Semester I

Code No.	Subject	L	T	P	C
MCS401	Operating Systems	3	0	0	3
MCS402	Design and Analysis of Algorithms	3	1	0	4
MCS403	Discrete Mathematics	3	0	0	3
MCS404	Data Base Management Systems	3	0	0	3
MCS405	Object Oriented Programming and C++	3	0	0	3
MCS481	Algorithms Laboratory (using C++)	0	0	3	2
MCS482	RDBMS Laboratory	0	0	3	2
	Total	**15**	**1**	**6**	**20**

Semester II

Code No.	Subject	L	T	P	C
MCS406	Software Engineering	3	0	0	3
MCS407	Internet Programming	3	1	0	4
MCS408	Computer Networks	3	0	0	3
MCS409	Object Oriented Analysis and Design	3	0	0	3
MCS***	Elective I	3	0	0	3
HSS***	Communication skills (English / German / French)	2	0	0	2
MCS483	Operating Systems Laboratory	0	0	3	2
MCS484	Internet Programming Laboratory	0	0	3	2
	Total	**17**	**1**	**6**	**22**

Semester III

Code No.	Subject	L	T	P	C
MCS501	Compiler Design	3	1	0	4
MCS502	Software Quality Management	3	0	0	3
MCS503	Visual Programming	3	1	0	4
MCS***	Elective II	3	0	0	3
MCS***	Elective III	3	0	0	3
MCS581	Visual Programming Laboratory	0	0	3	1
MCS598	Mini Project	0	0	6	4
	Total	**15**	**1**	**6**	**22**

Semester IV

Code No.	Subject	L	T	P	C
MCS599	Project Work	0	0	22	12

Total Credits (from 1st semester to 4th semester = 76)

Electives

S. No.	Subject	L	T	P	C
MCS608	Microprocessors and its applications	3	0	0	3
MCS609	System Software	3	0	0	3
MCS610	Advanced Databases	3	0	0	3
MCS611	Distributed Computing	3	0	0	3
MCS612	Data Mining and Data Warehousing	3	0	0	3
MCS613	Artificial Intelligence and Expert Systems	3	0	0	3
MCS614	Neural Networks	3	0	0	3
MCS615	Embedded Systems	3	0	0	3
MCS616	Mobile Computing	3	0	0	3
MCS617	Computer Security	3	0	0	3
MCS618	TCP / IP Protocol Suite	3	0	0	3
MCS619	Component based Technology	3	0	0	3
MCS620	Computer Animation	3	0	0	3
MCS621	Digital Image Processing	3	0	0	3
MCS622	Agent Based Intelligent System	3	0	0	3

MCS623	Software Agents	3	0	0	3
MCS624	Natural Language Processing	3	0	0	3
MCS703	Electronic Commerce	3	0	0	3
MCS704	Management Information Systems	3	0	0	3
MCS705	Enterprise Resource Planning	3	0	0	3
MCS706	Managerial Economics	3	0	0	3
MCS707	Human Resources Management	3	0	0	3
MCS708	Supply Chain Management	3	0	0	3
MCS709	Health Care Systems	3	0	0	3
MCS710	Numerical and Statistical Methods	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

SEMESTER I

MCS401	OPERATING SYSTEMS	L	T	P	C
		3	0	0	3

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

Processes – Concepts, Process scheduling, Operations on processes, Cooperating processes, Inter process communication - CPU scheduling - Scheduling concepts, Criteria, Scheduling algorithms, Multiprocessor scheduling, Real time scheduling, Algorithm evaluation -Threads – Overview, Multithreading models, Threading issues.

SYNCHRONIZATION AND DEADLOCKS

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 AND FILE MANAGEMENT

I/O Systems – Overview , I/O hardware – Mass storage structure – Disk structure , Disk scheduling, Disk management, Swap space management.

TEXT BOOK

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

REFERENCE

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

MCS402	DESIGN AND ANALYSIS OF ALGORITHMS	L	T	P	C
		3	1	0	4

INTRODUCTION TO ALGORITHM ANALYSIS TECHNIQUES

Introduction – Algorithm, Algorithm specification, Performance analysis.

DIVIDE AND CONQUER AND GREEDY TECHNIQUE

Divide and conquer - General method, Binary search , Finding the maximum and minimum , Merge sort, Quick sort, Strassen's matrix multiplication - Greedy technique – General method, Knapsack problem, Tree vertex splitting, Job sequencing with deadlines, Single source shortest paths.

DYNAMIC PROGRAMMING

Dynamic programming - General method, All pairs shortest path, Single source shortest path (General weights), Optimal binary search trees, 0/1 Knapsack problem, The Traveling salesperson problem.

BACKTRACKING AND BRANCH AND BOUND

Backtracking - General method, 8-Queens problem, Sum of subsets, Graph coloring, Hamiltonian cycles – Branch and bound – General method , Knapsack problem, Traveling salesperson problem.

NP PROBLEMS

NP Problems - Introduction to P, NP, NP - Complete, NP - Hard problems, Definitions, Examples.

TEXT BOOK.

1. Ellis Horowitz, Satraj Sahni, Sanguthevar Rajasekaran , Fundamentals of Computer

Algorithms , Galgotia Publishers pvt. Ltd., Reprint 2005.

REFERENCES

1. Anany Levitin, Introduction to the Design and Analysis of Algorithms , Pearson Education , Reprint 2006.
2. Aho, Hopcroft, Ullman , The Design and Analysis of Computer Algorithms, Pearson Education, Reprint 2004.

