

**CURRICULAM FOR THE
M.TECH. DEGREE PROGRAMME IN
COMPUTER SCIENCE AND ENGINEERING**

Semester 1

Code No.	Course Title	L	T	P	C
CSE5001	Advanced Data Structures and Algorithms	3	0	0	3
CSE5002	Distributed Computing	3	0	0	3
CSE*	Elective – I	3	0	0	3
CSE5003	Advanced Networks	3	0	0	3
CSE5004	Advanced Operating Systems	3	0	0	3
CSE5011	Theory of Computation	3	0	0	3
CSE5081	Advanced Operating Systems Lab	0	0	3	1
CSE5082	Distributed Systems Lab	0	0	3	1
Total		18	0	6	20

Semester 2

Code No.	Course Title	L	T	P	C
CSE5006	Advanced Computer Architecture	3	0	0	3
CSE5007	Object Oriented System Design	3	0	0	3
CSE5008	Network Security	3	0	0	3
CSE*	Elective – II	3	0	0	3
CSE*	Elective – III	3	0	0	3
CSE5009	Advanced Databases	3	0	0	3
CSE5083	Object Oriented System Design Lab	0	0	3	1
CSE5084	Databases Lab	0	0	3	1
Total		18	0	6	20

Semester 3

Code No.	Course Title	L	T	P	C
CSE*	Elective - IV	3	0	0	3
CSE*	Elective - V	3	0	0	3
CSE*	Elective - VI	3	0	0	3
CSE6098	Project Phase – I	0	0	18	6
Total		9	0	18	15

Semester 4

Code No.	Course Title	L	T	P	C
CSE6099	Project Phase – II	0	0	30	10

List of Electives for M.Tech (CSE)

Code No.	Course Title	L	T	P	C
CSE5010	Web Technology	3	0	0	3
CSE5012	Mobile Computing	3	0	0	3
CSE5013	Bio informatics	3	0	0	3
CSE5014	Embedded Systems	3	0	0	3
CSE5015	Digital Image Processing	3	0	0	3
CSE5016	Natural Language Processing	3	0	0	3
CSE6001	Soft Computing	3	0	0	3
CSE6002	Grid Computing	3	0	0	3
CSE6003	Nano Computing	3	0	0	3
CSE6004	Software Architecture	3	0	0	3
CSE6005	Data mining	3	0	0	3

CSE5001	ADVANCED DATA STRUCTURES AND ALGORITHMS	L	T	P	C
		3	0	0	3

FOUNDATIONS

Introduction-The role of Algorithms in Computing-Getting Started-Growth of Functions-Recurrences- Probabilistic Analysis and Randomized Algorithms-Heap sort-Quick sort-sorting in Linear time-Medians and Order Statistics

DATA STRUCTURES

Elementary Data Structures-Hash Tables-Binary Search Trees- Red-Black Trees-B-Trees -Augmenting Data Structures

ADVANCED DATA STRUCTURES

Introduction-Binomial Heaps-Fibonacci Heaps-Data Structures for Disjoint Sets- String matching-Elementary Graph algorithms-Minimum Spanning Trees-Single Source Shortest Paths-All-Pairs shortest Paths

NETWORK FLOWS AND NP-HARD GRAPH PROBLEMS

Maximum s-t flows and their relationship with minimum s-t cuts. Flow decomposition. Augmenting path algorithms (bit scaling, shortest augmenting path, fattest path, blocking flows). Minimum-cost flow problems and algorithms- Relating system-optimal and user-optimal solutions to global routing problems-Approximation Algorithms for NP-hard graph problems.

ADVANCED DESIGN AND ANALYSIS

Algorithm Analysis - Sorting – Searching- Design Techniques – Dynamic programming, Greedy Algorithms and Amortized analysis

TEXT BOOK

1. Cormen, Leiserson, Rivest, and Stein, Introduction to Algorithms, MIT Press and McGraw-Hill, 2nd Edition, September 2001.

REFERENCES

1. Ahuja, Magnanti, and Orlin, The Network Flows : Theory, Algorithms, and Applications, Prentice Hall, United States ,second edition, 1993.
2. Robert Tarjan, Data Structures and Network Algorithms , Society for Industrial and Applied Mathematics, January 1987.
3. Weiss M. A., Data Structures and Problem Solving Using Java, Addison Wesley, 2002.

CSE5002	DISTRIBUTED COMPUTING	L	T	P	C
		3	0	0	3

INTRODUCTION

Characterization of Distributed Systems - Examples - Resource Sharing and the Web - Challenges - System Models - Architectural and Fundamental Models - Networking and Internetworking - Types of Networks - Network Principles - Internet Protocols - Case Studies.

PROCESSES AND DISTRIBUTED OBJECTS

Interprocess Communication - The API for the Internet Protocols - External Data Representation and Marshalling - Client-Server Communication - Group Communication - Case Study - Distributed Objects and Remote Invocation - Communication Between Distributed Objects - Remote Procedure Call - Events and Notifications - Java RMI - Case Study.

OPERATING SYSTEM ISSUES

The OS Layer - Protection - Processes and Threads - Communication and Invocation - OS Architecture - Security - Overview - Cryptographic Algorithms - Digital Signatures - Cryptography Pragmatics - Distributed File Systems - File Service Architecture - Clocks, Events and Process States - Synchronizing Physical Clocks - Logical Time And Logical Clocks - Global States - Distributed Debugging - Distributed Mutual Exclusion - Elections - Multicast Communication Related Problems.

