

**KALASALINGAM UNIVERSITY**  
**ANAND NAGAR, KRISHNANKOIL - 626 190**  
**VIRUDHUNAGAR DISTRICT, TAMIL NADU**



**DEPARTMENT OF COMPUTER APPLICATIONS**

**M.TECH (CA) SYLLABUS**



**KALASALINGAM UNIVERSITY**  
**Anand Nagar, Krishnankoil - 626 190**

**Department of Computer Applications**  
**CURRICULUM for M.TECH (CA)**

**Semester I**

Code No.	Course Title	L	T	P	C	
MCT501	Design and Analysis of Algorithms	3	0	0	3	
MCT502	Object Oriented Programming	3	0	0	3	
MCT503	Database Management Systems	3	0	0	3	
MCT504	Operating Systems	3	0	0	3	
MCT505	Computer Architecture	3	0	0	3	
HSS***	Communication skills (English / German / French)	3	0	0	3	
MCT581	DBMS Lab	0	0	3	1	
MCT582	OOP & Algorithms Lab	0	0	3	2	
	<b>Total</b>	<b>18</b>	<b>0</b>	<b>6</b>	<b>21</b>	<b>21</b>

**Semester II**

Code No.	Course Title	L	T	P	C	
MCT506	Software Engineering	3	0	0	3	
MCT507	Computer Networks	3	0	0	3	
MCT508	Visual Programming	3	0	0	3	
MCT509	Internet Programming	3	0	0	3	
MCT510	Service Oriented Architecture	3	0	0	3	
MCT***	Elective I	3	0	0	3	
MCT583	Visual Programming Lab	0	0	3	1	
MCT584	Internet Programming Lab	0	0	3	1	
	<b>Total</b>	<b>18</b>	<b>0</b>	<b>6</b>	<b>20</b>	<b>41</b>

**Semester III**

<b>Code No.</b>	<b>Course Title</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	
MCT601	Distributed Computing	3	0	0	3	
MCT602	UNIX & Network Programming	3	0	0	3	
MCT***	Elective II	3	0	0	3	
MCT***	Elective III	3	0	0	3	
MCT***	Elective IV	3	0	0	3	
MCT681	UNIX & Network Programming Lab	0	0	3	2	
MCT698	Project Phase I	0	0	12	4	
	<b>Total</b>	<b>15</b>	<b>0</b>	<b>15</b>	<b>21</b>	<b>62</b>

**Semester IV**

<b>Code No.</b>	<b>Course Title</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	
MCT698	Project Phase II	0	0	30	10	
	<b>Total</b>	<b>0</b>	<b>0</b>	<b>30</b>	<b>10</b>	<b>72</b>

**Department of Computer Applications**  
**List of Electives for M.TECH (CA)**

<b>Code No.</b>	<b>Course Title</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
MCE511	Component Based Technologies	3	0	0	3
MCE512	Electronic Commerce	3	0	0	3
MCE513	Natural Language Processing	3	0	0	3
MCE514	Theory of Computation	3	0	0	3
MCE515	Artificial Intelligence and Expert Systems	3	0	0	3
MCE603	Data Mining and Data Warehousing	3	0	0	3
MCE604	Computer Animation	3	0	0	3
MCE605	Bio informatics	3	0	0	3
MCE606	Neural Networks	3	0	0	3
MCE607	Software Architecture	3	0	0	3
MCE608	TCP/IP Protocol Suite	3	0	0	3
MCE609	Agent Based Intelligent System	3	0	0	3
MCE610	Object Oriented Analysis and Design	3	0	0	3
MCE611	Embedded Systems	3	0	0	3
MCE612	Computer Security	3	0	0	3
MCE613	Mobile Computing	3	0	0	3
MCE614	Digital Image Processing	3	0	0	3
MCE615	Nano Computing	3	0	0	3
MCE616	Soft Computing	3	0	0	3
MCE617	IT Infrastructure Management	3	0	0	3
HSS018	Communication Skills	3	0	0	3
HSS031	English Advanced Level	3	0	0	3
HSS026	German – I	3	0	0	3
HSS027	German – II	3	0	0	3
HSS028	French – I	3	0	0	3
HSS029	French – II	3	0	0	3

**CATEGORY OF COURSES WITH CREDIT**

<b>S. No.</b>	<b>DESCRIPTION</b>	<b>TOTAL CREDITS</b>	<b>I</b>	<b>II</b>	<b>III</b>	<b>IV</b>
	<b>CGPA CREDITS</b>					
<b>1</b>	<b>PROFESSIONAL MAJOR</b>					
	Core papers	36	15	15	6	-
	Electives	12	-	3	9	-
	Laboratory	7	3	2	2	-
	Project	14	-	-	4	10
<b>2</b>	<b>HUMANITIES</b>	<b>3</b>	<b>3</b>	<b>-</b>	<b>-</b>	<b>-</b>
<b>3</b>	<b>MATHEMATICS</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>
<b>4</b>	<b>MANAGEMENT</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>
	<b>TOTAL CGPA CREDITS</b>	<b>72</b>				

**Minimum credit requirement : 72**

<b>SEMESTER I</b>
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<b>MCT501</b>	<b>DESIGN AND ANALYSIS OF ALGORITHMS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**EFFICIENT ALGORITHMS AND SORTING ORDER**

Design of Efficient Algorithms - Data Structures, Set representations, Graphs, Trees, Recursion, Divide and conquer, Balancing, Dynamic Programming - Sorting and Order Statistics - The sorting problem, Radix Sorting, Sorting by comparison, Heapsort, Quicksort, Order statistics, Expected time for order statistics.

**DATA STRUCTURES FOR SET MANIPULATION PROBLEMS**

Data Structures for set Manipulation Problems - Fundamental operation on sets, Hashing, Binary Search, Binary search trees, Optimal search trees, Simple disjoint set union algorithm, Tree structures for the UNION-FIND problem, Applications and extensions of the UNION-FIND Algorithms, Balanced tree schemes, Dictionaries and priority queues, Mergeable heaps, Concatenable queues, Partitioning.

**ALGORITHMS ON GRAPHS**

Minimum cost spanning trees, Depth first search, Biconnectivity, Depth first search of a directed graph, Strong Connectivity, Path finding problems, Transitive closure algorithm, Shortest path algorithm, Path problems and Matrix multiplication, Single source problems.

**MATRIX MULTIPLICATIONS AND OPERATIONS**

Matrix Multiplications and Related operations – Basics - Strassen's matrix multiplication algorithm, Inversion of matrices, LUP decomposition of matrices, Applications of LUP decomposition, Boolean matrix multiplications.

**NP PROBLEMS**

Nondeterministic Turing machines, The classes P and NP, Languages and problems, NP-completeness of the satisfiability problem, Additional NP-complete problems, Polynomial space bounded problems.

**TEXT BOOK**

1. Aho, Hopcraft, Ullman, The Design and Analysis of Computer algorithms, Pearson Education, Tenth Indian Reprint, New Delhi, 2004.

**REFERENCE BOOKS**

1. Anany Levitin, Introduction to the design and analysis of algorithms, Pearson Education, Reprint 2006.
2. Ellis Horowitz, Satraj Sahni, Sanguthevar Rajasekaran, Fundamentals of Computer Algorithms, Galgotia Publishers pvt.Ltd., Reprint 2005.

<b>MCT502</b>	<b>OBJECT ORIENTED PROGRAMMING</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**OOP PARADIGM**

Programming Paradigms - Procedural Programming, Modularity, Exception Handling, Data Abstraction - User Defined Types - Concrete Types, Abstract Types, Virtual Functions - Object Oriented Programming - Generic Programming – Containers – Algorithms.

