

UNIVERSITY DEPARTMENTS
ANNA UNIVERSITY CHENNAI :: CHENNAI 600 025
REGULATIONS - 2009
CURRICULUM I TO IV SEMESTERS (FULL TIME)
M.E. COMPUTER SCIENCE AND ENGINEERING
SEMESTER I

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1	MA9110	Operations Research	3	1	0	4
2	CP9112	Advanced Data Structures and Algorithms	3	0	0	3
3	CP9113	Advanced Computer Architecture	3	0	0	3
4	CP9114	Object Oriented Systems Engineering	3	0	0	3
5	CP9115	Network Engineering and Management	3	0	0	3
PRACTICAL						
6	CP9118	Data Structures Laboratory	0	0	3	2
TOTAL			15	1	3	18

SEMESTER II (6+1)

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1	CP9121	UNIX Internals	3	0	0	3
2	CP9122	Compiler Optimization	3	0	0	3
3	CP9123	Advanced Database Technology	3	0	0	3
4	CP9124	Parallel Algorithms	3	0	0	3
5	CP9125	Mobile and Pervasive Computing	3	0	0	3
6	E1	Elective - I	3	0	0	3
PRACTICAL						
7	CP9128	UNIX Laboratory	0	0	3	2
TOTAL			18	0	3	20

SEMESTER III (3+1)

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1	CP9131	Security Principles and Practice	3	0	0	3
2	E2	Elective – II	3	0	0	3
3	E3	Elective – III	3	0	0	3
PRACTICAL						
4	CP9134	Project Phase – I	0	0	12	6
TOTAL			9	0	12	15

SEMESTER IV (0+1)

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
PRACTICAL						
1	CP9141	Project Phase – II	0	0	24	12
TOTAL			0	0	24	12

Total No of Credits : **65**
No of Theory courses : **14**
No of Lab Courses : **04**

UNIVERSITY DEPARTMENTS
ANNA UNIVERSITY CHENNAI :: CHENNAI 600 025
REGULATIONS - 2009
CURRICULUM I TO VI SEMESTERS (PART TIME)
M.E. COMPUTER SCIENCE AND ENGINEERING

SEMESTER I

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1	MA9110	Operations Research	3	1	0	4
2	CP9112	Advanced Data Structures and Algorithms	3	0	0	3
3	CP9113	Advanced Computer Architecture	3	0	0	3
TOTAL			9	1	0	10

SEMESTER II

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1	CP9121	Unix Internals	3	0	0	3
2	CP9123	Advanced Database Technology	3	0	0	3
3	CP9124	Parallel Algorithms	3	0	0	3
PRACTICAL						
4	CP9128	Unix Laboratory	0	0	3	2
TOTAL			9	0	3	11

SEMESTER III

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1	CP9114	Object Oriented Systems Engineering	3	0	0	3
2	CP9115	Network Engineering and Management	3	0	0	3

PRACTICAL						
SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
3	CP9118	Data Structures Laboratory	0	0	3	2
TOTAL			6	0	3	8

SEMESTER IV

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1	CP9122	Compiler Optimization	3	0	0	3
2	CP9125	Mobile and Pervasive Computing	3	0	0	3
3	E1	Elective I	3	0	0	3
TOTAL			9	0	0	9

SEMESTER V

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1	CP9131	Security Principles and Practice	3	0	0	3
2	E2	Elective II	3	0	0	3
3	E3	Elective III	3	0	0	3
PRACTICAL						
4	CP9134	Project Work (phase I)	0	0	12	6
TOTAL			9	0	12	15

SEMESTER VI

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
PRACTICAL						
1	CP9141	Project Work (Phase II)	0	0	24	12
TOTAL			0	0	24	12

List of Electives

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
1	CP9151	Component Based Development	3	0	0	3
2	CP9152	Performance Evaluation of Systems and Networks	3	0	0	3
3	CP9153	Knowledge Engineering	3	0	0	3
4	CP9154	Visualization Techniques	3	0	0	3
5	CP9155	Infometrics	3	0	0	3
6	CP9156	User Interface Design	3	0	0	3
7	CP9157	Speech Processing	3	0	0	3
8	CP9158	Bio informatics	3	0	0	3
9	CP9159	Soft Computing	3	0	0	3
10	CP9160	Language Technologies	3	0	0	3
11	CP9161	Knowledge Management	3	0	0	3
12	CP9162	ASIC Design	3	0	0	3
13	CP9163	Embedded Systems	3	0	0	3
14	CP9164	Data Warehousing and Data Mining	3	0	0	3
15	CP9165	Integrated Software Project Management	3	0	0	3
16	MM9111	Principles of Multimedia	3	0	0	3
17	CP9167	Digital Image Processing	3	0	0	3
18	CP9168	Adhoc and Sensor Networks	3	0	0	3
19	CP9169	Virtualization Techniques	3	0	0	3
20	CP9170	Service Oriented Architecture	3	0	0	3
21	CP9171	Ethical Hacking and Digital Forensics	3	0	0	3
22	CP9172	Cloud Computing	3	0	0	3
23	CP9173	Machine Learning	3	0	0	3
24	CP9174	Database Tuning	3	0	0	3
25	IT9152	Enterprise Resource Planning	3	0	0	3
26	CP9176	Human Resources Management	3	0	0	3
27	CP9177	Multicore Architecture	3	0	0	3

MA9110 OPERATIONS RESEARCH

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UNIT I QUEUEING MODELS

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

UNIT II ADVANCED QUEUEING MODELS 9

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

UNIT III SIMULATION 9

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

UNIT IV LINEAR PROGRAMMING 9

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

UNIT V NON-LINEAR PROGRAMMING 9

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

L + T: 45+15 =60

TEXT BOOKS

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

REFERENCES

1. Robertazzi. T.G. “Computer Networks and Systems – Queuing Theory and Performance Evaluation”, Third Edition, Springer, 2002 Reprint.
2. Ross. S.M., “Probability Models for Computer Science”, Academic Press, 2002.

CP9112 ADVANCED DATA STRUCTURES AND ALGORITHMS

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9**

UNIT I FUNDAMENTALS

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

UNIT II HEAP STRUCTURES 9

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

UNIT III SEARCH STRUCTURES 9

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

UNIT IV MULTIMEDIA STRUCTURES 9

Segment Trees – k-d Trees – Point Quad Trees – MX-Quad Trees – R-Trees – TV-Trees.

UNIT V ALGORITHMS 9

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

TOTAL = 45

REFERENCES

1. E. Horowitz, S.Sahni and Dinesh Mehta, Fundamentals of Data structures in C++, University Press, 2007.
2. E. Horowitz, S. Sahni and S. Rajasekaran, Computer Algorithms/C++, Second Edition, University Press, 2007.
3. G. Brassard and P. Bratley, Algorithmics: Theory and Practice, Printice –Hall, 1988.
4. V.S. Subramanian, Principles of Multimedia Database systems, Morgan Kaufman, 1998.