DISTRIBUTED TRANSACTION PROCESSING

Transactions - Nested Transactions - Locks - Optimistic Concurrency Control - Timestamp Ordering - Comparison - Flat and Nested Distributed Transactions - Atomic Commit Protocols - Concurrency Control in Distributed Transactions - Distributed Deadlocks - Transaction Recovery - Overview of Replication And Distributed Multimedia Systems

MOBILE AND UBIQUITOUS COMPUTING

Introduction-Volatile systems-Interoperation- Sensing and context-awareness- Security and privacy- Adaptation- Web services-SOAP- SOAP with Java - Comparison of web services with CORBA- Service descriptions and IDL for web services- A directory service for use with web services- XML security- Coordination of web services

TEXT BOOK

1. George Coulouris, Jean Dollimore, Tim Kindberg, Distributed Systems Concepts and Design, AWL, 4th Edition, 2005.

REFERENCES

1. Andrew Tanenbaum S, Maarten van Steen, Distributed Systems Principles and Paradigms, Pearson Education, 2002
2. Liu M.L, Distributed Computing Principles and Applications, Pearson Education, 2004.
3. Mughesh Singhal, Niranjana Shivaratri G, Advanced Concepts in Operating Systems, Tata McGraw Hill Edition, 2001

CSE5003	ADVANCED NETWORKS	L	T	P	C
		3	0	0	3

FUNDAMENTALS OF COMMUNICATION NETWORKS

Layers and standards-Packet and circuit switching- Protocols TCP/IP-Ipv6 addressing and routing.-Technical background- Signals and interference- Modulation and encoding- Switching and Multiplexing- Coding and error control.

NETWORK SECURITY

Requirement-Encryption- Decryption- Message authentication and digital signature- Security in IP- QoS principles and protocols-Differential Service-RSVP and MPLS

INTERNETWORKING

VLAN-Addressing and routing-network layer protocols-unicast and multicast routing-Mobile IP routing-Ad hoc networks routing-Evolution in the Ethernet-Switched and fast Ethernet-Infrastructure-Scaling to Gigabit architectures-Performance consideration-Physical components and wire protocols.

OPTICAL NETWORKS

Optical layers- Services and interfacing- Photonic packet switching- Access networks- Network survivability- Protection- Optical IP- OTN/SONET/SDH layers structure and design relation to 10 Gbps Ethernet.

ADVANCED TOPICS

SAN (Storage Area Networks) and Infinite band architectures-Home networking- DSL-cable modems- Zero copy systems-Intelligent networks-Future directions.

TEXT BOOK

1. Fourouzan, B, Data Communication and Networking, McGraw-Hill, 2004.

REFERENCES

1. Ramaswani R and Sivarajan K, Optical Networks: A Practical Perspective, Morgan Kaufmann, 2001.
2. Clark T, IP SANs , Addison Wesley, 2002.
3. Kurose J.F, Ross K. W, Computer Networking, Top-down Approach Featuring the Internet, Addison Wesley, 2005.

CSE5004	ADVANCED OPERATING SYSTEM	L	T	P	C
		3	0	0	3

CONCEPTS OF OPERATING SYSEM

Distributed Operating Systems - Architectures of Distributed Systems - Theoretical Foundations - distributed Mutual Exclusion - Distributed Deadlock Detection - Agreement Protocols

FILE SYSTEM

Distributed Resource Management - Distributed File Systems - Distributed Shared Memory - Distributed Scheduling

FAULT TOLERANCE

Failure Recovery and Fault Tolerance - Recovery - Fault Tolerance

SECURITY

Protection and Security - Resource Security and Protection: Access and Flow Control - Multiprocessor Operating Systems - Multiprocessor System Architectures - Multiprocessor Operating Systems

DISTRIBUTED OPERATING SYSTEM

Database operating systems - Introduction to Database Operating Systems - Concurrency Control: Theoretical Aspects - Concurrency Control Algorithms

TEXT BOOK

1. Mukesh Singhal, Niranjana Shivaratri G, Advanced Concepts in Operating Systems Distributed, Database, and Multiprocessor Operating Systems, Tata McGraw-Hill, 2001.

REFERENCES

1. Mary Gorman S, Todd Stubbs S, Introduction to Operating Systems: Advanced Course, 2001.
2. Andrew Tanenbaum S, Modern Operating Systems, Prentice Hall.
3. Pradeep J, Sinha K, Distributed Operating Systems Concepts and design, PHI, 1997.

CSE5011	THEORY OF COMPUTATION	L	T	P	C
		3	0	0	3

FINITE AUTOMATA AND REGULAR LANGUAGES

Finite Automata and Regular languages - Regular expressions and Regular languages – non determinism and Kleenes theorem, Equivalence of DFA and NFA, Finite Automation with e-moves, equivalence of regular expression and NFA with e-moves – pumping lemma for regular sets.

CONTEXT FREE LANGUAGES

Context free languages, Derivation and languages, Relationship between derivation and derivation trees, Simplification of context free grammars – Normal forms for context free grammars, CNF, and GNF.

PUSH DOWN AUTOMATA (PDA)

Acceptance by PDA, Pushdown automata and Context free languages, Pumping lemma for CFL, deterministic Context free languages and Deterministic pushdown automata.

TURING MACHINE

Context sensitive languages and LBA, Turing machine (Definition and examples), Computable languages and functions, Church Turing hypothesis, Universal Turing machine, P and NP problems, NP-complete.

UNSOLVABLE PROBLEMS

Unsolvable problems - Rice Theorem - Post's correspondence Problem, Recursive and recursively enumerable languages.