**INTRODUCTION TO C++**

Overview of C++ - Classes and Objects - Friend Functions, Friend Classes, Inline Function, Static Members – Arrays – Pointers – References - Dynamic Allocation.

**OVERLOADING**

Function Overloading - Overloading Constructor Functions, Copy Constructors, Default Argument - Operator Overloading - Member Operator Overloading, Overloading new and delete.

**ADDITIONAL FEATURES**

Inheritance-Base Class - Access Control - Virtual Functions - Pure Virtual Functions - Templates - Generic Functions, Applying Generic Functions, Generic Classes - Exception Handling - C++ I/O Streams - File I/O – STL - Overview, Container Classes, Lists, Maps, Algorithms Using Functions and Objects, String Class.

**DESIGN CONCEPTS**

Role of Classes - Kinds of Classes, Concrete Types, Abstract Types, Nodes, Changing Interfaces, Object I/O, Actions, Interface Classes, Handles, Use Counts Applications frame works.

**TEXT BOOK**

1. Herbert Schildt, The Complete Reference C++, Tata McGraw Hill, 4<sup>th</sup> Edition, 2002.

**REFERENCE BOOK**

1. Bjarne Stroustrup, The C++ Programming Language, Addison-Wesley, 3<sup>rd</sup> Edition, 1997.

<b>MCT503</b>	<b>DATABASE MANAGEMENT SYSTEMS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### **AN OVERVIEW OF DATABASE SYSTEMS**

Introduction – Database system applications, Database versus file systems, View of data, Data models, Database languages, Database users and administrators, Transaction management, Database system structure, Application architectures - Data Models - Entity – Relationship Model – Basic concepts, Constraints, Keys, Design issues, ER diagram, Weak entity sets, Extended ER features, Design of an ER database schema, Reduction of an ER schema to tables - Relational Model – Structure of relational databases – The relational algebra – Extended relational algebra operations, Modification of database, Tuple relational calculus, Domain relational calculus.

### **RELATIONAL DATABASES AND OBJECT-BASED DATABASES**

SQL – Background, Basic structure, Set operations, Aggregate functions, Null values, Nested subqueries, Views, Complex queries, Modification of the database, Joined relations, DDL, Embedded SQL, Dynamic SQL, QBE – Integrity and Security – Domain constraints, Referential integrity, Assertions, Triggers - Relational Database Design – First Normal Form, Pitfalls in relational database design, Functional dependencies, Decomposition, Desirable properties of decomposition, BCNF, Third normal form, Fourth normal form – Object-based databases – Need for complex data types, Object oriented data model, Object oriented languages, Persistent programming languages – Object relational Databases – Nested relations, Complex types, Inheritance.

### **INDEXING AND QUERYING**

Indexing and Hashing – Basic concepts, Ordered indices, B+ tree index files – B tree index files – Static hashing – Dynamic hashing, Comparison of ordered indexing and hashing, Multiple key access - Query Processing – Overview, Measures of query cost, Selection operation, Sorting, join operation - Query Optimization – Overview, Estimating statistics of expression results, Transformation of relational expressions, Choice of evaluation plans, Materialized views.

### **TRANSACTION, CONCURRENCY CONTROL**

Transactions – Transaction concept, Transaction state, Implementation of atomicity and durability, Concurrent executions, Serializability, Recoverability, Implementation of isolation, Transaction definition in SQL, Testing for serializability - Concurrency Control – Lock based protocols, Timestamp based protocols, Validation based protocols, Multiple granularity, Multiversion schemes, Deadlock handling, Insert and delete operations, Weak levels of consistency, Concurrency in index structures.

**RECOVERY MANAGEMENT**

Recovery System – Failure classification, Storage structure, Recovery and atomicity, Log based recovery, Shadow paging, Recovery with concurrent transactions, Buffer management, Failure with loss of nonvolatile storage, Advanced recovery techniques, Remote backup systems.

**TEXT BOOK**

1. Silberschatz, Korth, Sudarshan, Database System Concepts, McGrawHill International Edition, 4<sup>th</sup> Edition, 2002.

**REFERENCE BOOKS**

1. Date, C.J., An introduction to database systems, Addison-Wesley, 7th Edition.
2. Elmasri, R., & Navathe, S.B., Fundamentals of database systems, Pearson Education, 3<sup>rd</sup> Edition.

<b>MCT504</b>	<b>OPERATING SYSTEMS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### **AN OVERVIEW OF OPERATING SYSTEM AND ITS STRUCTURES**

Introduction - Definition of OS, Mainframe System, Desktop Systems, Multi processor System, Distributed, Clustered, Real time Systems, Handheld Systems, Operating System Structure, System Components, Services-System Calls, System Programs, System Design and Implementation.

### **PROCESS MANAGEMENT AND DEADLOCKS**

Processes – Concepts, process Scheduling, Operations on Processes, Co-operating Processes, Inter Process Communication - CPU Scheduling - Scheduling Concepts, Criteria, Scheduling Algorithms, Multiprocessor Scheduling, Real time Scheduling, Algorithm Evaluation - Threads – Overview, Multithreading models, Threading issues - Process Synchronization – Background, Critical section problem, Synchronization hardware, Semaphores, Classic problems of synchronization, Critical regions, Monitors - Deadlocks - System model, Characterization, Methods of handling deadlocks, Deadlock prevention, Avoidance, Detection and recovery from deadlocks.

### **STORAGE MANAGEMENT**

Memory Management – Background, Swapping, Contiguous Memory Allocation, Paging, Segmentation, Segmentation with paging - Virtual Memory – Background, Demand paging, Process creation, Page replacement, Allocation of frames, Thrashing - File System Interface – File concept, Access methods, Directory Structure, File sharing, Protection - File System Implementation - File system structure, File system implementation, Directory implementation, Allocation Methods, Free space management.

### **I/O SYSTEMS AND SECURITY**

I/O Systems – Overview, I/O Hardware - Mass – Storage structure – Disk structure, Disk scheduling, Disk management, Swap space Management – Protection- Goals of Protection, Access Matrix, Implementation, Revocation of access Rights – Security – The Security Problem, User Authentication – Program Threats – System Threats.

### **CASE STUDY**

The LINUX System .

**TEXT BOOK**

1. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, Operating System Principles, John Wiley & Sons (ASIA) Pvt. Ltd., 7<sup>th</sup> Edition, 2005.

**REFERENCE BOOK**

1. Milankovic, M., Operating System Concepts and Design, Mc Graw Hill, 2<sup>nd</sup> Edition, 1992.

<b>MCT505</b>	<b>COMPUTER ARCHITECTURE</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### **PRINCIPLES OF PARALLEL PROCESSING**

Multiprocessors and Multicomputers – Multivector and SIMD - Computers, PRAM and VLSI Models - Conditions of Parallelism - Program Partitioning and Scheduling, Program flow mechanisms, Parallel Processing applications, Speed up performance law.

### **PROCESSOR AND MEMORY ORGANIZATION**

Advanced processor technology – Superscalar and vector processors - Memory hierarchy technology - Virtual memory technology - Cache memory organization - Shared memory organization.

### **PIPELINE AND PARALLEL ARCHITECTURE**

Linear pipeline processors - Non linear pipeline processors - Instruction pipeline design - Arithmetic pipeline design - Superscalar and Super pipeline design - Multiprocessor system interconnects cache coherence and synchronization mechanism - Message passing mechanisms.

### **VECTOR, MULTITHREAD AND DATAFLOW ARCHITECTURE**

Vector Processing principle - Multivector Multiprocessors - Compound Vector processing - Principles of multithreading - Fine grain multicomputers - Scalable and multithread architectures – Dataflow and hybrid architectures.

