampling theorem, Ideal or Impulse sampling, Anti aliasing and reconstruction filters, convolution with an impulse, error, sampling methods, impulse, natural and flat top sampling, reconstruction of sampled signals

UNIT IV DISCRETE TIME SIGNALS AND SYSTEMS 9+3

Discrete Time Fourier transform (CTFT Linear (DTFT) , Inverse DTFT, Signal Symmetries and DTFT DFT properties and theorems, Relationship between DTFT, DFT and CTFT.

UNIT V FOURIER ANALYSIS OF THE DT SIGNALS AND SYSTEMS 9+3

Fourier series representation of DT periodic signals (DTFS), properties, representation of DT a-periodic signals by Discrete Time Fourier Transform (DTFT), Fast Fourier Transform .Z transforms and its properties, inverse Z-transform, analysis of LSI systems using Z-transform, stability and causality

TOTAL : 60

TEXT BOOKS:

1. Ramakrishnakrishna Roa P, “Signals and Systems”, Tata Mc-graw Hill Publishing Co. Ltd., New Delhi, 2008.
2. Alan V Oppenhiem, Alan S Wilsky., and Hamid Nawab S., “Signals and Systems”, second edition, Prentice Hall, New Delhi, 2005.

REFERENCE BOOKS:

1. Simon Haykin and Barry Van Veen, “Signals and Systems”, second edition, John Wiley & Sons Inc., New York, 2003.
2. Ashok Ambardar, “Introduction to Analog and Digital Signal Processing”, second edition, Thomson learning, New Delhi, 2004.
3. Dimitris G Monalakis, John G Proakis, “Digital Signal Processing, Principles, Algorithms and Applications”, fourth edition, Pearson Education, New Delhi, 2006.

CLIENT SERVER COMPUTING

L	T	P	M	C
3	0	0	100	3

UNIT I INTRODUCTION **9**

Client Server Computing, Benefits, Evolution of client server computing, Client Server Applications, Components, Classes of Client Server Computing – Categories of Client Server Computing

UNIT II CLIENT/SERVER OPERATING SYSTEMS **9**

Dispelling the myths, Obstacles upfront and hidden, open systems and standards, factors needed for success. Standards setting organizations

UNIT III THE CLIENT **9**

Client Hardware and software, Client components, Client Operating Systems, GUI, X windows and Windowing, Database Access Application Logic, Client Software Products, Client Requirements

UNIT IV THE SERVER **9**

Server Hardware, Categories, Features classes of Server Machines, Server Environment, Network management environment, network Computing Environment, Network Operating Systems, Server requirements, Platform Independence, Transaction Processing , Connectivity. Server Data Management and Access Tools

UNIT V CLIENT SERVER AND INTERNET **9**

Client server and internet, Web client server, 3 tier client server web style, CGI , the server side of web, CGI and State, SQL database servers, Middleware and federated databases, data warehouses, EIS/DSS to data mining, GroupWare Server , what is GroupWare, components of GroupWare

Total 45

TEXT BOOKS:

1. Dawana Travis Dewire, " Client Server Computing", Tata Mc-Graw Hill Education Pvt. Ltd., New Delhi, 2003
2. Robert Orfali, Dan Harkey & Jeri Edwards, "Essential Client/Server Survival Guide", second edition, John Wiley & Sons, Singapore, 2003.

REFERENCE BOOKS:

1. Eric J Johnson, "A complete guide to Client / Server Computing", first edition, Prentice Hall, New Delhi, 2001.
2. Smith & Guengerich, "Client /Server Computing", Prentice Hall, New Delhi, 2002
3. James E. Goldman, Phillip T. Rawles, Julie R. Mariga, "Client/Server Information Systems, A Business Oriented Approach", John Wiley & Sons, Singapore, 2000.

COMPUTER NETWORKS

L T P M C

3 0 0 100 3

UNIT I DATA COMMUNICATIONS 8

Components – Direction of Data flow – networks – Components and Categories – types of Connections – Topologies –Protocols and Standards – ISO / OSI model – Transmission Media – Coaxial Cable – Fiber Optics – Line Coding – Modems – RS232 Interfacing sequences.

UNIT II DATA LINK LAYER 10

Error – detection and correction – Parity – LRC – CRC – Hamming code – low Control and Error control - stop and wait – go back-N ARQ – selective repeat ARQ- sliding window – HDLC. - LAN - Ethernet IEEE 802.3 - IEEE 802.4 - IEEE 802.5 - IEEE 802.11 – FDDI - SONET – Bridges.

UNIT III NETWORK LAYER 10

Internetworks – Packet Switching and Datagram approach – IP addressing methods – Subnetting – Routing – Distance Vector Routing – Link State Routing – Routers.

UNIT IV TRANSPORT LAYER 9

Duties of transport layer – Multiplexing – Demultiplexing – Sockets – User Datagram Protocol (UDP) – Transmission Control Protocol (TCP) – Congestion Control – Quality of services (QOS) – Integrated Services.

UNIT V APPLICATION LAYER 8

Domain Name Space (DNS) – SMTP – FTP – HTTP - WWW – Security – Cryptography.

TOTAL : 45

TEXT BOOKS:

1. Behrouz A. Forouzan, “Data communication and Networking”, Fourth Edition, Tata McGraw-Hill Publishing Co. Pvt., Ltd., New Delhi, 2006.
2. Prakash C Gupta, “Data Communications and Computer Networks”, PHI Learning Pvt. Ltd., New Delhi, 2009

REFERENCE BOOKS:

1. William Stallings, “Data and Computer Communication”, Sixth Edition, Pearson Education, New Delhi 2000
2. Alberto Leon Garcia and Indra Widjaja, “Communication Networks Fundamental Concepts and key Architectures”, Second Edition, Tata McGraw-Hill Publishing Co. Pvt., Ltd., New Delhi, 2009
3. James F. Kurose and Keith W. Ross, “Computer Networking: A Top-Down Approach Featuring the Internet”, Pearson Education, New Delhi 2003.
4. Larry L.Peterson and Peter S. Davie, “Computer Networks”, Second Edition Harcourt Asia Pvt. Ltd.,USA, 2003
5. Andrew S. Tanenbaum, “Computer Networks”, Fourth Edition PHI Learning, New Delhi, 2003.

DESIGN AND ANALYSIS OF ALGORITHMS

L	T	P	M	C
3	0	0	100	3

UNIT I INTRODUCTION **9**

Definition and properties of an algorithm- Analysis of algorithms. Divide and Conquer - The general method- Binary search- Finding maximum and minimum element- Analysis of Merge sort- Analysis of Quick sort- Analysis of Selection sort- Analysis of Heap sort

UNIT II GREEDY METHOD **9**

The general method- Optimal storage on tapes- Knapsack problem- Minimum spanning trees- Single source shortest path method

UNIT III DYNAMIC PROGRAMMING **9**

The General method- All pairs shortest path- Optimal binary tree- Multistage graphs

UNIT IV BACKTRACKING **9**

The General method- Solution space and tree organization- The Eight Queens problem- Sum of subset problem- Graph coloring- Knapsack problem

UNIT V BRANCH AND BOUND **9**

The General method- O/I Knapsack problem- Traveling sales person problem- Efficiency consideration . NP Hard and NP Complete problems - Basic concepts

TOTAL 45

TEXT BOOKS:

1. Anany Levitin, "Introduction to the Design and Analysis of Algorithms", second edition, Pearson Education, New Delhi, 2005
2. Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, "Fundamentals of Computer Algorithms", second edition, Galgotia Publications, New Delhi, 2003

REFERENCE BOOKS:

1. R C T Lee, S S Tseng, R C Chang, Y T Tsai, "Introduction to Design and Analysis of Algorithms", Tata Mc Graw Hill, Education, 2005
2. Andrew Haiigh, " Object Oriented Analysis and Design", Tata Mc-Graw Publishing Co. Ltd., New Delhi, 2001.
3. Aho A V., J E Hopcroft., J D Ullman., "Design and Analysis of Algorithms", third edition, Pearson Education, Singapore, 2000.
4. Donald E. Knuth., " Fundamental Algorithms- The Art of Computer Programming Vol- I", second Edition, Narosa Publishing House, Bombay, 2002.

COMPUTER NETWORKS LAB

L	T	P	C
0	0	3	2

1. Study of system administration and network administration
2. Implementation of UDP
3. Implementation of TCP
4. Implementation of stop and wait protocol
5. Implementation of sliding window protocol
6. Implementation of shortest path algorithm
7. Implementation of distance vector algorithm
8. Implementation of link-state vector algorithm

DESIGN AND ANALYSIS OF ALGORITHMS LAB

L	T	P	C
0	0	3	2

1. Implementation of Sorting Algorithms
2. Implementation of Binary Search Algorithm
3. Implementation of Minimum Spanning Tree Algorithm
4. Implementation of Knapsack Algorithm
5. Implementation of Multistage Graphs
6. Implementation of All pair shortest Path Algorithm
7. Implementation of Eight Queens Problem
8. Implementation of Graph Coloring
9. Implementation of Traveling Salesman Problem

SEMESTER VI
DIGITAL SIGNAL PROCESSING

L	T	P	M	C
3	1	0	100	4

UNIT I DISCRETE TIME SIGNALS AND SYSTEMS 9+3

Sequence and sequence representation, Sampling process, Discrete time systems, Time domain characterization of LTI discrete time systems, Classification of LTI systems, Correlation of Signals, Random Signals.

UNIT II DIGITAL FILTER STRUCTURES 9+3

Basic FIR Digital Filter Structures, All pass Filters, IIR Digital Filter Design, Properties of IIR filters, IIR filter design, Characteristics of FIR filters with linear phase, Design of high pass, Band pass and Band stop IIR filter design

UNIT III DISCRETE FOURIER TRANSFORM 9+3

Discrete Fourier Transform (DFT) , Definition , Properties , Relationship between the Fourier transform and the DFT, Operation of finite length sequences, classification, DFT symmetry relations, Fourier Domain Filtering, Linear Convolution using DFT, Discrete Cosine Transform, The Haar Transform.

UNIT IV EFFECTS OF FINITE REGISTER LENGTH 9+3

Effect of number representation on Quantization, Quantization in Sampling Analog signals. Finite Register Length effects in realization of IIR digital filters, Finite register length effects in realization of FIR digital filters, Effects of Finite register length in DFT computations

UNIT V MULTIRATE DIGITAL SIGNAL PROCESSING 9+3

Introduction, Decimation by a factor D, Interpolation by a factor I, Sampling rate conversion by a rational factor I/D, Applications of multi rate signal processing,

POWER SPECTRUM ESTIMATION: Basic principles of Estimation Theory, Estimation of Auto covariance, Periodogram method of Power Spectral Estimation, Smoothed Spectrum Estimators

TOTAL : 60

TEXT BOOKS:

1. Sanjit K Mitra, **"**Digital Signal Processing - A Computer Baeed Approach", Third Edition, Tata McGraw-Hill Publishing Co. Pvt., Ltd., New Delhi, 2008
2. Oppenheim A.V, Schaffer R.W., "Discrete-time Signal Processing", Second edition, Prentice Hall, New Delhi, 2002.