TEXT BOOK

1. Natarajan A.M, Tamilarasi A and Balasubramani P, Theory of Computation New age International publishers, 2002

REFERENCES

1. Hopcroft and Ullman, Introduction to Automata, Languages and Computation Narosa Publishers, 2nd Edition, 2000
2. John Martin C, Introduction to languages and the Theory of Computation, McGraw Hill, 2nd Edition, 1997

CSE5081	ADVANCED OPERATING SYSTEMS LAB	L	T	P	C
		0	0	3	1

LIST OF EXPERIMENTS

1. Implement the following CPU scheduling algorithms
a) FCFS b) Round Robin c) SJF
2. Implementation of mutual Exclusion problem Using Dekker`s Algorithm
3. Implement inter process communication
4. Implement Best-Fit ,First-Fit algorithm for Memory Management
5. Implement Memory Allocation with pages
6. Implement FIFO replacement algorithm
7. Implement LRU replacement algorithm
8. Implement creation of shared memory segment
9. Implement File Locking
10. Implement Banker`s algorithm

CSE5082	DISTRIBUTED SYSTEMS LAB	L	T	P	C
		0	0	3	1

LIST OF EXPERIMENTS

1. Measuring Process Times
2. Measuring System Call Time
3. Creating Simple Remote Procedure calls
4. Create RPC programs with Single and Multiple procedures
5. Marshalling in Practice – Message exchange display, Marshalling code
6. Measuring Process creation time
7. Measuring RPC invocation time – In-process invocation
8. Measuring RPC invocation time - Inter-process, Intra-machine invocation
9. Measuring RPC invocation time - Inter-machine invocation
10. Implementing an Election Algorithm

CSE5006	ADVANCED COMPUTER ARCHITECTURE	L	T	P	C
		3	0	0	3

FUNDAMENTALS OF COMPUTER DESIGN

Introduction to computer architectures – Measuring and Reporting Performance – Quantitative Principles of Computer Design - Classifying instruction set Architecture - Memory addressing - Addressing modes - Type and size of operands - Operations in the instruction set - Operands and operations for media and signal processing - Instructions for control flow - Encoding an instruction set - Example Architectures: MIPS and TM32

INSTRUCTION LEVEL PARALLELISM

Pipelining and Hazards - Concepts of ILP - Dynamic scheduling: Score Board Technique, Tomasulo's Algorithm - Dynamic Hardware prediction - Hardware based speculation - Limitations of ILP - Case study: IP6 Microarchitecture

EXPLOITING INSTRUCTION LEVEL PARALLELISM WITH SOFTWARE APPROACHES

Basic Compiler techniques for exposing ILP - Static branch prediction - Static Multiple Issue: VLIW - Advanced compiler support for exposing and exploiting ILP- Hardware support for exposing parallelism - Hardware Vs software speculation. Mechanism – Case Studies: IA 64 and Itanium Processor

MEMORY AND I/O

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

MULTIPROCESSORS AND THREAD LEVEL PARALLELISM

Symmetric and distributed shared memory architectures - Performance issues - Synchronization - Models of memory consistency - Multithreading.

TEXT BOOK

1. David Patterson A and John Hennessy L, Computer Architecture: A Quantitative Approach, Harcourt Asia Pvt Ltd, 3rd Edition, 2003

REFERENCE

1. Kai Hwang, Advanced Computer Architecture: Parallelism, Scalability and Programmability, McGraw-Hill.

CSE5007	OBJECT ORIENTED SYSTEM DESIGN	L	T	P	C
		3	0	0	3

INTRODUCTION

Overview of Object-Oriented Systems Development - Object Basics - Systems Development Life Cycle: Unified Approach

METHODOLOGY AND MODELING

Object-Oriented Methodology - Unified Modeling Language

OBJECT-ORIENTED ANALYSIS

Object-Oriented Analysis: The Use Case Driven Process - Object Analysis: Classification- Object Relationship Analysis

OBJECT-ORIENTED DESIGN

Object-Oriented Design Process and Benchmarking -Designing Classes: Defining Attributes and Methods - Object Storage and Access Layer - Designing the View Layer: Toward Object-Oriented User Interface (OOUI)

SOFTWARE QUALITY

Measuring User Satisfaction and Systems Usability -Software Quality Assurance

TEXT BOOK

1. Bahrami, Ali, Object Oriented Systems Development. Boston, Massachusetts: The McGraw-Hill Companies Incorporated,2000.

REFERENCES

1. Johnsonbaugh, Richard, and Martin Kalin, Object-Oriented Programming in C++ upper Saddle River, New Jersey , Prentice Hall, 2nd edition, 2000.
2. Deitel H. M. and Deitel P.J, C++ How To Program Upper Saddle River, New Jersey: Prentice-Hall , 3rd edition, 2000
3. Haigh, Andrew, Object-Oriented Analysis and Design, McGraw-Hill Companies, 2000.

CSE5008	NETWORK SECURITY	L	T	P	C
		3	0	0	3

INTRODUCTION

Attacks - Services - Mechanisms - Conventional Encryption - Classical And Modern Techniques – Encryption Algorithms - Confidentiality.

PUBLIC KEY ENCRYPTION

RSA - Elliptic Curve Cryptography - Number Theory Concepts

MESSAGE AUTHENTICATION

Hash Functions - Digest Functions - Digital Signatures - Authentication Protocols.

NETWORK SECURITY PRACTICE

Authentication, Applications - Electronic Mail Security - IP Security - Web Security.

SYSTEM SECURITY

Intruders – Viruses – Worms – Firewalls Design Principles – Trusted Systems.