### **PARALLEL PROGRAMMING**

Parallel programming models - Parallel languages and compilers - Parallel programming environments - Synchronization and multiprocessing modes - Message passing program development - Mapping programs onto multicomputers - Multiprocessor UNIX design goals - MACH/OS kernel architecture - OSF/1 architecture and applications.

### **TEXT BOOKS**

1. Kai Hwang, Advanced Computer Architecture, Tata McGraw Hill, New Delhi, 2001.
2. William Stallings, Computer Organization and Architecture, McMillan Publishing Company, 1990.

### **REFERENCE BOOKS**

1. Quin, M.J., Designing Efficient Algorithms for Parallel Computer, Tata McGraw Hill International, New Delhi, 1994.

<b>MCT581</b>	<b>DBMS LAB</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>0</b>	<b>0</b>	<b>3</b>	<b>1</b>

**SQL**

Creation of the Database  
Manipulation of the Database  
Operations on Views

**High Level Programming level Extensions – PL/SQL**

Programs using control structures  
Functions  
Cursors  
Triggers  
Packages  
Procedures

**Developer Tools :** Forms and Reports.

<b>MCT582</b>	<b>OOP AND ALGORITHMS LAB</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>0</b>	<b>0</b>	<b>3</b>	<b>2</b>

1. Programs using constructor and destructor.
2. Programs using function overloading and operator overloading.
3. Programs using inheritance.
4. Programs using friend function.
5. Programs using virtual function.
6. Programs using exception handling.
7. Programs using files.
8. Programs using function templates.
9. Implementation of quick sort and merge sort using divide and conquer.
10. Implementation of binary search using divide and conquer.
11. Implementation of Kruskal's algorithm using greedy method.
12. Implementation of Prim's algorithm using greedy method.
13. Implementation of Dijkstra's algorithm using greedy method.
14. Implementation of Warshall's algorithm using dynamic programming.
15. Implementation of optimal binary search tree using dynamic programming.

<b>SEMESTER II</b>
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<b>MCT506</b>	<b>SOFTWARE ENGINEERING</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**PRODUCT AND PROCESS**

Introduction - Some definitions, Quality and productivity factors - The Software Process – A generic view of process, Process Models.

**SYSTEM ANALYSIS AND DESIGN**

System Engineering - Analysis Concepts, Principles and Analysis Modeling – Requirements Engineering, Building the Analysis Model - Design concepts and principles – Design Engineering, Types of Design, Modeling Component-level design, User interface design.

**TESTING**

Testing Strategies – Testing Tactics.

**MANAGING SOFTWARE PROJECTS**

Project Management - Process and Project metrics, Source code metrics - Project Planning - Defining the problem, Estimation, Project Scheduling, Risk Management, Quality Management, Change Management.

**CASE STUDY****TEXT BOOK**

1. Roger Pressman, Software Engineering - A Practitioner's Approach, TMH, 6<sup>th</sup> Edition.

**REFERENCE BOOK**

1. Richard Fairley, Software Engineering Concepts, Tata McGraw Hill, 2005.

<b>MCT507</b>	<b>COMPUTER NETWORKS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### **INTRODUCTION AND PHYSICAL LAYER**

Overview of data communications and networking - Networks models, Signals, Digital transmission, Multiplexing, Transmission media, Circuit switching - High speed digital access – DSL, Cabel modems and SONET.

### **DATALINK LAYER**

Error detection and correction - Data link controls and protocols, Point-to-Point access (PPP) - Multiple access - LAN, Wireless LAN, Cellular telephone and Satellite networks, Frame relay and ATM.

### **NETWORK LAYER**

Internetworking - Addressing and routing, Network layer protocols – ARP, IP, IPv6, ICMP, Unicast and Multicast routing.

### **TRANSPORT LAYER AND APPLICATION LAYER**

Transport layer - UDP, TCP, Congestion control and QoS - Application layer - DNS, SMTP, FTP, HTTP, WWW, Multimedia.

### **NETWORK SECURITY**

Cryptography - Message security, User authentication and key management, Security Protocols in the internet.

### **TEXT BOOK**

1. Behrouz Forouzan, A., Data communication and Networking, Tata McGraw-Hill, 2004.

### **REFERENCE BOOKS**

1. William Stallings, SNMP, SNMP V2, SNMPV3, RMON 1 and 2, Addison Wesley, 3<sup>rd</sup> Edition, 6<sup>th</sup> Indian reprint, 2002.
2. Kurose, J. F., Ross, K.W., Computer Networking–A top–down approach featuring the internet, Addison Wesley, 2001.
3. William Stallings, Data and Computer Communication, Pearson Education, 6<sup>th</sup> Edition, 2002.
4. Andrew Tanenbaum, S., Computer Networks, Tata McGraw Hill, 3<sup>rd</sup> Edition, 2001.

<b>MCT508</b>	<b>VISUAL PROGRAMMING</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**WINDOWS PROGRAMMING**

Overview of windows programming- Data type, Resources, Window messages - GDI – Device Context - Keyboard and Mouse messages – SDK tools.

**VISUAL BASIC PROGRAMMING**

Fundamentals - Graphics Application Controls - File System Controls – Database Controls – Database applications.

**VISUAL C++ PROGRAMMING**

Resources – Menus, Dialog boxes, Toolbar, Bitmap, Icon, Cursor - Components - Color and Font Dialog Boxes - Controls, Event Handling.

**DOCUMENT VIEW ARCHITECTURE**

Framework classes – VC++ Components - Event handling – Message Dispatch system - Menus – Accelerators - MDI, SDI documents, Splitter windows.

**ADVANCED CONCEPTS**

ActiveX and OLE - Database Management with MS ODBC - DLL - COM.

**TEXT BOOKS**

1. Charles Petzold, Windows Programming, Microsoft press, 1996.
2. David Kruglinski, J., George Shepherd and Scot Wingo, Programming Visual C++, Microsoft press, 1999.

**REFERENCE BOOK**

1. Evangelos Petroustos, Mastering Visual Basic 6, Sybex Publication, 2<sup>nd</sup> Edition, 1998.
2. David Kruglinski, J., George Shepherd, Scott Wingo, Inside Visual C++, Microsoft press, 1999.

<b>MCT509</b>	<b>INTERNET PROGRAMMING</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**INTRODUCTION**

World Wide Web – History of the World Wide Web, World Wide Web Consortium – HTML – Dynamic HTML – Object Model and Collections, Event Model, Filters and Transitions.

**JAVA SCRIPT**

Javascript - Introduction – Simple Program, Memory Concepts, Arithmetic - Decision Making - Equality and Relational Operators – Control Statements – Control Structures, Operators – Functions – Programmer - Defined Functions, JavaScript Global Functions, Recursion – Arrays – References and Reference Parameters, Passing Arrays to Functions, Multidimensional Arrays – Objects – Object Types, Cookies.

**XML**

XML - Introduction, Structuring Data, XML Namespaces, Document Type Definitions (DTDs) and Schemas, Document Type Definitions, W3C XML Schema Documents, XML Vocabularies, Document Object Model (DOM), DOM Methods, Simple API for XML (SAX), Extensible Style sheet Language (XSL), Simple Object Access Protocol (SOAP) .

**PERL, CGI AND PHP**

Perl - Introduction, String Processing and Regular Expressions, Viewing Client/Server Environment Variables, Form Processing and Business Logic, Verifying a Username and Password, Connecting to a Database, Cookies, Operator Precedence Chart.

**JAVA PROGRAMMING**

Java - Classes – Constructors, Garbage Collection - Overloading Methods – Overriding Methods - Exception Handling - Multithreading – Creating a Thread, Synchronization, InterThread Communication - Streams – Byte Streams, Character Streams.

