AFFILIATED INSTITUTIONS

ANNA UNIVERSITY, CHENNAI

REGULATIONS - 2009

M.TECH. INFORMATION TECHNOLOGY

I TO VI SEMESTERS (PART TIME) CURRICULUM AND SYLLABUS

SEMESTER I

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1	**MA9219**	Operations Research	3	1	0	4
2	CS9212	Data Structures and algorithms	3	0	0	3
3	CS9211	Computer Architecture	3	0	0	3
PRACTICAL						
4	CS9215	**Data Structures Laboratory**	0	0	3	2
		TOTAL	**9**	**1**	**3**	**12**

SEMESTER II

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1	IT9221	Information Systems Design	3	0	0	3
2	IT9222	Software Requirements Engineering	3	0	0	3
3	IT9223	Advance Database Systems	3	0	0	3
PRACTICAL						
4	**IT9225**	**Internet Programming Lab**	**1**	**0**	**3**	**3**
		TOTAL	**10**	**0**	**3**	**12**

SEMESTER III

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1	**CS9213**	Computer Networks and Management	3	0	0	3
2	IT9211	Software Engineering	3	0	0	3
PRACTICAL						
3	CS9216	**Networking Laboratory**	0	0	3	2
		TOTAL	**6**	**0**	**3**	**8**

SEMESTER IV

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1	**CS9224**	**Information Security**	**3**	**0**	**0**	**3**
2	IT9224	Distributed Systems	3	0	0	3
3	E1	Elective – I	3	0	0	3
PRACTICAL						
4	SE9217	Case Tools Laboratory	0	0	3	2
		TOTAL	**9**	**0**	**3**	**11**

SEMESTER V

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SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1	E2	Elective II	3	0	0	3
2	E3	Elective III	3	0	0	3
3	E4	Elective IV	3	0	0	3
PRACTICAL						
4	IT9234	Project Work (phase - I)	0	0	12	6
		TOTAL	**9**	**0**	**12**	**15**

SEMESTER VI

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
PRACTICAL						
1	IT9241	Project Work (Phase - II)	0	0	24	12
		TOTAL	**0**	**0**	**24**	**12**

TOTAL CREDIT 12+12+8+11+15+12 = 70

LIST OF ELECTIVES

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
1	SE9224	Software Metrics	3	0	0	3
2	CS9258	Bioinformatics	3	0	0	3
3	IT9251	Digital Signal Processing	3	0	0	3
4	CS9257	XML and Web Services	3	0	0	3
5	IT9252	Enterprise Resource Planning	3	0	0	3
6	CS9252	Grid Computing	3	0	0	3
7	IT9253	Scientific Computing	3	0	0	3
8	NE9222	High Speed Networks	3	0	0	3
9	IT9255	Pervasive Computing	3	0	0	3
10	CS9270	Component Based Technology	3	0	0	3
11	CS9254	Soft Computing	3	0	0	3
12	SE9261	Language Technologies	3	0	0	3
13	IT9256	Artificial Intelligence	3	0	0	3
14	CS9260	Embedded Systems	3	0	0	3
15	CS9264	Data Warehousing and Data Mining	3	0	0	3
16	CS9251	Mobile Computing	3	0	0	3
17	IT9257	Supply Chain Management	3	0	0	3
18	CS9269	Software Project Management	3	0	0	3
19	CS9261	Digital Imaging	3	0	0	3

MA9219 OPERATIONS RESEARCH L T P C
3 1 0 4

UNIT I QUEUEING MODELS 12

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 12

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

UNIT III SIMULATION 12

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

UNIT IV LINEAR PROGRAMMING 12

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

UNIT V NON-LINEAR PROGRAMMING 12

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

L + T: 45+15 = 60 PERIODS

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.

CS9212 DATA STRUCTURES AND ALGORITHMS L T P C
3 0 0 3

UNIT I COMPLEXITY ANALYSIS & ELEMENTARY DATA STRUCTURES 9

Asymptotic notations – Properties of big oh notation – asymptotic notation with several parameters – conditional asymptotic notation – amortized analysis – NP-completeness – NP-hard – recurrence equations – solving recurrence equations – arrays – linked lists – trees.

UNIT II HEAP STRUCTURES 9

Min-max heaps – Deaps – Leftist heaps –Binomial heaps – Fibonacci heaps – Skew heaps - Lazy-binomial heaps.

UNIT III SEARCH STRUCTURES 9

Binary search trees – AVL trees – 2-3 trees – 2-3-4 trees – Red-black trees – B-trees – splay trees – Tries.

UNIT IV GREEDY & DIVIDE AND CONQUER 9

Quicksort – Strassen's matrix multiplication – Convex hull - Tree-vertex splitting – Job sequencing with deadlines – Optimal storage on tapes

UNIT V DYNAMIC PROGRAMMING AND BACKTRACKING 9

Multistage graphs – 0/1 knapsack using dynamic programming – Flow shop scheduling – 8-queens problem – graph coloring – knapsack using backtracking

TOTAL: 45 PERIODS

REFERENCES:

1. E. Horowitz, S.Sahni and Dinesh Mehta, Fundamentals of Data structures in C++, Galgotia, 1999.
2. E. Horowitz, S.Sahni and S. Rajasekaran, Computer Algorithms / C++, Galgotia, 1999.
3. Adam Drozdex, Data Structures and algorithms in C++, Second Edition, Thomson learning – vikas publishing house, 2001.
4. G. Brassard and P. Bratley, Algorithmics: Theory and Practice, Printice –Hall, 1988.
5. Thomas H.Corman, Charles E.Leiserson, Ronald L. Rivest, "Introduction to Algorithms", Second Edition, PHI 2003.

CS9211 COMPUTER ARCHITECTURE L T P C
3 0 0 3

UNIT I FUNDAMENTALS OF COMPUTER DESIGN AND PIPELINING 9

Fundamentals of Computer Design – Measuring and reporting performance – Quantitative principles of computer design. Instruction set principles – Classifying ISA – Design issues. Pipelining – Basic concepts – Hazards – Implementation – Multicycle operations.