MCS403	DISCRETE MATHEMATICS	L	T	P	C
		3	0	0	3

MATHEMATICAL LOGIC

Connection - Normal forms - Theory of inferences - Predicate calculus.

SET THEORY

Set - Operations on sets, Basic set identities, Relations and orderings.

FUNCTIONS

Functions - Definition of functions, Classification of functions, Types of functions, Examples, Composition of functions, Inverse functions, Binary and n-ary operations, Characteristic function of a set, Hashing functions, Recursive functions, Permutation functions.

COMBINATORICS

Permutation - Combination - Pigeonhole principle - The principle of inclusion and exclusion - Recurrence relations.

GRAPH THEORY

Graphs - Undirected trees, Minimal spanning trees, Euler paths and circuits, Hamiltonian paths and circuits, Transport networks.

TEXT BOOKS

1. Tremblay, J.P., and Manohar, R., Discrete Mathematical Structures with Applications to Computer Science, Tata McGraw Hill Publication Co.Ltd, New Delhi, 2004.
2. Kolman, B., Busby and Ross, S.C., Discrete Mathematical Structure, 5th Edition, Pearson Education, New Delhi, 2004.

REFERENCES

1. Judith Gersting , L., Mathematical Structures for Computer Science, 5th Edition, W.H.Freeman and Company, NY, 2003.
2. Kenneth Rosen, H., Discrete Mathematics and its Applications, 5th Edition, TMH, 2003.
3. Ralph,Grimaldi, P., Discrete and Combinatorial Mathematics, 4th Edition, Pearson Education, New Delhi, 2002.
4. Venkatraman, M.K., Sridharan, N., and Chandrasekaran, N., Discrete Mathematics, The National Publishing Company, 2003.

MCS404	DATABASE MANAGEMENT SYSTEMS	L	T	P	C
		3	0	0	3

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

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.

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 CONTRL AND RECOVERY MANAGEMENT

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 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, 4th Edition, McGrawHill International Edition, 2002.

REFERENCES

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

MCS405	OBJECT-ORIENTED PROGRAMMING AND C++	L	T	P	C
		3	0	0	3

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 arguments - 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 BOOKS

1. Bjarne Stroustrup, The C++ Programming Language, 3rd Edition, Addison-Wesley, 1997.
2. Herbert Schildt, The Complete Reference C++, 4th Edition, Tata McGraw Hill, 2002.

REFERENCES

1. Robert Lafore, Waite Groups OOP in Turbo C++, 3rd Edition, Addison Wesley, 2000.
2. Stanley Lippman, Jove Largie, C++ Primer, 3rd Edition, Addison Wesley, 1998.

MCS481	ALGORITHMS LABORATORY (Using C++)	L	T	P	C
		0	0	3	2

1. Finding largest and smallest element using divide and conquer.
2. Implementation of quick sort and merge sort using divide and conquer.
3. Implementation of binary search using divide and conquer.
4. Implementation of binary tree traversals using divide and conquer.
5. Implementation of Kruskal's algorithm using greedy method.
6. Implementation of Prim's algorithm using greedy method.
7. Implementation of Dijkstra's algorithm using greedy method.
8. Implementation of Fractional Knapsack problem using greedy method.
9. Implementation of Warshall's algorithm using dynamic programming.
10. Implementation of Floyd's algorithm using dynamic programming.
11. Implementation of optimal binary search tree using dynamic programming.
12. Implementation of 0/1 knapsack problem using dynamic programming.
13. Implementation of N- queens problem using backtracking.
14. Implementation of Hamiltonian circuit problem using backtracking.
15. Implementation of subset-sum problem using backtracking.

MCS482	RDBMS LABORATORY	L	T	P	C
		0	0	3	2

1. Programs for creation of database using SQL.
2. Programs for manipulation of database using SQL.
3. Programs for implementation of operations on Views using SQL.
4. Programs for implementation of various control structures using SQL.
5. Programs for implementation of functions using PL/SQL.
6. Programs for implementation of cursors using PL/SQL.
7. Programs for implementation of triggers using PL/SQL.
8. Programs for implementation of packages using PL/SQL.
9. Programs for implementation of procedures using PL/SQL.
10. Programs for creation of forms and reports using developer tools.

SEMESTER II

MCS406	SOFTWARE ENGINEERING	L	T	P	C
		3	0	0	3

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 – A Strategic approach to software testing, Strategic issues, Test strategies for conventional and Object-Oriented software, Validation testing, System testing - Testing tactics – Software testing fundamentals, Black-box and white-box testing, Basis path testing, Control structure testing, Object-Oriented testing methods, Testing for specialized environments, architectures and applications.

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

Case study – Perform system analysis, Estimation , Risk analysis and Identify factors that affect the quality of software product for various real world business problems.

TEXT BOOK

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

REFERENCE

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

MCS407	INTERNET PROGRAMMING	L	T	P	C
		3	1	0	4

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

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

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

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

Classes – Constructors, Garbage collection - Overloading methods – Overriding methods - Exception handling - Multithreading – Creating a thread, Synchronization, Inter thread 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, 5th Edition, Tata McGraw Hill, 2002.
3. Deitel and Deitel , XML How to Program, 3rd Edition , Pearson Education, 2001.