UNIT I CLASSICAL PARADIGM

System Concepts – Project Organization – Communication – Project Management

UNIT II PROCESS MODELS

Life cycle models – Unified Process – Iterative and Incremental – Workflow – Agile Processes

UNIT III ANALYSIS

Requirements Elicitation – Use Cases – Unified Modeling Language, Tools – Analysis Object Model (Domain Model) – Analysis Dynamic Models – Non-functional requirements – Analysis Patterns

UNIT IV DESIGN

System Design, Architecture – Design Principles - Design Patterns – Dynamic Object Modeling – Static Object Modeling – Interface Specification – Object Constraint Language

UNIT V IMPLEMENTATION, DEPLOYMENT AND MAINTENANCE

Mapping Design (Models) to Code – Testing - Usability – Deployment – Configuration Management – Maintenance

REFERENCES

1. Bernd Bruegge, Alan H Dutoit, Object-Oriented Software Engineering, 2nd ed, Pearson Education, 2004.
2. Craig Larman, Applying UML and Patterns 3rd ed, Pearson Education, 2005.
3. Stephen Schach, Software Engineering 7th ed, McGraw-Hill, 2007.
4. Ivar Jacobson, Grady Booch, James Rumbaugh, The Unified Software Development Process, Pearson Education, 1999.
5. Alistair Cockburn, Agile Software Development 2nd ed, Pearson Education, 2007.

UNIT I FOUNDATIONS OF NETWORKING 9

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

UNIT II QUALITY OF SERVICE 9

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

UNIT III HIGH PERFORMANCE NETWORKS 9

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

UNIT IV HIGH SPEED NETWORKS 9

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

UNIT V NETWORK MANAGEMENT 9

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

REFERENCES

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

1. Implementation of multi-dimensional structures such as matrices, triangular matrices, diagonal matrices, etc into a one dimensional array (atleast any two)
2. Implementation of any two of the following Heap structures
 - Deaps (Insertion, Delete Min, Delete Max)
 - Leftist Heap (All Meldable Priority Queue operations)
 - Skew Heap (All Meldable Priority Queue operations)
 - Fibonacci Heap (All Meldable Priority Queue operations)
3. Implementation of any two of the following Search Structures
 - AVL Trees (Insertion, Deletion and Search)
 - Splay Trees (Insertion, Deletion and Search)
 - Tries for any specified alphabet (Insertion, Deletion and Search)
 - B-Trees (Insertion, Deletion and Search)
4. Implementation of any two of the following multimedia structures
 - 2-d Trees (Insertion, Deletion and Range Queries)
 - Point Quad-Trees (Insertion, Deletion and Range Queries)
 - Segment Trees (Insertion, Deletion – Show list of nodes where in insertion and deletion took place)
5. Finding Convex-hull.

CP9121 UNIX INTERNALS

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UNIT I OVERVIEW 8

General Overview of the System : History – System structure – User perspective – Operating system services – Assumptions about hardware. Introduction to the Kernel : Architecture of the UNIX operating system – Introduction to system concepts. The Buffer Cache: Buffer headers – Structure of the buffer pool – Scenarios for retrieval of a buffer – Reading and writing disk blocks – Advantages and disadvantages of the buffer cache.

UNIT II FILE SUBSYSTEM 8

Internal representation of files: Inodes – Structure of a regular file – Directories – Conversion of a path name to an Inode – Super block – Inode assignment to a new file – Allocation of disk blocks.

UNIT III SYSTEM CALLS FOR THE FILE SYSTEM 10

Open – Read – Write – File and record locking – Adjusting the position of file I/O – Lseek – Close – File creation – Creation of special files – Changing directory, root, owner, mode – stat and fstat – Pipes – Dup – Mounting and unmounting file systems – link – unlink.

UNIT IV PROCESSES 10

Process states and transitions – Layout of system memory – The context of a process – Saving the context of a process – Manipulation of the process address space - Sleep. Process Control : Process creation – Signals – Process termination – Awaiting process termination – Invoking other programs – user id of a process – Changing the size of a process - Shell – System boot and the INIT process– Process Scheduling.

UNIT V MEMORY MANAGEMENT AND I/O 9

Memory Management Policies : Swapping – Demand paging. The I/O Subsystem : Driver Interface – Disk Drivers – Terminal Drivers– Streams – Inter process communication.

TOTAL = 45

TEXT BOOKS

1. Maurice J. Bach, “The Design of the Unix Operating System”, First Edition, Pearson Education, 1999.

REFERENCES

1. B. Goodheart, J. Cox, "The Magic Garden Explained", Prentice Hall of India, 1986.
2. S. J. Leffler, M. K. Mckusick, M. J. .Karels and J. S. Quarterman., "The Design and Implementation of the 4.3 BSD Unix Operating System", Addison Wesley, 1998.

UNIT I**9**

Principles Of Compiler – Compiler Structure – Properties of a Compiler – Optimization – Importance of Code optimization – Structure of Optimizing compilers – placement of optimizations in optimizing compilers – ICAN – Introduction and Overview – Symbol table structure – Local and Global Symbol table management

UNIT II**9**

Intermediate representation – Issues – High level, medium level, low level intermediate languages – MIR, HIR, LIR – ICAN for Intermediate code – Optimization – Early optimization – Constant folding – scalar replacement of aggregates – Simplification – value numbering – constant propagation – redundancy elimination – loop optimization

UNIT III**9**

Procedure optimization – in-line expansion – leaf routine optimization and shrink wrapping – register allocation and assignment – graph coloring – code scheduling – control flow and low level optimizations – inter-procedural analysis and optimization – call graph – data flow analysis – constant propagation – alias analysis – register allocation – global references – Optimization for memory hierarchy

UNIT IV**9**

Code Scheduling – Instruction scheduling – Speculative scheduling – Software pipelining – trace scheduling – percolation scheduling – Run-time support – Register usage – local stack frame – run-time stack – Code sharing – position-independent code – Symbolic and polymorphic language support

UNIT V**9**

Case Studies – Sun Compilers for SPARC – IBM XL Compilers – Alpha compilers – PA –RISC assembly language – COOL – (Classroom Object oriented language) - Compiler testing tools – SPIM

TOTAL ; 45**TEXT BOOKS:**

1. Steven S. Muchnick, “Advanced Compiler Design Implementation”, Morgan Koffman – Elsevier Science, India, Indian Reprint 2003
2. Keith D Cooper and Linda Torczon, “ Engineering a Compiler, Elsevier Science, India,

REFERENCES

1. Allen Holub “Compiler Design in C”, Prentice Hall of India, 1990.
2. Alfred Aho, V. Ravi Sethi, D. Jeffery Ullman, “Compilers Principles, Techniques and Tools”, Addison Wesley, 1988.
3. Charles N. Fischer, Richard J. Leblanc, “Crafting a compiler with C”, Benjamin Cummings, 1991.

5. V.S.Subramanian, "Principles of Multimedia Database Systems", Harcourt India Pvt Ltd., 2001.
6. Vijay Kumar, " Mobile Database Systems", John Wiley & Sons, 2006.

CP9124 PARALLEL ALGORITHMS

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UNIT I

9

PRAM Model – PRAM Algorithms – Parallel Reduction – Prefix Sums – List Ranking – Preorder Tree Traversal – Merging Two Sorted Lists – Graph Coloring – Reducing Number of Processors – NC Class.

UNIT II

9

Classifying MIMD Algorithms – Hypercube SIMD Model – Shuffle Exchange SIMD Model – 2D Mesh SIMD Model – UMA Multiprocessor Model – Broadcast – Prefix Sums.