REFERENCE BOOKS:

1. Somanathan Nair, " Digital Signal Processing", PHI Learning, New Delhi, 2005
2. John G. Proakis and Dimitris K Manolakis., "Digital Signal Processing Principles, Algorithms and Applications " fourth edition, Prentice Hall, New Delhi, 2006.
3. Sanjit K. Mitra, "Digital Signal Processing - A Computer Based Approach", second edition, Tata McGraw Hill, New Delhi, 2001.
4. Johny R.Johnson, "Introduction to Digital Signal Processing", second edition, PHI/Pearson Education, New Delhi, 2003.

PRINCIPLES OF COMPILER DESIGN

L	T	P	M	C
3	1	0	100	4

UNIT I INTRODUCTION TO COMPILERS 9+3

Compilers, Analysis of the Source Program, The Phases of a Compiler, Cousins of the Compiler, The Grouping of Phases, Compiler-Construction Tools, Translators-Compilation and Interpretation, A simple one-pass compiler

UNIT II LEXICAL ANALYSIS 9+3

Need and role of lexical analyzer-Lexical errors, Input Buffering - Specification of Tokens, Recognition of Tokens, A Language for Specifying Lexical Analyzers, Finite Automata, From a Regular Expression to an NFA, Design of a Lexical Analyzer Generator

UNIT III SYNTAX ANALYSIS 9+3

Need and role of the parser- Context Free Grammars-Top Down parsing - Recursive Descent Parser - Predictive Parser - LL(1) Parser -Shift Reduce Parser - LR Parser - LR (0) item - Construction of SLR Parsing table -Introduction to LALR Parser, YACC-Design of a syntax analyzer for a sample language

UNIT IV SYNTAX DIRECTED TRANSLATION AND TYPE CHECKING 9+3

Syntax-Directed Definitions, Construction of Syntax Trees, Bottom-Up Evaluation of S-Attributed Definitions, L-Attributed Definitions, Top Down Translation, Bottom-Up Evaluation of Inherited Attributes, Forms of intermediate code -Translation of Assignment, Boolean Expression and Control statements - Back patching type systems - Specification of a simple type checker - equivalence of type expressions - type conversions

UNIT V RUN-TIME ENVIRONMENT AND ERROR HANDLING 9+3

Source language issues-Storage organization-Storage allocation-parameter passing-Symbol tables-Dynamic storage allocation-Storage allocation in FORTRAN, Error handling and recovery in different phases. Principal sources of Optimization – DAG - Optimization of basic blocks-Global data flow analysis - Efficient data flow algorithms - Issues in design of a code generator-a simple code generator algorithm

TOTAL : 60

TEXT BOOKS

1. Alfred V.Aho, Ravi Sethi and Jeffrey D.Ullman, "Compilers – Principles, Techniques and Tools", second edition, Pearson Education, New Delhi, 2006.
2. Raghavan V, “Principles of Compiler Design”, Tata Mc-Graw Hill Education Pvt. Ltd., New Delhi, 2009

REFERENCE BOOKS

1. Dhamdhere D M, "Compiler Construction Principles and Practice", second edition, Macmillan India Ltd., New Delhi, 2001.
2. Jean Paul Tremblay, Paul G Serenson, "The Theory and Practice of Compiler Writing", McGraw Hill, New Delhi, 2001.
3. Dick Grone, Henri E Bal, Ceriel J H Jacobs and Koen G Langendoen, “Modern Compiler Design”, John Wiley, New Delhi, 2000.

ENTERPRISE COMPUTING

L T P M C

3 0 0 100 3

UNIT I ENTERPRISE FOUNDATIONS 9

Enterprise Architectural overview - object oriented software development for enterprise - Component Based software development for enterprise. Java Enterprise System. Enterprise Data - Basis of JDBC - interfaces -drivers. Advanced JDBC features.

UNIT II DISTRIBUTED ENTERPRISE COMMUNICATIONS ENABLING 9

Distributed Enterprise Communications Basis - RMI Communication - CORBA communication - DCOM Communication – Software Development for RMI Communication

UNIT III SERVICES FOR DISTRIBUTED ENTERPRISE SYSTEMS 9

Naming Services, Directory and Trading services, Activation Services, Message Services, Transaction Services, Security Services and High assurance Enterprise applications.

UNIT IV ENTERPRISE WEB ENABLING 9

Web Browsers and Web Servers in Enterprise. Web Programming, XML. Java Servlets - Java Server pages.

UNIT V INTEROPERABILITYAND MULTITIER ENTERPRISE COMPUTING 9

Java Beans, EJB, Enterprise Application Integration, Interoperability between various computing technologies - Tools For Enterprise Computing - Patterns – Frame work

TOTAL 45

TEXT BOOKS:

1. Paul J Perrone, Venkata S.R. Krishna R and Chayanti, " Building Java Enterprise Systems with J2EE", Techmedia , New Delhi, 2000.
2. George Reese, “ Database programming, with JDBC and Java" Second Edition, O’Reiliy Publishers , New Delhi, 2000.

REFERENCE BOOKS:

1. Dustin R. Callaway - "Inside Servlets " - Addison Wesley Longman Inc, New Delhi, 2001.
2. Tom Valesky - "Enterprise Java Beans" - Addison Wesley Longman Inc. New Delhi, 2000.
3. Ed Roman - "Mastering EJB" - John Wiley & Sons, New Delhi, 2001.

OBJECT ORIENTED ANALYSIS AND DESIGN

L	T	P	M	C
3	0	0	100	3

UNIT I INTRODUCTION 8

An Overview of Object Oriented Systems Development - Object Basics – Object Oriented Systems Development Life Cycle.

UNIT II OBJECT ORIENTED METHODOLOGIES 12

Rumbaugh Methodology - Booch Methodology - Jacobson Methodology - Patterns – Frameworks – Unified Approach – Unified Modeling Language – Use case - class diagram - Interactive Diagram - Package Diagram - Collaboration Diagram - State Diagram - Activity Diagram.

UNIT III OBJECT ORIENTED ANALYSIS 9

Identifying use cases - Object Analysis - Classification – Identifying Object relationships - Attributes and Methods.

UNIT IV OBJECT ORIENTED DESIGN 8

Design axioms - Designing Classes – Access Layer - Object Storage - Object Interoperability.

UNIT V SOFTWARE QUALITY AND USABILITY 8

Designing Interface Objects – Software Quality Assurance – System Usability - Measuring User Satisfaction

TOTAL : 45

TEXT BOOKS:

1. Ali Bahrami, “Object Oriented Systems Development”, Tata McGraw-Hill, New Delhi, 2008
2. Martin Fowler, “UML Distilled”, Second Edition, PHI Learning, New Delhi, 2002.
3. Mahesh P Matha, “ Object Oriented Analysis and Design using UML”, PHI Learning, New Delhi, 2005

REFERENCE BOOKS:

1. Stephen R. Schach, “Introduction to Object Oriented Analysis and Design”, Tata McGraw-Hill, New Delhi, 2003.
2. James Rumbaugh, Ivar Jacobson, Grady Booch “The Unified Modeling Language Reference Manual”, Addison Wesley, New Delhi, 1999.
3. Hans-Erik Eriksson, Magnus Penker, Brain Lyons, David Fado, “UML Toolkit”, OMG Press Wiley Publishing Inc., New Delhi, 2004.

COMMUNICATION SWITCHING TECHNIQUES

L	T	P	M	C
3	1	0	100	4

UNIT I COMPONENTS AND PRINCIPLES 9+3

Block diagram of switching system – Pulse and DTMF Dialing – Signaling Tones – Strowger Switching with design examples – Principles of common control, cross bar switching

UNIT II SPACE DIVISION AND TIME DIVISION SWITCHING 9+3

Stored program control – Centralized and distributed SPC, 2stage, 3 stage and N stage networks, Time division time and space switching, Time multiplexed time and space switching, combination switching

UNIT III TRAFFIC ENGINEERING 9+3

Network traffic load and parameters, Grade of service and blocking probability, Modeling switching systems, Blocking models and loss estimates, Delay models and queue analysis

UNIT IV DIGITAL SUBSCRIBER ACCESS 9+3

Integrated services digital network, High data rate digital subscriber loops, Digital loop carrier systems, Fiber in the loop, Voice band modems

UNIT V CELLULAR WIRELESS NETWORKS 9+3

Principles of cellular networks, frequency reuse, Channel assignment strategies, Handoff strategies, Cordless systems, Wireless local loop, Wireless application protocol BLUE TOOTH: Overview, Radio specification, Base band specification, Link manager specification, logical link control and adaptation protocol

LECTURE 45 TUTORIAL 15
TOTAL : 60

TEXT BOOKS:

1. Viswanathan.T., “Telecommunication Switching System and Networks”, Prentice Hall, New Delhi, 2004.
2. William Stallings, “Wireless Communication and Networks”, second edition, Pearson Education, New Delhi, 2004.

REFERENCE BOOKS:

1. Frenzel, “ Communication Electronics – Principles and Applications”, Tata Mc-Graw Publishing Co. Ltd., Third Edition, New Delhi, 2009
2. John. C. Bellamy, “Digital Telephony”, John Wiley & Sons, Singapore, 2000.
3. Behrouz Forouzan, “Introduction to Data Communication and Networking”, Tata McGraw Hill, New York,1996.
4. Marion Cole, “Introduction to Telecommunications Voice, Data & the Internet”, Pearson Education, New Delhi, 2002.

ENTERPRISE COMPUTING LAB

L	T	P	C
0	0	3	2

Study of multi-tier software environment.
Study of web servers / web browser and Tools for enterprise software development and deployment

1. Develop a package using servlets / JSP.
2. Develop a package using RMI.
3. Develop a package using EJB.
4. Develop a package using JDBC

COMPILER DESIGN LAB

L	T	P	C
0	0	3	2

1. Study of LEX and YACC
2. Lexical Analysis using LEX.
3. Syntax Analysis using YACC
4. Construction of NFA from a given regular expression.
5. Construction of minimized DFA from a given regular expression.
6. Implementation of Symbol Table.
7. Implementation of Shift Reduce Parsing Algorithm.
8. Construction of LR Parsing Table.
9. Generation of Code for a given Intermediate Code.
10. Implementation of Code Optimization techniques.

CASE TOOLS LAB

L	T	P	C
0	0	3	2

1. Prepare the following documents for two or three of the experiments listed below and develop the software engineering methodology.
2. Program Analysis and Project Planning.
   Thorough study of the problem – Identify project scope, Objectives, Infrastructure.
3. Software requirement Analysis
   Describe the individual Phases / Modules of the project, Identify deliverables.
4. Data Modeling
   Use work products – Data dictionary, Use diagrams and activity diagrams, build and test lass diagrams, Sequence diagrams and add interface to class diagrams.
5. Software Development and Debugging
6. Software Testing
   Prepare test plan, perform validation testing, Coverage analysis, memory leaks, develop test case hierarchy, Site check and Site monitor.

SUGGESTED LIST OF APPLICATIONS

1. Student Marks Analyzing System
2. Quiz System
3. Online Ticket Reservation System
4. Payroll System
5. Course Registration System
6. Expert Systems
7. ATM Systems
8. Stock Maintenance
9. Real-Time Scheduler
10. Remote Procedure Call Implementation

SEMESTER VII
WEB TECHNOLOGY

L	T	P	M	C
3	0	0	100	3

UNIT I INTRODUCTION WEB SERVICES 8

Web services architecture – overview of web services – service oriented roles and architecture – architectural process – three tier web based architecture

UNIT II XML 10

Introduction to XML – XML fundamentals – well-formed XML documents – components of XML document – XML tools – XML stylesheets – XSL – CSS - XML namespaces-EDI Fact- Message Definition-segments-Mapping-Message Structure and Electronic Enveloping.

