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	Т	Ρ	С
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
PRACTIC	AL					
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	т	Ρ	С
THEOR	Y					
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

PRACTI	CAL					
7	IT9127	Unix Programming Laboratory	0	0	3	2
		ΤΟΤΑΙ	. 18	0	3	20

SEMESTER III (3+1)

SL. NO	COURSE CODE	COURSE TITLE	L	Т	Ρ	С
THEOR	ſ					
1	IT9131	Grid Computing	3	0	0	3
2	E2	Elective - II	3	0	0	3
3	E3	Elective - III	3	0	0	3
PRACTI	CAL					
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	т	Ρ	С
PRACTI	CAL					
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

UNIVERSITY DEPARTMENTS ANNA UNIVERSITY CHENNAI : : CHENNAI 600 025 REGULATIONS - 2009 CURRICULUM I TO VI SEMESTERS (PART TIME) M.TECH. INFORMATION TECHNOLOGY

SEMESTER I

SL. NO	COURSE CODE	COURSE TITLE	L	Т	Ρ	С
THEOR	(
1	MA9128	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
		TOTAL	9	1	0	10

SEMESTER II

SL. NO	COURSE CODE	COURSE TITLE	L	т	Р	С
THEOR	(
1	CP9121	Unix Internals	3	0	0	3
2	IT9123	Advances in Databases	3	0	0	3
3	E1	Elective I	3	0	0	3
PRACTI	CAL					
4	IT9127	Unix Programming Laboratory II	0	0	3	2
		TOTAL	9	0	3	11

SEMESTER III

SL. NO	COURSE CODE	COURSE TITLE	L	т	Р	С
THEOR	(
1	IT9111	Software Engineering Methodologies	3	0	0	3
2	MM9112	Multimedia Communication and Networks	3	0	0	3
PRACTI	CAL					
3	IT9115	Data Structures Laboratory	0	0	3	2
		TOTAL	6	0	3	8

SEMESTER IV

SL. NO	COURSE CODE	COURSE TITLE	L	Т	Ρ	С
THEOR	(
1	IT9121	Object Oriented Analysis and Design	3	0	0	3
2	IT9122	Applied Cryptography	3	0	0	3
3	SW9121	Software Quality Assurance	3	0	0	3
		TOTAL	9	0	0	9

SEMESTER V

SL. NO	COURSE CODE	COURSE TITLE	L	Т	Ρ	С
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
PRACTI	CAL					
4	IT9135	Project Work (phase I)	0	0	12	6

TOTAL	9	0	12	15

SEMESTER VI

SL. NO	COURSE CODE	COURSE TITLE		Т	Ρ	С	
PRACTICAL							
1	IT9141	Project Work (Phase II)	0	0	24	12	
		TOTAL	0	0	24	12	

List of Electives

SL. NO	COURSE CODE	COURSE TITLE	L	т	Р	С
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

SL. NO	COURSE CODE	COURSE TITLE	L	Т	Ρ	С
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

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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

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

UNIT III SIMULATION

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

UNIT IV LINEAR PROGRAMMING

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

UNIT V NON-LINEAR PROGRAMMING

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

LTPC 3003 UNIT I INTRODUCTION

Linear Skip list, Hash table representation Binary Trees, Heaps, Height and weight balanced trees, Tournament Trees.

UNIT II **SEARCH TREES**

Binary Search Trees, AVL Trees, Red-Black Trees, B- Trees and case studies.

UNIT III **GRAPHS**

Graphs, Graph Search Methods, Applications of Graphs – Path finding, Spanning Trees, connecting graphs and components.

ALGORITHM ANALYSIS AND DESIGN UNIT IV

Algorithm Analysis - Design Techniques - Asymptotic notations - Properties of big oh notation- solving recurrence equations- Divide & Conquer - Greedy – Dynamic Programming

UNIT V **BACKTRACKING AND BRANCH & BOUND TECHNIQUES** 9

Knapsack - Traveling Salesman Problem - Graph coloring- 8 Queens problem, Sum of Subsets – NP Hard and complete problems.

TOTAL = 45

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TEXT BOOKS

- 1. Aho, Hopcroft, Ullman, Data Structure & Algorithms, Addison Wesley pub Company 1985.
- 2. Sartaj Sahni, Data Structures, Algorithms and Applications in C++, McGraw Hill International Edition, 1998.