REFERENCE

1. Margaret Levine Young, Internet and WWW, 2nd Edition, Tata McGraw Hill, 2002.

MCS408	COMPUTER NETWORKS	L	T	P	C
		3	0	0	3

INTRODUCTION

Building a network, Requirements, Network architecture, OSI, Internet, Direct link networks, Hardware building blocks, Framing, Error detection, Reliable transmission - Network fundamentals - LAN technology, LAN architecture, Bus/Tree, Ring, Star, Ethernet, Token Rings, Wireless.

NETWORK LAYER

Switching - Circuit switching, Packet switching, Switching and Forwarding, Bridges and LAN switches, Cell switching, Internetworking, Routing, Global Internet, Multicast.

TRANSPORT LAYER

UDP, TCP, Remote Procedure Call, Congestion control and Resource allocation, TCP congestion control, Congestion avoidance mechanisms.

NETWORK SECURITY AND APPLICATION LAYER

Cryptographic algorithms, DES, RSA, MD5, Security mechanisms, Fire walls, Name service, Traditional applications, SMTP, HTTP, Multimedia application – RTP – RTCP – SCTP.

NETWORK MANAGEMENT

Introduction – Network monitoring, Network control - SNMPV I Network management - concepts – information – Standard MIBS.

TEXT BOOK

1. Larry Peterson, L., and Brule Davie, S., Computer Networks – A System Approach, 2nd Edition, MarGankangmann – Harcourt Asia, 2002.

REFERENCES

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

MCS409	OBJECT ORIENTED ANALYSIS AND DESIGN	L	T	P	C
		3	0	0	3

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 and 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.

REFENENCES

1. Craig Larman, Applying UML and Patterns, 2nd Edition, Pearson Education, 2002.
2. Grady Booch, James Rumbaugh, Ivar Jacobson, The Unified Modeling Language User Guide, Addison Wesley, 1999.

MCS483	OPERATING SYSTEMS LABORATORY	L	T	P	C
		0	0	3	2

Implement the following CPU Scheduling Algorithms.
i) FCFS ii) Round Robin iii) Shortest Job First.
Implement the Mutual Exclusion Problem using Dekker's Algorithm.
Implement Inter Process Communication Problem.
Implement (Producer-Consumer / Reader - Writer Problem) using Semaphores.
Implement Best fit, First Fit Algorithm for Memory Management.
Implement Memory Allocation with Pages.
Implement FIFO page Replacement Algorithm.
Implement LRU page Replacement Algorithm.
Implement the creation of Shared memory Segment.
Implement File Locking.
Implement Banker's algorithm.

MCS484	INTERNET PROGRAMMING LABORATORY	L	T	P	C
		0	0	3	2

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

MCS501	COMPILER DESIGN	L	T	P	C
		3	1	0	4

INTRODUCTION

Compiler structure – Analysis - Synthesis model of compilation, Various phases of a compiler, Tool based approach to compiler construction.

LEXICAL ANALYSIS

Interface with input, Parser and symbol table, Token, Lexeme and patterns, Difficulties in lexical analysis, Error reporting and implementation, Regular definition, Transition diagrams , LEX.

SYNTAX ANALYSIS

Context free grammars, Ambiguity, Associativity, Precedence, Top down parsing, Recursive descent parsing, Transformation on the grammars, Predictive parsing, Bottom up parsing, Operator precedence grammars, LR parsers (SLR, LALR, LR), YACC.

INTERMEDIATE CODE GENERATION

Intermediate code generation, Intermediate representations, Translation of declarations, Assignments, Intermediate code generation for control flow, Boolean expressions, Procedure calls, Implementation issues.

CODE GENERATION

Code generation and instruction selection – Issues, Basic blocks and flow graphs, Register allocation, Code generation - DAG representation of programs - Code generation from dags, Peep hole optimization, Code generators, Specifications of machine - Code optimization, Source of optimizations, Optimization of basic blocks, Loops, Global dataflow analysis, Solution to iterative dataflow equations - Code improving transformations - Dealing with aliases, Data flow analysis of structured flow graphs.

TEXT BOOK

1. Aho, A.V., Ravi Sethi, Ullman, J.D., Compilers - Principles, Techniques and Tools, Addison - Wesley, 2006.

REFERENCES

1. Kennath Louden, C., Compiler Construction Principles and Practice, Vikas publishing House, 2003.
2. Allen Holub, I., Compiler Design in C, Prentice Hall of India, 2001.
3. Aho, V., and Ullman, J.D., Theory of Parsing, Translation and Compiling (Vol 1: Parsing and Vol 2:Compiling), Prentice Hall, 1973.
4. Steven Muchnick, S., Advanced Compiler Design and Implementation, Morgan Kaufmann, 1997.

MCS502	SOFTWARE QUALITY MANAGEMENT	L	T	P	C
		3	0	0	3

INTRODUCTION

Introduction to software quality – Establishment of software quality program – Software quality assurance planning and management – Case study - Y2K.

MODELS
Software development process models – Reliability and projection models – Exponential reliability growth models – Quality management models.

SOFTWARE QUALITY
Software quality standards – Review and Audits – Documentation and verification – Document audit verification.

TESTING
Test plan focus area – Testing for recoverability – Planning for trouble – Developing good test program – Case study - Testing real memory management.

QUALITY ASSESSMENT
In-process quality assessment - Software project assessment – Dos and Don'ts in software process improvements – Stages of software process improvement sequence.