**TEXT BOOKS**

1. Deitel, Deitel and Neito, INTERNET and WORLD WIDE WEB – How to program, Pearson Education Asia, 2001.
2. Norton, D., and Schildt, H., Java 2: The complete Reference, Tata McGraw Hill, 5<sup>th</sup> Edition, 2002.
3. Deitel and Deitel, XML How to Program, Pearson Education, 3<sup>rd</sup> Edition, 2001.

<b>MCT510</b>	<b>SERVICE ORIENTED ARCHITECTURE</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### **SOA AND WEB SERVICES FUNDAMENTALS**

Defining SOA, Business Value of SOA, Evolution of SOA, SOA characteristics, Concept of a service in SOA, Misperceptions about SOA, Basic SOA architecture, infrastructure services, Enterprise Service Bus (ESB), SOA Enterprise Software models, IBM On Demand operating environment.

### **WEB SERVICES TECHNOLOGIES**

XML technologies – XML, DTD, XSD, XSLT, XQuery, XPath-Web services technologies - Web services and SOA, WSDL, SOAP, UDDI, WS Standards (WS-\*) - Web services and Service-oriented enterprise (SOE), WS-Coordination and WS-Transaction, Business Process Execution Language for Web Services (BPEL4WS), WS-Security and the Web services security specifications, WS-Reliable Messaging, WS-Policy, WS-Attachments.

### **SOA PLANNING AND ANALYSIS**

Stages of the SOA lifecycle, SOA Delivery Strategies, Service-oriented analysis, Capture and assess business and IT issues and drivers, Determining non-functional requirements (e.g., technical constraints, business constraints, runtime qualities, non-runtime qualities), Business centric SOA and its benefits, Service modeling, Basic modeling building blocks, Service models for legacy application integration and enterprise integration, Enterprise solution assets(ESA).

### **SOA DESIGN AND IMPLEMENTATION**

Service-oriented design process, Design activities, Determine services and tasks based on business process model, Choosing appropriate standards, Articulate architecture, Mapping business processes to technology, Designing service integration environment (e.g., ESB, registry), Tools available for appropriate designing, Implementing SOA, Security implementation, Implementation of integration patterns, Services enablement, Quality assurance

### **MANAGING SOA ENVIRONMENT**

Distributing service management and monitoring concepts, Operational management challenges, Service-level agreement considerations, SOA governance (SLA, roles and responsibilities, policies, critical success factors, and metrics), QOS compliance in SOA governance, role of ESB in SOA governance, Impact of changes to services in the SOA lifecycle.

**TEXT BOOKS**

1. Thomas Erl, Service Oriented Architecture Concepts Technology and Design, Prentice Hall Publication, 2005.
2. Nobert Bieberstein, Sanjay Bose, Marc Fiammante, Keith Jones, Rawn Shah, Service Oriented Architecture Compass Buisness Value, Planning and Enterprise Roadmap, IBM Press Publication, 2005.
3. Sandey Carter, The new Language of Buisness SOA and web 2.0, IBM Press Publication, 2007.

**REFERENCE BOOKS**

1. Thomas ERL, Service Oriented Architecture a field Guide to Integrating XML and Web services, Prentice Hall Publication, 2004.
2. Dave Chappell, Enterprise Service Bus, O'Reilly Publications, 2004.
3. SanjivaWeerawarna, Francisco Cubera, Frank Leymann, Tony Storey, Donald Ferguson, F., Web Services Architecture, Prentice Hall Publication, 2005.
4. Eric Newcomer, Greglowman, Understanding SOA with Web services, Addison Wesley Publication, 2005.
5. Thomas Mattern Dan Woods, Enterprise SOA Designing IT for Business Innovation, O'Reily Publications, 2006.

<b>MCT583</b>	<b>VISUAL PROGRAMMING LAB</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>0</b>	<b>0</b>	<b>3</b>	<b>1</b>

1. Program using application wizard.
2. SDI, MDI, Drawing Inside the View Window, Device Context.
3. Program to handle basic events.
4. The message map, saving the view's state, initializing a view class data member.
5. Program using graphical device interface objects.
6. Program to display modal and modeless dialogs.
7. Program using static and dynamic controls.
8. Program using document – view architecture.
9. Program with tool bars and status bars.
10. Program using SDI and MDI serialization.
11. Program to create dynamic link libraries using MFC.
12. Program to interface with database.

<b>MCT584</b>	<b>INTERNET PROGRAMMING LAB</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>0</b>	<b>0</b>	<b>3</b>	<b>1</b>

1. Program to illustrate the use of overloading and overriding.
2. Program to implement the concept of Interfaces and packages.
3. Generate the program using exceptions handling mechanism.
4. Program to achieve Inter thread communication and deadlock avoidance.
5. Implement the file operations.
6. Program using Applets.
7. Program using JDBC.
8. Program using JNI concepts.
9. Program to illustrate the use of Remote Method Invocation.
10. Program using Servlets.

**SEMESTER III**

<b>MCT601</b>	<b>DISTRIBUTED COMPUTING</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**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 – I**

The OS Layer - Protection - Processes and Threads - Communication and Invocation – OS Architecture - Security - Overview - Cryptographic Algorithms - Digital Signatures - Cryptography Pragmatics - Case Studies - Distributed File Systems - File Service Architecture - Sun Network File System - The Andrew File System .

**OPERATING SYSTEM ISSUES – II**

Name Services - Domain Name System - Directory and Discovery Services - Global Name Service - X.500 Directory Service - 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.

**TEXT BOOK**

1. George Coulouris, Jean Dollimore, Tim Kindberg, Distributed Systems and concepts, Pearson Education, 3<sup>rd</sup> Edition, 2002.

**REFERENCE BOOKS**

1. Sape Mullender, Distributed Systems, Addison Wesley, 2<sup>nd</sup> Edition, 1993 .
2. Albert Fleishman Springer, Distributed Systems Software Design and Implementation, verlag, 1994.
3. Liu, M.L., Distributed Computing Principles and Applications, Pearson Education, 2004.
4. Andrew Tanenbaum, S., Maatenvan Steen, Distributed Systems, Pearson Education, 2002.

<b>MCT602</b>	<b>UNIX AND NETWORK PROGRAMMING</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### **INTRODUCTION AND FILE SYSTEM**

Overview of UNIX OS - File I/O – File Descriptors – File sharing - Files and directories – File types - File access permissions – File systems – Symbolic links - Standard I/O library – Streams and file objects – Buffering - System data files and information - Password file – Group file – Login accounting – System identification.

### **PROCESSES**

Environment of a UNIX process – Process termination – Command line arguments - Process control – Process identifiers - Process relationships terminal logins – Signals - threads.

### **INTERPROCESS COMMUNICATION**

Introduction - Message passing (SVR4) - Pipes – FIFO – Message queues - Synchronization (SVR4) – Mutexes – Condition variables – Read – Write locks – File locking – Record locking – Semaphores – Shared memory(SVR4).

### **SOCKETS**

Introduction – Transport layer – Socket introduction - TCP sockets – UDP sockets - Raw sockets – Socket options - I/O multiplexing - Name and address conversions.

### **APPLICATIONS**

Debugging techniques - TCP echo client server - UDP echo client server - Ping - Trace route - Client server applications like file transfer and chat.

### **TEXT BOOKS**

1. Richard Stevens, W., Advanced Programming in the UNIX environment, Addison Wesley, 1999.
2. Stevens, Bill Fenner, Andrew Rudoff, Volume 1 The Sockets networking, Pearson Education, 3<sup>rd</sup> Edition, November 2003.