UNIT III JAVA WEBSERVICES ARCHITECTURE 9

J2EE and web services-Introduction to JSP and java servlets – servlets – overview of Java server pages

UNIT IV ACTIVE SERVER PAGES 9

HTML and VBScript fundamentals – ASP concepts, using request, response, application, session, server objects – using cookies

UNIT V .NET FRAMEWORK 9

Introducing .NET framework – brief history – building blocks of .NET platform – role of .NET class libraries – understanding CTS, CLR, CLS – deploying .NET – Building C# applications

TOTAL 45

TEXT BOOK

1. Rashim Mogha, Preetham.V.V., " Java Web Services Programming", Wiley Dreamtech, New Delhi, 2002.
2. Achyut S Godbole and Atul Kahate, "Web Technologies – TCP/IP Architectures and Java Programming", Second Edition, Tata Mc-Graw Hill Education Pvt., Ltd., New Delhi, 2009
3. E Balagurusamy, "Programming in C#", Second Edition, Tata Mc-Graw hill Publishing Co. Ltd., New Delhi, 2008

REFERENCE BOOKS

1. Deitel ," XML How to Program", first edition, Pearson Education, USA, 2002.
2. Jason Hunter, William Crawford, "Java Servlet Programming", O' Reilly Publications, USA, 1998.
3. Bhanu Pradhap, " Understanding Active Server Pages ", Cyber Tech Publications ,New Delhi, 2001.
4. James Conard,Patrick Dengler,Brain Franics Et Al, " Introducing .NET ", Shroff Publishers, New Delhi, 2001.
5. N P Gopalan, J Akilandeswari, " Web Technology – A developers Perspective", PHI Learning Pvt. Ltd., New Delhi, 2009

MOBILE COMPUTING

L	T	P	M	C
3	0	0	100	3

UNIT I INTRODUCTION 9

Mobile Communication, Mobile Computing, Mobile Computing Architecture, Mobile Devices, Mobile System Networks, Data Dissemination, Mobility Management, Security. Introduction to Cellular Systems, Global System for Mobile Communication (GSM), General Packet Radio Services(GPRS) and their architectures

UNIT II WIRELESS MEDIUM ACCESS CONTROL 9

Interference in Cellular Systems, Frequency Management, Channel Assignment, Location management in cellular networks, Medium Access Control, Introduction to CDMA based systems, Spread Spectrum in CDMA systems, Coding Methods in CDMA

UNIT III MOBILE IP NETWORK LAYER 9

Mobile IP Protocol Overview, Route Optimization, Mobility support for IPV6, Connectivity with 3G Networks, Packet Delivery and Handover Management, location Management, Registration, Tunneling and Encapsulation, Route Optimization, Dynamic Host Control protocol

UNIT IV MOBILE TRANSPORT LAYER 9

Conventional TCP/IP protocols, Indirect TCP, Snooping TCP, Mobile TCP, Other methods of TCP layer transmission for Mobile networks. MOBILE OPERATING SYSTEMS**:** Palm OS, Windows CE, Symbion OS, Linux for Mobile Devices

UNIT V MOBILE MIDDLEWARE 9

Mobile middleware, Middleware for Application development, Adaptation, Mobile Agents, Service Discovery Middleware, Services, Garbage Collection, Eventing, Security, Interoperability ADHOC AND SENSOR NETWORKS : Overview, Properties, Unique features of sensor networks, Applications, Challenges, Constrained Resources, Security, Mobility, Protocols, Auto Configuration, Energy Efficient Communication, Mobility Requirements.

TOTAL 45

TEXT BOOKS

1. Raj Kamal, “Mobile Computing”, Oxford University Press, New Delhi, 2007.
2. Frank Adelstein, Sandeep K S Gupta, Golden G Richard, Loren Schwiebert, “Fundamentals of Mobile and Pervasive Computing,”tata Mc-Graw Hill Education Pvt. Ltd., New Delhi, 2005

REFERENCE BOOKS

1. Jochen H. Schller, “Mobile Communications”, second edition, Pearson Education, New Delhi, 2007.
2. Jon W. Mark, Weihua Zhuang, “Wireless Communications and Networking”, Prentice Hall, New Delhi, 2007.
3. Dharma Prakash Agarval, Qing , An Zeng, "Introduction to Wireless and Mobile systems", Thomson Asia Pvt Ltd, Singapore, 2005.

PRINCIPLES OF MANAGEMENT

L	T	P	M	C
3	0	0	100	3

UNIT I INTRODUCTION 9

Meaning, Definition and Significance of Management, Basic Functions of Management – Planning, Organizing, Staffing, Directing and Controlling. Engineers and Organizational Environment – Social, Economic, Technological and Political. Social Responsibility of Engineers

UNIT II MANAGEMENT CONCEPTS 9

MBO, Theory Z, Kaizen, Six Sigma, Quality Circles and TQM. BUSINESS PROCESS REENGINEERING: Need for BPR, Various phases of BPR, Production and Productivity – Factors Influencing Productivity.

UNIT III ORGANIZATIONAL BEHAVIOUR 9

Significance of OB, Role of leadership, Personality and Motivation. Attitudes, Values and Perceptions at work. INDUSTRIAL AND BUSINESS ORGANIZATION: Growth of Industries (Small Scale, Medium Scale and Large Scale Industries). Forms of Business Organizations. Resource Management – Internal and External Sources.

UNIT III MATERIALS MANAGEMENT 9

Importance and Scope of Materials Management, Purchase Procedure, Inventory Control and Systems for Inventory Control – ROL, EOQ, MRP, ABC Analysis, VED, FSN and Value Analysis. MARKETING MANAGEMENT: Definition and Approaches to Marketing Management – Marketing Environment. The Marketing Process. Marketing Mix, Advertising, Sales Promotion and Consumer Behavior.

UNIT V HUMAN RESOURCE MANAGEMENT 9

Importance, Objectives and Functions, Job Analysis and Recruitment, Selection and Placement, Training and Development – Case Discussion. JOB EVALUATION: Meaning and Methods of Job Evaluation. Performance Appraisal – Meaning and Methods of Performance Appraisal. WELFARE IN INDUSTRY: Working condition, service facilities, legal legislation – Factories Act, 1948 and Workmen's Compensation Act.

TOTAL 45

TEXT BOOKS:

1. Harold Koontz, Heinz Weihrich and Ramachandra Aryasri, "Essentials of Management", Eighth Edition, Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2009.
2. M Govindarajan, and S Natarajan, " Principles of Management", PHI Learning, New Delhi, 2005
3. Mamoria C B, "Personnel Management", Sultan Chand & Sons, New Delhi, 2002.

REFERENCE BOOKS:

1. John W Newstrom, Keith Davis, “Organizational Behavior”, Tata McGraw Hill, New Delhi, 2002.
2. Philip Kotler, “Marketing Management”, Pearson Education Asia, New Delhi, 2003.
3. Khanna O P, “Industrial Engineering & Management”, Dhanpat Rai Publications, New Delhi, 2003

WEB TECHNOLOGY LAB

L	T	P	C
0	0	3	2

Creating applications using web development tools

1. HTML & VB Script
2. XML - DTD
3. XML - XSL
4. XML - CSS
5. Translating EDIfact document to XML
6. Active Server Pages
7. Java Server Pages
8. Java Servlets
9. .NET Platform
10. C# in .NET Platform

MOBILE COMPUTING LAB

L	T	P	C
0	0	3	2

1. Study of WML and J2ME simulators
2. Design of simple Calculator having +,,,* and / using WML/J2ME
3. Design of Calendar for any given month and year using WML/J2ME
4. Design a Timer to System Time using WML/J2ME
5. Design of simple game using WML/J2ME
6. Animate an image using WML/J2ME
7. Design a personal phone book containing the name, phone no., address, e-mail, etc.
8. Simulation of Authentication and encryption technique used in GSM
9. Browsing the Internet using Mobile phone simulator
10. Study of GlomoSim Simulator

SEMESTER VIII
CRYPTOGRAPHY AND NETWORK SECURITY

L	T	P	M	C
3	1	0	100	4

UNIT I INTRODUCTION 9+3

OSI Security Architecture - Classical Encryption techniques – Cipher Principles – Data Encryption Standard – Block Cipher Design Principles and Modes of Operation - Evaluation criteria for AES – AES Cipher – Triple DES – Placement of Encryption Function – Traffic Confidentiality

UNIT II PUBLIC KEY CRYPTOGRAPHY 9+3

Key Management - Diffie-Hellman key Exchange – Elliptic Curve Architecture and Cryptography - Introduction to Number Theory – Confidentiality using Symmetric Encryption – Public Key Cryptography and RSA.

UNIT III AUTHENTICATION AND HASH FUNCTION 9+3

Authentication requirements – Authentication functions – Message Authentication Codes – Hash Functions – Security of Hash Functions and MACs – MD5 message Digest algorithm - Secure Hash Algorithm – RIPEMD – HMAC Digital Signatures – Authentication Protocols – Digital Signature Standard

UNIT IV NETWORK SECURITY 9+3

Authentication Applications: Kerberos – X.509 Authentication Service – Electronic Mail Security – PGP – S/MIME - IP Security – Web Security.

UNIT V SYSTEM LEVEL SECURITY 9+3

Intrusion detection – password management – Viruses and related Threats – Virus Counter measures – Firewall Design Principles – Trusted Systems.

TOTAL : 60

TEXT BOOKS

1. Behrouz A Forouzan , “Cryptography and Network Security”, Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2007.
2. Atul Kahate, ““Cryptography and Network Security”, Second Edition, Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2009
3. William Stallings, “Cryptography and Network Security, fourth edition, Prentice Hall, New Delhi, 2006.

REFERENCE BOOKS

1. Bruce Schneier, “Applied Cryptography”, second edition, John Wiley & Sons, New York, 1996.
2. Chris Brenton, “Mastering Network Security”, BPB Publication, New Delhi, 2002.
3. Steven L Shaffer, Alan R Simon, “Network Security”, AP Professional, New York, 2001.

ELECTIVES – SEMESTER VI

RESOURCE MANAGEMENT TECHNIQUES

L	T	P	M	C
3	0	0	100	3

UNIT I LINEAR PROGRAMMING 9

Principal components of decision problem – Modeling phases – LP Formulation and graphic solution – Resource allocation problems – Simplex method – Sensitivity analysis.

UNIT II. DUALITY AND NETWORKS 9

Definition of dual problem – Primal – Dual relation ships – Dual simplex methods – Post optimality analysis – Transportation and assignment model shortest route problem.

UNIT III INTEGER PROGRAMMING 9

Cutting plan algorithm – Branch and bound methods, Multistage (Dynamic) programming.

UNIT IV CLASSICAL OPTIMISATION THEORY 9

Unconstrained external problems, Newton – Ralphson method – Equality constraints – Jacobean methods – Lagrangian method – Kuhn – Tucker conditions – Simple problems.

UNIT V OBJECT SCHEDULING 9

Network diagram representation – Critical path method – Time charts and resource leveling – PERT.

TOTAL 45

TEXT BOOKS:

1. Anderson ‘Quantitative Methods for Business’, Eight Edition, Thomson Learning, New Delhi, 2002.
2. Paneerselvam R, “Operations Research”, PHI Learning, New Delhi, 2003
3. Winston ‘Operation Research’, Thomson Learning, New Delhi, 2003.