TEXT BOOKS
1. Mordechai Ben-Menachem, Garry Marliss, S., Software Quality, Producing Practical Consistent Software, Vikas Publishing House , 2003.
2. Stephen Khan, H., Metrics and Models in Software Quality Engineering, Pearson Education, 2003.

REFERENCE
1. Loveland, Miller, Prewitt, Shannon , Software Testing Techniques, Charles River Media Inc., 2005.

MCS503	VISUAL PROGRAMMING	L	T	P	C
		3	1	0	4

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.

REFERENCES

1. Evangelos Petroutsos, Mastering Visual Basic 6, 2nd Edition, Sybex Publication, 1998.
2. David Kruglinkski, J., George Shepherd, Scott Wingo, Inside Visual C++, Microsoft Press, 1999.

MCS581	VISUAL PROGRAMMING LABORATORY	L	T	P	C
		0	0	3	1

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

MCS608	MICROPROCESSOR AND ITS APPLICATIONS	L	T	P	C
		3	0	0	3

INTRODUCTION TO 8085 MICROPROCESSOR

Evolution of the Microprocessor - INTEL 8085 - Introduction, Register architecture, Memory addressing, 8085 Addressing modes, 8085 Instruction set, Timing methods, 8085 Pins and Signals, 8085 Instruction timing and execution, Interrupts, DMA, Serial port, 8085 Based system design.

INTRODUCTION TO 8086 MICROPROCESSOR

Introduction - 8086 Architecture, 8086 Addressing modes, 8086 Instruction set - Data movement instructions, Arithmetic and Logic instructions, Program control instructions.

8086 MICROPROCESSOR INTERFACING

System design using 8086 - Basic system concepts, Bus cycle, Address and data bus concepts - Interfacing with memories - RAM, EPROM, DRAMs, Programmed I/O, 8086-Based microcomputer.

80386 AND PENTIUM MICROPROCESSORS

Introduction to Intel 80386 - Basic programming model, Memory organization, I/O space, 80386 pins and signals, Bus transfer techniques, 80386 Modes – Introduction to Intel pentium microprocessor - Block diagram and Registers.

PERIPHERAL INTERFACING

Keyboard Display interface - Hex key and display interface to 8085, 8279 Keyboard display controller chip - Printer interface - LR 7040 Printer interface using 8295 printer controller - CRT controller interface - CRT fundamentals, 8275 CRT controller, Coprocessors.

TEXT BOOK

1. Mohamed Rafiquzzaman, Introduction to Microprocessors and Microcomputer - Based System Design, 2nd Edition, CRC Press, 1995.

REFERENCES

1. Walter Triebel, A., Avtar Singh, The 8088 and 8086 Microprocessors Programming, Interfacing, Software, Hardware and Applications, Prentice Hall of India Pvt. Ltd., 2002.
2. Barry Brey, B., The INTEL microprocessors 8086/8088, 80186, 80286, 80386 and 80486 Architecture, Programming and Interfacing, Prentice Hall of India, 2001.

MCS609	SYSTEM SOFTWARE	L	T	P	C
		3	0	0	3

INTRODUCTION AND ASSEMBLERS

Introduction to system software and Machine architecture, SIC, Traditional machines, RISC machines, Basic assembler functions, Machine dependent and machine independent assembler features, Assembler design options, Implementation examples.

LINKERS AND LOADERS

Basic loader functions, Machine dependent and machine independent assembler features, Loader design options, Implementation examples.

MACROPROCESSORS

Basic macro processor functions, Machine independent macro processor features, Macro processor design options, Implementation examples.

COMPILERS

Basic compiler functions, Machine dependent and Machine independent compiler features, Compiler design options, Implementation examples.

EDITORS AND DEBUGGING SYSTEMS

DBMS – Text editors – Interactive debugging systems.

TEXTBOOK

1. Leland Beck, L., System Software : An Introduction to Systems Programming, 3rd Edition , Addison Wesley.

REFERENCE

1. Dhamdhere, Systems Programming and Operating Systems, McGraw-Hill Education, New Delhi, 2003.

MCS610	ADVANCED DATABASES	L	T	P	C
		3	0	0	3

OBJECT ORIENTED DATABASES AND OBJECT RELATIONAL DATABASES

Object oriented databases - Complex data types, Object-oriented data model, Object-oriented languages, Persistent programming languages – Object relational databases - Nested relations, Complex types, Inheritance, Reference types, Querying with complex types, Functions and procedures, Object-oriented versus Object-relational .

DISTRIBUTED DATABASES AND PARALLEL DATABASES

Distributed databases - Homogeneous and Heterogeneous databases, Distributed data storage, Distributed transactions, Commit protocols, Concurrency control in distributed databases, Availability, Distributed query processing, Heterogeneous distributed databases, Directory systems – Parallel databases - I/O parallelism, Inter query parallelism, Intra query parallelism, Intra operation parallelism, Inter operation parallelism, Design of parallel systems.

SPECIALIZED DATABASES

Spatial databases and Spatial, Geographic data - Representation of geometric information, Design databases, Geographic data, Spatial queries, Indexing of spatial data – Temporal and Time series databases - Time in databases, Time specification in SQL, Temporal query language.

OTHER DATABASES

Multimedia databases – Multimedia data formats, Continuous media data, Similarity-based retrieval - Web databases – Web fundamentals, URL, HTML, Client side scripting and Applets, Web servers and sessions, Servlets, Server side scripting, Improving performance.