TEXT BOOK

1. Stallings, Cryptography and Network Security , Principles and Practice, Prentice Hall, 3rd Edition 2002.

REFERENCES

1. Bruce, Schneier, Applied Cryptography, Toha Wiley and Sons, 2nd Edition,1996.
2. Man Young Rhee, Internet Security, Wiley, 2003.

CSE5009	ADVANCED DATABASES	L	T	P	C
		3	0	0	3

INTRODUCTION

Overview of Transaction Management: The ACID Properties-Transactions and Schedules-Concurrent Execution of Transaction-Lock-Based Concurrency Control-Performance of Locking-Transaction Support in SQL-Introduction to Crash Recovery
Concurrency Control: 2PL, Serializability and Recoverability-Introduction to Lock Management-Lock Conversion-Dealing with Deadlock-Specialized Locking Techniques-Concurrency Control without Locking. **Crash Recovery:** Introduction To ARIES –The Log: Other Recovery-Related Structures-The Write-ahead Log Protocol –Check Pointing-Recovering from a System Crash –Media Recovery.

PHYSICAL DATABASES

Physical Database Design and Tuning : Introduction to Physical Database Design – Guidelines for Index Selection-Clustering and Indexing –Tools to Assist Index Selection –Overview of Database Tuning –Choices in Tuning the Conceptual Schema-Choices in Tuning Queries and Views –Impact of Concurrency- Case Study: The Internet Shop.
Security and Authorization: Introduction to Database Security-Access Control-Discretionary and Mandatory Access Control-Security for Internet Application – Additional Issues Related to Security.

PARALLEL & DISTRIBUTED DATABASES

Parallel and Distributed Databases: Architecture for Parallel Databases-Parallel Query Evaluation- Parallelizing Individual Operations-Parallel Query Optimization-Types of Distributed Databases –Distributed DBMS Architecture-Storing Data in Distributed DBMS- Distributed Catalog Management-Distributed Query Processing-Updating Distributed Data-Distributed Transaction-Distributed Concurrency Control-Distributed Recovery.

XML

Information retrieval and XML Data: Colliding Worlds: Databases, IR and XML – Introduction to Information retrieval –Indexing for Text Search-Web Search Engines-Managing Text in a DBMS-A Data Model for XML –X Queries: Querying XML Data – Efficient Evaluation of XML Queries.

SPATIAL AND MULTIMEDIA DATABASES

Spatial Data Management: Types of Spatial Data and Queries-Application involving Spatial Data-Introduction to Spatial Indexes-Indexing Based on Space Filling Curves-Grid files –R-Trees –Issues in High Dimensional Indexing. **Further Reading:** Advanced Transaction Processing-Data Integration-Mobile Databases –Main Memory Databases-Multimedia Databases-Geographic Information System-Temporal Databases –Biological Databases –Information Visualization.

TEXT BOOK

1. Raghu Ramakrishnan and Johannes Gehrke, Database Management Systems, TataMcGrawHill, third edition ,2003.

REFERENCES

1. Elmasri R and Navathae S.B, Fundamentals of Database Systems, Pearson Education, Third Edition, 2004.
2. TamerÖzsu M, Patrick Valduriez, Principles of Distributed Database Systems, Second Edition.
3. Alex Benson, Stephen Smith and Kurt Thearling, Building Data Mining Applications for CRM, Tata McGraw-Hill, 2000

CSE5083	OBJECT ORIENTED SYSTEM DESIGN LAB	L	T	P	C
		0	0	3	4

LIST OF EXPERIMENTS

1. A Study of Object Orientation
2. Object-Oriented CASE Tool : Rational Rose
3. Requirements Capturing
4. Creating the Object Model
5. Object Interaction
6. Object Behavior Definition
7. Operation Definition
8. Object-Oriented Design
9. Databases
10. Implementation Issues

CSE5084	DATABASE LAB	L	T	P	C
		0	0	3	1

LIST OF EXPERIMENTS

MS-ACCESS

1. Creating Tables and Queries using Access
2. Creating Forms and Reports using Access

SQL

3. Implementation of DDL commands in RDBMS.
4. Implementation of DML and DCL commands in RDBMS.
5. Implementation of Date and Built in Functions of SQL.

PL/SQL

6. Implementation of Simple Programs.
7. Implementation of High-level language extension with Cursors.
8. Implementation of High level language extension with Triggers
9. Implementation of stored Procedures and Functions.
10. Embedded SQL.
11. Database design using E-R model and Normalization.
12. Database Connectivity using ADO
13. Database Connectivity using ODBC
14. Database Connectivity using JDBC
15. Mini Projects.

CSE5010	WEB TECHNOLOGY	L	T	P	C
		3	0	0	3

INTRODUCTION

Introduction – Network concepts – Web concepts – Internet addresses - Retrieving Data with URL – HTML – DHTML: Cascading Style Sheets - Scripting Languages: Javascript – Vbscript.

COMMON GATEWAY INTERFACE

Common Gateway Interface: Programming CGI Scripts – HTML Forms – Custom Database Query Scripts – Server Side Includes – Server security issues – XML.

JAVA PROGRAMMING

Java fundamentals: Classes – Inheritance – Packages – Interfaces – Exceptions Handling – Multi threading – Applets

SERVER SIDE PROGRAMMING

Server side Programming – Active server pages – Java server pages – Java Servlets: Servlet container – Exceptions – Sessions and Session Tracking – Using Servlet context – Dynamic Content Generation – Servlet Chaining and Communications.