REFERNECE BOOKS:

1. Anderson ‘Quantitative Methods for Business’, 8th Edition, Thomson Learning, New Delhi, 2002.
2. Winston ‘Operation Research’, Thomson Learning, New Delhi, 2003.
3. H.A.Taha, ‘Operation Research’, Prentice Hall of India, New Delhi, 2002.
4. Vohra, ‘Quantitative Techniques in Management’, Tata McGraw Hill, New Delhi, 2002.
5. Anand Sarma, ‘Operation Research’, Himalaya Publishing House, New Delhi, 2003.

UNIX INTERNALS

L	T	P	M	C
3	0	0	100	3

UNIT I GENERAL OVERVIEW OF THE SYSTEM 9

Unix Operating System, Linux and GNU, The UNIX Architecture, Features, POSIX and Single UNIX Specification, Commands, Command Structure, Understanding the man configuration,

UNIT II BUFFER CACHE 9

Buffer headers – Structure of the buffer pool – Advantages and disadvantages of the buffer cache. Internal representation of files : Inodes – Structure of a regular file – Directories – Conversion of a path name to an Inode – Super block – Other file types**.**

UNIT III SYSTEM CALLS FOR FILE SYSTEM 9

Open – Read – Write – File and record locking – Adjusting the position of file I/O – LSEEK – Close – File creation – Creation of special files – Pipes – Dup – Mounting and unmounting file systems

UNIT IV THE PROCESS 9

Process basics, Process Status, System Process, Mechanism of Process Creation, Running Jobs, Killing Processes, Customizing the Environment, Environment Variables, Aliases, Command History, In line Command Editing, Initialization Scripts.

UNIT V PROCESS SCHEDULING AND MEMORY MANAGEMENT POLICIES 9

Process Scheduling – Memory Management Policies : Swapping – A hybrid system with swapping and demand paging. The I/O Subsystem : Driver Interfaces– Disk Drivers- Terminal Drivers.

TOTAL : 45

TEXT BOOKS:

1. Sumitabha Das, “UNIX Concepts and Applications”, Fourth Edition, Tata Mc Graw Hill Publishing Co. Ltd., New Delhi, 2008
2. Maurice J. Bach, “The Design of the Unix Operating System”, Prentice Hall of India, New Delhi, 2004.

REFERENCE BOOKS:

1. N. P. Gopalan, “ Begineers Guide to Unix”, PHI Learning, New Delhi, 2009
2. Vahalia, “Unix Internals: The New Frontiers”, Pearson Education Inc, New Delhi, 2003.

MULTIMEDIA SYSTEMS

L	T	P	M	C
3	0	0	100	3

UNIT – I INTRODUCTION 9

Definition - CD-ROM and multimedia. Multimedia applications: business - schools - homes - public places and virtual reality. Introduction to making of multimedia: hardware - software - creativity - and organization.

UNIT – II MULTIMEDIA TOOLS 9

Macintosh and windows production platforms - 3-d modeling and animation - image-editing tools - sound editing tools - animation - video - and digital movie tools - linking multimedia objects - office suites - word processors - spread sheets - databases - presentation tools. Authoring tools - Card and Page-based authoring tools - Icon Based authoring tools - time based authoring tools - object oriented authoring tools - cross platform-authoring tools

UNIT – III MULTIMEDIA BUILDING BLOCKS 12

Text: About fonts and faces - text in multimedia - computers and text - Font editing and design tools - Hypermedia and Hypertext.Sound: Multimedia system sounds - MIDI versus digital audio - digital audio - making MIDI audio - audio file format - working with sounds in windows - working with sounds on the Macintosh - NIFF - Adding sounds to multimedia - Towards professional sounds - production tips. Images: -Making still images - Colors - Image file format. Animation: Principals of animation - Making animation that works. Video: How video works - Broadcast video standards - Integrating computers and television - Shooting and Editing - Video tips - Recoding formats - Digital video

UNIT – IV MULTIMEDIA AND INTERNET 9

Internet fundamentals: Internetworking - Connections - Internet services - The World Wide Web - Tools for the World Wide Web: Web serves - Web browsers - Web page makers and Site builders - Plug-ins and Delivery vehicles - Beyond HTML

UNIT V DESIGINING FOR WORLD WIDE WEB 6

Working on web - Text for web - Images for web - Sound for web - Animation for web.

TOTAL 45

TEXT BOOKS:

1. Tay Vaughan, " Multimedia: Making It Work", Seventh Edition, Tata Mc- Graw hill, New Delhi, 2006
2. K. Andleigh and K. Thakkrar, "Multimedia Systems Design", Prentice Hall of India, New Delhi, 2009
3. Ralf stein Metz and Klara Nahrstedt, " Multimedia: Computing, Communication & Application", Prentice Hall of India, New Delhi, 2005

REFERENCE BOOKS

1. Donald Hearn and M.Pauline Baker, "Computer Graphics C Version", Pearson Education, New Delhi, 2003.
2. Prabat K Andleigh and Kiran Thakrar, "Multimedia Systems and Design", PHI Learning, New Delhi, 2003.

DATA WAREHOUSING AND MINING

L	T	P	M	C
3	0	0	100	3

UNIT I INTRODUCTION AND DATA WAREHOUSING 8

Introduction, Need for Data Warehouse, Paradigm Shift, Business Problem definition, Operational and Informational data Store, data warehouse Architecture,

UNIT II DATA WAREHOUSING 8

Data Warehouse Components, Building a Data warehouse, Mapping Data Warehouse to a Multiprocessor Architecture, Data Extraction, Clean up and Transformation Tools, Meta data

UNIT III DATA MINING 9

Data Mining, Motivation, Effectiveness, Embedded data mining, Overfitting, Comparing the technologies, Decision trees, Exploration Preprocessing, Prediction, Working of decision trees, Strengths and Weaknesses.

UNIT IV CLUSTERING 12

Business Score Card, Nearest Neighbor prediction, Classification and Prediction, ule Induction, Conjunctions and Disjunctions, Rules vs. decision trees.

UNIT V RECENT TRENDS 8

Multidimensional Analysis and Descriptive Mining of Complex Data Objects, Spatial Databases, Multimedia Databases, Time Series and Sequence Data, Text Databases, World Wide Web, Applications and Trends in Data Mining

TOTAL : 45

TEXT BOOKS:

1. Alex Berson, Stephen J. Smith, “Data Warehousing, Data Mining, and OLAP”, Tata Mc Graw Hill Publishing Co. Ltd., New Delhi, 2008
2. J. Han, M. Kamber, “Data Mining: Concepts and Techniques”, Harcourt India / Morgan Kauffman, New Delhi, 2001.
3. Margaret H.Dunham, “Data Mining: Introductory and Advanced Topics”, Pearson Education, New Delhi, 2004.
4. Sam Anahory, Dennis Murry, “Data Warehousing in the real world”, Pearson Education, New Delhi, 2003.

REFERENCE BOOKS:

1. David Hand, Heikki Manila, Padhraic Symth, “Principles of Data Mining”, PHI Learning, New Delhi, 2004.
2. W.H.Inmon, “Building the Data Warehouse”, Third Edition, Wiley Publishers, New Delhi, 2003.
3. Paulraj Ponniah, “Data Warehousing Fundamentals”, Wiley-Interscience Publication, New Delhi, 2003

ECOMMERCE

L	T	P	M	C
3	0	0	100	3

UNIT – I INTRODUCTION 9

Electronic Commerce-Frame work, anatomy of E-Commerce applications, E-Commerce Consumer applications, E-Commerce organization applications. Consumer Oriented Electronic commerce - Mercantile Process models.

UNIT – II ELECTRONIC PAYMENTS **9**

Electronic payment systems - Digital Token-Based, Smart Cards, Credit Cards, Risks in Electronic Payment systems. Inter Organizational Commerce - EDI, EDI Implementation, Value added networks.

UNIT – III ORGANIZATIONAL COMMERCE **9**

Intra Organizational Commerce - work Flow, Automation Customization and internal Commerce, Supply chain Management.

UNIT – IV DIGITAL COMMERCE **9**

Corporate Digital Library - Document Library, digital Document types, corporate Data Warehouses. Advertising and Marketing - Information based marketing, Advertising on Internet, on-line marketing process, market research.

UNIT – V INFORMATION **9**

Consumer Search and Resource Discovery - Information search and Retrieval, Commerce Catalogues, Information Filtering. Digital Video and electronic Commerce, Desktop video processing, Desktop video conferencing.

TEXT BOOKS:

1. Ravi Kalakata, Whinston, “Frontiers of Electronic Commerce”, Pearson Education, New Delhi, 2004
2. P T Joseph, “ E-Commerce – An Indian Perspective” Prentice Hall of India, Third Edition, New Delhi, 2008.

REFERENCE BOOK

1. Kamlesh K Bajaj, Debjani Nag, “ E-Commerce – Cutting Edge of Business”, Tata McGraw Hill, New Delhi, 2003

ADVANCED DATABASE

L	T	P	M	C
3	0	0	100	3

UNIT I DISTRIBUTED DATABASES 9

Distributed DBMS Concepts and Design – Introduction – Functions and Architecture of DDBMS – Distributed Relational Database Design – Transparency in DDBMS – Distributed Transaction Management – Concurrency control – Deadlock Management – Database recovery – The X/Open Distributed Transaction Processing Model – Replication servers – Distributed Query Optimisation - Distribution and Replication in Oracle.

UNIT II OBJECT ORIENTED DATABASES 9

Object Oriented Databases – Introduction – Weakness of RDBMS – Object Oriented Concepts Storing Objects in Relational Databases – Next Generation Database Systems – Object Oriented Data models – OODBMS Perspectives – Persistence – Issues in OODBMS – Object Oriented Database Management System Manifesto – Advantages and Disadvantages of OODBMS – Object Oriented Database Design – OODBMS Standards and Systems – Object Management Group – Object Database Standard ODMG – Object Relational DBMS –Postgres - Comparison of ORDBMS and OODBMS.

UNIT III WEB DATABASES 9

Web Technology And DBMS – Introduction – The Web – The Web as a Database Application Platform – Scripting languages – Common Gateway Interface – HTTP Cookies – Extending the Web Server – Java – Microsoft's Web Solution Platform – Oracle Internet Platform – Semi structured Data and XML – XML Related Technologies – XML Query Languages

UNIT IV INTELLIGENT DATABASES 9

Enhanced Data Models For Advanced Applications – Active Database Concepts And Triggers – Temporal Database Concepts – Deductive databases – Knowledge Databases.

UNIT V CURRENT TRENDS 9

Mobile Database – Geographic Information Systems – Genome Data Management – Multimedia Database – Parallel Database – Spatial Databases - Database administration – Data Warehousing and Data Mining.

TOTAL : 45

TEXT BOOKS:

2. Thomas M. Connolly, Carolyn E. Begg, "Database Systems - A Practical Approach to Design , Implementation , and Management", Third Edition , Pearson Education, New Delhi, 2003
3. Ramez Elmasri & Shamkant B.Navathe, "Fundamentals of Database Systems", Fourth Edition , Pearson Education, New Delhi, 2004.