CURRENT ISSUES

Rules - Active and Deductive databases - Security - Integrity - Consistency - Database tuning optimization and research issues.

TEXT BOOK

1. Henry Korth, F., Abraham Silberchatz, Sudarshan, S., Database System Concepts, , 4th Edition , Mc Graw Hill International Editions.
2. Elmasri, R., Navathe, S.B., Fundamentals of Database Systems , Addison Wesley, 2000.

REFERENCES

1. Gary Hanson,W., and James Hanson, V., Database Management and Design, Prentice Hall of India Pvt. Ltd., 1999.
2. Alex Benson, Stephen Smith and Kurt Thearling, Building Data Mining Applications for CRM, Tata McGraw-Hill, 2000.
3. Stefano Ceri, Giuseppe Pelagatti, Distributed Databases: Principles and Systems , Mc Graw-Hill Computer Science Series.

MCS611	DISTRIBUTED COMPUTING	L	T	P	C
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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 .

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 and Tim Kindberg, Distributed Systems Concepts and Design, 3rd Edition , Pearson Education, 2002.

REFERENCES

1. Sape Mullender, Distributed Systems, 2nd Edition, Addison Wesley, 1993.
2. Albert Fleishman Springer-Verlag, Distributed Systems - Software Design and Implementation, 1994.
3. Liu, M.L., Distributed Computing Principles and Applications, Pearson Education, 2004.
4. Andrew Tanenbaum , S., Maartenvan Steen, Distibuted Systems –Principles and Pardigms, Pearson Education, 2002.
5. Mugesh Singhal, Niranjan Shivaratri, G., Advanced Concepts in Operating Systems, Tata McGraw Hill Edition, 2001.

MCS612	DATA MINING AND DATA WAREHOUSING	L	T	P	C
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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 – Spatial data cube construction and spatial OLAP, Spatial association analysis, Spatial clustering methods, Spatial classification and spatial trend analysis, Mining raster databases – Mining Time series and Sequence data - Trend analysis, Similarity search in time-series analysis, Sequential pattern mining, Periodicity analysis.

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, 2nd Edition, Morgan Kaufmann Publishers, 2001.

REFERENCE

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

MCS613	ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEM	L	T	P	C
		3	0	0	3

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, proportional 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, COMMUINICATION 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

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

MCS614	NEURAL NETWORKS	L	T	P	C
		3	0	0	3

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, Back propagation, 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 Eduction, Asia, 2001.
2. Rajasekaran, S., Vijayalakshmi Pai, G.A., Neural Networks Fuzzy Logic And Genetic Algorithms, 1st Edition, Prentice Hall of India.

REFERENCE

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

MCS615	EMBEDDED SYSTEMS	L	T	P	C
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INTRODUCTION TO EMBEDDED SYSTEMS

Introduction - Definitions, Applications, Categories of embedded system – Characteristics of embedded system - Reliability, Performance, Power consumptions, Cost and Size**,** Limited user interface**,** Software up gradation capability**,** Recent trends in embedded systems.

ARCHITECTURE OF EMBEDDED SYSTEMS

Hardware architecture **–** Software architecture – Application software – Communication software – Process of generating executable image – Basic programming of embedded systems - Overview of embedded C - Memory management, Timing of programs, Device drivers, Code optimization.

PROGRAMMING EMBEDDED SYSTEMS

Embedded program – Role of infinite loop, Compiling, Linking and Locating – Downloading and Debugging – Emulators and Simulators processor – External peripherals – Toper of memory – Memory testing – Flash memory.

REAL TIME OPERATING SYSTEM

Real time operating systems - Real-Time and Embedded system operating systems, Interrupt routines in RTOS environment - Handling of interrupt source call by the RTOSs , RTOS takes scheduling models, Interrupt latency and response time of the tasks as performance metrics, Performance metrics in scheduling model for periodic, sporadic and aperiodic tasks , List of basic actions in a preemptive scheduler and expected times taken at a processor, Fifteen-point strategy for synchronization between the processors, ISRs, OS functions and tasks and for resource management – Embedded Linux internals - Linux kernel for the device drivers and embedded system, OS security issues.

DESIGN CYCLE FOR EMBEDDED SYSTEM

Case study of an embedded system for a smart card – Hardware – Software codesign in an embedded system - Embedded system project management , Embedded system design and codesign issues in system development process – Design cycle in the development phase for an embedded system – Users of target system or its emulator and incircuit emulator (ICE) – Use of software tools for development of an embedded system – Use of scopes and logic analyses for system hardware tests – Issues in embedded system design.

TEXT BOOK

1. Dr. Prasad, K. V. K. K., Embedded / Real Time Systems: Concepts, Design and Programming, Dreamtech Press, 2005.
2. Raj Kamal, Embedded systems – Architecture, Programming and Design, Tata McGraw-Hill , 2003.

REFERENCES

1. David Simson, E., An Embedded Software Primer, Addison Wesley, 2001.
2. Frank Vahid , Tony Givargis, Embedded system design, John Wiley and Sons Inc., 2002.

MCS616	MOBILE COMPUTING	L	T	P	C
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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 and 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, Base band 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, WML script, Wireless telephony application, Push architecture, Push / Pull services.

