

UNIVERSITY DEPARTMENTS
ANNA UNIVERSITY CHENNAI : : CHENNAI 600 025
REGULATIONS - 2009
CURRICULUM I TO IV SEMESTERS (FULL TIME)
M.TECH. INFORMATION TECHNOLOGY
SEMESTER I (5+1)

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1	MA9110	Operations Research	3	1	0	4
2	IT9112	Data Structures and Algorithm Design	3	0	0	3
3	CP9113	Advanced Computer Architecture	3	0	0	3
4	MM9112	Multimedia Communication and Networks	3	0	0	3
5	IT9111	Software Engineering Methodologies	3	0	0	3
PRACTICAL						
6	IT9115	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	IT9121	Object Oriented Analysis and Design	3	0	0	3
2	IT9122	Applied Cryptography	3	0	0	3
3	CP9121	UNIX Internals	3	0	0	3
4	IT9123	Advances in Databases	3	0	0	3
5	SW9121	Software Quality Assurance	3	0	0	3
6	E1	Elective – I	3	0	0	3
PRACTICAL						
7	IT9127	Unix Programming 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	IT9131	Grid Computing	3	0	0	3
2	E2	Elective - II	3	0	0	3
3	E3	Elective - III	3	0	0	3
PRACTICAL						
4	IT9135	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	IT9141	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**

List of Electives

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
1	IT9151	Advanced Digital Signal Processing	3	0	0	3
2	CP9168	Adhoc and Sensor Networks	3	0	0	3
3	IT9152	Enterprise Resource Planning	3	0	0	3
4	IT9153	Software Reliability Metrics	3	0	0	3
5	IT9154	Scientific Computing	3	0	0	3
6	IT9155	Ontology and Semantic Web	3	0	0	3
7	CP9158	Bioinformatics	3	0	0	3
8	CP9159	Soft Computing	3	0	0	3
9	CP9163	Embedded Systems	3	0	0	3
10	CP9164	Data Warehousing and Data Mining	3	0	0	3
11	SW9155	Supply Chain Management	3	0	0	3
12	CP9165	Integrated Software Project Management	3	0	0	3
13	CP9167	Digital Image Processing	3	0	0	3
14	IT9156	Multicore Programming	3	0	0	3
15	CP9172	Cloud Computing	3	0	0	3
16	CP9169	Virtualization Techniques	3	0	0	3
17	CP9170	Service Oriented Architecture	3	0	0	3
18	IT9158	Information Retrieval Techniques	3	0	0	3
19	CP9125	Mobile and Pervasive Computing	3	0	0	3
20	CP9176	Human Resources Management	3	0	0	3
21	CP9177	Multicore Architecture	3	0	0	3
22	IT9160	Natural Language Processing	3	0	0	3

MA9110 OPERATIONS RESEARCH

L T P C

3 1 0 4

UNIT I QUEUEING MODELS

9

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

UNIT II ADVANCED QUEUEING MODELS

9

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

UNIT III SIMULATION

9

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

UNIT IV LINEAR PROGRAMMING

9

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

UNIT V NON-LINEAR PROGRAMMING

9

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

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.

IT9112 DATA STRUCTURES AND ALGORITHM DESIGN

3 0 0 3

1. Fundamentals

9

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.

2. Data Structures 9

Min/Max heaps – Leftist Heaps – Skew Heaps – AVL Trees – Red-Black Trees – B-Trees – Splay Trees – Tries.

3. Algorithm Design: I 9

Divide and Conquer strategy – Selection of k-th Smallest Elements – Convex Hull – Strassen’s Matrix Multiplication – Greedy Approach – Container Loading – Tree Vertex Splitting – Optimal Merge Patterns.

4. Algorithm Design: II 9

Dynamic Programming Approach – Principle of Optimality – String Editing – Flow Shop Scheduling – Connected Components – Bi-Connected Components Graph Coloring using Backtracking Technique – Branch and Bound Methodology.

5. Approximation Algorithms 9

Planar Graph Coloring – Maximum Program Stored Problem – Bin Packing – Scheduling Independent Tasks – 0/1 Knapsack – Rounding – Interval Partitioning.

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. E. Horowitz, S. Sahni, and S. Rajasekaran , COMPUTER ALGORITHMS , W.H. Freeman Press, 1997.