UNIT II INSTRUCTION LEVEL PARALLELISM WITH DYNAMIC APPROACHES 9

Concepts – Dynamic Scheduling – Dynamic hardware prediction – Multiple issue – Hardware based speculation – Limitations of ILP – Case studies.

UNIT III INSTRUCTION LEVEL PARALLELISM WITH SOFTWARE APPROACHES 9

Compiler techniques for exposing ILP – Static branch prediction – VLIW – Advanced compiler support – Hardware support for exposing more parallelism – Hardware versus software speculation mechanisms – Case studies.

UNIT IV MULTIPROCESSORS AND MULTICORE ARCHITECTURES 9

Symmetric and distributed shared memory architectures – Performance issues – Synchronisation issues – Models of memory consistency – Software and hardware multithreading – SMT and CMP architectures – Design issues – Case studies.

UNIT V MEMORY AND I/O **9**

Cache performance – Reducing cache miss penalty and miss rate – Reducing hit time – Main memory and performance – Memory technology. Types of storage devices – Buses – RAID – Reliability, availability and dependability – I/O performance measures – Designing an I/O system.

TOTAL:45 PERIODS

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.
4. Behrooz Parhami, "Computer Architecture", Oxford University Press, 2006.

CS9215 DATA STRUCTURES LABORATORY **L T P C**
0 0 3 2

1. Min Heap
2. Deaps
3. Leftist Heap
4. AVL Tree
5. B-Tree
6. Tries
7. Quick Sort
8. Convex hull
9. 0/1 Knapsack using Dynamic Programming
10. Graph coloring using backtracking

TOTAL: 45 PERIODS

IT9221 INFORMATION SYSTEMS DESIGN **L T P C**
3 0 0 3

UNIT I INFORMATION SYSTEM AND ORGANIZATION **9**

Matching the Information System Plan to the Organizational Strategic Plan – Identifying Key Organizational Objective and Processes and Developing an Information System Development – User role in Systems Development Process – Maintainability and Recoverability in System Design.

UNIT II REPRESENTATION AND ANALYSIS OF SYSTEM STRUCTURE 9

Models for Representing Systems: Mathematical, Graphical and Hierarchical (Organization Chart, Tree Diagram) – Information Flow – Process Flow – Methods and Heuristics – Decomposition and Aggregation – Information Architecture - Application of System Representation to Case Studies

UNIT III SYSTEMS, INFORMATION AND DECISION THEORY 9

Information Theory – Information Content and Redundancy – Classification and Compression – Summarizing and Filtering – Inferences and Uncertainty – Identifying Information needed to Support Decision Making – Human Factors – Problem characteristics and Information System Capabilities in Decision Making.

UNIT IV INFORMATION SYSTEM APPLICATION 9

Transaction Processing Applications – Basic Accounting Application – Applications for Budgeting and Planning – Other use of Information Technology: Automation – Word Processing – Electronic Mail – Evaluation Remote Conferencing and Graphics – System and Selection – Cost Benefit – Centralized versus Decentralized Allocation Mechanism.

UNIT V DEVELOPMENT AND MAINTENANCE OF INFORMATION SYSTEMS 9

Systems analysis and design – System development life cycle – Limitation – End User Development – Managing End Users – off-the Shelf Software Packages – Outsourcing – Comparison of Different Methodologies.

TOTAL : 45 PERIODS

TEXT BOOKS:

1. K. C. Laudon, J. P. Laudon, M. E. Brabston, “Management Information Systems: Managing the Digital Firm”, Pearson Education 2002.
2. K. C. Laudon, J. P. Laudon, “Management Information Systems, Organization and Technology in the Networked Enterprise,” Sixth Edition, Prentice Hall, 2000.

REFERENCES:

1. E.F. Turban, R.K., R.E. Potter. “Introduction to Information Technology”, Wiley, 2004.
2. M. E. Brabston, “Management Information Systems: Managing the Digital Firm”, Pearson Education, 2002.
3. Jeffrey A. Hoffer, Joey F. George, Joseph S. Valachich, “Modern Systems Analysis and Design”, Third Edition, Prentice Hall,2002.

IT9222 SOFTWARE REQUIREMENTS ENGINEERING L T P C
3 0 0 3

UNIT I REQUIREMENTS ENGINEERING OVERVIEW 9

Software Requirement Overview – Software Development Roles –Software Development Process Kernels – Commercial Life Cycle Model – Vision Development – Stakeholders Needs and Analysis – Stakeholder needs – Stakeholder activities.

UNIT II REQUIREMENTS ELICITATION 9

The Process of Requirements Elicitation – Requirements Elicitation Problems – Problems of Scope – Problems of Understanding – Problems of Volatility – Current Elicitation Techniques – Information Gathering – Requirements Expression and Analysis – Validation – An Elicitation Methodology Framework – A Requirements Elicitation Process Model – Methodology over Method – Integration of Techniques – Fact–Finding – Requirements Gathering – Evaluation and Rationalization – Prioritization – Integration and Validation.

UNIT III REQUIREMENTS ANALYSIS 9

Identification of Functional and Non Functional Requirements – Identification of Performance Requirements – Identification of safety Requirements – Analysis – Feasibility & Internal Compatibility of System Requirements – Definition of Human Requirements Baseline.

UNIT IV REQUIREMENTS DEVELOPMENT 9

Requirements Analysis – Requirements Documentation – Requirements Development Workflow – Fundamentals of Requirements Development – Requirements Attributes Guidelines Document – Supplementary Specification Document – Use Case Specification Document – Methods for Software Prototyping – Evolutionary Prototyping –Throwaway Prototyping.

UNIT V REQUIREMENTS VALIDATION 9

Validation Objectives – Analysis of Requirements Validation – Activities – Properties – Requirement Reviews – Requirements Testing – Case Tools For Requirements Engineering.