REFERENCE BOOKS:

1. M.Tamer Ozsu , Patrick Ualduriel, “Principles of Distributed Database Systems”, Second Edition, Pearson Education, New Delhi, 2003.
2. C.S.R.Prabhu, “Object Oriented Database Systems”, PHI Learning, New Delhi, 2003.
3. Peter Rob and Corlos Coronel, “Database Systems – Design, Implementation and Management”, Fifth Edition, Thompson Learning, Course Technology, New Delhi, 2003.

INTELLECTUAL PROPERTY RIGHTS (IPR)

L	T	P	M	C
3	0	0	100	3

UNIT I INTRODUCTION **5**

Introduction – Invention and Creativity – Intellectual Property (IP) – Importance – Protection of IPR – Basic types of property (i. Movable Property ii. Immovable Property and iii. Intellectual Property).

UNIT II IP PATENTS **10**

IP – Patents – Copyrights and related rights – Trade Marks and rights arising from Trademark registration – Definitions – Industrial Designs and Integrated circuits – Protection of Geographical Indications at national and International levels – Application Procedures.

UNIT III MISSION **10**

International convention relating to Intellectual Property – Establishment of WIPO – Mission and Activities – History – General Agreement on Trade and Tariff (GATT).

UNIT IV IPR LEGISLATIONS **10**

Indian Position Vs WTO and Strategies – Indian IPR legislations – commitments to WTO-Patent Ordinance and the Bill – Draft of a national Intellectual Property Policy – Present against unfair competition.

UNIT V CASE STUDIES **10**

Case Studies on – Patents (Basumati rice, turmeric, Neem, etc.) – Copyright and related rights – Trade Marks – Industrial design and Integrated circuits – Geographic indications – Protection against unfair competition.

TOTAL 45

TEXT BOOKS:

1. Subbaram N.R. " Handbook of Indian Patent Law and Practice ", S. Viswanathan Printers and Publishers Pvt. Ltd., New Delhi, 1998.
2. Eli Whitney, "United States Patent Number : 72X", Cotton Gin, March 14, USA, 1794.

REFERENCE BOOKS:

2. Intellectual Property Today : Volume 8, No. 5, May 2001, [www.iptoday.com].
3. Using the Internet for non-patent prior art searches, Derwent IP Matters, July 2000. [www.ipmatters.net/features/000707_gibbs.html.

INDIAN CONSTITUTION AND SOCIETY

L	T	P	M	C
3	0	0	100	3

UNIT I INTRODUCTION 9

Historical Background – Constituent Assembly of India – Philosophical foundations of the Indian Constitution – Preamble – Fundamental Rights – Directive Principles of State Policy – Fundamental Duties – Citizenship – Constitutional Remedies for citizens

UNIT II STRUCTURES 9

Union Government – Structures of the Union Government and Functions – President – Vice President – Prime Minister – Cabinet – Parliament – Supreme Court of India – Judicial Review.

UNIT III FUNCTIONS 9

State Government – Structure and Functions – Governor – Chief Minister – Cabinet – State Legislature – Judicial System in States – High Courts and other Subordinate Courts.

UNIT IV RELATIONS 9

Indian Federal System – Center – State Relations – President's Rule – Constitutional Amendments – Constitutional Functionaries - Assessment of working of the Parliamentary System in India.

UNIT V SOCIETY 9

Society : Nature, Meaning and definition; Indian Social Structure; Castle, Religion, Language in India; Constitutional Remedies for citizens – Political Parties and Pressure Groups; Right of Women, Children and Scheduled Castes and Scheduled Tribes and other Weaker Sections.

TOTAL : 45

TEXT BOOKS:

1. Durga Das Basu, "Introduction to the Constitution of India", Prentice Hall of India, New Delhi, 2003
2. R.C.Agarwal, " Indian Political System", S.Chand and Company, New Delhi, 1997

REFERENCE BOOKS:

1. Sharma, Brij Kishore, "Introduction to the Constitution of India", Fifth Edition, Prentice Hall of India, New Delhi, 2009
2. Maciver and Page, "Society: An Introduction Analysis", Mac Milan India Ltd., New Delhi, 2003
3. K.L.Sharma,"Social Stratification in India: Issues and Themes", Jawaharlal Nehru University, New Delhi, 1997
4. U.R.Gahai, "Indian Political System", New Academic Publishing House, Jalaendhar, 1998

ELECTIVES – SEMESTER VII

TCP / IP DESIGN AND IMPLEMENTATION

L	T	P	M	C
3	0	0	100	3

UNIT I ROUTING **9**

Datalink layer protocols- Internet Protocol, Header, Routing, Subnetting and Supernetting, ARP and RARP, Internet Control Message Protocol (ICMP), Internet Group Message Protocol (IGMP), IP Routing, Dynamic Routing Protocols, IPV6

UNIT II TRANSPORT LAYER **9**

End-to-end issues- Flow control- Congestion control- Error control- User Datagram protocol- Transmission Control Protocol- Services and Leader connection Establishment and Termination, Interactive Dataflow, Timeout and Retransmission - SCTP

UNIT II TCP **9**

Services – header – connection establishment and termination- interactive data flow- bulk data flow- timeout and retransmission – persist timer - keepalive timer- futures and performance

UNIT IV TCP IMPLEMENTATION I **9**

Data structure and input processing – transmission control blocks- segment format- comparison-finite state machine implementation-Output processing- mutual exclusion- computing the TCP data length

UNIT V TCP IMPLEMENTATION II **9**

Timers-events and messages- timer process- deleting and inserting timer event- flow control and adaptive retransmission-congestion avoidance and control – urgent data processing and push function.

TOTAL : 45

TEXT BOOKS:

1. Behrouz A.Forouzan, ”TCP/IP Protocol Suite”, second edition, Tata McGraw Hill, New Delhi, 2003.
2. Douglas E.Comer, “Internetworking with TCP/IP, Principles, Protocols and Architecture”, fourth edition, Prentice Hall, New Delhi, 2004.

REFERENCE BOOKS:

1. Richard Stevens.W, “Unix Network Programming” , second edition, Prentice Hall, New Delhi, 2001.
2. Richard Stevens, “TCP/IP Illustrated”, Volume 2, Prentice Hall, New Delhi, 2003.

C # AND . NET FRAMEWORK

L	T	P	M	C
3	0	0	100	3

UNIT I INTRODUCTION TO C# 8

Introducing C#, Understanding .NET, Overview of C#, Literals, Variables, Data Types, Operators, Expressions, Branching, Looping, Methods, Arrays, Strings, Structures, Enumerations.

UNIT II OBJECT ORIENTED ASPECTS OF C# 9

Classes, Objects, Inheritance, Polymorphism, Interfaces, Operator Overloading, Delegates, Events, Errors and Exceptions.

UNIT III APPLICATION DEVELOPMENT ON .NET 8

Building Windows Applications, Accessing Data with ADO.NET.

UNIT IV WEB BASED APPLICATION DEVELOPMENT ON .NET 8

Programming Web Applications with Web Forms, Programming Web Services.

UNIT V THE CLR AND THE .NET FRAMEWORK 12

Assemblies, Versioning, Attributes, Reflection, Viewing MetaData, Type Discovery, Reflecting on a Type, Marshaling, Remoting, Understanding Server Object Types, Specifying a Server with an Interface, Building a Server, Building the Client, Using SingleCall, Threads.

TOTAL : 45

TEXT BOOKS:

3. E. Balagurusamy, “Programming in C#”, Tata McGraw-Hill, New Delhi, 2004.
4. J. Liberty, “Programming C#”, 2nd ed., O’Reilly, New Delhi, 2002.
5. Herbert Schildt, “The Complete Reference: C#”, Tata McGraw-Hill, New Delhi, 2004.

REFERENCE BOOKS:

1. Robinson et al, “Professional C#”, Second Edition, Wrox Press, USA, 2002.
2. Andrew Troelsen, “C# and the .NET Platform”, A! Press, USA, 2003.
3. S. Thamarai Selvi, R. Murugesan, “A Textbook on C#”, Pearson Education, New Delhi, 2003.

PERVASIVE COMPUTING

L	T	P	M	C
3	0	0	100	3

UNIT – I PERVASIVE COMPUTING APPLICATION 9

Pervasive Computing devices and Interfaces – Device technology trends, Connecting issues and protocols, pervasive computing principles

UNIT – II PERVASIVE COMPUTING AND WEB BASED APPLICATIONS 9

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

UNIT – III MIDDLEWARE COMPONENTS 9

Programming consumer devices, Smart card programming, messaging components, Database components

UNIT – IV PDA IN PERVASIVE COMPUTING 9

Introduction - PDA software Components, Standards, emerging trends - PDA Device characteristics - PDA Based Access Architecture

UNIT – V USER INTERFACE ISSUES IN PERVASIVE COMPUTING 9

Architecture - Smart Card- based Authentication Mechanisms - Wearable computing Architecture

TOTAL 45

TEXT BOOKS:

1. Jochen Burkhardt, Horst Henn, Stefan Hepper, Thomas Schaec, Klaus Rindtorff, “Pervasive Computing Technology and Architecture of Mobile Internet Applications”, Addison Wesley, New Delhi, 2002
2. Uwe Hansman, Lothat Merk, Martin S Nicklous, Thomas Stober, “Pervasive Computing - Handbook”, Springer- Verlag, New Delhi, 2003

REFERENCE BOOK:

1. Uwe Hansman, Lothat Merk, Martin S Nicklous, Thomas Stober, “Principles of Mobile Computing”, Springer- Verlag, New Delhi, 2003

GRID COMPUTING

L T P M C

3 0 0 100 3

UNIT – I INTRODUCTION 9

The Grid - Past, Present, Future, A New Infrastructure for 21st Century Science - The Evolution of the Grid - Grids and Grid Technologies, Programming models - A Look at a Grid Enabled Server and Parallelization Techniques – Grid applications

UNIT – II THE ANATOMY OF THE GRID 9

The concept of virtual organizations – Grid architecture – Grid architecture and relationship to other Distributed Technologies – computational and data Grids, semantic grids

UNIT – III THE OPEN GRID SERVICES ARCHITECTURE 9

Grid Management systems, security, Grid Grid-Enabling software and Grid-enabling network services, Data Grid - Virtualization Services for Data Grids, Peer-to-Peer Grids - Peer-to-Peer Grid Databases for Web Service Discovery

UNIT – IV THE OPEN GRID SERVICES INFRASTRUCTURE 9

Technical details of OSGI specification, service data concepts, Naming and Change Management Recommendations – OGSA basic services

UNIT – V APPLICATION CASE STUDY 9

Molecular Modeling for Drug Design and Brain Activity Analysis, Resource management and scheduling, Setting up Grid, deployment of Grid software and tools, and application execution

TOTAL 45

TEXT BOOKS:

1. Fran Bermn, Geoffrey Fox, Anthony Hey J.G., “Grid Computing: Making the Global Infrastructure a Reality”, Wiley, USA, 2003
2. Joshy Joseph, Craig Fallenstein, “Grid Computing”, Pearson Education, New Delhi, 2004.
3. C S R Prabhu, “ Grid and Cluster Computing, PHI Learning, New Delhi, 2008

REFERENCE BOOKS:

1. Ian Foster, Carl Kesselman, “The Grid2: Blueprint for a New Computing Infrastructure”. Morgan Kaufman, New Delhi, 2004
2. Ahmar Abbas, “Grid Computing: Practical Guide to Technology and Applications”, Delmar Thomson Learning, USA, 2004,

NEURAL NETWORKS

L T P M C

3 0 0 100 3

UNIT – I INTRODUCTION TO NEURAL NETWORKS 9

Introduction, Humans and Computers, Organization of the Brain, Biological Neuron, Biological and Artificial Neuron Models, Characteristics of ANN, McCulloch-Pitts Model, Historical Developments, Potential Applications of ANN.