UNIT I	PIPELINING AND ILP	9
Fundamentals of Computer Design - Measuring and Reporting Performance - Instruction Level Parallelism and Its Exploitation - Concepts and Challenges - Overcoming Data Hazards with Dynamic Scheduling – Dynamic Branch Prediction - Speculation - Multiple Issue Processors – Case Studies.		
UNIT II	ADVANCED TECHNIQUES FOR EXPLOITING ILP	9
Compiler Techniques for Exposing ILP - Limitations on ILP for Realizable Processors - Hardware versus Software Speculation - Multithreading: Using ILP Support to Exploit Thread-level Parallelism - Performance and Efficiency in Advanced Multiple Issue Processors - Case Studies.		
UNIT III	MULTIPROCESSORS	9
Symmetric and distributed shared memory architectures – Cache coherence issues - Performance Issues – Synchronization issues – Models of Memory Consistency - Interconnection networks – Buses, crossbar and multi-stage switches.		
UNIT IV	MULTI-CORE ARCHITECTURES	9
Software and hardware multithreading – SMT and CMP architectures – Design issues – Case studies – Intel Multi-core architecture – SUN CMP architecture – IBM cell architecture.- hp architecture.		
UNIT V	MEMORY HIERARCHY DESIGN	9
Introduction - Optimizations of Cache Performance - Memory Technology and Optimizations - Protection: Virtual Memory and Virtual Machines - Design of Memory Hierarchies - Case Studies.		

TOTAL - 45**REFERENCES**

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

UNIT I IP NETWORKS 9
 Open Data Network Model – Narrow Waist Model of the Internet - Success and Limitations of the Internet – Suggested Improvements for IP and TCP – Significance of UDP in modern Communication – Network level Solutions – End to End Solutions - Best Effort service model – Scheduling and Dropping policies for Best Effort Service model

UNIT II ADVANCED ROUTING 9
 Intra AS routing – Inter AS routing – Router Architecture – Switch Fabric – Active Queue Management – Head of Line blocking – Transition from IPv4 to IPv6 – Multicasting – Abstraction of Multicast groups – Group Management – IGMP – Group Shared Multicast Tree – Source based Multicast Tree – Multicast routing in Internet – DVMRP and MOSPF – PIM – Sparse mode and Dense mode

UNIT III GUARANTEED SERVICE MODEL 9
 Best Effort service model – Scheduling and Dropping policies – Network Performance Parameters – Quality of Service and metrics – WFQ and its variants – Random Early Detection – QoS aware Routing – Admission Control – Resource Reservation – RSVP - Traffic Shaping Algorithms – Caching – Laissez Faire Approach - Possible Architectures – An Overview of QoS Architectures

UNIT IV MULTIMEDIA COMMUNICATION 9
 Stream characteristics for Continuous media – Temporal Relationship – Object Stream Interactions, Media Levity, Media Synchronization – Models for Temporal Specifications – Streaming of Audio and Video – Jitter – Fixed playout and Adaptive playout – Recovering from packet loss – RTSP — Multimedia Communication Standards – RTP/RTCP – SIP and H.263

UNIT V WIRELESS MULTIMEDIA COMMUNICATION 9
 End to End QoS provisioning in Wireless Multimedia Networks – Adaptive Framework – MAC layer QoS enhancements in Wireless Networks – A Hybrid MAC protocol for Multimedia Traffic – Call Admission Control in Wireless Multimedia Networks – A Global QoS Management for Wireless Networks

REFERENCES

1. Jean Warland and Pravin Vareya, 'High Performance Networks', Morgan Kauffman Publishers, 2002
2. Mahbub Hassan and Raj Jain, 'High Performance TCP/IP Networking', Pearson Education, 2004.
3. William Stallings, 'High Speed Networks: Performance and Quality of Service', 2nd Edition, Pearson Education, 2002.
4. Kurose and Ross, 'Computer Networks : A top down Approach', Pearson Education, 2002
5. Nalin K Sharda, 'Multimedia Information Networking', Prentice Hall of India, 1999
6. Aura Ganz, Zvi Ganz and Kittu Wongthawaravat, 'Multimedia Wireless Networks: Technologies, Standards and QoS', Prentice Hall, 2003.
7. Ellen Kayata Wesel, 'Wireless Multimedia Communications: Networking Video, Voice and Data', Addison Wesley, 1998

IT9111 SOFTWARE ENGINEERING METHODOLOGIES

UNIT I SOFTWARE LIFE CYCLE 12

Scope of Software Engineering – Historical, Economic and Maintenance Aspects – Software Process – Software Life Cycle Models – Tools.

UNIT II TESTING 7

Quality – Non-Execution based Testing – Execution based Testing – Testing versus Correctness Proofs – Testing Distributed and Real Time Software

UNIT III OBJECT ORIENTATION 7

Modules – Objects – Reusability – Portability and Interoperability – Planning and Estimation

UNIT IV ANALYSIS AND DESIGN 11

Requirements Phase – Specification Phase – Object Oriented Analysis Phase – Design Phase.