### **REFERENCE BOOKS**

1. Tilak Shetty, Meeta Gandhi, Rajiv Shah, The ‘C’ Odssey Unix – The Boundless C, 1<sup>st</sup> Edition, BPB Publications, 1992.

<b>MCT681</b>	<b>UNIX AND NETWORKING LAB</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>0</b>	<b>0</b>	<b>3</b>	<b>2</b>

1. Program using basic network commands.
2. Program using system calls : create, open, read, write, close, stat, fstat, lseek.
3. Program to implement inter process communication using pipes.
4. Program to perform inter process communication using message queues.
5. Program to perform inter process communication using shared memory.
6. Program to perform synchronization using semaphores .
7. Program to capture packets using sniffer.
8. Program using TCP sockets (Client and Server).
9. Program using UDP sockets (Client and Server).
10. Program using URL class to download webpages.

<b>MCE511</b>	<b>COMPONENT BASED TECHNOLOGY</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**INTRODUCTION**

Windows DNA – Designing Multitired component architectures .

**COM**

Persistent Storage - Monikers – Connectable Objects – COM Threading –COM and the Registry – COM Optimization, Inheritance and Aggregation.

**DCOM**

Using DCOM with the NT Services – Marshalling – Security – Configuration and error handling.

**MTS**

MTS architecture and administration – MTS as a component manager – MTS as a transaction coordinator – MTS security – COM transaction integrator.

**MSMQ**

Programming Loosely Coupled Systems - MSMQ administration and architecture- Programming the MSMQ - Advanced MSMQ Programming - Introducing COM+- Programming COM+ services.

**TEXT BOOK**

1. Randy Abernethy, COM/DCOM, Tech Media, 1999.

**REFERENCE BOOK**

1. Dale Rogerson, Inside COM, WB Publication, 2003.

<b>MCE512</b>	<b>ELECTRONIC COMMERCE</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### **INTRODUCTION AND INFRASTRUCTURE**

What is E-commerce, Internet and WWW - Economic Forces and E-COM - Value chains in E-Com - Technology overview - Packet Switched networks - Markup languages and web - Web clients and servers - Internets – Intranets – Extranets.

### **WEB BASED TOOLS AND E-COM SOFTWARE**

Webserver hardware and performance Evaluation - Web Server Software Feature sets - Webserver softwares and tools - Other webserver tools - What kind of software solution do you need - Marketing Smarts - Hosting services - Basic Packages, Midrange packages.

### **SECURITY THREATS AND IMPLEMENTING SECURITY**

Security overview - Intellectual Property threats - E-Com threats – CERT - Protecting E-Com Assets - Protecting Intellectual Property - Protecting client computers - Protecting E-COM Channels - Protecting Commerce Server.

### **E- PAYMENTS**

E-Cash - Electronic Wallets - Smart Cards - Credit and Charge cards - Case Studies.

### **STRATEGIES FOR MARKETING, PURCHASING, SALES AND SUPPORT ACTIVITIES**

Creating an effective presence - Identifying and reaching customers - Creating and Maintaining Brands on the web - Buisness models for selling on the web – Purchasing - Logistics, and Support Activities - Electronic Data Interchange - Supply Chain Management - Software for Purchasing Logistics and Support Activities.

### **TEXT BOOK**

1. Gary Scheider, P., James Perry Thomas, T., E-Commerce, Course Technology, 2000.

### **REFERENCE BOOKS**

1. Pete Loshin, Electronic Commerce, Firewall Media, 4<sup>th</sup> Edition.
2. Greenstein, Electronic Commerce, Tata McGraw Hill Pvt Ltd., 2000.

<b>MCE513</b>	<b>NATURAL LANGUAGE PROCESSING</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**INTRODUCTION**

Speech and Language Processing – Ambiguity – Models and algorithms – Language – Thought – Understanding – Brief history – Regular Expressions – Automata – Morphology and Finite State Transducers – Computational Phonology and Text-to-Speech.

**PROBABILISTIC MODELS AND SPEECH RECOGNITION**

Spelling – Bayesian method – Weighted Automata – N-grams – Smoothing – Entropy – HMMs and Speech Recognition – Speech Recognition Architecture – Hidden Markov models – Decoding – Acoustic processing – Speech recognizer – Speech synthesis.

**SYNTAX**

Word classes and Part-of-Speech Tagging – Tagsets – Transformation based tagging – Context free rules and trees – The noun Phrase – Co-ordination – Verb phrase – Finite state and Context free grammars – Parsing with context free grammars.

**UNIFICATION AND PROBABILISTIC PARSING**

Features – Implementing unification – Unification constraints – Probabilistic context free grammars – Problems – Lexicalized context free grammars – Dependency grammars – Human parsing – Language and Complexity.

**SEMANTICS**

Representing meaning – First order predicate calculus – Semantic analysis – Attachments – Idioms – Compositionality – Robust semantic analysis – Lexical semantics – Selectional restrictions – Machine learning approaches – Dictionary based approaches – Information retrieval.

**TEXT BOOK**

1. Daniel Jurafsky and James Martin, H., Speech and Language Processing, Pearson Education, 2002.

**REFERENCE BOOKS**

1. Michael Berry, W., Survey of Text Mining: Clustering, Classification and Retrieval Systems, Springer Verlag, 2003.
2. James Allen, Natural Language Understanding, Benjamin Cummings Publishing Co. 1995.

<b>MCE514</b>	<b>THEORY OF COMPUTATION</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**AUTOMATA**

Introduction to formal proof – Additional forms of proof – Inductive proofs – Finite Automata (FA) – Deterministic Finite Automata (DFA) – Non-deterministic Finite Automata (NFA) – Finite Automata with Epsilon transitions.

**REGULAR EXPRESSIONS AND LANGUAGES**

Regular Expression – Regular Grammars – Properties of regular languages - Pumping Lemma and application .

**CONTEXT-FREE GRAMMAR AND LANGUAGES**

Context-Free Grammar (CFG) – Application - Parse Trees – Ambiguity in grammars and languages – Pushdown automata – Languages of a Pushdown Automata – Equivalence of Pushdown automata and CFG, Deterministic Pushdown Automata.

**PROPERTIES OF CONTEXT-FREE LANGUAGES**

Normal forms for CFG – Pumping Lemma for CFL – Applications properties of CFL – Turing Machines – Programming Techniques for TM – Extensions - Restricted TM.

**UNDECIDABILITY**

A language that is not Recursively Enumerable (RE) – An undecidable problem that is RE – Undecidable problems about Turing Machine – Post’s Correspondence Problem - The classes P and NP-NP complete-complements of languages in NP.

**TEXT BOOK**

1. Hopcroft, J. E., Motwani, R., Ullman, J. D., Introduction to Automata Theory, Languages and Computations, 3<sup>rd</sup> Edition, 2006.

**REFERENCE BOOKS**

1. Martin J., Introduction to Languages and the Theory of Computation, Third Edition, Tata McGraw Hill, 2003.
2. Lewis, H.R., Papadimitriou, C.H., Elements of The theory of Computation, 2<sup>nd</sup> Edition, Pearson Education/PHI, 2003.

<b>MCE515</b>	<b>ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEM</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### **OVERVIEW**

Overview of AI –What is AI, Importance of AI, Easy work in AI, AI and related files – Knowledge - General concepts, Definition and importance of knowledge, Knowledge based system, Representation of knowledge, Organization, Manipulation - Programming languages - AI programming language, Introduction to LISP, Basic list manipulation, Functions, Predicates and conditionals, I/O and local variables.

### **KNOWLEDGE REPRESENTATION**

Formalized symbolic logic – Introduction, Propositional logic, Syntax and semantics for FOPL, Properties of WFFS, Conversion to clausal form- Inconsistencies and uncertainties – Truth maintenance system, Default reasoning, Predicate completion and circumscription - Probabilistic reasoning – Introduction, Bayesian probabilistic reference, Possible world representation, Dempster\_Sheifer theory - Structured knowledge – Associative networks frame structure, Conceptual dependency and scripts - Object oriented representations.