TOTAL = 45 PERIODS

TEXT BOOKS:

1. Ian Sommerville, Pete Sawyer, “Requirements Engineering: A Good Practice Guide”, John Wiley and sons, 2000.
2. Dean Leffingwell, Don Widrig, “Managing Software Requirements, Second Addition: A Use Case Approach”, Addison Wesley, 2003.
3. Karl Eugene Wiegers, ”Software Requirements”, Microsoft Press, 1999.
4. Ian Graham, ”Requirements Engineering and Rapid Development”, Addison Wesley 1998.

IT9223 ADVANCED DATABASE SYSTEMS L T P C
3 0 0 3

UNIT I DISTRIBUTED DATABASES 5

Distributed Databases Vs Conventional Databases – Architecture – Fragmentation – Query Processing – Transaction Processing – Concurrency Control – Recovery.

UNIT II OBJECT ORIENTED DATABASES 10

Introduction to Object Oriented Data Bases - Approaches - Modeling and Design - Persistence – Query Languages - Transaction - Concurrency – Multi Version Locks - Recovery.

UNIT III EMERGING SYSTEMS 10

Enhanced Data Models - Client/Server Model - Data Warehousing and Data Mining - Web Databases – Mobile Databases.

UNIT IV DATABASE DESIGN ISSUES 10

ER Model - Normalization - Security - Integrity - Consistency - Database Tuning - Optimization and Research Issues – Design of Temporal Databases – Spatial Databases.

UNIT V CURRENT ISSUES 10

Rules - Knowledge Bases - Active and Deductive Databases - Parallel databases – Multimedia Databases – Image Databases – Text Database

TOTAL : 45 PERIODS

REFERENCES:

1. Elisa Bertino, Barbara Catania, Gian Piero Zarri, “Intelligent Database Systems”, Addison-Wesley, 2001.
2. Carlo Zaniolo, Stefano Ceri, Christos Faloustsos, R.T.Snodgrass, V.S.Subrahmanian, “Advanced Database Systems”, Morgan Kaufman, 1997.
3. N.Tamer Ozsu, Patrick Valduriez, “Principles of Distributed Database Systems”, Prentice Hal International Inc., 1999.
4. C.S.R Prabhu, “Object-Oriented Database Systems”, Prentice Hall of India, 1998.
5. Abdullah Uz Tansel et al, “Temporal Databases: Theory, Design and principles”, Benjamin Cummings Publishers, 1993.
6. Raghu Ramakrishnan, Johannes Gehrke, “Database Management Systems”, McGraw Hill, Third Edition 2004.
7. Henry F Korth, Abraham Silberschatz, S. Sudharshan, “Database System Concepts”, Fourth Ediion, McGraw Hill, 2002.
8. R. Elmasri, S.B. Navathe, “Fundamentals of Database Systems”, Pearson Education, 2004.

IT9225 INTERNET PROGRAMMING LAB L T P C
1 0 3 3

1. Designing Web Pages using Client Side Scripting and DHTML.
2. Client Server Scripting Programs.

3. Simulation of Email and File Transfer Protocols.
4. Development of Web Services.
5. XML and Databases.
6. Server Side Application Using JSP.
7. Web Customisation.
8. Development of E-Business Application.

TOTAL : 60 PERIODS

CS9213 COMPUTER NETWORKS AND MANAGEMENT L T P C
3 0 0 3

UNIT I HIGH SPEED NETWORKS 9

Frame Relay Networks – Asynchronous transfer mode – ATM Protocol Architecture, ATM logical Connection, ATM Cell – ATM Service Categories – AAL. High Speed LAN's: Fast Ethernet, Gigabit Ethernet, Fibre Channel – Wireless LAN's.

UNIT II CONGESTION AND TRAFFIC MANAGEMENT 9

Queuing Analysis- Queuing Models – Single Server Queues – Effects of Congestion – Congestion Control – Traffic Management – Congestion Control in Packet Switching Networks – Frame Relay Congestion Control.

UNIT III TCP AND ATM CONGESTION CONTROL 10

TCP Flow control – TCP Congestion Control – Retransmission – Timer Management – Exponential RTO backoff – KARN's Algorithm – Window management – Performance of TCP over ATM. Traffic and Congestion control in ATM – Requirements – Attributes – Traffic Management Frame work, Traffic Control – ABR traffic Management – ABR rate control, RM cell formats, ABR Capacity allocations – GFR traffic management.

UNIT IV INTEGRATED AND DIFFERENTIATED SERVICES 9

Integrated Services Architecture – Approach, Components, Services- Queuing Discipline, FQ, PS, BRFQ, GPS, WFQ – Random Early Detection, Differentiated Services.

UNIT V PROTOCOLS FOR QoS SUPPORT 8

RSVP – Goals & Characteristics, Data Flow, RSVP operations, Protocol Mechanisms – Multiprotocol Label Switching – Operations, Label Stacking, Protocol details – RTP – Protocol Architecture, Data Transfer Protocol, RTCP.

TOTAL : 45 PERIODS

TEXT BOOKS:

1. William Stallings, "HIGH SPEED NETWORKS AND INTERNET", Pearson Education,Second Edition, 2002.

REFERENCES:

1. Warland & Pravin Varaiya, "HIGH PERFORMANCE COMMUNICATION NETWORKS", Jean Harcourt Asia Pvt. Ltd., II Edition, 2001.

2 Irvan Pepelnjk, Jim Guichard and Jeff Apcar, “MPLS and VPN architecture”, Cisco Press, Volume 1 and 2, 2003.

IT9211 SOFTWARE ENGINEERING L T P C
3 0 0 3

UNIT I **9**

Definition – systems approach – modeling the process and lifecycle – meaning of process – software process models – tools and techniques – practical process modeling – information systems – planning and managing the project – tracking project – project personnel – effort estimation – risk management – project plan – process models and project management

UNIT II **9**

Capturing the requirements – requirements process – requirements elicitation – types – characteristics – modeling notations – specification languages – prototyping – documentation – validation and verification – measures – specification techniques – designing the system – decomposition and modularity – architectural styles and strategies – issues – characteristics – improvement techniques – design evaluation, validation – documentation

UNIT III **8**

Considering objects – object orientation – OO development – use cases – representing OO – OO system design – program design – OO measurement – writing programs – standards – procedures – guidelines – documentation – programming process