UNIT V IMPLEMENTATION AND INTEGRATION 8

Implementation Phase – Integration Phase – Maintenance Phase

TOTAL = 45**TEXT BOOKS**

1. Stephen R Schach, "Classical and Object-Oriented Software Engineering – With UML and C++", McGraw Hill, New Delhi, 2002.
2. Ivar Jacobson, "Object Oriented Software Engineering", Pearson Education, 1992

REFERENCES

1. Roger S.Pressman, Software engineering- A practitioner's Approach, McGraw-Hill International Edition, Fifth Edition , 2001.
2. Ian Sommerville, Software engineering, Pearson education Asia, Sixth edition, 2000.
3. Pankaj Jalote- An Integrated Approach to Software Engineering, Springer Verlag, 1997.
4. James F Peters and Witold Pedrycz, "Software Engineering – An Engineering Approach", John Wiley and Sons, New Delhi, 2000.
5. Ali Behforooz and Frederick J Hudson, "Software Engineering Fundamentals", Oxford University Press, New Delhi, 1996.

IT9115 DATA STRUCTURES LABORATORY

1. Min/Max Heaps (Insertion, Deletion/Delete Max)
2. Binary Search Trees (Insertion, Deletion and Search)
3. AVL Trees (Insertion, Deletion and Search)
4. B-Trees (Insertion, Deletion and Search)
5. Finding Spanning Trees
6. Finding connected components of a graph
7. Knapsack problem
8. Graph coloring
9. Depth-first and Breadth-first searches

UNIT I 10

Introduction to System Concepts - Managing Complex Software — Properties – Object Oriented Systems Development – Object Basics – Systems Development Life Cycle - Rumbaugh Methodology - Booch Methodology - Jacobson Methodology – Unified Process

UNIT II 8

Unified Approach – Unified Modeling Language – Static behavior diagrams – Dynamic behavior diagrams – Object Constraint Language

UNIT III 9

Inception – Evolutionary Requirements – Domain Models – Operation Contracts - Requirements to Design – Design Axioms – Logical Architecture - Designing Objects with Responsibilities – Object Design – Designing for Visibility

UNIT IV 9

Patterns – Analysis and Design patterns – GoF Patterns - Mapping designs to code – Test Driven development and refactoring – UML Tools and UML as blueprint

UNIT V 9

More Patterns – Applying design patterns – Architectural Analysis – Logical Architecture Refinement – Package Design – Persistence framework with patterns

REFERENCES

1. Craig Larman. “Applying UML and Patterns – An introduction to Object-Oriented Analysis and Design and Iterative Development”, 3rd ed, Pearson Education, 2005.
2. Fowler, Martin. UML Distilled. 3rd ed. Pearson Education. 2004.
3. Michael Blaha and James Rumbaugh, “Object-oriented modeling and design with UML”, Prentice-Hall of India, 2005.
4. Booch, Grady. Object Oriented Analysis and Design. 2nd ed. Pearson Education. 2000.
5. Ali Bahrami, “ Object Oriented Systems Development”, Tata McGrawHill, 1999.

UNIT I **9**
 Classical Cryptography-The Shift Cipher,The Substitution Cipher,The Affine Cipher
 Cryptanalysis-Cryptanalysis of the Affine Cipher,Cryptanalysis of the Substitution
 Cipher,Cryptanalysis of the Vigenere Cipher,Shannon’s Theory.

UNIT II **9**
 Block Cipher and the Advanced Encryption Standard-Substitution -Permutation
 Networks, Linear Cryptanalysis, Differential Cryptoanalysis , The Data Encryption
 Standard, The Advanced Encryption Standard, Modes of Operation ,Cryptography Hash
 Function- Hash Function and Data Integrity,Security of Hash Function ,Iterated
 Hash Functions, Message Authentication Codes.

UNIT III **9**
 The RSA Cryptosystem and Factorin Integer- Intoduction to Public -key
 Cryptography, Number theory,The RSA Cryptosystem ,Other Attacks on RSA,The
 ELGamal Cryptosystem,Shanks’ Algorithm, Finit Fields, Elliptic Curves over the Reals,
 Elliptical Curves Modulo a Prime,Signature Scheme –Digital Signature Algorithm.

UNIT IV **9**
 Identification Scheme and Entity Attenuation-Challenge – and – Response in the
 Secret-key Setting,Challenge – and – Response in the Public key Setting,The Schnorr
 Identificataon Scheme,Key distribution-Diffie-Hellman Key,
 Predistribution,Unconditional Secure key Predistribution,Key Agreement Scheme-
 Diffie-Hellman Key agreement,Public key infrastructure-PKI,Certificates,Trust Models.