UNIT – II ESSENTIALS OF ARTIFICIAL NEURAL NETWORKS 9

Artificial Neuron Model, Operations of Artificial Neuron, Types of Neuron Activation Function, ANN Architectures, Classification Taxonomy of ANN – Connectivity, Learning Strategy (Supervised, Unsupervised, Reinforcement), Learning Rules.

UNIT – III SINGLE LAYER FEED FORWARD NETWORKS 9

Introduction, Perceptron Models: Discrete, Continuous and Multi-Category, Training Algorithms: Discrete and Continuous Perceptron Networks, Limitations of the Perceptron Model.

UNIT – IVI MULTI- LAYER FEED FORWARD NETWORKS 9

Credit Assignment Problem, Generalized Delta Rule, Derivation of Backpropagation (BP) Training, Summary of Backpropagation Algorithm, Kolmogorov Theorem, Learning Difficulties and Improvements.

UNIT - V ASSOCIATIVE MEMORIES 9

Paradigms of Associative Memory, Pattern Mathematics, Hebbian Learning, General Concepts of Associative Memory, Bidirectional Associative Memory (BAM) Architecture, BAM Training Algorithms: Storage and Recall Algorithm, BAM Energy Function. Architecture of Hopfield Network: Discrete and Continuous versions, Storage and Recall Algorithm, Stability Analysis. Neural network applications: Process identification, control, faultdiagnosis.

TOTAL : 45

TEXT BOOKS:

1. Laurene Fausett, “Fundamentals of Neural Networks” , Pearson Education, New Delhi, 2004..

2. Simon Haykin, “Neural Networks- A comprehensive foundation”, Pearson Education, New Delhi, 2003.

REFERENCE BOOKS:

1. S.N.Sivanandam, S.Sumathi,S. N. Deepa “Introduction to Neural Networks using MATLAB 6.0”, Tata Mc Graw Hill, New Delhi, 2006.
2. S. Rajasekharan and G. A. Vijayalakshmi pai, “Neural Networks, Fuzzy logic, Genetic algorithms: synthesis and applications”, PHI Learning, New Delhi, 2004.
3. Timothy J. Ross, “ Fuzzy Logic With Engineering Applications”, Tata McGraw-Hill Inc. New Delhi, 2000

SERVICE ORIENTED ARCHITECTURE

L	T	P	M	C
3	0	0	100	3

UNIT I THE TECHNOLOGY OF ENTERPRISE SOA 9

The goal of loose coupling-Web services overview-Introducing Service oriented Architecture: Enterprise architecture-The service oriented architecture

UNIT II ENTERPRISE APPLICTION INTEGRATION AND B2B COMMERCE 9

EAI-web services in portals and software development-managing the supply chain-Building hubs-Partner to Partner-Government and scientific SOA

UNIT III REAL TIME OPERATIONS AND SECURITY 9

Goal of the real time enterprise-Delivering real time with the SOA –Real time virtual data warehouse-business level agreements. SECURITY: Risk of loose coupling-layers of SOA security-Solutions to SOA security

UNIT IV SOA MANAGEMENT SOLUTION AND SOA NETWORKS 9

Problems in the unmanaged SOA-web services management solutions-Managing the SOA network-Securing the SOA network and solutions-SOA network management-Utility computing in the SOA

UNIT V PEOPLE AND PROCESS OF ENTERPRISE SOA 9

Exploring an SOA for titan-achieving consensus at titan-Grouping for SOA Training ESTABLISHING PRACTICE, PLAN AND PROCEED: Services discovery-Service creation-Selecting a platform-Forming an SOA plan and proceed

TOTAL 45

TEXT BOOK:

1. Eric Pulier,Hugh Taylor, " Understanding Enterprise SOA", Dreamtech press, New Delhi, 2005.

REFERENCE BOOKS:

1. Chris Peiris and Dennis Mulder, "Pro WCF Practical Microsoft SOA implementation", Apress, Berkeley, CA, USA, 2007.
2. Greg Lomow, Eric Newcomer, "Understanding SOA with Web Services", Pearson Education, New Delhi, 2005.
3. Dan Woods, Thomas Mattern, "Enterprise SOA: Designing it for Business Innovation", Shroff publishers, New Delhi, 2006.

MAINFRAME TECHNOLOGIES

L	T	P	M	C
3	0	0	100	3

UNIT – I INTRODUCTION **9**

Mainframe concepts-an evolving architecture- mainframe computer users- factors contributing to mainframe use – mainframe workloads.

UNIT – II CAPACITY **9**

Capacity – elements of a system required for capacity – few server Vs Many server – service level agreement – managing the system to the SLA – architecture, running work and capacity – several servers on one physical machine – parallel sysplex and its measurements.

UNIT - III SCALABILITY, INTEGRITY AND AVAILABILITY **9**

Introduction to scalability – scalability concepts – scalability implementation on IBM system – Introduction to integrity – Integrity serialization– introduction to availability – Inhibitors to availability - redundancy – z/OS elements for availability – Disaster recovery.

UNIT - IV ACCESSING LARGE AMOUNT OF DATA **9**

Introduction – channel subsystem – control unit – mapping for access to devices - multiple allegiance/Parallel Access volumes – database and data sharing – Data placement and management .

UNIT - V SYSTEM MANAGEMENT AND AUTONOMIC COMPUTING **9**

Introduction – system data – workload management – operations management – performance management – autonomic computing principles - autonomic computing concepts – z/OS implementation of autonomic computing – self healing – self configuring - self protecting – self optimizing.

TOTAL 45

TEXT BOOK

1. Mike Ebbers,Frank Byrne, Pilar Gonzalez Adrados, Rodney Martin and Jon Veilleux, “Introduction to the New Mainframe : Large Scale Commercial Computing”, IBM International Technical Support Organization, 2006

REFERENCE BOOKS:

1. Alexis Leon, “IBM Mainframe Handbook”, Leon Vikas Publishing House Pvt. Ltd., Chennai, 2003
2. Lydia Parziale, Edi Lopes Alves, Klaus Egeler, Clive Jordan” Introduction to the New Mainframe: VM Basics”, IBM International Technical Support Organization, 2007

ADVANCED JAVA PROGRAMMING

L	T	P	M	C
3	0	0	100	3

UNIT I JAVA FUNDAMENTALS 9

Java I/O streaming – filter and pipe streams – Byte Code interpretation - reflection – Dynamic Reflexive Classes – Threading – Java Native Interfaces- Swing.

UNIT II NETWORK PROGRAMMING IN JAVA 9

Sockets – secure sockets – custom sockets – UDP datagrams – multicast sockets – URL classes – Reading Data from the server – writing data – configuring the connection – Reading the header – telnet application – Java Messaging services

UNIT III APPLICATIONS IN DISTRIBUTED ENVIRONMENT 9

Remote method Invocation – activation models – RMI custom sockets – Object Serialization – RMI – IIOP implementation – CORBA – IDL technology – Naming Services – CORBA programming Models - JAR file creation

UNIT IV MULTI-TIER APPLICATION DEVELOPMENT 9

Server side programming – servlets – Java Server Pages - Applet to Applet communication – applet to Servlet communication - JDBC – Using BLOB and CLOB objects – storing Multimedia data into databases – Multimedia streaming applications – Java Media Framework.

UNIT V ENTERPRISE APPLICATIONS 9

Server Side Component Architecture – Introduction to J2EE – Session Beans – Entity Beans – Persistent Entity Beans – Transactions.

TOTAL : 45

TEXT BOOKS:

1. Elliotte Rusty Harold, " Java Network Programming", O'Reilly publishers, New Delhi, 2000
2. Ed Roman, "Mastering Enterprise Java Beans", John Wiley & Sons Inc., New Delhi, 1999.

REFERENCE BOOKS

1. Harvey M. Deitel, Paul J. Deitel, "Java How to Program", Fourth Edition, PHI Learning, New Delhi, 2005
2. Hortsmann & Cornell, "Core Java 2 Advanced Features, Vol ii", Pearson Education, New Delhi, 2002.
3. Web reference: http://java.sun.com.
4. Patrick Naughton, "Complete Reference: Java2", Tata McGraw-Hill, New Delhi, 2003.

SOFTWARE TESTING

L	T	P	M	C
3	0	0	100	3

UNIT I INTRODUCTION 9

Perspective of Testing – definition, approaches, testing during development life cycle, test policy, test planning, categories of defect, configuration management, risk analysis.

UNIT II TESTING TECHNIQUES 9

Levels of testing, acceptance testing, criticality of requirement, special tests – complexity, GUI, compatibility, security, recovery, installation, error handling, smoke, sanity, parallel and execution testing

UNIT III TECHNIQUES FOR AUTOMATING TEST EXECUTION 9

Testing and test automation – The V model –Tool support for life-cycle testing – The promise of test automation, Common problems of test automation – The limitations of automating software testing, Script Preprocessing, Scripting Techniques

UNIT IV TOOLS TO AUTOMATE TESTING 9

Selecting tools - requirements - tool market - tool selection project - tool selection team - Identifying requirements - Identifying constraints - Identifying tools availability in market - Evaluating the candidate tools - decision making, Testing Tools - WinRunner, SilkTest, LoadRunner, JMeter

UNIT V AUTOMATED COMPARISON 9

Verification, comparison, automation – comparators, dynamic comparison – post-execution comparison – simple comparison, complex comparison – test sensitivity – comparing different types of outcomes – comparison filters and guidelines – Testware Architecture – Automating pre and post processing – Building maintainable tests

TOTAL 45

TEXT BOOKS:

1. Limaye L G, “Software Testing – Principles, Techniques and Tools”, Tata Mc- Graw Hill Education Pvt. Ltd., New Delhi, 2009
2. Boris Beizer, “Software Testing Techniques”, Dream Tech press, New Delhi, 1990.
3. Mark Fewster, Dorothy Graham., "Software Test Automation: Effective Use of Test Execution Tools", Addison Wesley, New Delhi, 1999.

REFERENCE BOOKS:

1. William E Perry, “Effective Methods of Software Testing”, John Wiley & sons, Singapore, 2006.
2. Roger S Pressman, "Software Engineering – A Practitioner’s Approach", sixth edition, Tata McGraw Hill, New Delhi, 2006.
3. Glenford J Myer, "The Art of Software Testing", Second edition, John Wiley & Sons, Singapore, 2004.
4. Prasad K.V.K.K., “Software Testing Tools: Covering WinRunner, SilkTest, LoadRunner, JMeter”, Dreamtech Press, USA, 2005.