TEXT BOOK

1. Jochen Schiller, Mobile Communication, 2nd Edition , Pearson Education, 2004.

REFERENCE

1. William Lee, C.Y., Mobile Communication Engineering, 2nd Edition , McGraw Hill.

MCS617	COMPUTER SECURITY	L	T	P	C
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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 - 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, 3rd Edition , Pearson Education, 2003.

REFERENCE
1. Charles PFleeger, Shari Lawrence PFleeger, Security in Computing, 3rd Edition, Pearson Education, 2004.

MCS618	TCP / IP PROTOCOL SUITE	L	T	P	C
		3	0	0	3

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.

APPLIATION LAYER AND PROTOCOL
Host configuration – DNS – Remote login - Telnet - File Transfer Protocols - Electronic mail - SMTP, POP, IMAP – SNMP – WWW - HTTP.

IP AND VPN
Internet Protocol and Virtual Private Network – Internet Protocol over ATM Mobile, Internet Protocol (IPV6) – Virtual Private Network.

TEXT BOOK

1. Behrouz Forouzan, A., TCP / IP Protocol Suite, 3rd Edition, Tata McGraw Hill, 2006.

REFERENCE

1. Douglas Comer, E., David Stevens, L., Internetworking with TCP/IP – Volume I, II and III, 2nd Edition, Prentice Hall of India Pvt. Ltd., 1994.

MCS619	COMPONENT BASED TECHNOLOGY	L	T	P	C
		3	0	0	3

INTRODUCTION

Windows DNA – Designing multi tiered 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

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

MCS620	COMPUTER ANIMATION	L	T	P	C
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INTRODUCTION

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

HTML AND SCRIPTS

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

MULTIMEDIA

Creating clippings - Animations with sound effects - Adding audio or Video - Windows Media Player ActiveX Control - Agent control - Embedding VRML in a web page - Real Player ActiveX control - Graphics - Animations and Interaction.

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.

REFERENCES

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

MCS621	DIGITAL IMAGE PROCESSING	L	T	P	C
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DIGITAL IMAGE FUNDAMENTALS

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

IMAGE ENHANCEMENT AND RESTORATION

Histogram modification techniques - Image smoothening - Image sharpening - Image restoration - Degradation model – Noise models - Spatial filtering – Frequency domain filtering.

IMAGE COMPRESSION AND 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, 2nd Edition, Pearson Education, 2002.

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

MCS622	AGENT BASED INTELLIGENT SYSTEMS	L	T	P	C
		3	0	0	3

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 - Multi agent 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 and Peter Norvig, Artificial Intelligence - A Modern Approach, 2nd Edition, Prentice Hall, 2002.

REFERENCES

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

MCS623	SOFTWARE AGENTS	L	T	P	C
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AGENT AND USER EXPERIENCE

Interacting with agents - Agent from direct manipulation to delegation - Interface agent metaphor with character - Designing agents - Direct manipulation versus agent path to predictable.

AGENTS FOR LEARNING IN INTELLIGENT ASSISTANCE

Agents for information sharing and coordination - Agents that reduce work information overhead - Agents without programming language - Life like computer character - S/W agents for cooperative learning - Architecture of intelligent agents.

AGENT COMMUNICATION AND COLLABORATION

Overview of agent oriented programming - Agent communication language - Agent based framework of interoperability.

AGENT ARCHITECTURE

Agents for information gathering - Open agent architecture - Communicative action for artificial agent.

MOBILE AGENTS

Mobile agent paradigm - Mobile agent concepts - Mobile agent technology - Case study - Tele Script, Agent Tel.

TEXT BOOKS

1. Jeffrey Bradshaw, M., Software Agents, MIT Press, 2000.
2. William Cockayne, R., Michael Zyda, Mobile Agents, Prentice Hall, 1998.

REFERENCES

1. Russel and Norvig, Artificial Intelligence: A Modern Approach, 2nd Edition, Prentice Hall, 2002.
2. Joseph Bigus, P., and Jennifer Bigus, Constructing Intelligent agents with Java: A Programmer's Guide to Smarter Applications, Wiley, 1997.

MCS624	NATURAL LANGUAGE PROCESSING	L	T	P	C
		3	0	0	3

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 – Tag sets – 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.

REFERENCES

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

MCS703	ELECTRONIC COMMERCE	L	T	P	C
		3	0	0	3

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 - Business 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, T., Thomas, E-Commerce, Course Technology, 2000.

REFERENCES

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

MCS704	MANAGEMENT INFORMATION SYSTEMS	L	T	P	C
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SYSTEM CONCEPTS

Definition – Computer based user machine system – Integrated system – Need for a database – Utilization of models – Evolution – Subsystems – Organizational subsystems – Activities subsystems.

ORGANIZATIONAL STRUCTURE

Basic model – Hierarchical – Specialization – Formalization – Centralization – Modifications of basic organizational structure – Project organization – Lateral relations – Matrix organization – Organizational culture and power organizational change.

STRUCTURE OF MIS

Operating elements – Physical components – Processing functions – Outputs – MIS support for decision making – Structured programmable decisions – Unstructured non-programmable decisions – MIS structure based on management activity and organizational functions – Synthesis of MIS structure.

SYSTEM SUPPORT

Data representation – Communication network – Distributed systems – Logical data concepts – Physical storage devices – File organizations – Data base organization – Transaction processing.

DEVELOPMENT AND MANAGEMENT

A contingency approach to choosing an application – Developing strategy – Lifecycle definition stage – Lifecycle development stage – Lifecycle installation and operation stage – Project management .