UNIT III

9

Enumeration Sort – Lower Bound on Parallel Sorting – Odd-Even Transposition Sort – Bitonic Merge – Parallel Quick Sort – Complexity of Parallel Search – Searching on Multiprocessors.

Unit IV

9

P-Depth Search – Breadth Depth Search – Breadth First Search – Connected Components – All pair Shortest Path – Single Source Shortest Path – Minimum Cost Spanning Tree.

UNIT V

9

Matrix Multiplication on 2-D Mesh, Hypercube and Shuffle Exchange SIMD Models – Algorithms for Multiprocessors – Algorithms for Multicomputers – Mapping Data to Processors.

TOTAL : 45

REFERENCES

1. Michael J. Quinn, Parallel Computing : Theory & Practice, Tata McGraw Hill Edition, 2003.
2. Ananth Grame, George Karpis, Vipin Kumar and Anshul Gupta, Introduction to Parallel Computing, 2nd Edition, Addison Wesley, 2003

UNIT I 9

Wireless networks- emerging technologies- Blue tooth, WiFi, WiMAX, 3G ,WATM.- Mobile IP protocols -WAP push architecture-Wml scripts and applications.

UNIT II 8

Mobile computing environment—functions-architecture-design considerations ,content architecture -CC/PP exchange protocol ,context manager. Data management in WAE- Coda file system- caching schemes- Mobility QOS. Security in mobile computing.

UNIT III 8

Handoff in wireless mobile networks-reference model-handoff schemes. Location management in cellular networks - Mobility models- location and tracking management schemes- time, movement ,profile and distance based update strategies. All technologies

UNIT IV 10

Pervasive Computing- Principles, Characteristics- interaction transparency, context aware, automated experience capture. Architecture for pervasive computing- Pervasive devices-embedded controls.- smart sensors and actuators -Context communication and access services

UNIT V 10

Open protocols- Service discovery technologies- SDP, Jini, SLP, UpnP protocols–data synchronization- SyncML framework - Context aware mobile services -Context aware sensor networks, addressing and communications. Context aware security.

REFERENCES

1. Ivan Stojmenovic , Handbook of Wireless Networks and Mobile Computing, John Wiley & sons Inc, Canada, 2002.
2. Asoke K Taukder, Roopa R Yavagal, Mobile Computing, Tata McGraw Hill Pub Co. , New Delhi, 2005.
3. Seng Loke, Context-Aware Computing Pervasive Systems, Auerbach Pub., New York, 2007.
4. Uwe Hansmann etl , Pervasive Computing, Springer, New York, 2001.

1. Use of Unix/Linux – User Commands – Editors - Shell programming
2. C/C++ programming on Unix/Linux – use of make, version control
3. Use of system calls – files – processes – I/O – IPC
4. Experiments using C of mini unix systems (such as Minix) – File system – Processes – Memory Management – Drivers
5. Unix / Linux sources – build, run kernel – small modifications

UNIT I INTRODUCTION & MATHEMATICAL FOUNDATION 9

Beginning with a simple communication game – wrestling between safeguard and attack – Probability and Information Theory - Algebraic foundations – Number theory.

UNIT II ENCRYPTION – SYMMETRIC TECHNIQUES 9

Substitution Ciphers - Transposition Ciphers - Classical Ciphers – DES – AES – Confidentiality Modes of Operation – Key Channel Establishment for symmetric cryptosystems.

UNIT III ENCRYPTION –ASYMMETRIC TECHNIQUES & DATA INTEGRITY TECHNIQUES 9

Diffie-Hellman Key Exchange protocol – Discrete logarithm problem – RSA cryptosystems & cryptanalysis – ElGamal cryptosystem – Need for stronger Security Notions for Public key Cryptosystems – Combination of Asymmetric and Symmetric Cryptography – Key Channel Establishment for Public key Cryptosystems - Data Integrity techniques – Symmetric techniques - Asymmetric techniques

UNIT IV AUTHENTICATION 9

Authentication Protocols Principles – Authentication protocols for Internet Security – SSH Remote logic protocol – Kerberos Protocol – SSL & TLS – Authentication frame for public key Cryptography – Directory Based Authentication framework – Non - Directory Based Public-Key Authentication framework .

UNIT V SECURITY PRACTICES 9

Protecting Programs and Data – Information and the Law – Rights of Employees and Employers – Software Failures – Computer Crime – Privacy – Ethical Issues in Computer Security.

REFERENCES

1. Wenbo Mao, “Modern Cryptography – Theory and Practice”, Pearson Education, First Edition, 2006.
2. Douglas R. Stinson, “Cryptography Theory and Practice ”, Third Edition, Chapman & Hall/CRC,2006.
3. Charles B. Pfleeger, Shari Lawrence Pfleeger, “Security in Computing”, Fourth Edition, Pearson Education, 2007.
4. Wade Trappe and Lawrence C. Washington, “Introduction to Cryptography with Coding Theory” Second Edition, Pearson Education, 2007.

UNIT I **9**
Performance Characteristics – Requirement Analysis: Concepts –User, Device, Network Requirements – Process –Developing RMA ,Delay, Capacity Requirements – Flow Analysis – Identifying and Developing Flows –Flow Models –Flow Prioritization – Specification.

UNIT II **9**
Random variables - Stochastic process –Link Delay components – Queuing Models – Little’s Theorem – Birth & Death process – Queuing Disciplines.

UNIT III **9**
Markovian FIFO Queuing Systems – M/M/1 – M/M/a – M/M/∞ - M/G/1 – M/M/m/m and other Markov-Non-Markovian and self-similar models – Network of Queues –Burke’s Theorem –Jackson’s Theorem.

UNIT IV **9**
Multi-User Uplinks/Downlinks - Capacity Regions - Opportunistic Scheduling for Stability and Max Throughput - Multi-Hop Routing - Mobile Networks - Throughput Optimality and Backpressure

UNIT V **9**
Performance of Optimal Lyapunov Networking - Energy Optimality- Energy-Delay Tradeoffs - Virtual Cost Queues - Average Power Constraints - Flow Control with Infinite Demand - Auxiliary Variables - Flow Control with Finite Demand - General Utility Optimization.

TEXT BOOKS

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

REFERENCES

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

UNIT I INTRODUCTION

Key concepts – Why knowledge Representation and Reasoning – Language of first order Logic – Syntax, Semantics Pragmatics – Expressing Knowledge – Levels of Representation – Knowledge Acquisition and Sharing – Sharing Ontologies – Language Ontologies –Language Patterns – Tools for Knowledge Acquisition

UNIT II RESOLUTION AND REASONING 9

Proportional Case – Handling Variables and Qualifies – Dealing with Intractability – Reasoning with Horn Clauses - Procedural Control of Reasoning – Rules in Production – Description Logic - Vivid Knowledge – Beyond Vivid.

UNIT III REPRESENTATION 9

Object Oriented Representations – Frame Formalism – Structured Descriptions – Meaning and Entailment - Taxonomies and Classification – Inheritance – Networks – Strategies for Defeasible Inheritance – Formal Account of Inheritance Networks.