UNIT V **9**
 Secret Sharing Schemes-The Shamir Threshold Scheme,Access Structure and General
 Scret key sharing,Informataion Rate and Construction of Effcient Schemes,Multicast
 Security and Copyright production-Multicast Security,Braodcast Encryption ,Multicast
 Re-keying,Copyright Protection ,Tracing Illegally Redistribution keys.

TOTAL : 45

TEXT BOOK

Douglas R. Stinson ,“Cryptography Theory and Practice ”, Third Edition, Chapman &
 Hall/CRC,2006

REFERENCES

1. Menges A. J , Oorschot P, Vanstone S.A,“Handbollk of Applied Cryptography”
 CRC Press,1997.
2. William Stallings, “Cryptography and Network Security: Principles and Practices”,
 Third Edition, Pearson Education,2006.
3. Wenbo Mao, “Modern Cryptography – Theory and Practice”, Pearson Education,
 First Edition, 2006.
4. Charles B. Pfleeger, Shari Lawrence Pfleeger, “Security in Computing”, Fourth
 Edition, Pearson Education, 2007.
5. Wade Trappe and Lawrence C. Washington, “Intrduction to Cryptography with
 Coding Theory” Second Edition, Pearson Education, 2007.

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 QUERY AND TRANSACTION PROCESSING 9

Data Storage and Querying : Storage and File Structure - Indexing and Hashing – Physical Database Design and Tuning - Query Processing Algorithms – Query Optimization Techniques – Transaction Management: Transaction Processing Concepts – Concurrency Control – Recovery Techniques – Database Security.

UNIT II PARALLEL AND DISTRIBUTED DATABASES 9

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

UNIT III OBJECT AND OBJECT RELATIONAL DATABASES 9

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

UNIT IV ENHANCED DATA MODELS 9

Active Database Concepts and Triggers – Temporal Databases – Spatial Databases – Multimedia Databases – Deductive Databases – XML Databases: XML Data Model – DTD - XML Schema - XML Querying - Geographic Information Systems - Genome Data Management.

UNIT V EMERGING TECHNOLOGIES 9

Mobile Databases: Location and Handoff Management - Effect of Mobility on Data Management - Location Dependent Data Distribution - Mobile Transaction Models - Concurrency Control - Transaction Commit Protocols – Web Databases - Information Retrieval - Data Warehousing - Data Mining.

TOTAL = 45**REFERENCES**

1. R. Elmasri, S.B. Navathe, “Fundamentals of Database Systems”, Fifth Edition, Pearson Education/Addison Wesley, 2007.
2. Thomas Cannolly and Carolyn Begg, “ Database Systems, A Practical Approach to Design, Implementation and Management”, Third Edition, Pearson Education, 2007.
3. Henry F Korth, Abraham Silberschatz, S. Sudharshan, “Database System Concepts”, Fifth Edition, McGraw Hill, 2006.
4. C.J.Date, A.Kannan and S.Swamynathan, “An Introduction to Database Systems”, Eighth Edition, Pearson Education, 2006.
5. Raghu Ramakrishnan, Johannes Gehrke, “Database Management Systems”, McGraw Hill, Third Edition 2004.

UNIT I 9

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

UNIT II 9

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

UNIT III 9

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

UNIT IV 9

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

UNIT V 9

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

TOTAL = 45**REFERENCES**

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

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 CONCEPTS AND ARCHITECTURE 9

Introduction-Parallel and Distributed Computing-Cluster Computing-Grid Computing- Anatomy and Physiology of Grid- Web and Grid Services-Grid Standards - OGSA-WSRF - Trends, Challenges and applications.

UNIT II GRID MONITORING 9

Grid Monitoring Architecture (GMA) - An Overview of Grid Monitoring Systems- R-GMA - GridICE – MDS- Service Level Agreements (SLAs) - Other Monitoring Systems- Ganglia, GridMon, Hawkeye and Network Weather Service.

UNIT III GRID SECURITY AND RESOURCE MANAGEMENT 9

Grid Security-A Brief Security Primer-PKI-X509 Certificates-Grid Security-Grid Scheduling and Resource Management, Gridway and Gridbus Broker-principles of Local Schedulers- Overview of Condor, SGE, PBS, LSF-Grid Scheduling with QoS.

UNIT IV DATA MANAGEMENT AND GRID PORTALS 9

Data Management-Categories and Origins of Structured Data-Data Management Challenges-Architectural Approaches-Collective Data Management Services-Federation Services-Grid Portals-Generations of Grid Portals.