REFERENCES

- 1. M.A. Weiss, Data Structures & Algorithm analysis in C++, Benjamin Cummings, 1994.
- 2. Sara Baase, Computer algorithms Introduction to design and analysis, AW, 1988.
- 3. Sahni, Data Structures, Algorithms and applications in Java, McGraw Hill, 2000.
- 4. E. Horowitz, S. Sahni, and S. Rajasekaran, COMPUTER ALGORITHMS, W.H. Freeman Press, 1997.

CP9113 ADVANCED COMPUTER ARCHITECTURE

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UNIT I PIPELINING AND ILP

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

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

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

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

Introduction - Optimizations of Cache Performance - Memory Technology and Optimizations - Protection: Virtual Memory and Virtual Machines - Design of Memory Hierarchies - Case Studies.

TOTAL - 45

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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.

MM9112 MULTIMEDIA COMMUNICATION AND NETWORKS

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UNIT I IP NETWORKS

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

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

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

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

End to End QoS provisioning in Wireless Multimedia Networks – Adaptive Framework – MAC layer QoS enhancements in Wireless Networks – A Hybrid MAC protocol for

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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 Kitti Wongthawaravat, 'Multimedia Wireless Networks: Technologies, Standards and QoS', Prentice Hall, 2003.
- 7. Ellen Kayata Wesel, 'Wireless Multimedia Communications: Networking Video, Voice and Data', Addision Wesley, 1998

IT9111 SOFTWARE ENGINEERING METHODOLOGIES

		LTPC
		3003
UNIT I	SOFTWARE LIFE CYCLE	12

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

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UNIT II TESTING

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

UNIT III OBJECT ORIENTATION

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

UNIT IV ANALYSIS AND DESIGN

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

UNIT V IMPLEMENTATION AND INTEGRATION

Implementation Phase – Integration Phase – Maintenance Phase

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 Pedryez, "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

L T P C 0 0 3 2

- 1. Min/Max Heaps (Insertion, Deletemin/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

IT9121 OBJECT ORIENTED ANALYSIS AND DESIGN

UNIT I

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

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

UNIT III

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

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

UNIT V

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.
- Booch, Grady. Object Oriented Analysis and Design. 2nd ed. Pearson Education. 2000.
- 5. Ali Bahrami, "Object Oriented Systems Development", Tata McGrawHill, 1999.

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IT9122 APPLIED CRYPTOGRAPHY

UNIT I

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

Block Cipher and the Advanced Encryption Standard-Substitution -Permutation Netrworks, 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

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

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, Predustribution, Unconditionaly Secure key Predistribution, Key Agreement Scheme-Diffie-Hellman Key agreement, Public key infrastructure-PKI, Certificates, Trust Models.

UNIT V

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

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 Appliled 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.

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L T P C 3 0 0 3 5. Wade Trappe and Lawrence C. Washington, "Intrduction to Cryptography with Coding Theory" Second Edition, Pearson Education, 2007.

CP9121 UNIX INTERNALS

UNIT I OVERVIEW

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

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

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

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

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

TEXT BOOKS

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

REFERENCES

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TOTAL = 45

- 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.

IT9123 **ADVANCES IN DATABASES**

UNIT I QUERY AND TRANSACTION PROCESSING

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.

PARALLEL AND DISTRIBUTED DATABASES UNIT II

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**

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.

ENHANCED DATA MODELS UNIT IV

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**

REFERENCES

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.

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- 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.

SW9121 SOFTWARE QUALITY ASSURANCE

UNIT I

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

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

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

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

REFERENCES

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

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LTPC 3003

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

IT9127 UNIX PROGRAMMING LABORATORY

L T P C 0 0 3 2

- 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

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**

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**

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.

DATA MANAGEMENT AND GRID PORTALS UNIT IV

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**

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

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 Raikumar 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

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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

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

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

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

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

UNIT V

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

REFERENCES

- 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

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CP9168 AD-HOC AND SENSOR NETWORKS

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.

IT9152 ENTERPRISE RESOURCE PLANNING

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UNIT I INTRODUCTION TO ERP

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

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

UNIT III BUSINESS MODULES

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

UNIT IV ERP MARKET

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

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

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

IT9153 SOFTWARE RELIABILITY AND METRICS

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UNIT I INTRODUCTION TO SOFTWARE RELIABILITY

Basic Concepts – Failure and Faults – Environment – Availability – Modeling – uses.

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UNIT II SOFTWARE RELIABILITY MODELING

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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

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

Measurements in Software Engineering – Scope of Software metrics – Measurements theory – Goal based Framework – Software Measurement Validation.