TEXT BOOK

1. Gordon Davis, B., Margrethe Olson, H., Management Information Systems: Conceptual foundations, Structure and development, 2nd Edition, Tata McGraw Hill International book company, 2000.

REFERENCE

1. Wainright Martin, E., Carol Brown, V., Daniel DeHayes, W., Jeffrey Hoffer, A. ,William Perkins, C., Managing Information Technology, 3rd Edition, Prentice Hall International Edition, 1999.

MCS705	ENTERPRISE RESOURCE PLANNING	L	T	P	C
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INTRODUCTION TO ERP

Integrated management information seamless integration – Supply chain management – Integrated data model – Benefits of ERP – Business engineering and ERP – Definition of business engineering – Principle of business engineering – Business engineering with Information Technology.

BUSINESS MODELLING FOR ERP

Building the business model – ERP implementation – An overview – Role of consultant, Vendors and Users, Customization – Precautions – ERP post implementation options - ERP implementation technology – Guidelines for ERP implementation.

ERP AND THE COMPETITIVE ADVANTAGE

ERP domain MPGPRO – IFS/Avalon – Industrial and financial systems – Baan IV SAP - Market dynamics and Dynamic strategy.

COMMERCIAL ERP PACKAGE

Description – Multi-Client Server solution – Open technology – User interface - Application integration.

ARCHITECTURE

Basic architectural concepts – The system control interfaces – Services – Presentation interface – Database interface.

TEXT BOOK

1. Vinod Kumar Garg and Venkita Krishnan, N.K., Enterprise Resource Planning – Concepts and Practice, PHI, 1998.

REFERENCE

1. Jose Antonio Fernandz, The SAP R/3 Handbook, Tata McGraw Hill, 1998.

MCS706	MANAGERIAL ECONOMICS	L	T	P	C
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INTRODUCTION TO MANAGERIAL ECONOMICS

Managerial Economics – Meaning, Nature and Scope – Managerial Economics and Business decision making – Role of managerial economist – Fundamental concepts of Managerial Economics - Demand analysis – Meaning, Determinants and types of demand – Elasticity of demand – Demand function – Demand curve – Estimation of the demand function.

SUPPLY, PRODUCTION AND COST ANALYSIS

Supply – Meaning and determinants – Supply function - Meaning of production – Production analysis - Long run and short run – Production functions – Isoquants - Expansion path – Cobb - Douglas function - Cost concepts – Cost – Output relationship - Long run and short run – Economies and diseconomies of scale – Cost functions – Estimation of cost function.

MARKET STRUCTURE AND PRICE DETERMINATION

Market structure – Perfect competition – Monopoly – Monopolistic competition – Oligopoly - characteristics – Pricing of goods and services - Pricing and output decisions – Price discrimination – Price determinants – Profit maximization and free pricing - Methods of pricing – Differential pricing – Government intervention and pricing.

PROFIT AND INVESTMENT ANALYSIS

Profit - Meaning and nature – Profit policies – Profit planning and forecasting – Cost volume profit analysis – Investment analysis – Meaning and significance – Time value of money – Cash flow and measures of investment worth – Payback period criterion – Average rate of return criterion – Net present value criterion – Internal rate of return criterion – Profitability – Index criterion.

MACROECONOMIC ISSUE

National income – Concepts – Determination of national income - Business cycle – Inflation and Deflation – Types of inflation – Causes of inflation - Balance of payments – Account - Assessing the balance of payments figures – Monetary and Fiscal Policies – Attitudes towards monetary policy – Problems of monetary policies – Nature of fiscal policy - Effectiveness of fiscal policy.

TEXT BOOK

1. Gupta,V.G.S., Managerial Economics, Tata McGraw Hill, 1990.

REFERENCES

1. Joel Dean , Managerial Economics, Prentice Hall India,1987.
2. Evan Douglas J., Managerial Economics, Prentice Hall International, 1987.

MCS707	HUMAN RESOURCE MANAGEMENT	L	T	P	C
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PERSPECTIVES IN HUMAN RESOURCE MANAGEMENT

Evolution of Human Resource Management - The importance of the human factor - Objectives of Human Resource Management - Role of human resource manager - Human resource policies.

THE CONCEPT OF BEST FIT EMPLOYEE

Importance of human resource planning - Forecasting human resource requirements - Internal and External sources - Selection process.

TRAINING AND EXECUTIVE DEVELOPMEN

Types of training methods - Purpose - Benefits – Resistance - Executive development programmes - Common practices - Benefits - Self development - Knowledge management.

SUSTAINING EMPLOYEES INTEREST

Compensation plans - Rewards - Motivation - Theories of motivation career management - Developing mentor - Protege relationships.

PERFORMANCE EVALUATION AND CONTROL PROCESS

Methods of performance evaluation - Feedback - Industry practices, Promotion, Demotion, Transfer and Separation - Implications of job change - The Control process - Importance - Methods.

TEXT BOOK

1. Decenzo and Robbins, Human Resource Management, Wiley and Sons, Singapore, 1999.

REFERENCE

1. Watts Humphrey, S., Managing Technical People: Innovation, Teamwork, and the Software Process, Addison-Wesley, 1996.

MCS708	SUPPLY CHAIN MANAGEMENT	L	T	P	C
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BASIC CONCEPTS

Introduction to supply chain management (SCM) – Concept of SCM – Components of SCM, An overview – Features of SCM – Strategic issues in SCM – Systems View - SCM current scenario – Value chain management and customer relations management.