UNIT V GRID MIDDLEWARE 9

List of globally available Middlewares - Case Studies-Recent version of Globus Toolkit and gLite - Architecture, Components and Features. Features of Next generation grid.

TOTAL : 45**REFERENCES**

1. Ian Foster, Carl Kesselman, The Grid 2: Blueprint for a New Computing Infrastructure, Elsevier Series, 2004.
2. Vladimir Silva, Grid Computing for Developers, Charles River Media, January 2006.
3. Parvin Asadzadeh, Rajkumar Buyya, Chun Ling Kei, Deepa Nayar, and Srikumar Venugopal, Global Grids and Software Toolkits: A Study of Four Grid Middleware Technologies, High Performance Computing: Paradigm and Infrastructure, Laurence Yang and Minyi Guo (editors), Wiley Press, New Jersey, USA, June 2005.
4. Jarek Nabrzyski, Jennifer M. Schopf, Jan Weglarz, Grid Resource Management: State of the Art and Future Trends , (International Series in Operations Research & Management Science), Springer; First edition, 2003
5. Srikumar Venugopal, Krishna Nadiminti, Hussein Gibbins and Rajkumar Buyya,
6. Designing a Resource Broker for Heterogeneous Grids, Software: Practice and Experience, Wiley Press, New York, USA, 2008.
7. Fran Berman , Geoffrey Fox, Anthony J.G. Hey, Grid Computing: Making The Global Infrastructure a Reality,Wiley, 2003
8. Maozhen Li , Mark Baker , The Grid: Core Technologies, Wiley, 2005
9. Joshy Joseph , Craig Fellenstein Grid Computing, IBM Press, 2004
10. Borja Sotomayor , Lisa Childers, Globus Toolkit 4 : Programming Java Services , The Elsevier Series in Grid Computing, Morgan Kaufmann, 2005

IT9151 ADVANCED DIGITAL SIGNAL PROCESSING

L T P C
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9

UNIT I

Basic elements of DSP – concepts of frequency in Analog and Digital Signals – sampling theorem – Discrete – time signals, systems – Analysis of discrete time LTI systems – Z transform – Convolution (linear and circular) – Correlation.

UNIT II

9

Introduction to DFT – Properties of DFT – Filtering methods based on DFT – FFT Algorithms - Decimation – in – time Algorithms, Decimation – in – frequency Algorithms – Use of FFT in Linear Filtering – DCT-wavelets

UNIT III

9

Structures of IIR – Analog filter design – Discrete time IIR filter from analog filter – IIR filter design by Impulse Invariance, Bilinear transformation, Approximation of derivatives – (HPF, BPF, BRF) filter design using frequency translation

UNIT IV

9

Structures of FIR – Linear phase FIR filter – Filter design using windowing techniques, Frequency sampling techniques – Finite word length effects in digital Filters

UNIT V

9

Multirate signal processing – Speech compression – Adaptive filter – Musical sound processing – Image enhancement.

TOTAL = 45

REFERENCES

1. John G. Proakis & Dimitris G.Manolakis, “Digital Signal Processing – Principles, Algorithms & Applications”, Fourth edition, Pearson education / Prentice Hall, 2007.
2. Emmanuel C..Ifeachor, & Barrie.W.Jervis, “Digital Signal Processing”, Second edition, Pearson Education / Prentice Hall, 2002.
3. Sanjit K. Mitra, “Digital Signal Processing – A Computer Based Approach” ,Tata McGraw Hill, Third Edition, 2007 .
4. Alan V.Oppenheim, Ronald W. Jchafer & Hohn. R.Back, “Discrete Time Signal Processing”, PHI / Pearson Education, Second Edition, 2001.
5. Andreas Antoniou, “Digital Signal Processing”, Tata McGraw Hill.
6. Michael weeks “Digital signal processing using matlab and wavelets” Infinity Science press

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.

UNIT I INTRODUCTION TO ERP**9**

Overview – Benefits of ERP – ERP and Related Technologies – Business Process Reengineering – Data Warehousing – Data Mining – On-line Analytical Processing – Supply Chain Management.

UNIT II ERP IMPLEMENTATION**9**

Implementation Life Cycle – Implementation Methodology – Hidden Costs – Organizing Implementation – Vendors, Consultants and Users – Contracts – Project Management and Monitoring.

UNIT III BUSINESS MODULES**9**

Business Modules in an ERP Package – Finance – Manufacturing – Human Resource – Plant Maintenance – Materials Management – Quality Management – Sales and Distribution.

UNIT IV ERP MARKET**9**

ERP Market Place – SAP AG – PeopleSoft – Baan Company – JD Edwards World Solutions Company – Oracle Corporation – QAD – System Software Associates.