APPLICATIONS

Simple applications – Internet Commerce – Database connectivity – Online databases – EDI Applications in Business – Plug-ins – Firewalls

TEXT BOOK

1. Deitel, Deitel and Neito, INTERNET and WORLD WIDE WEB How to program, Pearson education asia, 2001

REFERENCES

1. Norton D and Schildt H, Java 2: The complete Reference, TMH, 2000.
2. Eric Ladd and Jim O'Donnell, et al, USING HTML 4, XML, and JAVA1.2, PHI publications, 2003.

CSE5011	THEORY OF COMPUTATION	L	T	P	C
		3	0	0	3

FINITE AUTOMATA AND REGULAR LANGUAGES

Finite Automata and Regular languages - Regular expressions and Regular languages – non determinism and Kleenes theorem, Equivalence of DFA and NFA, Finite Automation with e-moves, equivalence of regular expression and NFA with e-moves – pumping lemma for regular sets.

CONTEXT FREE LANGUAGES

Context free languages, Derivation and languages, Relationship between derivation and derivation trees, Simplification of context free grammars – Normal forms for context free grammars, CNF, and GNF.

PUSH DOWN AUTOMATA (PDA)

Acceptance by PDA, Pushdown automata and Context free languages, Pumping lemma for CFL, deterministic Context free languages and Deterministic pushdown automata.

TURING MACHINE

Context sensitive languages and LBA, Turing machine (Definition and examples), Computable languages and functions, Church Turing hypothesis, Universal Turing machine, P and NP problems, NP-complete.

UNSOLVABLE PROBLEMS

Unsolvable problems - Rice Theorem - Post's correspondence Problem, Recursive and recursively enumerable languages.

TEXT BOOK

- Natarajan A.M, Tamilarasi A and Balasubramani P, Theory of Computation New age International publishers, 2002

REFERENCES

- Hopcroft and Ullman, Introduction to Automata, Languages and Computation Narosa Publishers, 2nd Edition, 2000
- John Martin C, Introduction to languages and the Theory of Computation, McGraw Hill, 2nd Edition, 1997

CSE5012	MOBILE COMPUTING	L	T	P	C
		3	0	0	3

INTRODUCTION

Medium Access Control : Motivation for Specialized MAC- SDMA- FDMA- TDMA- CDMA- Comparison of Access mechanisms – Tele communications : GSM- DECT- TETRA – UMTS- IMT-2000

SATELLITE SYSTEMS

Basics- Routing- Localization- Handover- Broadcast Systems: Overview – Cyclic Repetition of Data- Digital Audio Broadcasting – Digital Video Broadcasting

WIRELESS LOCAL AREA NETWORKS

Infrared Vs Radio Transmission – Infrastructure Networks- Ad hoc Networks- IEEE 802.11 – HIPERLAN – Bluetooth.

WIRELESS ASYNCHRONOUS TRANSFER MODE

Motivation for QATM, Wireless ATM working group- WATM services- Reference Model – Functions – Radio Access Layer – Handover- Location Management- Addressing Mobile Quality of Service- Access Point Control Protocol

MOBILE TRANSPORT LAYER AND WAP

Traditional TCP- Indirect TCP- Snooping TCP- Mobile TCP- Fast retransmit/ Fast Recovery- Transmission/ Timeout Freezing – Selective Retransmission- Transaction Oriented TCP. WAP - Architecture – Datagram Protocol- Transport Layer Security- Transaction Protocol- Session Protocol- Application Environment.

TEXT BOOK

1. Schiller J, Mobile Communication, Addison Wesley, 2006.

REFERENCES

1. William Stallings, Wireless Communication and Networks, Pearson Education, 2004.
2. Singhal, WAP-Wireless Application Protocol, Pearson Education, 2005

CSE5013	BIO INFORMATICS	L	T	P	C
		3	0	0	3

INTRODUCTION

The Central Dogma – Killer Application – Parallel Universes – Watson’s Definition – Top Down Vs Bottom Up Approach – Information Flow – Conversance – Communications

DATABASE AND NETWORKS

Definition – Data Management – Data Life Cycle – Database Technology – Interfaces – Implementation – Networks: Communication Models – Transmission Technology – Protocols – Bandwidth – Topology – Contents – Security – Ownership – Implementation.

SEARCH ENGINES AND DATA VISUALIZATION

Search Process – Technologies – Searching And Information Theory – Computational Methods – Knowledge Management – Sequence Visualizations – Structure Visualizations – User Interfaces – Animation Vs Simulation

STATISTICS, DATA MINING AND PATTERN MATCHING

Statistical Concepts – Micro Arrays – Imperfect Data – Basics – Quantifying – Randomness – Data Analysis – Tools Selection – Alignment – Clustering – Classification – Data Mining Methods – Technology – Infrastructure Pattern Recognition – Discovery – Machine Learning – Text Mining – Pattern Matching Fundamentals – Dot Matrix Analysis – Substitution Matrix – Dynamic Programming – Word Method – Bayesian Method – Multiple Sequence Alignment Tools.

MODELING SIMULATION AND COLLABORATION

Drug Discovery Fundamentals – Protein Structure – System Biology Tools – Collaboration And Communication – Standards – Issues – Case Study.

TEXT BOOK

1. Bryan Bergeron, Bio Informatics Computing, Prentice Hall, 2003.

REFERENCES

1. Affward T.K, Parry Smith D.J, Introduction to Bio Informatics, Pearson Education, 2001.
2. Pierre Baldi, Soren Brunak, Bio Informatics The Machine Learning Approach, First East West Press, 2nd Edition,2003

CSE5014	EMBEDDED SYSTEMS	L	T	P	C
		3	0	0	3

INTRODUCTION TO EMBEDDED SYSTEM AND HARDWARE FUNDAMENTALS

Examples of Embedded Systems-Typical Hardware- Terminology-Gates-A Few Other Basic Considerations-Timing Diagrams-Memory- Interrupts: Microprocessor Architecture-Interrupt Basics-The Shared-Data Problem-Interrupt Latency.