CYBER LAW AND INFORMATION ACT

L	T	P	C
3	0	0	3

UNIT – I EVOLUTION OF LAW IN CYBERSPACE 9

The Online Landscape: Technological, Social and Legal Issues, Harmonisation of Laws and the Issue of Jurisdiction Over the Internet , The Internet in the Context of International Commerce, Electronic Signature Legislation-a historical respective, An Overview of Specific Aspects, SEBI Guidelines, The UNCITRAL Model Law and Electronic Equivalents to Traditional Bills of Lading

UNIT – II SECURITY CONCERNS 9

The legal framework, Confidential Information, Protection of Confidential Information , Nature of confidential information , Confidence implied in a contract, Confidence implied by circumstances, Identification of confidential information, Essential requirements of breach of confidence, Exceptions to breach of confidence, Remedies for breach of confidence , Employee Privacy Rights , Employer Protection, Internet Banking in India : Analyzing Legal Issues, Negligent Misstatements

Unit – III INTELLECTUAL PROPERTY IN CYBERSPACE 9

9 Intellectual Property on The Internet , Squatting in Cyberspace: A Web of Deception, WIPO Cases Involving Complainants from India, Intellectual Property (Trade Marks), Domain Names: ICANN and New Remedies Against Cybersquatting, Domain names, copyright intellectual Property and the Internet: A case study of the Indian approach to intellectual property and e-commerce, The CSS Technology License, DVD Audio Disc Copy Protection, Systems-on-a-Chip: Intellectual Property and Licensing Issues

UNIT – IV PROTECTION OF PERSONAL DATA AND PRIVACY 9

. Introduction, Personal Data, Data Subject, Data Processing: Definition and Grounds, Purpose Limitation , Legitimate Purposes, Data Controllers And Data Processors, Establishment, Data - Access and Information, Anonymous and Pseudonymous Data, Freedom of Expression , Free Flow of Data within the Eu, Data Transfer, Data Minimization

UNIT – V INFORMATION TECHNOLOGY ACT 9

Observations on the Preamble, Jurisdictions proposing to adopt provisions of the Model Law, UNCITRAL Model Law on Electronic Commerce Part One. Electronic Commerce In General, Sphere of application, UNCITRAL Model Law , Information Technology Act, 2000: An overview, Existing restrictions on FDI in domestic trading to be applicable to e-commerce as well.

TOTAL : 45

TEXT BOOKS :

1. Rodney D. Ryder, " Guide to Cyber Laws", Second Edition, Wadhwa and Company, New Delhi, 2007
2. Joha Rao, " Law of Cyber Crimes and Information Technology Law", Wadhwa and Company, New Delhi, 2007
3. Vakul Sharma, "Handbook of Cyber laws" Macmillan India Ltd, New Delhi, 2003

REFERENCE BOOKS:

1. Justice Yatindra Singh, " Cyber Laws", Universal Law Publishing, New Delhi, 2003

ELECTIVES – SEMESTER VIII

PARALLEL COMPUTING

L	T	P	M	C
3	0	0	100	3

UNIT I SCALABILITY AND CLUSTERING 9

Evolution of Computer Architecture – Dimensions of Scalability – Parallel Computer Models – Basic Concepts Of Clustering – Scalable Design Principles – Parallel Programming Overview – Processes, Tasks and Threads – Parallelism Issues – Interaction / Communication Issues – Semantic Issues In Parallel Programs.

UNIT II ENABLING TECHNOLOGIES 9

System Development Trends – Principles of Processor Design – Microprocessor Architecture Families – Hierarchical Memory Technology – Cache Coherence Protocols – Shared Memory Consistency – Distributed Cache Memory Architecture – Latency Tolerance Techniques – Multithreaded Latency Hiding.

UNIT III SYSTEM INTERCONNECTS 9

Basics of Interconnection Networks – Network Topologies and Properties – Buses, Crossbar and Multistage Switches, Software Multithreading – Synchronization Mechanisms.

UNIT IV PARALLEL PROGRAMMING 9

Paradigms And Programmability – Parallel Programming Models – Shared Memory Programming.

UNIT V MESSAGE PASSING PROGRAMMING 9

Message Passing Paradigm – Message Passing Interface – Parallel Virtual Machine.

TOTAL : 45

TEXT BOOKS:

1.Kai Hwang and Zhi.Wei Xu, “Scalable Parallel Computing”, Tata Mc GrawHill, New Delhi, 2003.
2.Michael J. Quinn, “Parallel Computing Theory and Practice”, Second Edition, Tata McGraw-Hill Publishing Co. Ltd., New Delhi, 2003.

REFERENCE BOOKS:

1. Ananth Grama, Anshul Gupta, George Karypis, Vipin Kumar, “ Introduction to Parallel Computing”, Pearson, Education, New Delhi, 2009.
2. Kai Hwang, “Advanced Computer Architecture” Tata McGraw-Hill, New Delhi, 2003.
3. David E. Culler & Jaswinder Pal Singh, “Parallel Computing Architecture: A Hardware/Software Approach”, Morgan Kaufman Publishers, New Delhi, 1999.

GENETIC ALGORITHMS AND APPLICATIONS

L	T	P	M	C
3	0	0	100	3

UNIT – I INTRODUCTION TO EVOLUTIONARY COMPUTATION 9

Biological and artificial evolution - Evolutionary computation and AI - Different historical branches of EC-GAs- EP- ES- GP - A simple evolutionary algorithm.

UNIT- II SEARCH AND SELECTION OPERATORS 9

Recombination/Crossover for strings- one-point- multi-point-uniform crossover operators - Mutation for strings- bit-flipping - Recombination/Crossover and mutation rates - Recombination for real-valued representations- Fitness proportional selection and fitness scaling – Ranking methods – Tournament selection.

UNIT – III EVOLUTIONARY COMBINATORIAL OPTIMIZATION 9

TSP - Evolutionary algorithms for TSPs – Hybrid evolutionary and local search algorithms.Schema theorems - Convergence of EAs - Computational time complexity of EAs - No free lunch theorem.

UNIT – IV CONSTRAINT HANDLING 9

Common techniques- penalty methods- repair methods - Analysis -Some examples. Pareto optimality - Multiobjective evolutionary algorithms.

UNIT – V GENETIC PROGRAMMING 9

Trees as individuals - Major steps of genetic programming-, functional and terminal sets- initialization- crossover-mutation- fitness evaluation - Search operators on trees – Examples.

TOTAL 45

TEXT BOOKS:

1. Goldberg and David E, “Genetic Algorithms in Search. Optimization and Machine Learning”, Pearson Education, New Delhi, 2006.
2. Kalyamoy Deb, “Multi-objective Optimization using Evolutionary Algorithms”, First Edition, John Wiley & Sons, USA, 2003.

REFERENCE BOOKS:

1. Koza, John, Wolfgang Banzhaf, Kumar Chellapilla, Kalyanmoy Deb, Marco Dorigo, David Fogel, Max Garzon, David Goldberg, Hitoshi Iba, and Rick Riolo(Eds.), “Genetic Programming”, Academic Press. Morgan Kaufmann, USA, 1998.
2. John R.Koza, Forrest H Bennett III , David Andre, Martin A Keane, “Genetic Programming III:Darwinian Invention and Problem Solving” Morgan Kaufmann, USA, 1999.

HIGH SPEED NETWORKS

L	T	P	C
3	0	0	3

UNIT I HIGH SPEED NETWORKS 8

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: applications, requirements – Architecture of 802.11

UNIT II CONGESTION AND TRAFFIC MANAGEMENT 8

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 12

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 8

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.

TOTAL : 45

TEXT BOOKS:

1. William Stallings, "High Speed Networks And Internet", Second Edition, Pearson Education, New Delhi, 2005.

REFERENCE BOOKS:

1. Warland & Pravin Varaiya, "High Performance Communication Networks", Second Edition, Jean Harcourt Asia Pvt. Ltd., New Delhi, 2001.
2. Irvan Pepelnjk, Jim Guichard and Jeff Apcar, "MPLS and VPN architecture", Cisco Press, Volume 1 and 2, New Delhi, 2003

DIGITAL IMAGE PROCESSING

L	T	P	M	C
3	0	0	100	3

UNIT I DIGITAL IMAGE FUNDAMENTALS AND TRANSFORMS 9

Elements of visual perception – Image sampling and quantization Basic relationship between pixels – Basic geometric transformations-Introduction to Fourier Transform and DFT – Properties of 2D Fourier Transform – FFT – Separable Image Transforms -Walsh – Hadamard – Discrete Cosine Transform, Haar, Slant – Karhunen – Loeve transforms.

UNIT II IMAGE ENHANCEMENT TECHNIQUES 9

Spatial Domain methods: Basic grey level transformation – Histogram equalization – Image subtraction – Image averaging –Spatial filtering: Smoothing, sharpening filters – Laplacian filters – Frequency domain filters : Smoothing – Sharpening filters – Homomorphic filtering.

UNIT III IMAGE RESTORATION: 9

Model of Image Degradation/restoration process – Noise models – Inverse filtering - Least mean square filtering – Constrained least mean square filtering – Blind image restoration – Pseudo inverse – Singular value decomposition.

UNIT IV IMAGE COMPRESSION 9

Lossless compression: Variable length coding – LZW coding – Bit plane coding-predictive coding-DPCM.

Lossy Compression: Transform coding – Wavelet coding – Basics of Image compression standards: JPEG, MPEG,Basics of Vector quantization.

UNIT V IMAGE SEGMENTATION AND REPRESENTATION 9

Edge detection –Thresholding - Region Based segmentation – Boundary representation: chair codes- Polygonal approximation –Boundary segments –boundary descriptors: Simple descriptors-Fourier descriptors - Regional descriptors –Simple descriptors- Texture

TOTAL : 45

TEXT BOOKS:

1. Rafael C Gonzalez, Richard E Woods 2nd Edition, Digital Image Processing - Pearson Education, New Delhi, 2003.
2. A.K. Jain, “Fundamentals of Digital Image Processing”, PHI Learning , New Delhi, 2005
3. William K Pratt, “Digital Image Processing”, John Willey & Sons, New Delhi, 2001

REFERENCE BOOKS:

1. Millman Sonka, Vaclav hlavac, Roger Boyle, Broos/colic, “Image Processing Analysis and Machine Vision”, Thompson Learning, New Delhi, 1999.
2. Chanda Dutta Magundar, “Digital Image Processing and Applications”, Prentice Hall of India, New Delhi, 2000

COMPONENT BASED TECHNOLOGY

L	T	P	M	C
3	0	0	100	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 BASED 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 COMPONENT 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 . NET BASED COMPONENT 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

TEXT BOOKS:

2. Clemens Szyperski, “Component Software: Beyond Object-Oriented Programming”, Pearson Education publishers, New Delhi, 2003
3. Ed Roman, “Mastering Enterprise Java Beans”, John Wiley & Sons Inc., New Delhi, 1999.

REFERENCE BOOKS

1. Mowbray, “Inside CORBA”, Pearson Education, New Delhi, 2003.
2. Freeze, “Visual Basic Development Guide for COM & COM+”, BPB Publication, New Delhi, 2001.
3. Hortsamann, Cornell, “CORE JAVA Vol-II” Sun Press, New Delhi, 2002.

SOFTWARE PROJECT MANAGEMENT

L	T	P	M	C
3	0	0	100	3

UNIT - I SOFTWARE PROJECT MANAGEMENT 9

Introduction, Need for Software Project Management – Software Project versus other projects – Overview of Project planning

UNIT - II PROJECT EVALUATION 9

Introduction, Strategic assessment, Technical Assessment, Cost benefit Analysis, Cash flow forecasting, Cost benefit Evaluation Techniques Risk Evaluation – Selection of appropriate project planning.