### **KNOWLEDGE ORGANIZATION AND MANIPULATION**

Search and control strategies – Preliminary concepts, Examples of search problems, Unformed blind search, Informed search - Matching techniques – Structures used in matching, Measurement for matching, Matching patterns, Partial matching, Fuzzy matching, RETE matching - Knowledge organization and management.

### **PERCEPTION, COMMUNICATION AND EXPERT SYSTEM**

Natural language processing – Introduction, Overview of Linguistic, Grammars and languages, Basic parsing techniques, Semantic analysis and representation, Natural language generation - Pattern recognition – Visual image understanding – Expert systems architectures.

### **KNOWLEDGE ACQUISITION**

General concepts – Introduction, Types of learning, General learning model - Machine learning – Perception, Checker playing, Genetic algorithm - Learning by induction – Analogical and explanation based learning.

### **TEXT BOOK**

1. Dan Patterson, W., Artificial Intelligence and Expert systems, PHI,1998.

### **REFERENCE BOOK**

1. Elaine Rich and Kevin Knight, Artificial Intelligence, Tata McGraw Hill, 2<sup>nd</sup> Edition, 2005.

<b>MCE603</b>	<b>DATA MINING AND DATA WAREHOUSING</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**INTRODUCTION**

Introduction to data mining and data warehousing – Relation to Statistics, Databases and Machine Learning, Taxonomy of data mining tasks, Steps in data mining process, Overview of data mining techniques - Data Warehousing – Design, Dimensional modeling, Metadata, Performance issues and indexing VLDB issues, Development life cycle, Merits.

**VISUALIZATION AND STATISTICAL PERSPECTIVE**

Visualization - Data Preprocessing – Dimension reduction techniques, Data summarization methods - Data mining primitives, Languages and System Architectures - Characterization - Comparison - Mining Association Rules.

**CLASSIFICATION, PREDICTION AND CLUSTERING**

Predictive Modeling - Classification – Prediction – Regression - Probabilistic and Deterministic Models - Cluster Analysis.

**MINING COMPLEX TYPES OF DATA**

Mining spatial and time – Series data.

**APPLICATIONS AND CASE STUDY**

Applications of Data Mining and Data warehouses, Commercial Data Mining Systems, Social Impacts of Data Mining - Case Study.

**TEXT BOOK**

1. Jiawei Han, Micheline Kamber, Data mining concepts and techniques, Morgan Kaufmann Publishers, 2001.

**REFERENCE BOOK**

1. Ralph Kimball, The Data warehouse Life cycle toolkit, John Wiley and sons, Inc 1998.

<b>MCE604</b>	<b>COMPUTER ANIMATION</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**INTRODUCTION**

Introducing web technologies – Structure of a page – Elements - Lists – EditingText – Links and Navigation – Hyperlinks, Anchors and Mailto Links – Defining and configuring a website.

**IMAGE HANDLING**

Displaying Images – Optimizing and creating Images – Creating image Maps and Navigation Bars – Adding multimedia to a web page – Managing assets using the Assets Panel.

**PAGE LAYOUT AND TABLES**

Displaying data in tables – Designing page layout using tables – Using frames to display multiple web pages.

**DHTML**

Using Dynamic HTML and layers – Formatting web pages – Adding interactivity – Form Creation – Scripts.

**IMPLEMENTATION**

Organizing and Uploading a project.

**TEXT BOOKS**

1. Jon Duckett, Beginning Web Programming with HTML, XHTML, CSS and JavaScript, Wiley Dreamtech India, 2005.
2. Besty Bruce, Macromedia Dreamweaver'8, Pearson Education, 2006.

**REFERENCE BOOKS**

1. James L. Mohles, Flash 5.0 Graphics, Animation & Interaction, Macromedia 2000.
2. Richard Schrand, Photoshop 6 Visual Jumpstrat, Adobe Press 2000.

<b>MCE605</b>	<b>BIOINFORMATICS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**INTRODUCTION**

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

**DATABASES**

Data management – Data life cycle – Database technology – Interfaces and implementation – Biological databases and their uses.

**PATTERN MATCHING AND MACHINE LEARNING**

Pairwise sequence alignment – Local vs. global alignment – Multiple sequence alignment – Dot matrix analysis – Substitution matrices – Dynamic programming – Bayesian methods – Tools – BLAST – FASTA - Machine learning – Neural networks – Statistical methods – Hidden Markov models.

**PHYLOGENY**

Introduction – Mutations - Irrelevant mutations – Controls - Mutations as a measure of time – Distances - Reconstruction - Distances between species - Estimating time intervals from distances.

**ADVANCED TOPICS IN BIOINFORMATICS**

Biomolecular and cellular computing – Micro array analysis – Systems biology.

**TEXT BOOKS**

1. Bergeron, B., Bioinformatics Computing, PHI, 2002.
2. Westhead, Parish, D.R., Twyman, R.M., BIOS, Scientific Publishers, 2000.

**REFERENCE BOOK**

1. Gibas, C., Jambeck, P., Developing Bioinformatics Skills, O’Reilly, 1999.

<b>MCE606</b>	<b>NEURAL NETWORKS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### **INTRODUCTION**

Elementary Neurophysiology – ANS - From Neurons to ANS, ANS Simulation - Adaline and Madaline - Review of Signal Processing, Adaline and ALC - Applications of Adaptive Signal Processing, Madaline, Simulating the Adaline, Backpropagation, BPN, Generalized Delta Rule, Applications, Simulator.

### **BAM AND CPN**

Associative Memory Definitions – BAM, The Hopfield Memory, Simulating the BAM – Boltzmann Machine, Simulator – The Counter Propagation Network – CPN Building blocks, CPN Data processing, CPN Simulator.

### **SOM AND NEOCOGNITRON**

Self-Organizing Maps – SOM Data processing, Applications, Simulating the SOM – ART Network Description, ART1, ART2, Simulators, Spatiotemporal Pattern Classification, The formal Avalanche, Architecture of STNS, Applications, Simulations – Neocognitron – Architecture, Data processing, Performance of the Neocognitron.

### **FUZZY SET THEORY**

Fuzzy Vs Crisp – Crisp Sets, Fuzzy Sets, Crisp Relations, Fuzzy Relations, Fuzzy Sets, Crisp Logic, Predicate Logic, Fuzzy Logic, Fuzzy Rule Based System, Defuzzification Methods, Applications.

### **GENETIC ALGORITHMS**

Fundamentals – History Of Genetic Algorithms, Basic Concepts, Creation of Offsprings, Working Principle, Encoding, Fitness Function, Reproduction, Genetic Modeling, Inheritance Operators, Cross Over, Inversion And Deletion, Mutation Operators, Bitwise Operators, Generation Cycle, Convergence of Genetic Algorithms, Applications, Advances in GA.

### **TEXT BOOKS**

1. James Freeman, A., David Skapura, M., Neural Networks Algorithms, Applications and Programming Techniques, Pearson Education Asia, 2001.
2. Rajasekaran, S., Vijayalakshmi Pai, G.A., Neural Networks Fuzzy Logic And Genetic Algorithms.

### **REFERENCE BOOK**

1. Bart Kosko, Neural Networks And Fuzzy Systems, Prentice Hall India Pvt., Ltd., 2005.

<b>MCE607</b>	<b>SOFTWARE ARCHITECTURE</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### **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, 2<sup>nd</sup> Edition, 2003.

### **REFERENCE BOOKS**

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, 2000.