UNIT IV DEFAULTS, UNCERTAINTY AND EXPRESSIVENESS 9

Defaults – Introduction – Closed World Reasoning – Circumscription – Default Logic Limitations of Logic – Fuzzy Logic – Nonmontonic Logic – Theories and World – Semiotics – Auto epistemic Logic - Vagueness – Uncertainty and Degrees of Belief – Noncategorical Reasoning – Objective and Subjective Probability.

UNIT V ACTIONS AND PLANNING 9

Explanation and Diagnosis – Purpose – Syntax, Semantics of Context – First Order Reasoning – Modal Reasoning in Context – Encapsulating Objects in Context – Agents – Actions – Situational Calculus – Frame Problem – Complex Actions – Planning – Strips – Planning as Reasoning – Hierarchical and Conditional Planning.

TOTAL=45**REFERENCES**

1. Ronald Brachman, Hector Levesque “Knowledge Representation and Reasoning “, The Morgan Kaufmann Series in Artificial Intelligence 2004
2. John F. Sowa, “ Knowledge Representation: Logical, Philosophical, and Computational Foundations”, 2000
3. Arthur B. Markman, “Knowledge Representation”, Lawrence Erlbaum Associates,1998

CP9154 VISUALIZATION TECHNIQUES

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UNIT I VISUALIZATION 9
Introduction – Issues – Data Representation – Data Presentation - Interaction

UNIT II FOUNDATIONS FOR DATA VISUALIZATION 9
Visualization stages – Experimental Semiotics based on Perception Gibson’s Affordance theory – A Model of Perceptual Processing – Types of Data.

UNIT III COMPUTER VISUALIZATION 9
Non-Computer Visualization – Computer Visualization: Exploring Complex Information Spaces – Fisheye Views – Applications – Comprehensible Fisheye views – Fisheye views for 3D data – Non Linear Magnificaiton – Comparing Visualization of Information Spaces – Abstraction in computer Graphics – Abstraction in user interfaces.

UNIT IV MULTIDIMENSIONAL VISUALIZATION 9
One Dimension – Two Dimensions – Three Dimensions – Multiple Dimensions – Trees – Web Works – Data Mapping: Document Visualization – Workspaces.

UNIT V CASE STUDIES 9
Small interactive calendars – Selecting one from many – Web browsing through a key hole – Communication analysis – Archival analysis

TOTAL = 45

TEXT BOOKS

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

REFERENCES

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

UNIT I IT ORGANIZATION

Metrics that matter - Interpreting the metrics – Collecting the data – Managing the data – Obstacles to acquiring IT metrics information – Old data versus new graphical analysis – Core of software planning – Measuring the core metrics (Product, Quality, Process, Productivity, Time, Effort) – Estimating and controlling with the core metrics – Work output measurements.

UNIT II MEASUREMENT PROGRAM APPROACHES 9

EDS Brazil metrics program – Measurement program implementation approaches – Bench marking – Data definition framework for defining software measurements.

UNIT III SOFTWARE METRICS 9

Functional points as part of measurement program – Estimation of software reliability – Establishing central support for software sizing activities – Using metrics to manage projects – Tracking software progress – Effectively utilizing software metrics.

UNIT IV SOFTWARE ESTIMATION 9

Problems with measurements – Avoiding obstacles and common pitfalls – Unreported and unpaid overtime – Using software metrics for effective estimating – Estimating software development projects – Enhanced estimation on time within budget – Metrics in outsourcing – Lifigaton – The product of non practicing function point metrics – Applying statistical process central to software – Metrics in E-Commerce.

UNIT V KNOWLEDGE MANAGEMENT 9

Quality information and knowledge – Why quality information and knowledge – Define information quality – Create organizational knowledge – Manage knowledge as assets – Create customized solution – Network knowledge infrastructure.

TOTAL = 45

REFERENCES

1. Stephen H. Kan, “ Metrics and Models In Software Quality Engineering”, First Edition, Pearson Education, 2003.
2. N. Fenton, S. L. Pfleeger, “Software Metrics: A Rigorous and Practical Approach”, Thomson Learning, 1997.
3. IT Measurement – A Practical Advice from the Experts”, International Function Point Users Group, Pearson Education, Asia.

CP9156 USER INTERFACE DESIGN

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8

UNIT I INTRODUCTION

Human-Computer Interface – Characteristics Of Graphics Interface –Direct Manipulation Graphical System – Web User Interface –Popularity –Characteristic & Principles.

UNIT II HUMAN COMPUTER INTERACTION

7

User Interface Design Process – Obstacles –Usability –Human Characteristics In Design – Human Interaction Speed –Business Functions –Requirement Analysis – Direct – Indirect Methods – Basic Business Functions – Design Standards – General Design Principles – Conceptual Model Design – Conceptual Model Mock-Ups

UNIT III WINDOWS

12

Characteristics– Components– Presentation Styles– Types– Managements– Organizations– Operations– Web Systems– System Timings - Device– Based Controls Characteristics– Screen – Based Controls — Human Consideration In Screen Design – Structures Of Menus – Functions Of Menus– Contents Of Menu– Formatting – Phrasing The Menu – Selecting Menu Choice– Navigating Menus– Graphical Menus. Operate Control – Text Boxes– Selection Control– Combination Control– Custom Control– Presentation Control.

UNIT IV MULTIMEDIA

9

Text For Web Pages – Effective Feedback– Guidance & Assistance– Internationalization– Accessibility– Icons– Image– Multimedia – Coloring.

UNIT V EVALUATION

9

Conceptual Model Evaluation – Design Standards Evaluation – Detailed User Interface Design Evaluation

Total = 45

TEXT BOOKS:

1. Wilbent. O. Galitz ,“The Essential Guide To User Interface Design”, John Wiley& Sons, 2001.
2. **Deborah Mayhew, The Usability Engineering Lifecycle**, Morgan Kaufmann, 1999Ben Shneiderman, “Design The User Interface”, Pearson Education, 1998.

REFERENCES:

1. Alan Cooper, “The Essential Of User Interface Design”, Wiley – Dream Tech Ltd., 2002. Sharp, Rogers, Preece, ‘Interaction Design’, Wiley India Edition, 2007

CP9157 SPEECH PROCESSING

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9

UNIT I INTRODUCTION

Spoken Language System Architecture and Structure – Sound and Human Speech System – Phonetics and Phonology – Syllables and Words – Syntax and Semantics – Probability Theory – Estimation Theory – Significance Testing.

UNIT II SPEECH SIGNAL REPRESENTATION AND CODING 9

Short Time Fourier Analysis – Acoustic Model of Speech Production - Linear Predictive Coding – Cepstral Processing – Perceptual Motivated Representations – Formant Frequencies – Role of Pitch – Scalar Waveform Coders – Scalar Frequency Domain Coders – Code excited linear Prediction – Low – Bit rate Speech coders.

UNIT III SPEECH RECOGNITION 9

Hidden Markov Models (HMM) – Practical Issues in Using HMMs – HMM Limitations Acoustic Modeling – Phonetic Modeling – Language Modeling - Speaker Recognition Algorithms – Signal Enhancement for Mismatched Conditions.

UNIT IV SPEECH SYNTHESIS 9

Formant Speech Synthesis – Concatenative Speech Synthesis – Prosodic Modification Of Speech – Source Filter Models For Prosody Modification – Evaluation Of Text To Speech System.