UNIT IV **9**

Testing the program – faults – failures – issues – unit testing – Integration testing – testing OO systems – test planning – automated testing tools - testing the system – principles – function testing – performance testing – reliability, availability and maintainability – acceptance testing – installation testing – automated system testing – test documentation – testing safety critical systems – delivering the system – training – documentation

UNIT V **10**

System maintenance – the changing system – nature of maintenance – problems – measuring maintenance characteristics – techniques and tools – software rejuvenation – evaluation approaches – selection – assessment vs. prediction - evaluating products, processes and resources – improving predictions, products, processes and resources – guidelines – decision making in software engineering – licensing – certification and ethics

TOTAL:45 PERIODS

TEXT BOOKS:

1. Shari Lawrence Pfleeger, Joanne M. Atlee, Software Engineering: Theory and Practice, Prentice Hall, 2006

REFERENCES:

1. Carlo Ghezzi, Mehdi Jazayeri, Dino Mandrioli, Fundamentals of Software Engineering, Prentice Hall, 2002

CS9216 NETWORKING LABORATORY L T P C
0 0 3 2

1. Socket Programming
   a. TCP Sockets
   b. UDP Sockets
   c. Applications using Sockets
2. Simulation of Sliding Window Protocol
3. Simulation of Routing Protocols
4. Development of applications such as DNS/ HTTP/ E – mail/ Multi - user Chat
5. Simulation of Network Management Protocols
6. Study of Network Simulator Packages – such as opnet, ns2, etc.

TOTAL: 45 PERIODS

CS9224 INFORMATION SECURITY L T P C
3 0 0 3

UNIT I **9**
An Overview of Computer Security, Access Control Matrix, Policy-Security policies, Confidentiality policies, Integrity policies and Hybrid policies.

UNIT II **9**
Cryptography- Key management – Session and Interchange keys, Key exchange and generation, Cryptographic Key Infrastructure, Storing and Revoking Keys, Digital Signatures, Cipher Techniques

UNIT III **9**
Systems: Design Principles, Representing Identity, Access Control Mechanisms, Information Flow and Confinement Problem.

UNIT IV **9**
Malicious Logic, Vulnerability Analysis, Auditing and Intrusion Detection

UNIT V **9**
Network Security, System Security, User Security and Program Security

TOTAL:45 PERIODS

TEXT BOOK:

1. Matt Bishop ,“Computer Security art and science ”, Second Edition, Pearson Education

REFERENCES:

1. Mark Merkow, James Breithaupt “ Information Security : Principles and Practices” First Edition, Pearson Education,
2. Whitman, “Principles of Information Security”, Second Edition, Pearson Education
3. William Stallings, “Cryptography and Network Security: Principles and Practices”, Third Edition, Pearson Education.
4. “Security in Computing ”, Charles P.Pfleeger and Shari Lawrence Pfleeger, Third Edition.

IT9224	DISTRIBUTED SYSTEMS	L T P C 3 0 0 3

UNIT I INTRODUCTION AND COMMUNICATION 8

Introduction – Distributed Operating Systems – Network Operating System – Middleware – Client-Server Model – Remote Procedure Call – Remote Object Invocation – Message-Oriented Communication – Threads in Distributed Systems – Code Migration.

UNIT II DISTRIBUTED OPERATING SYSTEMS 12

Clock Synchronization – Logical Clocks – Global States – Election Algorithms – Mutual Exclusion – Distributed Transactions – Consensus and Related Problems – Distributed Deadlocks.

UNIT III DISTRIBUTED SHARED MEMORY AND FAULT TOLERANCE 9

Introduction – Data-Centric Consistency Models – Client-Centric Consistency Models – Distribution Protocol – Consistency Protocol – Sequential Consistency and Ivy, Release Consistency and Munin – Introduction to Fault Tolerance – Distributed Commit.

UNIT IV DISTRIBUTED FILE SYSTEMS 8

Introduction to Distributed File Systems – File Service Architecture – Sun Network File System – The Andrew File System – Recent Advances.

UNIT V CASE STUDIES 8

CORBA – Mach – JINI.

TOTAL :45 PERIODS

TEXT BOOKS:

1. A.S. Tanenbaum, M. VanSteen, “Distributed Systems”, Pearson Education 2004.

2. George Coulouris, Jean Dollimore, Tim Kindberg, “Distributed Systems Concepts and Design”, Third Edition, Pearson Education, 2002.

REFERENCES:

1. Mukesh Singhal, “Advanced Concepts In Operating Systems”, McGraw Hill Series in Computer Science, 1994.
2. P.K.Sinha, “Distributed Operating Systems”.

SE9217 CASE TOOLS LABORATORY L T P C
0 0 3 2

1. Practicing the different types of case tools such as (Rational Rose & other Open Source) used for all the phases of Software development life cycle.
2. Data modeling
3. Semantic data modeling
4. Source code generators
5. Re-engineering
6. Experimenting CASE Environments

    a. Toolkits
    b. Language-centered
    c. Integrated
    d. Fourth generation
    e. Process-centered

7. Implementation of the following using CASE Workbenches:

    a. Business planning and modeling
    b. Analysis and design
    c. User-interface development
    d. Programming
    e. Verification and validation
    f. Maintenance and reverse engineering
    g. Configuration management
    h. Project management

TOTAL :45 PERIODS

SE9224 SOFTWARE METRICS L T P C

3 0 0 3

UNIT I MEASUREMENTS THEORY 9

Fundamentals Of Measurement - Measurements In Software Engineering - Scope Of Software Metrics - Measurements Theory - Goal Based Framework - Software Measurement Validation.

UNIT II DATA COLLECTION AND ANALYSIS 9

Empirical Investigation - Planning Experiments - Software Metrics Data Collection - Analysis Methods – Statistical Methods.

UNIT III PRODUCTS METRICS 9

Measurement Of Internet Product Attributes - Size And Structure - External Product Attributes - Measurement Of Quality.