INTERFACES WITH OTHER DISCIPLINES

Marketing and supply chain interface – Customer focus in SCM – Demand planning, Purchase planning – Make or Buy decision – Indigenous and global sourcing – Development and management of suppliers – Legal aspects of buying – Cost management – Negotiating for purchasing/subcontracting – Purchase insurance – Evaluation of purchase performance (performance indices) - Inventory management - Finance and supply chain interface, Financial impact of inventory.

MANUFACTURING AND WAREHOUSING

Manufacturing scheduling – Manufacturing flow system – Work flow automation – Flexibility in manufacturing to achieve dynamic optimization - Material handling system design and decision, Warehousing and store keeping – Strategies of warehousing and storekeeping – Space management.

LOGISTICS MANAGEMENT

Logistics management – Role of logistics in SCM – Integrated Logistics management – Transportation design and decision – Multi modalism – Third party logistics services and providers – Facilities management (port / airport ICD's) channels of distribution – Logistics and customer service.

INFORMATION TECHNOLOGY AND SCM

Information technology and SCM – EDI, ERP, Internet and Intranet, E-Commerce, Bar coding, Telecommunication Network, Advanced planning system, Decision support models for Supply Chain Management, Artificial Intelligence for SCM- Best practice in supply chain management – Organizational issues to implement SCM.

TEXT BOOK

1. Sahay, B.S., Supply chain management for global competitiveness, Mac Millan India Limited, 2000.

REFERENCES

1. Donald Bowersox, J., and David Closs, J., Logistical Management, Tata McGraw-Hill Editions, New Delhi, 2000.
2. David Simchi-Levi, Designing and managing the supply chain, Tata McGraw-Hill Editions, New Delhi, 2000.

MCS709	HEALTH CARE SYSTEMS	L	T	P	C
		3	0	0	3

PLANNING AND DEVELOPING AN IT STRATEGY

Introduction - Mission of IT in health care - Creating a system - Managing the IT strategic planning - Process - Strategies in consulting for the 21st Century - Baylor health care - Clarian cealth care.

PREPARING FOR ORGANIZATIONAL CHANGE

Informatics in health care - Managing organizational change - The role of ethics in IT decisions - Cases in redesign - Memorial Hermann healthcare system- Redesign and implementation of a multi facility - Clinical Information System - UPMC health system.

TRANSFORMATION

IT - Transition fundamentals in care transformation - The role of the CIO - Northwestern Memorial Hospital – Chicago - Patients first from the ground up, The Jewish Home and Hospital Life care system, NYC.

PATIENT-CENTERED TECHNOLOGIES

Patient outcomes of health care - Six Sigma excellence - Electronic health record - Interviewing patients with a computer - Nursing administration - A growing role in systems development - Computer enhanced radiology - Information Technology and the new culture of patient safety - A Component based clinical information and Electronic health record.

OUTLOOK ON FUTURE TECHNOLOGIES

Technologies in progress – Evidence based medicine - Aligning process and technology - Clinical Decision Support Systems - Quality information and care - Role for health information systems - Clinical practice - Connecting the community for better health.

TEXT BOOK

1. Ball, Marion, Weaver, Charlotte A., Kiel, Joan M., Healthcare Information Management Systems Cases, Strategies, and Solutions Series: Health Informatics, 3rd Edition, Springer Berlin Heidelberg, New York, 2004.

REFERENCES

1. KarenWager, A., Frances Wickham Lee, John Glaser Jossey-Bass, P., Managing Health Care Information Systems: A Practical Approach for Health Care Executives, 2005.

MCS710	NUMERICAL AND STATISTICAL METHODS	L	T	P	C
		3	0	0	3

LINEAR SYSTEM OF EQUATIONS

Solution of systems of equations – Solution of simultaneous linear equations, Gauss elimination methods, Gauss Jordan methods, Jacobi and Gauss Seidal iterative methods.

NUMERICAL DIFFERENTIATION AND INTEGRATION

Interpolation - Differentiation and integration, Difference table, Newton's forward and backward interpolation, Lagrangian interpolation, Differentiation formulae, Trapezoidal and Simpson rule Gaussian, Quadrature.

DIFFERENTIAL EQUATIONS

Ordinary differential equations – Taylor Series and Euler methods, Runge-Kutta methods, Predictor-corrector method , Milne and Adam Bashforth methods, Error analysis.

PROBABILITY DISTRIBUTIONS

Probability axioms - Bayes Theorem, Discrete random variables and Continuous random variables, Density and distribution functions, Joint and marginal distributions, Conditional distributions, Characteristic function, Moment generating function, Expectation.

SAMPLING DISTRIBUTIONS

Small sample - t-test, F-test, χ^2–test, ANOVA one way classification and two way classification.

TEXT BOOKS

1. Gewal, B.S., Numerical methods in Engineering and Science, Khanna Publishers-1994.
2. Irwin Miller, Marylees Miller, Mathematical Statistics with Applications, 7th Edition, Prentice Hall of India, 2004.

REFERENCES

1. Natarajan, M., and Tamilarasi, A., Probability Random Processes and Queuing theory, 2nd Edition, New Age International Publishers, 2005.
2. Gupta, S.K., Numerical Methods for Engineers, New age International Publishers, 1995.