UNIT V SPOKEN LANGUAGE UNDERSTANDING 9

Dialog Structure – Semantic Representation – Sentence Interpretation – Discourse Analysis – Dialog Management – Response Generation And Rendition – Case Study.

TOTAL = 45

TEXT BOOKS:

1. Thomas F.Quatieri, “Discrete-Time Speech Signal Processing”, Pearson Education, 2002.
2. Xuedong Huang, Alex Acero, Hsiad, Wuen Hon, “ Spoken Language Processing”, Prentice Hall ,2001.

REFERENCES:

1. B.Gold and N.Morgan, “Speech and Audio Signal Processing”, Wiley and Sons, 2000.
2. M.R.Schroeder, “Computer Speech – Recognition, Compression, Synthesis”, Springer Series in Information Sciences, 1999.
3. A Brief Introduction to Speech Analysis and Recognition, An Internet Tutorial - <http://www.mor.itesm.mx/~omayora/Tutorial/tutorial.html>
4. Daniel Jurafsky & James H.Martin, “Speech and Language Processing”, Pearson Education ,2000.

CP9160 LANGUAGE TECHNOLOGIES

**L T P C
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9**

UNIT I INTRODUCTION

Natural Language Processing – Linguistic Background- Spoken language input and output Technologies – Written language Input - Mathematical Methods - Statistical Modeling and Classification Finite State methods Grammar for Natural Language Processing – Parsing – Semantic and Logic Form – Ambiguity Resolution – Semantic Interpretation.

UNIT II INFORMATION RETRIEVAL 9

Information Retrieval architecture - Indexing- Storage – Compression Techniques – Retrieval Approaches – Evaluation - Search engines- commercial search engine features- comparison- performance measures – Document Processing - NLP based Information Retrieval – Information Extraction.

UNIT III TEXT MINING 9

Categorization – Extraction based Categorization- Clustering- Hierarchical Clustering- Document Classification and routing- finding and organizing answers from Text search – use of categories and clusters for organising retrieval results – Text Categorization and efficient Summarization using Lexical Chains – Pattern Extraction.

UNIT IV GENERIC ISSUES 9

Multilinguality – Multilingual Information Retrieval and Speech processing - Multimodality – Text and Images – Modality Integration - Transmission and Storage – Speech coding- Evaluation of systems – Human Factors and user Acceptability.

UNIT V APPLICATIONS 9

Machine Translation – Transfer Metaphor - Interlingua and Statistical Approaches - Discourse Processing – Dialog and Conversational Agents – Natural Language Generation – Surface Realization and Discourse Planning.

TOTAL = 45

TEXT BOOKS:

1. Daniel Jurafsky and James H. martin, “ Speech and Language Processing” , 2000.
2. Ron Cole, J.Mariani, et.al “Survey of the State of the Art in Human Language Technology”, Cambridge University Press, 1997.
3. Michael W. Berry “ Survey of Text Mining: Culstering, Classification and Retrieval”, Springer Verlag, 2003.
4. Christopher D.Manning and Hinrich Schutze, “ Foundations of Statistical Natural Language Processing “, MIT Press, 1999.

REFERENCES:

1. James Allen “ Natural Language Understanding “, Benjamin/ Cummings Publishing Co. 1995.
2. Gerald J. Kowalski and Mark.T. Maybury, “Information Storage and Retrieval systems”, Kluwer academic Publishers, 2000.
3. Tomek Strzalkowski “ Natural Language Information Retrieval “, Kluwer academic Publishers, 1999.
4. Christopher D.Manning and Hinrich Schutze, “ Foundations of Statistical Natural Language Processing “, MIT Press, 1999.

CP9161 KNOWLEDGE MANAGEMENT

L T P C

3 0 0 3

UNIT I INTRODUCTION 9

The value of Knowledge – Knowledge Engineering Basics – Knowledge Economy – The Task and Organizational Content – Knowledge Management – Knowledge Management Ontology.

UNIT II KNOWLEDGE MODELS 9

Knowledge Model Components – Template Knowledge Models – Reflective Knowledge Models – Knowledge Model Construction – Types of Knowledge Models.

UNIT III TECHNIQUES OF KNOWLEDGE MANAGEMENT 8

Knowledge Elicitation Techniques – Modeling Communication Aspects – Knowledge Management and Organizational Learning.

UNIT IV KNOWLEDGE SYSTEM IMPLEMENTATION 11

Case Studies – Designing Knowledge Systems – Knowledge Codification – Testing and Deployment – Knowledge Transfer and Knowledge Sharing – Knowledge System Implementation.

UNIT V ADVANCED KM 8

Advanced Knowledge Modeling – Value Networks – Business Models for Knowledge Economy – UML Notations – Project Management.

TOTAL = 45

TEXT BOOKS:

1. Guus Schreiber, Hans Akkermans, Anjo Anjewierden, Robert de Hoog, Nigel Shadbolt, Walter Van de Velde and Bob Wielinga, “Knowledge Engineering and Management”, Universities Press, 2001.
2. Elias M.Awad & Hassan M. Ghaziri, “Knowledge Management”, Pearson Education, 2003.

REFERENCES:

1. C.W. Holsapple, “Handbooks on Knowledge Management”, International Handbooks on Information Systems, Vol 1 and 2, 2003.
2. <http://www.epistemics.co.uk>
3. http://depts.washington.edu/pettt/papers/WIN_poster_text.pdf

UNIT I EMBEDDED COMPUTING 9

Challenges of Embedded Systems – Embedded system design process. Embedded processors – ARM processor – Architecture, ARM and Thumb Instruction sets

UNIT II EMBEDDED C PROGRAMMING 9

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

UNIT III OPTIMIZING ASSEMBLY CODE 9

Profiling and cycle counting – instruction scheduling – Register allocation – conditional execution – looping constructs – bit manipulation – efficient switches – optimized primitives.

UNIT IV PROCESSES AND OPERATING SYSTEMS 9

Multiple tasks and processes – Context switching – Scheduling policies – Interprocess communication mechanisms – Exception and interrupt handling - Performance issues.

UNIT V EMBEDDED SYSTEM DEVELOPMENT 9

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

Total = 45

REFERENCES

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

UNIT I 9
Data Warehousing and Business Analysis: - Data warehousing Components –Building a Data warehouse – Mapping the Data Warehouse to a Multiprocessor Architecture – DBMS Schemas for Decision Support – Data Extraction, Cleanup, and Transformation Tools –Metadata – reporting – Query tools and Applications – Online Analytical Processing (OLAP) – OLAP and Multidimensional Data Analysis.

UNIT II 9
Data Mining: - Data Mining Functionalities – Data Preprocessing – Data Cleaning – Data Integration and Transformation – Data Reduction – Data Discretization and Concept Hierarchy Generation.
Association Rule Mining: - Efficient and Scalable Frequent Item set Mining Methods – Mining Various Kinds of Association Rules – Association Mining to Correlation Analysis – Constraint-Based Association Mining.

UNIT III 9
Classification and Prediction: - Issues Regarding Classification and Prediction – Classification by Decision Tree Introduction – Bayesian Classification – Rule Based Classification – Classification by Back propagation – Support Vector Machines – Associative Classification – Lazy Learners – Other Classification Methods – Prediction – Accuracy and Error Measures – Evaluating the Accuracy of a Classifier or Predictor – Ensemble Methods – Model Section.