UNIT V PRODUCT METRICS

Measurement of Internet Product Attributes – Size and Structure – External Product Attributes – Measurement of Quality –Reliability Growth Model – Model Evaluation

REFERENCES

- 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.

IT9154 SCIENTIFIC COMPUTING

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UNIT I INTRODUCTION TO SYSTEM MODELING

.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

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Some Problems -Stochastic Simulation - Randomness and Random Numbers - Random Number Generators - Software for Generating Random Numbers.

UNIT II APPROXIMATIONS IN SCIENTIFIC COMPUTING

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

UNIT III OPTIMIZATION

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

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

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.

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IT9155 ONTOLOGY AND SEMANTIC WEB

UNIT I INTRODUCTION

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 IILANGUAGES FOR SEMANTIC WEB AND ONTOLOGIES12Web Documents in XML – RDF - Schema – Web Resource Description using RDF- RDFProperties – Topic Maps and RDF – Overview – Syntax Structure – Semantics –Pragmatics - Traditional Ontology Languages – LOOM- OKBC – OCML - FlogicOntology Markup Languages – SHOE – OIL - DAML + OIL- OWL

UNIT III ONTOLOGY LEARNING FOR SEMANTIC WEB

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

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

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

REFERENCES

- 1. Asuncion Gomez-Perez, Oscar Corcho, Mariano Fernandez-Lopez "Ontological Engineering: with examples from the areas of Knowledge Management, e-Commerce and the Semantic Web" Springer, 2004
- 2. Grigoris Antoniou, Frank van Harmelen, "A Semantic Web Primer (Cooperative Information Systems)", The MIT Press, 2004
- 3. Alexander Maedche, "Ontology Learning for the Semantic Web", Springer; 1 edition, 2002
- 4. John Davies, Dieter Fensel, Frank Van Harmelen, "Towards the Semantic Web: Ontology – Driven Knowledge Management", John Wiley & Sons Ltd., 2003.
- 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
- 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

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 Dean Allemang (Author), James Hendler (Author) "Semantic Web for the Working Ontologist: Effective Modeling in RDFS and OWL" (Paperback), Morgan Kaufmann, 2008

CP9158 BIO INFORMATICS

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UNIT I INTRODUCTORY CONCEPTS

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

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

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

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

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

 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.

CP9159 SOFT COMPUTING

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UNIT I INTRODUCTION TO SOFT COMPUTING AND NEURAL NETWORKS 9 Evolution of Computing - Soft Computing Constituents – From Conventional AI to Computational Intelligence - Machine Learning Basics

UNIT II GENETIC ALGORITHMS

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

UNIT III NEURAL NETWORKS

Machine Learning Using Neural Network, Adaptive Networks – Feed forward Networks – Supervised Learning Neural Networks – Radial Basis Function Networks – Reinforcement Learning – Unsupervised Learning Neural Networks – Adaptive Resonance architectures – Advances in Neural networks.

UNIT IV FUZZY LOGIC

Fuzzy Sets – Operations on Fuzzy Sets – Fuzzy Relations – Membership Functions-Fuzzy Rules and Fuzzy Reasoning – Fuzzy Inference Systems – Fuzzy Expert Systems – Fuzzy Decision Making.

UNIT V NEURO-FUZZY MODELING

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

TOTAL = 45

TEXT BOOKS

- 1. Jyh-Shing Roger Jang, Chuen-Tsai Sun, Eiji Mizutani, "Neuro-Fuzzy and Soft Computing", Prentice-Hall of India, 2003.
- 2. George J. Klir and Bo Yuan, "Fuzzy Sets and Fuzzy Logic-Theory and Applications", Prentice Hall, 1995.
- 3. James A. Freeman and David M. Skapura, "Neural Networks Algorithms, Applications, and Programming Techniques", Pearson Edn., 2003.

REFERENCES

- 1. Mitchell Melanie, "An Introduction to Genetic Algorithm", Prentice Hall, 1998.
- 2. David E. Goldberg, "Genetic Algorithms in Search, Optimization and Machine Learning", Addison Wesley, 1997.

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- 3. S. N. Sivanandam, S. Sumathi and S. N. Deepa, "Introduction to Fuzzy Logic using MATLAB", Springer, 2007.
- 4. S.N.Sivanandam · S.N.Deepa, " Introduction to Genetic Algorithms", Springer, 2007.
- 5. Jacek M. Zurada, "Introduction to Artificial Neural Systems", PWS Publishers, 1992.