UNIT IV QUALITY METRICS 9

Software Quality Metrics - Product Quality - Process Quality - Metrics For Software Maintenance - Case Studies Of Metrics Program - Motorola - Hp And IBM.

UNIT V MANAGEMENT METRICS 9

Quality Management Models - Rayleigh Model - Problem Tracking Report (PTR) Model - Reliability Growth Model - Model Evaluation - Orthogonal Classification.

TOTAL : 45 PERIODS

REFERENCES:

1. Norman E – Fentar, Share Lawrence Pflieger, "Software Metrics", International Thomson Computer Press, 1997.
2. Stephen H. Kin, "Metric and Models in Software Quality Engineering", Addison Wesley, 1995.

CS9258 BIO INFORMATICS L T P C
3 0 0 3

UNIT I INTRODUCTORY CONCEPTS 9

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

UNIT II SEARCH ENGINES AND DATA VISUALIZATION 9

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

UNIT III STATISTICS AND DATA MINING 9

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

UNIT IV PATTERN MATCHING 9

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

UNIT V MODELING AND SIMULATION 9

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

TOTAL : 45 PERIODS

TEXT BOOKS:

1. Bryan Bergeron, “Bio Informatics Computing”, Second Edition, Pearson Education, 2003.

REFERENCES:

1. T.K.Attwood and D.J. Perry Smith, “Introduction to Bio Informatics, Longman Essen, 1999.

IT9251 DIGITAL SIGNAL PROCESSING L T P C
3 0 0 3

AIM:

To give an understanding on the study that deals with the representation of signals as ordered sequences of numbers and how to process those ordered sequences.

OBJECTIVES:

- To understand the basics of signals and system by analyzing the various transformations available and determine their use to DSP
- To study on the various digital filtering techniques and how to apply to DSP
- To study on the ways to estimate signal parameters, and transform a signal into a form that is more informative.
- To give students a flavour on the applications of DSP in the areas of speech and image

UNIT I SIGNALS AND SYSTEMS 9

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 FREQUENCY TRANSFORMATIONS 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.

UNIT III IIR FILTER DESIGN 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 FIR FILTER DESIGN 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 APPLICATIONS 9

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

TOTAL: 45 PERIODS

TEXT BOOKS:

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.

REFERENCES:

1. Sanjit K. Mitra, “Digital Signal Processing – A Computer Based Approach” ,Tata McGraw Hill, Fourth Edition, 2007 .
2. Alan V.Oppenheim, Ronald W. Jchafer & Hohn. R.Back, “Discrete Time Signal Processing”, Pearson Education, Second Edition, 2001.
3. Andreas Antoniou, “Digital Signal Processing”, Tata McGraw Hill.

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

UNIT I XML TECHNOLOGY FAMILY 9

XML – benefits – Advantages of XML over HTML – EDL –Databases – XML based standards – DTD –XML Schemas – X- Files – XML processing – DOM –SAX- presentation technologies – XSL – XFORMS – XHTML – voice XML – Transformation – XSLT – XLINK – XPATH –XQ

UNIT II ARCHITECTING WEB SERVICES 9

Business motivations for web services – B2B – B2C- Technical motivations – limitations of CORBA and DCOM – Service – oriented Architecture (SOA) – Architecting web services – Implementation view – web services technology stack – logical view – composition of web services – deployment view – from application server to peer to peer – process view – life in the runtime

UNIT III WEB SERVICES BUILDING BLOCK 9

Transport protocols for web services – messaging with web services – protocols – SOAP – describing web services – WSDL – Anatomy of WSDL – manipulating WSDL – web service policy – Discovering web services – UDDI – Anatomy of UDDI- Web service inspection – Ad-Hoc Discovery – Securing web services.

UNIT IV IMPLEMENTING XML IN E-BUSINESS 9

B2B - B2C Applications – Different types of B2B interaction – Components of e-business XML systems – ebXML – Rosetta Net Applied XML in vertical industry – Web services for mobile devices.

UNIT V XML AND CONTENT MANAGEMENT 9

Semantic Web – Role of Meta data in web content – Resource Description Framework – RDF schema – Architecture of semantic web – content management workflow – XLANG –WSFL.

TOTAL: 45 PERIODS

TEXT BOOK

1. Ron schmelzer et al, "XML and Web Services", Pearson Education, 2002.
2. Sandeep Chatterjee and James Webber, "Developing Enterprise Web Services: An Architect's Guide", Prentice Hall, 2004.

REFERENCES

1. Frank P. Coyle, "XML, Web Services and the Data Revolution", Pearson Education, 2002.
2. Keith Ballinger, ".NET Web Services Architecture and Implementation", Pearson Education, 2003.
3. Henry Bequet and Meeraj Kunnumpurath, "Beginning Java Web Services", Apress, 2004.
4. Russ Basiura and Mike Batongbacal, "Professional ASP.NET Web Services", Apress,2.

IT9252 ENTERPRISE RESOURCE PLANNING L T P C
3 0 0 3

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 Maintanance – 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 PERIODS

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

CS9252 GRID COMPUTING L T P C

3 0 0 3

UNIT I INTRODUCTION TO GRID COMPUTING 7

Introduction – The Grid – Past, Present and Future – Applications of grid computing organizations and their roles.

UNIT II GRID COMPUTING ARCHITURE 8

Grid Computing anatomy – Next generation of Grid computing initiatives–Merging the Grid services architecture with Web services architecture.

UNIT III GRID COMPUTING TECHNOLOGIES 11

OGSA – Sample use cases that drive the OGSA platform components – OGSI and WSRF– OGSA Basic Services – Security standards for grid computing.

UNIT IV GRID COMPUTING TOOL KIT 10

Globus Toolkit –Versions – Architecture –GT Programming model –A sample grid service implementation.

UNIT V HIGH LEVEL GRID SERVICES 9

High level grid services – OGSI .NET middleware Solution Mobile OGSI.NET for Grid computing on Mobile devices.