UNIT IV 9
Cluster Analysis: - Types of Data in Cluster Analysis – A Categorization of Major Clustering Methods – Partitioning Methods – Hierarchical methods – Density-Based Methods – Grid-Based Methods – Model-Based Clustering Methods – Clustering High-Dimensional Data – Constraint-Based Cluster Analysis – Outlier Analysis.

UNIT V 9
Mining Object, Spatial, Multimedia, Text and Web Data:
Multidimensional Analysis and Descriptive Mining of Complex Data Objects – Spatial Data Mining – Multimedia Data Mining – Text Mining – Mining the World Wide Web.

Total = 45

REFERENCES

1. Jiawei Han and Micheline Kamber “Data Mining Concepts and Techniques” Second Edition, Elsevier, Reprinted 2008.
2. Alex Berson and Stephen J. Smith “Data Warehousing, Data Mining & OLAP”, Tata McGraw – Hill Edition, Tenth Reprint 2007.

4. K.P. Soman, Shyam Diwakar and V. Ajay "Insight into Data mining Theory and Practice", Easter Economy Edition, Prentice Hall of India, 2006.
5. G. K. Gupta "Introduction to Data Mining with Case Studies", Easter Economy Edition, Prentice Hall of India, 2006.
6. Pang-Ning Tan, Michael Steinbach and Vipin Kumar "Introduction to Data Mining", Pearson Education, 2007.

CP9165 INTEGRATED SOFTWARE PROJECT MANAGEMENT

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UNIT I	PROJECT MANAGEMENT CONCEPTS	9
Evolution of Software Economics – Software Management Process Framework (Phases, Artifacts, Workflows, Checkpoints) – Software Management Disciplines (Planning / Project Organization and Responsibilities / Automation / Project Control) – Modern Project Profiles		
UNIT II	SOFTWARE ESTIMATION & COSTING	15
Problems in Software Estimation – Algorithmic Cost Estimation Process, Function Points, SLIM (Software Life cycle Management), COCOMO II (CONstructive COSt MOdel) – Estimating Web Application Development – Concepts of Finance, Activity Based Costing and Economic Value Added (EVA) – Balanced Score Card.		
UNIT III	RISK MANAGEMENT	15
Risk Definition – Risk Categories – Risk Assessment (Identification / Analysis / Prioritization) – Risk Control (Planning / Resolution / Monitoring) – Failure Mode and Effects Analysis (FMEA)		
UNIT IV	METRICS	15
Need for Software Metrics – Classification of Software Metrics: Product Metrics (Size Metrics, Complexity Metrics, Halstead’s Product Metrics, Quality Metrics), and Process metrics (Empirical Models, Statistical Models, Theory-based Models, Composite Models, and Reliability Models).		
UNIT V	PEOPLE MANAGEMENT	6
Team Management – Client Relationship Management.		

TOTAL= 45

REFERENCES:

1. McConnell, S. “Software Project: Survival Guide”, Microsoft Press, 1998.
Royce, W. “Software Project management: A Unified Framework”, Addison-Wesley, 1998.
2. Cooper, R., “The Rise of Activity-Based Costing- PartOne: What is an Activity-Based Cost System?” Journal of Cost Management, Vol.2, No.2 (Summer 1988), pp.45 – 54.
3. Grant, J.L. “Foundations of Economic Value Added”, John Wiley & Sons, 1997.
4. Kaplan, R.S., Norton, D.P. “The Balanced Scorecard: Translating Strategy into Action”, Harvard Business School Press, 1996.
5. Boehm, B. W. "Software Risk Management: Principles and Practices" in IEEE Software, January 1991, pp32-41.
6. Fenton, N.E., and Pfleeger, S.L.. “Software Metrics: A Rigorous and Practical Approach, Revised” Brooks Cole, 1998.

7. Demarco, T. and Lister, T. "Peopleware: Productive Projects and Teams, 2nd Ed.", Dorset House, 1999.

MM9111 PRINCIPLES OF MULTIMEDIA

**L T P C
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UNIT I INTRODUCTION

7

Introduction to Multimedia – Characteristics – Utilities – Creation -Uses – Promotion – Digital Representation – Media and Data streams – Multimedia Architecture – Multimedia Documents

UNIT II ELEMENTS OF MULTIMEDIA

11

Text : types – font - Unicode standard - text compression - file formats. – Image: types - image processing – standards - specification - device independent color models - gamma correction - file formats – Video :video signal transmission - signal formats - broadcasting standards - digital video standards - PC video - video file formats – Audio : acoustics - characteristics of sound - elements of audio system – microphone – amplifier – loudspeaker - audio mixer - digital audio - MIDI – Graphics – components of graphics system, co-ordinate system – plotter - Intro to 2D & 3D Graphics -surface characteristics and texture - lights – Animation :key frames & Tweening, techniques, principles of animation, 3D animation, file formats.

UNIT III MULTIMEDIA SYSTEMS

9

Visual Display Systems – CRT - video adapter card - video adapter cable – LCD – PDP - optical storage media - CD technology - DVD Technology - Compression Types and Techniques – CODEC - GIF coding standards - lossy and lossless – JPEG - MPEG-1 - MPEG-2 - MP3 - Fractals – MMDBS

4. UNIT IV MULTIMEDIA TOOLS

9

Authoring tools – features and types - card and page based tools - icon and object based tools - time based tools - cross platform authoring tools - Editing tools - text editing and word processing tools - OCR software - painting and drawing tools - 3D modeling and animation tools - image editing tools -sound editing tools - digital movie tools – plug -ins and delivery vehicles for www

UNIT V MULTIMEDIA APPLICATION DEVELOPMENT

9

Software life cycle – ADDIE Model – conceptualization – content collection and processing – story – flowline – script - storyboard - implementation - multiplatform issues – authoring – metaphors – testing – report writing - documentation - case study: -Web Application – Console Application – Distributed Application – Mobile Application - games consoles – iTV – kiosks – education

TOTAL = 45

TEXT BOOKS :

1. Parekh R "Principles Of Multimedia" Tata McGraw-Hill, 2006.
2. Ralf Steinmetz, Klara Nahrstedt, "Multimedia: Computing, Communications and Applications" Prentice Hall, 1995.

REFERENCES :

1. Tay Vaughan, "Multimedia: Making It Work" McGraw-Hill Professional, 2006
2. Deitel & Deitel "Internet & World Wide Web How to Program", Fourth Edition – Prentice Hall, 2008.

CP9167 DIGITAL IMAGE PROCESSING

**L T P C
3 0 0 3**

UNIT I FUNDAMENTALS OF IMAGE PROCESSING

9

Introduction – Elements of visual perception, Steps in Image Processing Systems – Image Acquisition – Sampling and Quantization – Pixel Relationships – Colour Fundamentals and Models, File Formats. Introduction to the Mathematical tools.

UNIT II IMAGE ENHANCEMENT AND RESTORATION

9

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

UNIT III IMAGE SEGMENTATION AND FEATURE ANALYSIS

9

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

UNIT IV MULTI RESOLUTION ANALYSIS AND COMPRESSIONS

9

Multi Resolution Analysis: Image Pyramids – Multi resolution expansion – Wavelet Transforms, Fast Wavelet transforms, Wavelet Packets.