SOFTWARE ARCHITECTURES FOR EMBEDDED SYSTEMS

Round-Robin-Round-Robin with Interrupts-Function-Queue-Scheduling Architecture-Real-Time Operating System Architecture-Selecting an Architecture Forth/Open Firmware: Introducing Forth-. String Words-Stack Manipulation- Creating New Words-Comments- if ... else- Loops-. Data Structures-Interacting with Hardware and Memory-Forth Programming Guidelines

INTRODUCTION TO REAL-TIME OPERATING SYSTEMS.

Tasks and Task States-Tasks and Data-Semaphores and Shared Data-Operating System **Services**-Message Queues, Mailboxes, and Pipes-Timer Functions-Events-Memory Management-Interrupt Routines in an RTOS Environment.

BASIC DESIGN USING A REAL-TIME OPERATING SYSTEM.

Overview-Principles-An Example-Encapsulating Semaphores and Queues-Hard Real-Time Scheduling Considerations-Saving Memory Space-Saving Power-Embedded Software Development Tools-Host and Target Machines.-Linker/Locators for Embedded Software-Getting Embedded Software into the Target System

DEBUGGING TECHNIQUES AND AN EXAMPLE SYSTEM:

Testing on Your Host Machine-Instruction Set Simulators-The assert Macro-Using Laboratory Tools- An Example System-What the Program Does-Environment in Which the Program Operates-A Guide to the Source Code-Source Code.

TEXT BOOKS

1. David Simon , An Embedded Software Primer, Addison Wesley.
2. John Catsoulis, Designing Embedded Hardware, O'Reilly Publications, 2005

REFERENCE

1. Raj Kamal, Embedded Systems: Architecture and Programming ,Mc Graw Hill publications,1st Edition,2003.

CSE5015	DIGITAL IMAGE PROCESSING	L	T	P	C
		3	0	0	3

CONTINUOUS AND DISCRETE IMAGES AND SYSTEMS

Light, Luminance - Brightness and Contrast - Eye - Monochrome vision model - Image processing problems and applications - Vision – camera - Digital processing system - 2-D sampling theory – Aliasing - Image quantization - Lloyd Max Quantizer, Dither - Color images - Linear systems and shift invariance - Fourier Transform - Z-Transform - Matrix theory results - Block matrices and Kronecker products.

IMAGE TRANSFORMS

2-D orthogonal and Unitary transforms - 1-D and 2-D DFT - Cosine - Sine - Walsh Hadamard - Haar - Slant - Karhunen-loeve - Singular value decomposition transforms.

IMAGE ENHANCEMENT

Point operations - contrast stretching - clipping and thresholding - density slicing - Histogram equalization - modification and specification - spatial operations - spatial averaging - low pass - high pass - band pass filtering - direction smoothing - medium filtering - generalized cepstrum and homomorphic filtering - edge enhancement using 2-D IIR and FIR filters - color enhancement.

IMAGE RESTORATION

Image observation models - sources of degradation - inverse and Wiener filtering - geometric mean filter - non linear filters - smoothing splines and interpolation - constrained least square restoration.

IMAGE DATA COMPRESSION & IMAGE RECONSTRUCTION FROM PROJECTIONS

Pixel Coding - Predictive Coding Techniques - Transform Coding Of Images - Theory And Algorithms - Hybrid Coding And Vector Dpcm - Block Truncation Coding - Video Coding - Inter-Frame Coding - Coding Of 2 Tone Images - Image Coding Standards- Jbig, Jpeg And Mpeg-I And Ii. Wavelet Transform Coding Of Images - Color Image Coding - Random Transform - Back Projection Operator - Inverse Random Transform - Back Projection Algorithm - Fan Beam And Algebraic Restoration Techniques.

TEXT BOOKS

1. Anil Jain K, Fundamentals of Digital Image Processing, Pearson Education, 2003.
2. William Pratt , Digital Image Processing, Wiley Interscience, 2nd edition 1991

REFERENCES

1. Gonzales, Rafael and Windz, Digital Image Processing, Addison-Wesley. 2nd edition,1998
2. Maner Sid-Ahmed A., Image Processing, McGraw Hill International Edition, 1995.
3. Andrion Low, Introductory computer Vision and Image Processing, MCGraw Hill International Edition.

CSE5016	NATURAL LANGUAGE PROCESSING	L	T	P	C
		3	0	0	3

INTRODUCTION

Introduction: Knowledge in speech and language processing – Ambiguity – Models and Algorithms – Language Thought and Understanding. Regular Expressions and automata: Regular expressions – Finite-State automata. Morphology and Finite-State Transducers: Survey of English morphology – Finite-State Morphological parsing – Combining FST lexicon and rules – Lexicon-Free FSTs: The porter stammer – Human morphological processing

SYNTAX

Constituency – Context-Free rules and trees – Sentence-level constructions – The noun phrase – Coordination – Agreement – The verb phrase and sub categorization – Auxiliaries – Spoken language syntax – Grammars equivalence and normal form – Finite-State and Context-Free grammars – Grammars and human processing. Parsing with Context-Free Grammars: Parsing as search – A Basic Top-Down parser – Problems with the basic Top-Down parser – The early algorithm – Finite-State parsing methods.

SEMANTIC

Syntax-Driven semantic analysis – Attachments for a fragment of English – Integrating semantic analysis into the early parser – Idioms and compositionality – Robust semantic analysis. Lexical semantics: relational among lexemes and their senses – WordNet: A database of lexical relations – The Internal structure of words – Creativity and the lexicon.