UNIT V ERP – PRESENT AND FUTURE**9**

Turbo Charge the ERP System – EIA – ERP and E-Commerce – ERP and Internet – Future Directions in ERP.

TOTAL = 45**REFERENCES:**

1. Alexis Leon, "ERP Demystified", Tata McGraw Hill, 1999.
2. Joseph A. Brady, Ellen F. Monk, Bret J. Wangner, "Concepts in Enterprise Resource Planning", Thomson Learning, 2001.
3. Vinod Kumar Garg and N.K .Venkata Krishnan, "Enterprise Resource Planning – concepts and Planning", Prentice Hall, 1998.
4. Jose Antonio Fernandz, " The SAP R /3 Hand book", Tata McGraw Hill

UNIT I	INTRODUCTION TO SOFTWARE RELIABILITY	7
Basic Concepts – Failure and Faults – Environment – Availability –Modeling –uses.		
UNIT II	SOFTWARE RELIABILITY MODELING	12
Concepts – General Model Characteristic – Historical Development of models – Model Classification scheme – Markovian models – General concepts – General Poisson Type Models – Binomial Type Models – Poisson Type models – Fault reduction factor for Poisson Type models.		
UNIT III	COMPARISON OF SOFTWARE RELIABILITY MODELS	10
Comparison Criteria – Failure Data – Comparison of Predictive Validity of Model Groups – Recommended Models – Comparison of Time Domains – Calendar Time Modeling – Limiting Resource Concept – Resource Usage model – Resource Utilization – Calendar Time Estimation and confidence Intervals.		
UNIT IV	FUNDAMENTALS OF MEASUREMENT	8
Measurements in Software Engineering – Scope of Software metrics – Measurements theory – Goal based Framework – Software Measurement Validation.		
UNIT V	PRODUCT METRICS	8
Measurement of Internet Product Attributes – Size and Structure – External Product Attributes – Measurement of Quality –Reliability Growth Model – Model Evaluation		

TOTAL = 45**REFERENCES**

1. John D. Musa, Anthony Iannino, Kazuhira Okumoto, "Software Reliability – Measurement, Prediction, Application, Series in Software Engineering and Technology", McGraw Hill, 1987.
2. John D. Musa, "Software Reliability Engineering", Tata McGraw Hill, 1999.
3. Norman E . Fenton, Shari Lawrence Pfleeger, "Software metrics", Second Edition, International Student Edition, 2003.

UNIT I INTRODUCTION TO SYSTEM MODELING 10

.Modeling and General Systems Theory-Concepts of Simulation-Types of Simulation-Experimental Design Consideration- Comparison and Selection of Simulation Languages-Development of Simulation Models Using any one of the Languages for Some Problems -Stochastic Simulation - Randomness and Random Numbers - Random Number Generators - Software for Generating Random Numbers.

UNIT II APPROXIMATIONS IN SCIENTIFIC COMPUTING 8

General Strategy - Approximations in Scientific Computation - Mathematical Software - Mathematical Software Libraries - Scientific Computing Environments - Extended Arithmetic Packages

UNIT III OPTIMIZATION 8

Optimization Problems - Existence and Uniqueness - Convexity - Optimization in One Dimension- Multidimensional Unconstrained Optimization - Constrained Optimization - Linear Programming

UNIT IV ROOTS OF EQUATION ,LINEAR ALGEBRAIC EQUATION AND INTERPOLATION 10

Graphical Method – Iterative Methods- Newton-Raphson Method- Break-Even Analysis-Gauss Elimination-Solution Of Linear Systems By Gaussian, Gauss-Jordan, Jacobi And Gauss Seidel Methods-Matrix Inversion-Gauss-Jordan Method. Least-Square Regression -Newton’s Divided-Difference Interpolating Polynomials-Lagrange’s polynomials-Newton’s Forward and Backward Difference Formula- Stirling’s and Bessel’s Central Difference Formula.

UNIT V NUMERICAL ORDINARY AND PARTIAL DIFFERENTIATION AND INTEGRATION 9

Numerical Differentiation: Runge-Kutta Methods, Boundary-Value and Eigen value Problems.Partial Differential Equation-Elliptic Equation, Parabolic Equations.Numerical Integration: Trapezoidal and Simpson’s Rules – Two and Three Point Gaussian Quadrature Formula – Double Integral Using Trapezoidal and Simpson’s Rule.