Image Compression: Fundamentals – Models – Elements of Information Theory – Error Free Compression – Lossy Compression – Compression Standards – JPEG/MPEG.

UNIT V APPLICATIONS OF IMAGE PROCESSING

9

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

Total = 45

REFERENCES

1. Rafael C.Gonzalez and Richard E.Woods, “Digital Image Processing”, Third Edition, Pearson Education, 2008.
2. Milan Sonka, Vaclav Hlavac and Roger Boyle, “Image Processing, Analysis and Machine Vision”, Third Edition, Third Edition, Brooks Cole, 2008.
3. Anil K.Jain, “Fundamentals of Digital Image Processing”, Prentice-Hall India, 2007.
4. Madhuri A. Joshi, ‘Digital Image Processing: An Algorithmic Approach’, Prentice-Hall India, 2006.
5. Rafael C.Gonzalez , Richard E.Woods and Steven L. Eddins, “Digital Image Processing Using MATLAB”, First Edition, Pearson Education, 2004.

UNIT I AD-HOC MAC

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

UNIT II AD-HOC NETWORK ROUTING & TCP

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

UNIT III WSN -MAC

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

UNIT IV WSN ROUTING, LOCALIZATION & QOS

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

UNIT V MESH NETWORKS

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

REFERENCES:

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

CP9169 VIRTUALIZATION TECHNIQUES

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UNIT I OVERVIEW OF VIRTUALIZATION

10

Basics of Virtualization - Virtualization Types – Desktop Virtualization – Network Virtualization – Server and Machine Virtualization – Storage Virtualization – System-level or Operating Virtualization – Application Virtualization-Virtualization Advantages - Virtual Machine Basics – Taxonomy of Virtual machines - Process Virtual Machines - System Virtual Machines – Hypervisor - Key Concepts

UNIT II SERVER CONSOLIDATION

8

Hardware Virtualization – Virtual Hardware Overview - Server Virtualization – Physical and Logical Partitioning - Types of Server Virtualization – Business cases for Server Virtualization – Uses of Virtual server Consolidation – Planning for Development – Selecting server Virtualization Platform

UNIT III NETWORK VIRTUALIZATION

10

Design of Scalable Enterprise Networks - Virtualizing the Campus WAN Design - WAN Architecture - WAN Virtualization - Virtual Enterprise Transport Virtualization–VLANs and Scalability - Theory Network Device Virtualization Layer 2 - VLANs Layer 3 VRF Instances Layer 2 - VFI's Virtual Firewall Contexts Network Device Virtualization - Data-Path Virtualization Layer 2: 802.1q - Trunking Generic Routing Encapsulation - IPsec L2TPv3 Label Switched Paths - Control-Plane Virtualization–Routing Protocols- VRF - Aware Routing Multi-Topology Routing.

UNIT IV VIRTUALIZING STORAGE

8

SCSI- Speaking SCSI- Using SCSI buses – Fiber Channel – Fiber Channel Cables – Fiber Channel Hardware Devices – iSCSI Architecture – Securing iSCSI – SAN backup and recovery techniques – RAID – SNIA Shared Storage Model – Classical Storage Model – SNIA Shared Storage Model – Host based Architecture – Storage based architecture – Network based Architecture – Fault tolerance to SAN – Performing Backups – Virtual tape libraries.

UNIT V VIRTUAL MACHINES PRODUCTS

9

Xen Virtual machine monitors- Xen API – VMware – VMware products - VMware Features – Microsoft Virtual Server – Features of Microsoft Virtual Server

TOTAL =45HRS

REFERENCES:

1. William von Hagen, Professional Xen Virtualization, Wrox Publications, January, 2008.
2. Chris Wolf , Erick M. Halter, Virtualization: From the Desktop to the Enterprise, APress 2005.
3. Kumar Reddy, Victor Moreno, Network virtualization, Cisco Press, July, 2006.
4. James E. Smith, Ravi Nair, Virtual Machines: Versatile Platforms for Systems and Processes, Elsevier/Morgan Kaufmann, 2005.
5. David Marshall, Wade A. Reynolds, Advanced Server Virtualization: VMware and Microsoft Platform in the Virtual Data Center, Auerbach Publications, 2006.

CP9170 SERVICE ORIENTED ARCHITECTURE

**L T P C
3 0 0 3**

UNIT I 9

Software Architecture – Types of IT Architecture – SOA – Evolution – Key components – perspective of SOA – Enterprise-wide SOA – Architecture – Enterprise Applications – Solution Architecture for enterprise application – Software platforms for enterprise Applications – Patterns for SOA – SOA programming models

UNIT II 9

Service-oriented Analysis and Design – Design of Activity, Data, Client and business process services – Technologies of SOA – SOAP – WSDL – JAX – WS – XML WS for .NET – Service integration with ESB – Scenario – Business case for SOA – stakeholder objectives – benefits of SPA – Cost Savings

UNIT III 9

SOA implementation and Governance – strategy – SOA development – SOA governance – trends in SOA – event-driven architecture – software s a service – SOA technologies – proof-of-concept – process orchestration – SOA best practices

UNIT IV 9

Meta data management – XML security – XML signature – XML Encryption – SAML – XACML – XKMS – WS-Security – Security in web service framework - advanced messaging

UNIT V 9

Transaction processing – paradigm – protocols and coordination – transaction specifications – SOA in mobile – research issues

REFERENCES:

1. Shankar Kambhampaly, “Service –Oriented Architecture for Enterprise Applications”, Wiley India Pvt Ltd, 2008.
2. Eric Newcomer, Greg Lomow, “Understanding SOA with Web Services”, Pearson Education.
3. Mark O’ Neill, et al. , “Web Services Security”, Tata McGraw-Hill Edition, 2003.

CP9171 ETHICAL HACKING AND DIGITAL FORENSICS

L T P C
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UNIT I 9
Hacking windows – Network hacking – Web hacking – Password hacking. A study on various attacks – Input validation attacks – SQL injection attacks – Buffer overflow attacks - Privacy attacks.

UNIT II 9
TCP / IP – Checksums – IP Spoofing port scanning, DNS Spoofing. Dos attacks – SYN attacks, Smurf attacks, UDP flooding, DDOS – Models. Firewalls – Packet filter firewalls, Packet Inspection firewalls – Application Proxy Firewalls. Batch File Programming.

UNIT III 9
Fundamentals of Computer Fraud – Threat concepts – Framework for predicting inside attacks – Managing the threat – Strategic Planning Process.

UNIT IV 9
Architecture strategies for computer fraud prevention – Protection of Web sites – Intrusion detection system – NIDS, HIDS – Penetrating testing process – Web Services – Reducing transaction risks.

UNIT V 9
Key Fraud Indicator selection process customized taxonomies – Key fraud signature selection process – Accounting Forensics – Computer Forensics – Journaling and its requirements – Standardized logging criteria – Journal risk and control matrix – Neural networks – Misuse detection and Novelty detection.