NATURAL LANGUAGE GENERATION

Introduction to language generation – Architecture for generation – Surface realization – Discourse planning – Other issues.

MACHINE TRANSLATION

Language similarities and differences – The transfer metaphor – The interlingua idea: Using meaning – Direct translation – Using statistical techniques – Usability and system development.

TEXT BOOK

1. Daniel Jurafsky and James Martin H, Speech and Language Processing, Pearson Education Pvt Ltd., Singapore, 2003.

REFERENCE

1. James Allen, Natural Language Understanding, Pearson Education, 2003.

CSE6001	SOFT COMPUTING	L	T	P	C
		3	0	0	3

AIMS OF SOFT COMPUTING

Aims of Soft Computing-Foundations of Fuzzy Sets Theory-Basic Concepts And Properties Of Fuzzy Sets- Elements Of Fuzzy Mathematics-Fuzzy Relations-Fuzzy Logic

APPLICATION OF FUZZY SETS

Application of Fuzzy Sets-Fuzzy Modeling – Fuzzy Decision Making-Pattern Analysis And Classification-Fuzzy Control Systems-Fuzzy Information Processing-Fuzzy Robotics.

ARTIFICIAL NEURAL NETWORKS

Artificial Neural Networks-Models Of Neuron-Feed Forward Neural Networks-Recurrent Neural Networks-Time Delay Neural Networks-Radial Basis Function Neural Networks-Cerebellar Model Articulation Controller-Adaptive Resonance Theory (ART) NN-Associative Neural Memory Models-Supervised Learning Of Neural Networks - Unsupervised Learning-Reinforcement Learning-Application Of ANN- Probabilistic Reasoning

GENETIC ALGORITHM

Genetic Algorithm Main Operators- Genetic Algorithm Based Optimization-Genetic Algorithm With Group Principle-Group Genetic Algorithm With Directed Mutation-Comparison Of Conventional And Genetic Search Algorithms-Applications-Elements Of Chaos System-Basic Concepts-Identification Of Chaotic Movement System-Bifurcation And Handling Of Development Of Chaos-Empirical Chaos

NEURO-FUZZY TECHNOLOGY

Fuzzy Neural Networks And Their Learning-Architecture Of Neuro-Fuzzy Systems-Generation Of Fuzzy Rules And Membership Functions-Fuzzification And Defuzzification In Neuro-Fuzzy Systems- Neuro-Fuzzy Identification-Neuro Fuzzy Control- Neuro Fuzzy Navigation System For Intelligent Robot-Combination Of Genetic Algorithm With Neural Networks-Combination Of Genetic Algorithms And Fuzzy Logic-Neuro-Fuzzy-Genetic Approach.

TEXT BOOK

1. Aliev R.A, Aliev R.R., Soft Computing and its Application, World Scientific Publishing Co. Ptd. Ltd., 2001.

REFERENCES

1. Cordón, O, Herrera, F, Hoffman F, Magdalena L., Genetic Fuzzy systems, World Scientific Publishing Co. Pvt. Ltd., 2001.
2. Kecman, V, Learning and Soft Computing, The MIT Press, 2001.
3. Mehrotra, K, Mohan C, K, Ranka, S, Elements of Artificial Neural Networks, The MIT Press, 1997.

CSE6002	GRID COMPUTING	L	T	P	C
		3	0	0	3

GRID COMPUTING

Introduction - Definition - Scope of grid computing

GRID COMPUTING INITIATIVES

Grid Computing Organizations and their roles – Grid Computing analog – Grid Computing road map.

GRID COMPUTING APPLICATIONS

Merging the Grid sources – Architecture with the Web Devices Architecture.

TECHNOLOGIES

OGSA – Sample use cases – OGSA platform components – OGSI – OGSA Basic Services.

GRID COMPUTING TOOL KITS

Globus Toolkit – Architecture- Programming model- High level services – OGSI-Net middleware Solutions.

TEXT BOOK

1. Joshy Joseph and Craig Fellenstein, Grid Computing, PHI, PTR-2003

REFERENCES

1. Ahmar Abbas, Grid Computing: A Practical Guide to technology and Applications, Charles River media , 2003.
2. Daniel Minoli, A Networking Approach to Grid Computing, Wiley-Inter science, 2004.
3. Mark Baker and Rajkumar Buyya, Cluster Computing at a Glance, High Performance Cluster Computing: Architectures and Systems (Vol. 1), Prentice Hall, NJ, USA, 1999.

CSE6003	NANO COMPUTING	L	T	P	C
		3	0	0	3

DEVICES

Overview of current research in nano-scale electronics and devices, Semiconductor and Device 1(Materials and building blocks),Semiconductor and Device 2(Photonic Device and Materials),CMOS Device ,Limit of CMOS technology-Scaling Theory

QUANTUM CONCEPTS

Nano-Physics-Quantum Mechanics, Quantum Device 1-Length Scales/Transport, Quantum Device 2-Ballistic Electron Transport, Coulomb Blockade, RTD, Electron-Wave Coupling Devices

FUNDAMENTAL OF CHEMISTRY

Fundamental of chemistry, Organic Chemistry, Molecular Electronics I,(Molecular Semiconductors and Metals),Molecular Electronics II(Logic Gates),Carbon Nano tube and Its Application, Spintronics I, Spintronics II

QUANTUM COMPUTATION

Quantum Computation I ,Quantum Computation II,DNA Computation, Nano-Fabrication 1-photolithography, Nano-Fabrication 2,e-beam lithography,Advanced Nano-lithography

NANO CONCEPTS

Nano-Fabrication 3, Thin Film Technology MBE, CVD, PECVD, LB and Self Assembly, Spun-Coating,Nano-Characterization 1- Scanning Probe Microscopy,- Electron Microscopy (TEM, SEM), Nano-Characterization 2- Photon Spectroscopy, Electron Spectroscopy, Nanomanipulator

TEXT BOOK

1. Nanoelectronics and Information Technology: Advanced Electronic Materials and Novel Devices, Rainer Waser, Published by Wiley-VCH, 2003.