TOTAL : 45PERIODS

TEXT BOOKS:

1. Joshy Joseph & Craig Fellenstein, “Grid Computing”, Pearson/PHI PTR-2003.

REFERENCES:

1. Fran Berman, Geoffrey Fox, Anthony J.G. Hey, “Grid Computing: Making the Global Infrastructure a reality “, John Wiley and sons,2003.
2. Ahmar Abbas, “Grid Computing: A Practical Guide to Technology and Applications”, Charles River media, 2003.

IT9253	SCIENTIFIC COMPUTING	L T P C 3 0 0 3

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:

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

NE9222	HIGH SPEED NETWORKS	L T P C 3 0 0 3

UNIT I HIGH SPEED NETWORKS 9

Frame Relay Networks – Asynchronous transfer mode – ATM Protocol Architecture, ATM logical Connection, ATM Cell – ATM Service Categories – AAL. High Speed LAN's: Fast Ethernet, Gigabit Ethernet, Fibre Channel – Wireless LAN's.

UNIT II CONGESTION AND TRAFFIC MANAGEMENT 9

Queuing Analysis- Queuing Models – Single Server Queues – Effects of Congestion – Congestion Control – Traffic Management – Congestion Control in Packet Switching Networks – Frame Relay Congestion Control.

UNIT III TCP AND ATM CONGESTION CONTROL 10

TCP Flow control – TCP Congestion Control – Retransmission – Timer Management – Exponential RTO backoff – KARN's Algorithm – Window management – Performance of TCP over ATM. Traffic and Congestion control in ATM – Requirements – Attributes – Traffic Management Frame work, Traffic Control – ABR traffic Management – ABR rate control, RM cell formats, ABR Capacity allocations – GFR traffic management.

UNIT IV INTEGRATED AND DIFFERENTIATED SERVICES 9

Integrated Services Architecture – Approach, Components, Services- Queuing Discipline, FQ, PS, BRFQ, GPS, WFQ – Random Early Detection, Differentiated Services.

UNIT V PROTOCOLS FOR QoS SUPPORT 8

RSVP – Goals & Characteristics, Data Flow, RSVP operations, Protocol Mechanisms – Multiprotocol Label Switching – Operations, Label Stacking, Protocol details – RTP – Protocol Architecture, Data Transfer Protocol, RTCP.

TOTAL : 45 PERIODS

TEXT BOOKS:

1. William Stallings, "HIGH SPEED NETWORKS AND INTERNET", Pearson Education, Second Edition, 2002.

REFERENCES:

1. Warland & Pravin Varaiya, "HIGH PERFORMANCE COMMUNICATION NETWORKS", Jean Harcourt Asia Pvt. Ltd., II Edition, 2001.
2. Irvan Pepelnjk, Jim Guichard and Jeff Apcar, "MPLS and VPN architecture", Cisco Press, Volume 1 and 2, 2003.

IT9255 **PERVASIVE COMPUTING** **L T P C**
3 0 0 3

UNIT I **9**
Pervasive Computing Application - Pervasive Computing devices and Interfaces - Device technology trends, Connecting issues and protocols.

UNIT II **9**
Pervasive Computing and web based Applications - XML and its role in Pervasive Computing - Wireless Application Protocol (WAP) Architecture and Security - Wireless Mark-Up language (WML) – Introduction.

UNIT III **9**
Voice Enabling Pervasive Computing - Voice Standards - Speech Applications in Pervasive Computing and security.

UNIT IV **9**
PDA in Pervasive Computing – Introduction - PDA software Components, Standards, emerging trends - PDA Device characteristics - PDA Based Access Architecture.

UNIT V **9**
User Interface Issues in Pervasive Computing, Architecture - Smart Card- based Authentication Mechanisms - Wearable computing Architecture.

TOTAL : 45 PERIODS

TEXT BOOKS:

1. Jochen Burkhardt, Horst Henn, Stefan Hepper, Thomas Schaec & Klaus Rindtorff.Pervasive Computing Technology and Architecture of Mobile Internet Applications, Addision Wesley, Reading, 2002.

2. Uwe Ha nsman, Lothat Merk, Martin S Nicklous & Thomas Stober: Principles of Mobile Computing, Second Edition, Springer- Verlag, New Delhi, 2003. Reference Books

REFERENCES:

1. Rahul Banerjee: Internetworking Technologies: An Engineering Perspective, Prentice Hall of India, New Delhi, 2003. (ISBN 81-203-2185-5)

2**.** Rahul Banerjee: Lecture Notes in Pervasive Computing, Outline Notes, BITS-Pilani, 2003.

CS9270 COMPONENT BASED TECHNOLOGY

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UNIT I INTRODUCTION 9

Software Components – objects – fundamental properties of Component technology – modules – interfaces – callbacks – directory services – component architecture – components and middleware.

UNIT II JAVA COMPONENT TECHNOLOGIES 9

Threads – Java Beans – Events and connections – properties – introspection – JAR files – reflection – object serialization – Enterprise Java Beans – Distributed Object models – RMI and RMI-IIOP.

UNIT III CORBA TECHNOLOGIES 9

Java and CORBA – Interface Definition language – Object Request Broker – system object model – portable object adapter – CORBA services – CORBA component model – containers – application server – model driven architecture.

UNIT IV COM AND .NET TECHNOLOGIES 9

COM – Distributed COM – object reuse – interfaces and versioning – dispatch interfaces – connectable objects – OLE containers and servers – Active X controls – .NET components - assemblies – appdomains – contexts – reflection – remoting.

UNIT V COMPONENT FRAMEWORKS AND DEVELOPMENT 9

Connectors – contexts – EJB containers – CLR contexts and channels – Black Box component framework – directory objects – cross-development environment – component-oriented programming – Component design and implementation tools – testing tools - assembly tools.

TOTAL : 45 PERIODS

TEXT BOOKS:

1 “Component Software: Beyond Object-Oriented Programming”, Pearson Education publishers, 2003.