TOTAL: 45 PERIODS**TEXT BOOKS:**

1. Jerry Banks and John Carson, “Discrete Event System Simulation”, Third Edition, PHI, 2002.
2. Steven C. Chapra, Raymond P. Canale, “Numerical Methods for Engineering”, Second Edition, McGraw-Hill, 1989.

REFERENCES:

- Sastry S.S ”Introductory Methods of Numerical Analysis”, Third Edition, Prentice Hall India, 1998
2. Geoffery Gordon, “System Simulation”, Second Edition, PHI, 2002.

UNIT I	INTRODUCTION	8
Components – Types – Ontological Commitments – Ontological Categories – Philosophical Background -Sample - Knowledge Representation Ontologies – Top Level Ontologies – Linguistic Ontologies – Domain Ontologies – Semantic Web – Need – Foundation – Layers – Architecture.		
UNIT II	LANGUAGES FOR SEMANTIC WEB AND ONTOLOGIES	12
Web Documents in XML – RDF - Schema – Web Resource Description using RDF- RDF Properties – Topic Maps and RDF – Overview – Syntax Structure – Semantics – Pragmatics - Traditional Ontology Languages – LOOM- OKBC – OCML - Flogic Ontology Markup Languages – SHOE – OIL - DAML + OIL- OWL		
UNIT III	ONTOLOGY LEARNING FOR SEMANTIC WEB	12
Taxonomy for Ontology Learning – Layered Approach – Phases of Ontology Learning – Importing and Processing Ontologies and Documents – Ontology Learning Algorithms - Evaluation		
UNIT IV	ONTOLOGY MANAGEMENT AND TOOLS	8
Overview – need for management – development process – target ontology – ontology mapping – skills management system – ontological class – constraints – issues. volution – Development of Tools and Tool Suites – Ontology Merge Tools – Ontology based Annotation Tools.		
UNIT V	APPLICATIONS	5
Web Services – Semantic Web Services - Case Study for specific domain – Security issues – current trends.		
		TOTAL = 45

REFERENCES

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

UNIT I INTRODUCTORY CONCEPTS**9**

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

UNIT II SEARCH ENGINES AND DATA VISUALIZATION**9**

The search process – Search Engine Technology – Searching and Information Theory – Computational methods – Search Engines and Knowledge Management – Data Visualization – sequence visualization – structure visualization – user Interface – Animation Versus simulation – General Purpose Technologies.

UNIT III STATISTICS AND DATA MINING**9**

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

UNIT IV PATTERN MATCHING**9**

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

UNIT V MODELING AND SIMULATION**9**

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

TOTAL = 45**REFERENCES**

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

UNIT I INTRODUCTION 9

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.

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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.

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

UNIT I FUNDAMENTALS OF SUPPLY CHAIN MANAGEMENT

Supply chain networks, Integrated supply chain planning, Decision phases in a supply chain, process view of a supply chain, supply chain flows, Overview of supply chain models and modeling systems, Supply chain planning: Strategic, operational and tactical, Understanding supply chain through process mapping and process flow chart.

UNIT II SCM STRATEGIES, PERFORMANCE

Supply chain strategies, achieving strategic fit, value chain, Supply chain drivers and obstacles, Strategic Alliances and Outsourcing, purchasing aspects of supply chain, Supply chain performance measurement: The balanced score card approach, Performance Metrics. Planning demand and supply: Demand forecasting in supply chain, Aggregate planning in supply chain, Predictable variability.

UNIT III PLANNING AND MANAGING INVENTORIES

Introduction to Supply Chain Inventory Management. Inventory theory models: Economic Order Quantity Models, Reorder Point Models and Multiechelon Inventory Systems, Relevant deterministic and stochastic inventory models and Vendor managed inventory models.

UNIT IV DISTRIBUTION MANAGEMENT

Role of transportation in a supply chain - direct shipment, warehousing, cross-docking; push vs. pull systems; transportation decisions (mode selection, fleet size), market channel structure, vehicle routing problem. Facilities decisions in a supply chain. Mathematical foundations of distribution management, Supply chain facility layout and capacity planning,

UNIT V STRATEGIC COST MANAGEMENT IN SUPPLY CHAIN

The financial impacts, Volume leveraging and cross docking, global logistics and material positioning, global supplier development, target pricing, cost management enablers, Measuring service levels in supply chains, Customer Satisfaction/Value/Profitability/Differential Advantage.

REFERENCES

1. David Simchi-Levi, Philip Kaminsky, and Edith Simchi-Levi Designing and Managing the Supply Chain: Concepts, Strategies, and Case Studies, Second Edition, , McGraw-Hill/Irwin, New York, 2003.
2. Sunil Chopra and Peter Meindel. Supply Chain Management: Strategy, Planning, and Operation, Prentice Hall of India, 2002.
3. Sunil Chopra & Peter Meindl, Supply Chain Management , Prentice Hall Publisher, 2001
4. Robert Handfield & Ernest Nichols, Introduction to Supply Chain Management , Prentice hall Publishers, 1999.