IT9160 NATURAL LANGUAGE PROCESSING

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

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

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

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

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

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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REFERENCES

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

CP9163 **EMBEDDED SYSTEMS**

UNIT I EMBEDDED COMPUTING

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

UNIT II **EMBEDDED C PROGRAMMING**

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**

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

PROCESSES AND OPERATING SYSTEMS UNIT IV

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

UNIT V EMBEDDED SYSTEM DEVELOPMENT

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

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

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CP9164 DATA WAREHOUSING AND DATA MINING

UNIT I

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

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

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

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

Mining Object, Spatial, Multimedia, Text and Web Data:

Multidimensional Analysis and Descriptive Mining of Complex Data Objects – Spatial Data Mining – Multimedia Data Mining – Text Mining – Mining the World Wide Web.

REFERENCES

- 1. Jiawei Han and Micheline Kamber "Data Mining Concepts and Techniques" Second Edition,
- 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

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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.

SW9155 SUPPLY CHAIN MANAGEMENT

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UNIT I FUNDAMENTALS OF SUPPLY CHAIN MANAGEMENT

Supply chain networks, Integrated supply chain planning, Decision phases in s 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) LTPC 3003

UNIT I **PROJECT MANAGEMENT CONCEPTS**

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**

SOFTWARE ESTIMATION & COSTING UNIT II

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**

Risk Definition – Risk Categories – Risk Assessment (Identification / Analysis / Prioritization) - Risk Control (Planning / Resolution / Monitoring) - Failure Mode and Effects Analysis (FMEA)

UNIT IV METRICS

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**

Team Management – Client Relationship Management.

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.

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- 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. "Peopleware: Productive Projects and Teams, 2nd Ed.", Dorset House, 1999.

CP9167 DIGITAL IMAGE PROCESSING

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UNIT I FUNDAMENTALS OF IMAGE PROCESSING

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

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

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

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

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

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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.

IT9156 MULTI-CORE PROGRAMMING

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UNIT I INTRODUCTION TO MULTIPROCESSORS AND SCALABILITY ISSUES

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

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

UNIT III Openmp Programming

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

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

UNIT V MULTITHREADED APPLICATION DEVELOPMENT:

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.

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CLOUD COMPUTING CP9172

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**

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**

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**

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

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

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.



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TOTAL=45

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

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

UNIT III NETWORK VIRTUALIZATION

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 - VFIs 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

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

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

TOTAL NUMBER OF PERIODS 45HRS

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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

UNIT I

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

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

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

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

UNIT V

Transaction processing – paradigm – protocols and coodination – 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.



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IT9158 INFORMATION RETRIEVAL TECHNIQUES

UNIT I INTRODUCTION

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

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

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

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

UNIT V **APPLICATIONS**

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

REFERENCES

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

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CP9125 MOBILE AND PERVASIVE COMPUTING

UNIT I

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

UNIT II

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

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. ALI technologies.

UNIT IV

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

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.

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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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CP9176 HUMAN RESOURCE MANAGEMENT

UNIT I PERSPECTIVES IN HUMAN RESOURCE MANAGEMENT

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

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

Types of training, methods, purpose, benefits and resistance. Executive development programmes - common practices - benefits - self development - knowledge management.

UNIT IV SUSTAINING EMPLOYEE INTEREST

Compensation plan – reward – motivation – theories of motivation – career management development, mentor – protégé relationships.

PERFORMANCE EVALUATION AND CONTROL PROCESS UNIT V 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.

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CP9177 MULTICORE ARCHITECTURE

UNIT I

Fundamentals of SuperScalar Processor Design, Introduction to Multicore Architecture – Chip Multiprocessing, homogeneous Vs heterogeneous design - SMP - Multicore Vs Multithreading.

UNIT II

Shared memory architectures- synchronization - Memory organization - Cache Memory Cache Coherency Protocols - Design of Levels of Caches.

UNIT III

Multicore programming Model - Shared memory model, message passing model, transaction model – OpenMP and MPI Programming.

UNIT IV

PowerPC architecture – RISC design, PowerPC ISA, PowerPC Memory Management Power 5 Multicore architecture design, Power 6 Architecture.

UNIT V

Cell Broad band engine architecture, PPE (Power Processor Element), SPE (Synergistic processing element), Cell Software Development Kit, Programming for Multicore architecture.

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.
- IBM Journals for Power 5, Power 6 and Cell Broadband engine architecture. 3.

REFERENCES

- 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.

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