REFERENCES:

1. Ed Roman, “Enterprise Java Beans”, Third Edition , Wiley , 2004.

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

UNIT I INTRODUCTION TO SOFT COMPUTING AND NEURAL NETWORKS 9

Evolution of Computing - Soft Computing Constituents – From Conventional AI to Computational Intelligence - Machine Learning Basics

UNIT II GENETIC ALGORITHMS 9

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

UNIT III NEURAL NETWORKS 9

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

UNIT IV FUZZY LOGIC 9

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

UNIT V NEURO-FUZZY MODELING 9

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

TOTAL : 45 PERIODS

TEXT BOOKS:

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

REFERENCES:

1. Mitchell Melanie, “An Introduction to Genetic Algorithm”, Prentice Hall, 1998.
2. David E. Goldberg, “Genetic Algorithms in Search, Optimization and Machine Learning”, Addison Wesley, 1997.
3. S. N. Sivanandam, S. Sumathi and S. N. Deepa, “Introduction to Fuzzy Logic using MATLAB”, Springer, 2007.
4. S.N.Sivanandam · S.N.Deepa, “ Introduction to Genetic Algorithms”, Springer, 2007.
5. Jacek M. Zurada, “Introduction to Artificial Neural Systems”, PWS Publishers, 1992.

SE9261 LANGUAGE TECHNOLOGIES L T P C
3 0 0 3

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 PERIODS

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.

IT9256 ARTIFICIAL INTELLIGENCE L T P C
3 0 0 3

UNIT I INTRODUCTION 8

Intelligent Agents – Agents and environments – Good behavior – The nature of environments – structure of agents – Problem Solving – problem solving agents – example problems – searching for solutions – uniformed search strategies – avoiding repeated states – searching with partial information.

UNIT II SEARCHING TECHNIQUES 10

Informed search strategies – heuristic function – local search algorithms and optimistic problems – local search in continuous spaces – online search agents and unknown environments **–** Constraint satisfaction problems (CSP) – Backtracking search and Local search – Structure of problems **–** Adversarial Search – Games – Optimal decisions in games – Alpha – Beta Pruning – imperfect real-time decision – games that include an element of chance.

UNIT III KNOWLEDGE REPRESENTATION 10

First order logic - syntax and semantics – Using first order logic – Knowledge engineering **–** Inference – prepositional versus first order logic – unification and lifting – forward chaining – backward chaining **–** Resolution **–** Knowledge representation **–** Ontological Engineering **–** Categories and objects – Actions **–** Simulation and events **–** Mental events and mental objects.

UNIT IV LEARNING 9

Learning from observations **–** forms of learning **–** Inductive learning - Learning decision trees **–** Ensemble learning **–** Knowledge in learning – Logical formulation of learning – Explanation based learning – Learning using relevant information – Inductive logic programming - Statistical learning methods **–** Learning with complete data **–** Learning with hidden variable **–** EM algorithm **–** Instance based learning **–** Neural networks **–** Reinforcement learning – Passive reinforcement learning **–** Active reinforcement learning **–** Generalization in reinforcement learning.

UNIT V APPLICATIONS 8

Communication – Communication as action – Formal grammar for a fragment of English – Syntactic analysis – Augmented grammars – Semantic interpretation – Ambiguity and disambiguation – Discourse understanding – Grammar induction **–** Probabilistic language processing **–** Probabilistic language models – Information retrieval – Information Extraction – Machine translation.

TOTAL :45 PERIODS

REFERENCES

1. Stuart Russell, Peter Norvig, “Artificial Intelligence – A Modern Approach”, Second Edition, Pearson Education / Prentice Hall of India, 2004.
2. Nils J. Nilsson, “Artificial Intelligence: A new Synthesis”, Harcourt Asia Pvt. Ltd., 2000.
3. Elaine Rich and Kevin Knight, “Artificial Intelligence”, Second Edition, Tata McGraw Hill, 2003.
4. George F. Luger, “Artificial Intelligence-Structures And Strategies For Complex Problem Solving”, Pearson Education / PHI, 2002.

CS9260 EMBEDDED SYSTEMS L T P C
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UNIT I EMBEDDED COMPUTING 9

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

UNIT II EMBEDDED C PROGRAMMING 9

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

UNIT III OPTIMIZING ASSEMBLY CODE 9

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

UNIT IV PROCESSES AND OPERATING SYSTEMS 9

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

UNIT V EMBEDDED SYSTEM DEVELOPMENT 9

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

TOTAL : 45 PERIODS

REFERENCES

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

CS9264 DATA WAREHOUSING AND DATA MINING L T P C
3 0 0 3

UNIT I 9

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

UNIT II 9

Data Mining: - Data Mining Functionalities – Data Preprocessing – Data Cleaning – Data Integration and Transformation – Data Reduction – Data Discretization and Concept Hierarchy Generation.

Association Rule Mining: - Efficient and Scalable Frequent Item set Mining Methods – Mining Various Kinds of Association Rules – Association Mining to Correlation Analysis – Constraint-Based Association Mining.

UNIT III **9**

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

UNIT IV **9**

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

UNIT V **9**

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

TOTAL: 45 PERIODS

REFERENCES

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

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

UNIT I WIRELESS COMMUNICATION FUNDAMENTALS **9**

Introduction – Wireless transmission – Frequencies for radio transmission – Signals – Antennas – Signal Propagation – Multiplexing – Modulations – Spread spectrum – MAC – SDMA – FDMA – TDMA – CDMA – Cellular Wireless Networks.

UNIT II TELECOMMUNICATION SYSTEMS **11**

GSM – System Architecture – Protocols – Connection Establishment – Frequency Allocation – Routing – Handover – Security - GPRS

UNIT III WIRELESS NETWORKS **9**

Wireless LAN – IEEE 802.11 Standards – Architecture – services – HIPERLAN – AdHoc Network – Blue Tooth.

UNIT IV NETWORK LAYER 9

Mobile IP – Dynamic Host Configuration Protocol – Routing – DSDV – DSR – AODV – ZRP – ODMR.

UNIT V TRANSPORT AND APPLICATION LAYERS 7

TCP over Wireless Networks – Indirect TCP – Snooping TCP – Mobile TCP – Fast Retransmit / Fast Recovery – Transmission/Timeout Freezing – Selective Retransmission – Transaction Oriented TCP – WAP – WAP Architecture – WDP – WTLS – WTP – WSP – WML – WML Script – WAE – WTA.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Jochen Schiller, "Mobile Communications", Second Edition, Prentice Hall of India / Pearson Education, 2003.
2. William Stallings, "Wireless Communications and Networks", Second Edition, Prentice Hall of India / Pearson Education, 2004.