<b>MCE608</b>	<b>TCP / IP PROTOCOL SUITE</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**INTRODUCTION**

Introduction – OSI Model and TCP/IP protocol – Underlying technologies – IP addresses: Classful and Classless Addressing.

**INTERNET PROTOCOL**

Delivery, Forwarding and routing of IP packets – ARP and RARP – IP – ICMP – IGMP.

**TRANSMISSION CONTROL PROTOCOL**

UDP – TCP – SCTP – Unicast Routing protocols - Multicasting and Multicast routing protocols.

**APPLICATION LAYER AND PROTOCOL**

Host configuration – DNS – Remote login - Telnet - File Transfer Protocols - Electronic Mail - SMTP, POP, IMAP – SNMP – WWW - HTTP.

**IP AND VPN**

IP over ATM Mobile - IP – VPN – IPv6.

**TEXT BOOK**

1. Behrouz Forouzan, A., TCP/IP Protocol suite, Tata McGraw Hill, 3<sup>rd</sup> Edition, 2006.

<b>MCE609</b>	<b>AGENT BASED INTELLIGENT SYSTEM</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**INTRODUCTION**

Definitions - Foundations - History - Intelligent agents - Problem solving - Searching - Heuristics - Constraint satisfaction problems - Game playing.

**KNOWLEDGE REPRESENTATION AND REASONING**

Logical agents - First order logic - First order inference – Unification – Chaining - Resolution strategies - Knowledge representation – Objects – Actions - Events.

**PLANNING AGENTS**

Planning problem - State space search - Partial order planning – Graphs - Nondeterministic Domains - Conditional planning - Continuous planning - Multiagent planning.

**AGENTS AND UNCERTAINTY**

Acting under uncertainty – Probability notation - Bayes rule and use - Bayesian networks - Other approaches - Time and uncertainty - Temporal models - Utility theory - Decision network – Complex decisions.

**HIGHER LEVEL AGENTS**

Knowledge in learning - Relevance information - Statistical learning methods - Reinforcement learning – Communication - Formal grammar - Augmented grammars - Future of AI.

**TEXT BOOK**

1. Stuart Russell, Peter Norvig, Artificial Intelligence - A Modern Approach, Prentice Hall, 2<sup>nd</sup> Edition, 2002.

**REFERENCE BOOKS**

1. Michael Wooldridge, An Introduction to Multi Agent System, John Wiley, 2002.
2. Patrick Henry Winston, Artificial Intelligence, AW, 3<sup>rd</sup> Edition, 1999.
3. Nils Nilsson, J., Principles of Artificial Intelligence, Narosa Publishing House, 1992.

<b>MCE610</b>	<b>OBJECT ORIENTED ANALYSIS AND DESIGN</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**INTRODUCTION**

Basics – Object oriented philosophy, Object state, Behavior, Methods, Encapsulation and Information hiding, Associations, Aggregation, Meta classes, Identity, Dynamic binding - Object Oriented System Development Life Cycle.

**METHODOLOGY AND UML**

Methodology - Rumbaugh, Booch, Jacobson Methodology, Patterns, Frameworks, Unified approach – Introduction to UML – UML diagrams, Class diagrams, Use case diagrams, Static and Dynamic Models, Model Organization, Extensibility.

**OBJECT ORIENTED ANALYSIS**

Object analysis – Business object analysis, Use case driven approach, Use case model, Documentation – Classification – Identifying object relationship, Attributes, Methods, Super and Sub class, Object responsibility.

**OBJECT ORIENTED DESIGN**

OO design process – Design axioms, Corollaries, Design classes, Class visibility, Refining attributes, Methods and Protocols, Object storage and Interoperability – Databases – Object relational systems – Designing interface objects – Macro and Micro level processes, The purpose of a view layer interface.

**SOFTWARE QUALITY**

Quality assurance - Testing Strategies, Object orientation testing, Test cases, Test plan, Debugging principles – Testing – Usability testing, Satisfaction testing.

**TEXT BOOK**

1. Ali Bahrami, Object Oriented System Development, McGraw Hill International Edition, 1999.

<b>MCE611</b>	<b>EMBEDDED SYSTEMS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### **INTRODUCTION**

Real Time System - Types, Real Time Computing, Design Issue, Sample Systems - Hardware Requirements - Processor in a system, System Memories, System I/O, Other Hardware Devices (A/D, D/A, USART, Watchdog Timers, Interrupt Controllers) Device Drivers, Interrupt Servicing Mechanism and Interrupt Latency.

### **EMBEDDED SYSTEMS**

Introduction - Various System Architecture for Embedded System - High Performance Processors - Strong ARM processors, Programming, Interrupt Structure, I/O architecture.

### **REAL TIME OPERATING SYSTEM**

Fundamental Requirements of RTOS - Real Time Kernel Types, Schedulers, Various Scheduling modules with examples, Latency (Interrupt Latency, Scheduling Latency and Context Switching Latency), Tasks, State Transition Diagram, Task Control Block - Inter-task communication and Synchronization of tasks.

### **MEMORY AND FILE MANAGEMENT**

Pipelining and Cache Memories - Paging and Segmentation – Fragmentation - Address translation.

### **DEVELOPMENT AND VERIFICATION OF REAL TIME SOFTWARE**

Building Real Time applications - Considerations such as double buffering - Case Study - Introduction to VX Works/Mucos/Psos.

### **TEXT BOOKS**

1. David Simon, E., An Embedded software primer, Pearson Education, 1999.
2. Philip Laplante, A., Real-Time Systems Design and Analysis - an Engineer's Handbook, 2<sup>nd</sup> Edition, PHI Publications.
3. Jane Liu, W. S., Real-Time Systems, Pearson Education Inc., 2000.
4. Rajkamal, Embedded Systems: Architecture, Programming and Design, Tata McGraw Hill, New Delhi, 2003.

### **REFERENCE BOOKS**

1. Dr. Prasad, K.V.K.K., Embedded Real Time Systems: Concepts Design and Programming, Dreamtech Press New Delhi, 2003.
2. David Evesham, A., Developing real time systems – A practical introduction, Galgotia Publications, 1990.
3. Krishna, C.M., Real Time Systems, McGraw Hill, 1997.

<b>MCE612</b>	<b>COMPUTER SECURITY</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**INTRODUCTION**

Introduction – Conventional encryption, Classical and Modern techniques, Algorithms - Confidentiality using conventional encryption.

**CRYPTOGRAPHY**

Public key cryptography – Introduction to number theory – Message Authentication.

**AUTHENTICATION**

MAC algorithms – Authentication Protocols and Applications .

**HASH FUNCTION**

Hash algorithms – MD5-secure hash algorithm - RIPEMO-160, HMAC - Digital Signatures - Authentication protocol, Digital signature standards - Authentication protocols and Applications - Kerberos – X.509 Authentication service.

**SECURITY**

E-Mail Security – IP Security – Web Security Intruders – Viruses – Worms – Firewalls.

**TEXT BOOK**

1. William Stallings, Cryptography and Network Security, Pearson Education, 3<sup>rd</sup> Edition, 2003.

**REFERENCE BOOK**

1. Charles Fleeger, P., Shari Lawrence Pfleeger, Security in Computing, Pearson Education, 3<sup>rd</sup> Edition, 2004.

<b>MCE613</b>	<b>MOBILE COMPUTING</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**WIRELESS TRANSMISSION**

Introduction - Applications, Reference model - Wireless transmission - Signal propagation, Multiplexing, Modulation, Spread Spectrum.