UNIT III ACTIVITY PLANNING 9

Objectives of activity planning, Project schedules, Projects and activities, Sequencing and scheduling activities, Network Planning models –Formulating network models, Using dummy activities, Identifying critical path, identifying critical activities. Risk Analysis and Management: Nature of risk, Managing risk, Risk identification, Risk analysis, reducing the risks, evaluating the risks.

UNIT IV SOFTWARE EFFORT ESTIMATION 10

Problems with over and under estimate, the basis for software estimation, software estimation Techniques. Expert judgments, Estimating by analogy, Function point analysis. Resource Allocation: Identifying resource requirements, Scheduling resources, Monitoring and control, Managing people and organization teams.

UNIT V PROJECT MANAGEMENT 8

Project Management in the Testing phase – Introduction, test scheduling, test types, issues, management structures for testing, metrics for testing phase, Project Management in the Management phase – Introduction, activities, management issues, configuration management, estimating size, effort and people resources, advantages, metrics

TOTAL: 45

TEXT BOOKS

1. Bob huges, Mike cotterell, “Software Project Management”, Tata McGraw Hill, New Delhi, 2002.
2. Gopalaswamy Ramesh, “Managing Global Software Projects”, Tata McGraw Hill, New Delhi, 2006.
3. Kelkar Sa, “Software Project Management”, PHI Learning, New Delhi, 2007

REFERENCE BOOKS

1. Roger S Pressman, “Software Engineering, A Practitioner’s Approach”, Tata McGraw Hill, New Delhi, 2001.
2. Kamna Malik, Praveen Choudary, “Software Quality, a practitioner’s Approach”, Tata McGraw Hill, New Delhi, 2008.

CLOUD COMPUTING

L	T	P	M	C
3	0	0	100	3

UNIT – I INTRODUCTION **9**

Cloud Computing Introduction, From, Collaboration to cloud, Working of cloud computing, pros and cons, benefits, developing cloud computing services, Cloud service development, discovering cloud services.

UNIT – II CLOUD COMPUTING FOR EVERYONE **9**

Centralizing email communications, cloud computing for community, collaborating on schedules, collaborating on group projects and events, cloud computing for corporation, mapping schedulesm managing projects, presenting on road.

UNIT – III USING CLOUD SERVICES **9**

Collaborating on calendars, Schedules and task management, exploring on line scheduling and planning, collaborating on event management, collaborating on contact management, collaborating on project management, collaborating on word processing, spreadsheets, and databases.

UNIT – IV OUTSIDE THE CLOUD **9**

Evaluating web mail services, Evaluating instant messaging, Evaluating web conference tools, creating groups on social networks, Evaluating on line groupware, collaborating via blogs and wikis

UNIT – V STORING AND SHARING **9**

Understanding cloud storage, evaluating on line file storage, exploring on line book marking services, exploring on line photo editing applications, exploring photo sharing communities, controlling it with web based desktops.

TOTAL : 45

TEXT BOOK:

1. Michael Miller, " Cloud Computing", Pearson Education, New Delhi, 2009

BIO INFORMATICS

L	T	P	M	C
3	0	0	100	3

UNIT I INTRODUCTION 9

Need for Bioinformatics technologies – Overview of Bioinformatics technologies – Structural bioinformatics – Data format and processing – secondary resources and applications – Role of Structural bioinformatics - Biological Data Integration System.

UNIT II DATAWAREHOUSING AND DATAMINING IN BIOINFORMATICS 9

Bioinformatics data – Datawarehousing architecture – data quality – Biomedical data analysis – DNA data analysis – Protein data analysis – Machine learning – Neural network architecture and applications in bioinformatics

UNITIII MODELING FOR BIOINFORMATICS 9

Hidden markov modeling for biological data analysis – Sequence identification – Sequence classification – multiple alignment generation – Comparative modeling – Protein modeling – genomic modeling – Probabilistic modeling – Bayesian networks – Boolean networks - Molecular modeling – Computer programs for molecular modeling

UNIT IV PATTERN MATCHING AND VISUALIZATION 9

Gene regulation – motif recognition – motif detection – strategies for motif detection – Visualization – Fractal analysis – DNA walk models – one dimension – two dimension – higher dimension – Game representation of Biological sequences – DNA, Protein, Amino acid sequences.

UNIT V MICROARRAY ANALYSIS 9

Microarray technology for genome expression study – image analysis for data extraction – preprocessing – segmentation – gridding – spot extraction – normalization, filtering – cluster analysis – gene network analysis – Compared Evaluation of Scientific Data Management Systems – Cost Matrix – Evaluation model - Benchmark - Tradeoffs

TOTAL 45

TEXT BOOKS:

1. Yi-Ping Phoebe Chen (Ed), “BioInformatics Technologies”, First Indian Reprint, Springer Verlag, USA, 2007.
2. Byan B Bergeron, “ Bio Informatics Computing”, PHI Learning, New Delhi, 2008
3. Zoe lacroix and Terence Critchlow, “BioInformatics – Managing Scientific data”, First Indian Reprint, Elsevier, USA, 2004

REFERENCE BOOKS:

1. Zoe Lacroix and Terence Critchlow, “Bioinformatics – Managing Scientific Data”, First Edition, Elsevier, USA, 2004
2. Bryan Bergeron, “Bio Informatics Computing”, Second Edition, Pearson Education, New Delhi, 2003.

PROFESSIONAL ETHICS

L	T	P	M	C
3	0	0	100	3

UNIT I ENGINEERING ETHICS 9

Senses of 'Engineering Ethics' – Variety of moral issues – Types of inquiry – Moral dilemmas – Moral Autonomy – Kohlberg's theory – Gilligan's theory – Consensus and Controversy – Professions and Professionalism – Professional Ideals and Virtues – Uses of Ethical Theories

UNIT II ENGINEERING AS SOCIAL EXPERIMENTATION 9

Engineering as Experimentation – Engineers as responsible Experimenters – Research Ethics - Codes of Ethics – Industrial Standards - A Balanced Outlook on Law – The Challenger Case Study

UNIT III ENGINEER'S RESPONSIBILITY FOR SAFETY 9

Safety and Risk – Assessment of Safety and Risk – Riysis – Reducing Risk – The Government Regulator's Approach to Risk - Chernobyl Case Studies and Bhopal

UNIT IV RESPONSIBILITIES AND RIGHTS 9

Collegiality and Loyalty – Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) - Discrimination

UNIT V GLOBAL ISSUES 9

Multinational Corporations – Business Ethics - Environmental Ethics – Computer Ethics - Role in Technological Development – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Honesty – Moral Leadership – Sample Code of Conduct

TOTAL :45

TEXT BOOKS:

1. Mike Martin and Roland Schinzinger, "Ethics in Engineering", McGraw Hill, New York, 2005

2. M Govindarajan, M Natarajan and V S Senthil Kumar, "Engineering Ethics", PHI Learning, New Delhi, 2007

3. Charles E Harris, Michael S Pritchard and Michael J Rabins, "Engineering Ethics – Concepts and Cases", Thompson Learning, New Delhi, 2000

REFERENCE BOOKS:

1. Charles D Fleddermann, “Engineering Ethics”, Prentice Hall, New Mexico, 1999
2. John R Boatright, “Ethics and the Conduct of Business”, Pearson Education, New Delhi, 2003
3. Edmund G Seebauer and Robert L Barry, “Fundamentals of Ethics for Scientists and Engineers”, Oxford University Press, New Delhi, 2001
4. Prof. (Col) P S Bajaj and Dr. Raj Agrawal, “Business Ethics – An Indian Perspective”, Biztantra, New Delhi, 2004
5. David Ermann and Michele S Shauf, “Computers, Ethics and Society”, Oxford University Press, New Delhi, 2003

EMBEDDED SYSTEMS

L	T	P	M	C
3	0	0	100	3

UNIT I INTRODUCTION TO EMBEDDED SYSTEMS 9

Definition and Classification – Overview of Processors and hardware units in an embedded system – Software embedded into the system – Exemplary Embedded Systems – Embedded Systems on a Chip (SoC) and the use of VLSI designed circuits

UNIT II DEVICES AND BUSES FOR DEVICES NETWORK 9

I/O Devices - Device I/O Types and Examples – Synchronous - Iso-synchronous and Asynchronous Communications from Serial Devices - Examples of Internal Serial-Communication Devices - UART and HDLC - Parallel Port Devices - Sophisticated interfacing features in Devices/Ports- Timer and Counting Devices - '12C', 'USB', 'CAN' and advanced I/O Serial high speed buses- ISA, PCI, PCI-X, cPCI and advanced buses.

UNIT III PROGRAMMING CONCEPTS AND EMBEDDED PROGRAMMING IN C, C++ 9

Programming in assembly language (ALP) vs. High Level Language - C Program Elements, Macros and functions -Use of Pointers - NULL Pointers - Use of Function Calls – Multiple function calls in a Cyclic Order in the Main Function Pointers – Function Queues and Interrupt Service Routines Queues Pointers – Concepts of EMBEDDED PROGRAMMING in C++ - Objected Oriented Programming – Embedded Programming in C++, 'C' Program compilers – Cross compiler – Optimization of memory codes.

UNIT IV REAL TIME OPERATING SYSTEMS – PART - 1 9

Definitions of process, tasks and threads – Clear cut distinction between functions – ISRs and tasks by their characteristics – Operating System Services- Goals – Structures- Kernel - Process Management – Memory Management – Device Management – File System Organisation and Implementation – I/O Subsystems – Interrupt Routines Handling in RTOS, REAL TIME OPERATING SYSTEMS : RTOS Task scheduling models - Handling of task scheduling and latency and deadlines as performance metrics – Co-operative Round Robin Scheduling – Cyclic Scheduling with Time Slicing (Rate Monotonics Co-operative Scheduling) – Preemptive Scheduling Model strategy by a Scheduler – Critical Section Service by a Preemptive Scheduler – Fixed (Static) Real time scheduling of tasks - INTER PROCESS COMMUNICATION AND SYNCHRONISATION – Shared data problem – Use of Semaphore(s) – Priority Inversion Problem and Deadlock Situations – Inter Process Communications using Signals – Semaphore Flag or mutex as Resource key – Message Queues – Mailboxes – Pipes – Virtual (Logical) Sockets – Remote Procedure Calls (RPCs).

UNIT V REAL TIME OPERATING SYSTEMS – PART - 2 9

Study of Micro C/OS-II or Vx Works or Any other popular RTOS – RTOS System Level Functions – Task Service Functions – Time Delay Functions – Memory Allocation Related Functions – Semaphore Related Functions – Mailbox Related Functions – Queue Related Functions – Case Studies of Programming with RTOS – Understanding Case Definition – Multiple Tasks and their functions – Creating a list of tasks – Functions and IPCs – Exemplary Coding Steps.

TOTAL: 45

TEXT BOOKS:

1. Rajkamal, Embedded Systems Architecture, Programming and Design, Second Edition, Tata McGraw-Hill, New Delhi, 2009
2. Steve Heath, Embedded Systems Design, Second Edition, Elesvier India Pvt., Ltd, New Delhi, 2007,
3. David E.Simon, An Embedded Software Primer, Pearson Education Asia, First Indian Reprint , New Delhi, 2000

REFERENCE BOOKS:

1. Wayne Wolf, Computers as Components; Principles of Embedded Computing System Design – Harcourt India, Morgan Kaufman Publishers, First Indian Reprint 2001
2. Frank Vahid and Tony Givargis, Embedded Systems Design – A unified Hardware / Software Introduction, John Wiley, 2002.