REFERENCES

1. Sandeep Shukla and Iris Bahar R, Nano, Quantum and Molecular Computing, Kluwer Academic Publishers, 2004.
2. Poole C.P, Owens F.J, Wiley, Introduction to Nanotechnology ,2003.
3. Petty M.C, Bryce M.R, and Bloor D, Edward Arnold, Introduction to Molecular Electronics, 1995.

CSE6004	SOFTWARE ARCHITECTURE	L	T	P	C
		3	0	0	3

INTRODUCTION

Software architecture terminology- architecture in the system development life cycle- architecture dimensions- physical versus logical architectures.

ARCHITECTURAL VIEWTYPES AND STYLES

Module viewtypes and styles- component-and-connector view types and styles- allocation viewtypes and styles-architecture patterns and frameworks-Evaluating architecture and Architecture based development

CREATING AN ARCHITECTURE.

Understanding Quality Attributes- Achieving Qualities- Air Traffic Control: A Case study in Designing for High Availability. Creating the Architecture- Flight Simulation: A Case Study in an Architecture for Integrability-Documenting Software Architectures- Reconstructing Software Architectures.

ARCHITECTURE REPRESENTATION

Architecture Representation- Data Architectures Centralized versus distributed databases; -relational versus object oriented databases- Middleware Technologies- Remote procedure calls-object middleware including DCOM and CORBA-message-oriented middleware.

WEB-BASED ARCHITECTURES

Enterprise Java Beans architectures- Microsoft .NET architectures-Software Product Lines: Reusing Architectural Assets- CelsiusTech: A Case Study in Product Line Development-J2EE/EJB: A Case Study of an Industry Standard Computing Infrastructure- The Luther Architecture: A Case Study in Mobile Applications Using J2EE-Building Systems from Off-the-Shelf Components-Software Architecture in the Future.

TEXT BOOK

1. Len Bass,Paul Clements & Rick Kazman, Software Architecture in Practice, Addison Wesley professional, Second Edition,2003

REFERENCES

1. Frank Buschmann, Regine Meunier, Hans Rohnert, Peter Sommerlad, Miachel Stal,Douglas Schmidt, Pattern Oriented Software Architecture, John wiley and sons, 2000
2. Clements P, Bachmann F, Bass L, Garlan D, Ivers J, Little R, Nord R and Stafford J, Documenting Software Architectures: Views and Beyond ,Addison Wesley .
3. Mary Shaw and David Garlan, Software Architecture: Perspectives on an Emerging Discipline, Prentice-Hall.

CSE6005	DATA MINING	L	T	P	C
		3	0	0	3

INTRODUCTION

Data Mining –On What Kind Of Data –Data Mining Functionalities-Are All Of The Patterns Interesting-Classification Of Data Mining Systems-Major Issues In Data Mining-Data Warehouse And OLAP Technology For Data Mining-Introduction To Data Warehousing-A Multidimensional Data Model-Data Warehouse Architecture-Data Warehouse Implementation-Further Development Of Data Cube Technology-From Data Warehousing To Data Mining.

DATA PREPROCESSING, DATA MINING PRIMITIVES, LANGUAGES AND SYSTEM ARCHITECTURE

Data Cleaning-Data Integration And Transformation-Data Reduction-Discretization And Concepts Hierarchy Generation-Data Mining Primitives-A Data Mining Query Language-Designing Graphical User Interface Based on a Data Mining Query Language-Architectures Of Data Mining Systems- Concept Description.

MINING ASSOCIATION RULES , CLASSIFICATION AND PREDICTION

Association Rule Mining-Mining Single Dimensional Boolean Association Rules-Mining Multilevel Association Rules-Association Mining To Correlation Analysis-Constraint Based Association Mining-Introduction To Classification And Prediction-Issues Regarding Classification And Prediction-Classification By Decision Tree Induction-Bayesian Classification-Bayesian Classification-Classification By Back Propagation-Classification Based On Concepts From Association Rule Mining-Other Classification Methods-Prediction-Classifier Accuracy.

CLUSTER ANALYSIS

Clustering Methods-Partitioning, Hierarchical, Density, Grid, And Model Based Methods-Outlier Analysis- Mining Complex Types Of Data Objects-Mining Spatial, Multimedia Databases-Mining Time-Series And Sequence Data-Mining Text, Www Databases.

APPLICATION AND TRENDS IN DATA MINING

Data Mining Applications-Data Mining System Products and Research Prototypes - Additional Themes on Data Mining-Social Impacts of Data Mining-Trends in Data Mining-DB miner

TEXT BOOK

1. Han J and Kamber M, Data Mining: Concepts and Techniques, Morgan Kaufmann/ Elsevier, 2nd Edition.

REFERENCES

1. Jarke M, Lenzerini M, Vassiliou Y, Vassiliadis P, Fundamentals of Data Warehouses, Springer-Verlag, 1999.
2. Ralph Kimball, The Data Warehouse Toolkit, Wiley 1996.
3. Hand D, Mannila H and Smyth P, Principles of Data Mining, MIT Press, 2001.