REFERENCES:

1. Kaveh Pahlavan, Prasanth Krishnamoorthy, "Principles of Wireless Networks", Pearson Education, 2003.
2. Uwe Hansmann, Lothar Merk, Martin S. Nicklons and Thomas Stober, "Principles Mobile Computing", Springer, New York, 2003.
3. C.K.Toh, "AdHoc Mobile Wireless Networks", Prentice Hall Inc., 2002.

IT9257 SUPPLY CHAIN MANAGEMENT L T P C
3 0 0 3

UNIT I BUILDING BLOCKS, PERFORMANCE MEASURES, DECISIONS 9

Building Blocks of a Supply Chain Network – Performance Measures – Decisions in the Supply Chain World – Models for Supply Chain Decision – Making.

UNIT II SUPPLY CHAIN INVENTORY MANAGEMENT 9

Economic Order Quantity Models – Reorder Point Models – Multichelon Inventory Systems.

UNIT III MATHEMATICAL FOUNDATIONS OF SUPPLY CHAIN SOLUTIONS 9

Use of Stochastic Models and Combinatorial Optimization in Supply Chain Planning – Supply Chain Facilities Layout – Capacity Planning – Inventory Optimization – Dynamic Routing and Scheduling – Understanding the "*internals"* of industry best practice solutions.

UNIT IV INTERNET TECHNOLOGIES AND ELECTRONIC COMMERCE IN SCM 9

Relation to ERP – Eprocurement – ELogistics – Internet Auctions – Emarkets – Electronic business process optimization – Business objects in SCM.

UNIT V CASE STUDIES 9

Digital Equipment Case Study – IBM Case Study.

REFERENCES:
1. R.B. Handfield, E.L. Nochols Jr., “Introduction to Supply Chain Management”, Pearson Education, 1999.
2. Sunil Chopra, Peter Meindel, “Supply Chain Management: Strategy, P Planning, and Operation”, Second Edition, Pearson Education, 2003.
3. Jeremy F. Shapiro, “Modeling the Supply Chain”, Duxbury Thomson Learning, 2001.
4. David Simchi Levi, Philip kaminsky, Edith Simchi Levi, “Designing and Managing the Supply Chain: Concepts, Strategies, and Case Studies”, Irwin McGraw Hill, 2000.
5. W.J. Hopp, M.L. Spearman, “Factory Physics: Foundations of Manufacturing Management”, Irwin McGraw–Hill, 1996.
6. N. Viswanadham, “Analysis of Manufacturing Enterprises”, Kluwer Academic Publishers, 2000.
7. Sridhar Tayur, Ram Ganeshan, Michael Magazine, “Quantitative Models forSupply Chain Management”, Kluwer Academic Publishers, 1999.
8. N. Viswanadham, Y. Narahari, “Performance Modeling of Automated Manufacturing Systems”, Prentice Hall of India, 1998.

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

UNIT I BASIC CONCEPTS 9

Product, Process and Project – Definition – Product Life Cycle – Project Life Cycle Models.

UNIT II FORMAT PROCESS MODELS AND THEIR USE 9

Definition and Format model for a process – The ISO 9001 and CMM Models and their relevance to Project Management – Other Emerging Models like People CMM.

UNIT III UMBRELLA ACTIVITIES IN PROJECTS 9

Metrics – Configuration Management – Software Quality Assurance – Risk Analysis.

UNIT IV IN STREAM ACTIVITIES IN PROJECTS 9

Project Initiation **–** Project Planning **–** Execution and Tracking **–** Project Wind up **–** Concept of Process/Project Database.

UNIT V ENGINEERING AND PEOPLE ISSUES IN PROJECT MANAGEMENT 9

Phases (Requirements, Design, Development, Testing , Maintenance, Deployment) – Engineering Activities and Management Issues in Each Phase – Special Considerations in Project Management for India and Geographical Distribution Issues.

TOTAL : 45 PERIODS

REFERENCES:

1. Ramesh, Gopalaswamy, "Managing Global Projects", Tata McGraw Hill, 2001.
2. Humphrey,Watts,"Managing the Software Process ",Addison Wesley,1986.
3. Pressman,Roger,"Software Engineering",A Practitioner's approach.McGraw Hill,1997.
4. Bob Hughes and Mike Cotterell,"Software Project Management".
5. Wheelwright and Clark,"Revolutionising product development",The Free Press,1993.

CS9261	DIGITAL IMAGING	L	T	P	C
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UNIT I FUNDAMENTALS OF IMAGE PROCESSING 9

Introduction – Steps in Image Processing Systems – Image Acquisition – Sampling and Quantization – Pixel Relationships – Colour Fundamentals and Models, File Formats, Image operations – Arithmetic, Geometric and Morphological.

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UNIT II IMAGE ENHANCEMENT 9

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

.

UNIT III IMAGE SEGMENTATION AND FEATURE ANALYSIS 9

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

UNIT IV MULTI RESOLUTION ANALYSIS AND COMPRESSIONS 9

Multi Resolution Analysis : Image Pyramids – Multi resolution expansion – Wavelet Transforms.

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

UNIT V APPLICATIONS OF IMAGE PROCESSING 9

Image Classification – Image Recognition – Image Understanding – Video Motion Analysis – Image Fusion – Steganography – Digital Compositing – Mosaics – Colour Image Processing..

TOTAL : 45 PERIODS

REFERENCES:

1. Rafael C.Gonzalez and Richard E.Woods, "Digital Image Processing" Second Edition, Pearson Education, 2003.
2. Milan Sonka, Vaclav Hlavac and Roger Boyle, "Image Processing, Analysis anD Machine Vision", Second Edition, Thomson Learning, 2001
3. Anil K.Jain, "Fundamentals of Digital Image Processing", Person Educaiton, 2003.