**MEDIUM ACCESS CONTROL**

SDMA – FDMA – TDMA – Fixed TDMA, Classical Aloha, Slotted Aloha, CSMA, Demand assigned MA, PRMA, Reservation TDMA, MA with collision avoidance, Polling, ISMA – CDMA – Telecommunications system - GSM, DECT, TETRA, UMTS, IMT-2000.

**SATELLITE SYSTEMS**

Basics of satellite communication - GEO, LEO, MEO – Broadcast System - Overview of broadcasting, Digital audio broadcasting, Digital video broadcasting .

**WIRELESS NETWORKS**

IEEE 802.11 – Architecture, Protocol, MAC layer, Physical layer, 802.11b, 802.11a - HIPERLAN – HIPERLAN1, WATM, BRAN, HiperLAN2 – Bluetooth - Architecture, Radio layer, Baseband layer, Link manager Protocol, Security, SDP, Profiles.

**MOBILE LAYERS**

Mobile IP – Dynamic Host configuration protocol – Mobile ad-hoc networks – WAP - Architecture, WAP, Wireless transport layer security, Wireless transaction protocol, Session protocol, Wireless markup language, WMLscript, Wireless telephony application, Push architecture, Push / Pull services.

**TEXT BOOK**

1. Jochen Schiller, Mobile Communication, Pearson Education, 2<sup>nd</sup> Edition 2004.

**REFERENCE BOOK**

1. William, Lee, C.Y., Mobile Communication Engineering, McGraw Hill, 2<sup>nd</sup> Edition.

<b>MCE614</b>	<b>DIGITAL IMAGE PROCESSING</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**DIGITAL IMAGE FUNDAMENTALS**

Image formation, Image transforms – Fourier transforms, Walsh, Hadamard, Discrete cosine, Hotelling transforms.

**IMAGE ENHANCEMENT & RESTORATION**

Histogram modification techniques - Image smoothening - Image Sharpening - Image Restoration - Degradation Model – Noise models - Spatial filtering – Frequency domain filtering.

**IMAGE COMPRESSION & SEGMENTATION**

Compression Models - Elements of information theory - Error free Compression - Image segmentation – Detection of discontinuities - Edge linking and boundary detection - Thresholding – Region based segmentation - Morphology.

**REPRESENTATION AND DESCRIPTION**

Representation schemes - Boundary descriptors - Regional descriptors - Relational descriptors.

**OBJECT RECOGNITION AND INTERPRETATION**

Patterns and pattern classes – Decision - Theoretic methods - Structural methods.

**TEXT BOOK**

1. Gonzalez, R.C., Woods, R.E., Digital Image Processing, Pearson Education, 2<sup>nd</sup> Edition, 2002.

**REFERENCE BOOKS**

1. Anil Jain, K., Fundamentals of Digital image Processing, Prentice Hall of India, 1989.
2. Sid Ahmed, Image Processing, McGraw Hill, New York, 1995.

<b>MCE615</b>	<b>NANO COMPUTING</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**OVERVIEW**

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 MECHANICS**

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

**ORGANIC 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 CHARACTERIZATION**

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

**REFERENCE BOOKS**

1. Sandeep Shukla, Iris Bahar, Nano, Quantum and Molecular Computing, Kluwer Academic Publishers, 2004.
2. Poole Jr, C.P., Owens, F.J., Introduction to Nanotechnology, Wiley, 2003.
3. Drexler, K.E., Nanosystems, Wiley, 1992.
4. Petty, M.C., Bryce, M.R., and Bloor, D., Introduction to Molecular Electronics, Edward Arnold, 1995.
5. Mitin, V., Kochelap, V.M., Stroschio, Quantum Heterostructures, Cambridge, 1999.
6. Scherge, M., Gorb, S., Biological Micro-Nano-tribology, Springer, 2001.
7. Calude, C.S., and Paun, F., Computing with Cells and Atoms, Taylor and Francis, 2001.
8. Sakurai, T., Watanabe, Y., Advances in Scanning Probe Microscopy, Springer, 2000.

<b>MCE616</b>	<b>SOFT COMPUTING</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### **ARTIFICIAL NEURAL NETWORKS**

Basic concepts - Single layer perception - Multilayer Perception - Supervised and Unsupervised learning – Back propagation networks - Kohonen's self organizing networks - Hopfield network.

### **FUZZY SYSTEMS**

Fuzzy sets and Fuzzy reasoning - Fuzzy matrices - Fuzzy functions - Decomposition - Fuzzy automata and languages - Fuzzy control methods - Fuzzy decision making.

### **NEURO - FUZZY MODELING**

Adaptive networks based Fuzzy interface systems - Classification and Regression Trees - Data clustering algorithms - Rule based structure identification - Neuro-Fuzzy controls - Simulated annealing – Evolutionary computation.

### **GENETIC ALGORITHMS**

Survival of the Fittest - Fitness Computations - Cross over - Mutation - Reproduction - Rank method - Rank space method.

### **SOFTCOMPUTING AND CONVENTIONAL AI**

AI search algorithm - Predicate calculus - Rules of interference – Semantic networks - Frames - Objects - Hybrid models - Applications.

### **REFERENCE BOOKS**

1. Jang, J.S.R., Sun, C.T., and Mizutani, E., Neuro-Fuzzy and Soft computing, Prentice Hall 1998.
2. Laurene Fausett, Fundamentals of Neural Networks, Prentice Hall, 1994.
3. George, J., Klir and Bo Yuan, Fuzzy sets and Fuzzy Logic, Prentice Hall, USA, 1995.
4. Nih Nelsson, J., Artificial Intelligence - A New Synthesis, Harcourt Asia Ltd., 1998.
5. Goldberg, D.E., Genetic Algorithms: Search, Optimization and Machine Learning, Addison Wesley, New York, 1989.

<b>MCE617</b>	<b>IT INFRASTRUCTURE MANAGEMENT</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### **INFRASTRUCTURE MANAGEMENT OVERVIEW**

Definitions, Infrastructure management activities, Evolutions of Systems since 1960s (Mainframes-to-Midrange-to-PCs-to-Client-server computing-to-New age systems) and their management, Growth of internet, Current business demands and IT systems issues, Complexity of today's computing environment, Total cost of complexity issues, Value of systems management for business.

### **PREPARING FOR INFRASTRUCTURE MANAGEMENT**

Factors to consider in designing IT organizations and IT infrastructure, Determining customer's Requirements, Identifying system components to manage, Exist Processes, Data, applications, Tools and their integration, Patterns for IT systems management, Introduction to the design process for information systems, Models, Information Technology Infrastructure Library (ITIL).

### **SERVICE DELIVERY PROCESSES**

Service-level management, Financial management and costing, IT services continuity management, Capacity management, Availability management.

### **SERVICE SUPPORT PROCESSES**

Configuration Management, Service desk, Incident management, Problem management, Change management, Release management.

### **STORAGE AND SECURITY MANAGEMENT**

Introduction Security, Identity management, Single sign-on, Access Management, Basics of network security, LDAP fundamentals, Intrusion detection, Firewall, Security information management - Introduction to Storage, Backup and Restore, Archive and Retrieve, Space Management, SAN and NAS, Disaster Recovery, Hierarchical space management, Database and Application protection, Bare machine recovery, Data retention.

### **REFERENCE BOOKS**

1. Jan Van Bon, Foundations of IT Service Management: based on ITIL, Van Haren Publishing, 2<sup>nd</sup> Edition, 2005.
2. Floyd Piedad, Michael Hawkins, High Availability: Design, Techniques and Process, Prentice Hall, 2000.
3. Harris Kern, Stuart Galup, Guy Nemiro IT Organization: Building a Worldclass Infrastructure, Prentice Hall, 2000.
4. Rich Schiesser, IT Systems Management: Designing, Implementing and Managing World-Class Infrastructures, Prentice Hall, 2001.