CP9165 INTEGRATED SOFTWARE PROJECT MANAGEMENT (ELECTIVE I)
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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.
2. Royce, W. “Software Project management: A Unified Framework”, Addison-Wesley, 1998.
3. 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.
4. Grant, J.L. “Foundations of Economic Value Added”, John Wiley & Sons, 1997.
5. Kaplan, R.S., Norton, D.P. “The Balanced Scorecard: Translating Strategy into Action”, Harvard Business School Press, 1996.
6. Boehm, B. W. "Software Risk Management: Principles and Practices" in IEEE Software, January 1991, pp32-41.
7. Fenton, N.E., and Pfleeger, S.L.. “Software Metrics: A Rigorous and Practical Approach, Revised” Brooks Cole, 1998.
8. Demarco, T. and Lister, T. “Peopeware: Productive Projects and Teams, 2nd Ed.”, Dorset House, 1999.

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 INTRODUCTION TO MULTIPROCESSORS AND SCALABILITY ISSUES 9

Parallel computer models – Symmetric and distributed shared memory architectures – Performance Issues. Multi-core Architectures - Software and hardware multithreading – SMT and CMP architectures – Design issues – Case studies – Intel Multi-core architecture – SUN CMP architecture – IBM cell processor.

UNIT II PARALLEL PROGRAMMING 9

Fundamental concepts – Designing for threads. Threading and parallel programming constructs – Synchronization – Critical sections – Deadlock. Threading APIs.

UNIT III Openmp Programming 9

OpenMP – Threading a loop – Thread overheads – Performance issues – Library functions. Solutions to parallel programming problems – Data races, deadlocks and livelocks – Non-blocking algorithms – Memory and cache related issues.

UNIT IV MPI PROGRAMMING 9

MPI Model – collective communication – data decomposition – communicators and topologies – point-to-point communication – MPI Library.

UNIT V MULTITHREADED APPLICATION DEVELOPMENT: 9

Algorithms, program development and performance tuning.

TOTAL : 45 HOURS**REFERENCES**

1. Michael J Quinn, "Parallel programming in C with MPI and OpenMP", Tata McGraw Hill, 2003.
2. Shameem Akhter and Jason Roberts, "Multi-core Programming", Intel Press, 2006.
3. John L. Hennessey and David A. Patterson, "Computer architecture – A quantitative approach", Morgan Kaufmann/Elsevier Publishers, 4th. edition, 2007.
4. David E. Culler, Jaswinder Pal Singh, "Parallel computing architecture : A hardware/ software approach", Morgan Kaufmann/Elsevier Publishers, 2004.
5. Wesley Petersen and Peter Arbenz, "Introduction to Parallel Computing", Oxford University Press, 2004.

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.

CP9169 VIRTUALIZATION TECHNIQUES

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UNIT I OVERVIEW OF VIRTUALIZATION

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 NUMBER OF PERIODS 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.

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.

UNIT I	INTRODUCTION	9
Basic Concepts – Retrieval Process – Modeling – Classic Information Retrieval – Set Theoretic, Algebraic and Probabilistic Models – Structured Text Retrieval Models – Retrieval Evaluation – Word Sense Disambiguation		
UNIT II	QUERYING	9
Languages – Key Word based Querying – Pattern Matching – Structural Queries – Query Operations – User Relevance Feedback – Local and Global Analysis – Text and Multimedia languages		
UNIT III	TEXT OPERATIONS AND USER INTERFACE	9
Document Preprocessing – Clustering – Text Compression - Indexing and Searching – Inverted files – Boolean Queries – Sequential searching – Pattern matching – User Interface and Visualization – Human Computer Interaction – Access Process – Starting Points – Query Specification - Context – User relevance Judgment – Interface for Search		
UNIT IV	MULTIMEDIA INFORMATION RETRIEVAL	9
Data Models – Query Languages – Spatial Access Models – Generic Approach – One Dimensional Time Series – Two Dimensional Color Images – Feature Extraction		
UNIT V	APPLICATIONS	9
Searching the Web – Challenges – Characterizing the Web – Search Engines – Browsing – Meta-searchers – Online IR systems – Online Public Access Catalogs – Digital Libraries – Architectural Issues – Document Models, Representations and Access – Prototypes and Standards		

TOTAL = 45**REFERENCES**

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

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.

TOTAL ; 45

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.

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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.

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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.

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.