REFERENCES

1. Kenneth C.Brancik “Insider Computer Fraud” Auerbach Publications Taylor & Francis Group–2008.
2. Ankit Fadia “ Ethical Hacking” second edition Macmillan India Ltd, 2006

CP9172 CLOUD COMPUTING

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UNIT I UNDERSTANDING CLOUD COMPUTING

Cloud Computing – History of Cloud Computing – Cloud Architecture – Cloud Storage – Why Cloud Computing Matters – Advantages of Cloud Computing – Disadvantages of Cloud Computing – Companies in the Cloud Today – Cloud Services

UNIT II DEVELOPING CLOUD SERVICES 10

Web-Based Application – Pros and Cons of Cloud Service Development – Types of Cloud Service Development – Software as a Service – Platform as a Service – Web Services – On-Demand Computing – Discovering Cloud Services Development Services and Tools – Amazon Ec2 – Google App Engine – IBM Clouds

UNIT III CLOUD COMPUTING FOR EVERYONE 10

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

UNIT IV USING CLOUD SERVICES 10

Collaborating on Calendars, Schedules and Task Management – Exploring Online Scheduling Applications – Exploring Online Planning and Task Management – Collaborating on Event Management – Collaborating on Contact Management – Collaborating on Project Management – Collaborating on Word Processing – Collaborating on Databases – Storing and Sharing Files

UNIT V OTHER WAYS TO COLLABORATE ONLINE 9

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

Total=45

REFERENCES

1. Michael Miller, Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online, Que Publishing, August 2008.
2. Haley Beard, Cloud Computing Best Practices for Managing and Measuring Processes for On-demand Computing, Applications and Data Centers in the Cloud with SLAs, Emereo Pty Limited, July 2008.

CP9173 MACHINE LEARNING

**L T P C
3 0 0 3**

UNIT I INTRODUCTION 9

Learning Problems – Perspectives and Issues – Concept Learning – Version Spaces and Candidate Eliminations – Inductive bias – Decision Tree learning – Representation – Algorithm – Heuristic Space Search.

UNIT II NEURAL NETWORKS AND GENETIC ALGORITHMS 9

Neural Network Representation – Problems – Perceptrons – Multilayer Networks and Back Propagation Algorithms – Advanced Topics – Genetic Algorithms – Hypothesis Space Search – Genetic Programming – Models of Evaluation and Learning.

UNIT III BAYESIAN AND COMPUTATIONAL LEARNING 9

Bayes Theorem – Concept Learning – Maximum Likelihood – Minimum Description Length Principle – Bayes Optimal Classifier – Gibbs Algorithm – Naïve Bayes Classifier – Bayesian Belief Network – EM Algorithm – Probability Learning – Sample Complexity – Finite and Infinite Hypothesis Spaces – Mistake Bound Model.

UNIT IV INSTANT BASED LEARNING 9

K- Nearest Neighbour Learning – Locally weighted Regression – Radial Bases Functions – Case Based Learning.

UNIT V ADVANCED LEARNING 9

Learning Sets of Rules – Sequential Covering Algorithm – Learning Rule Set – First Order Rules – Sets of First Order Rules – Induction on Inverted Deduction – Inverting Resolution – Analytical Learning – Perfect Domain Theories – Explanation Base Learning – FOCL Algorithm – Reinforcement Learning – Task – Q-Learning – Temporal Difference Learning

Total =45

REFERENCES:

1. [Tom M. Mitchell](#), “Machine Learning”, McGraw-Hill Science /Engineering /Math; 1 edition, 1997
2. [Ethem Alpaydin](#), “Introduction to Machine Learning (Adaptive Computation and Machine Learning)”, The MIT Press 2004
3. [T. Hastie](#), [R. Tibshirani](#), [J. H. Friedman](#), “The Elements of Statistical Learning”, Springer; 1 edition, 2001

CP9176 HUMAN RESOURCE MANAGEMENT

**L T P C
3 0 0 3**

- UNIT I PERSPECTIVES IN HUMAN RESOURCE MANAGEMENT 9**
Evolution of human resource management – the importance of the human factor – objectives of human resource management – role of human resource manager – human resource policies – computer applications in human resource management.
- UNIT II THE CONCEPT OF BEST FIT EMPLOYEE 9**
Importance of human resource planning – forecasting human resource requirement – internal and external sources. Selection process-screening – tests - validation – interview - medical examination – recruitment introduction – importance – practices – socialization benefits.
- UNIT III TRAINING AND EXECUTIVE DEVELOPMENT 9**
Types of training, methods, purpose, benefits and resistance. Executive development programmes – common practices - benefits – self development – knowledge management.
- UNIT IV SUSTAINING EMPLOYEE INTEREST 9**
Compensation plan – reward – motivation – theories of motivation – career management – development, mentor – protégé relationships.
- UNIT V PERFORMANCE EVALUATION AND CONTROL PROCESS 9**
Method of performance evaluation – feedback – industry practices. Promotion, demotion, transfer and separation – implication of job change. The control process – importance – methods – requirement of effective control systems grievances – causes – implications – redressal methods.

TOTAL = 45

TEXT BOOKS

1. Decenzo and Robbins, Human Resource Management, Wilsey, 6th edition, 2001.
2. Biswajeet Pattanayak, Human Resource Management, Prentice Hall of India,2001.

REFERENCES

1. Human Resource Management, Eugence Mckenna and Nic Beach, Pearson Education Limited, 2002.
2. Dessler Human Resource Management, Pearson Education Limited, 2002.
3. Mamoria C.B. and Mamoria S.Personnel Management, Himalaya Publishing Company, 1997.
4. Wayne Cascio, Managing Human Resource, McGraw Hill, 1998.
5. Ivancevich, Human Resource Management, McGraw Hill 2002.

CP9177 MULTICORE ARCHITECTURE

**L T P C
3 0 0 3**

UNIT I	9
Fundamentals of SuperScalar Processor Design, Introduction to Multicore Architecture – Chip Multiprocessing, homogeneous Vs heterogeneous design - SMP – Multicore Vs Multithreading.	
UNIT II	9
Shared memory architectures– synchronization – Memory organization – Cache Memory – Cache Coherency Protocols - Design of Levels of Caches.	
UNIT III	9
Multicore programming Model – Shared memory model, message passing model, transaction model – OpenMP and MPI Programming.	
UNIT IV	9
PowerPC architecture – RISC design, PowerPC ISA, PowerPC Memory Management Power 5 Multicore architecture design, Power 6 Architecture.	
UNIT V	9
Cell Broad band engine architecture, PPE (Power Processor Element), SPE (Synergistic processing element), Cell Software Development Kit, Programming for Multicore architecture.	

TOTAL: 45

TEXT BOOK:

1. Hennessey & Pateterson, “Computer Architecture A Quantitative Approach”, Harcourt Asia, Morgan Kaufmann, 1999
2. Joseph JaJa, Introduction to Parallel Algorithms, Addison-Wesley, 1992.
3. IBM Journals for Power 5, Power 6 and Cell Broadband engine architecture.

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1. Kai Hwang, “Advanced Computer Architecture: Parallelism, Scalability and Programmability” McGraw-Hill, 1993
2. Richard Y. Kain, “Advanced Computer Architecture: A System Design Approach”, PHI, 1999
3. Rohit Chandra, Ramesh Menon, Leo Dagum, and David Kohr, Parallel Programming in OpenMP, Morgan Kaufmann, 2000.