

RAVENSHAW UNIVERSITY
MASTER IN COMPUTER APPLICATION (2013-2016 Batch)

<u>FIRST SEMESTER</u>		<u>F.M.</u>	<u>F.M.</u>
Subject Code	Subject Name	Internal	Semester
MCC - 1.1	Computer Organizations and Architecture	20	80
MCC - 1.2	Programming in C	20	80
MCC - 1.3	Written and Oral Technical Communication	20	40+40
MCC - 1.4	Introduction to Management Functions	20	80
MCC - 1.5	Discrete Mathematical Structures	20	80
MCL - 1.6	Windows & Ms-Office Lab.	25	50
MCL - 1.7	Programming in C Lab.	25	50
<u>SECOND SEMESTER</u>			
Subject Code	Subject Name		
MCC - 2.1	Object Oriented Programming Using C++	20	80
MCC - 2.2	Software Engineering	20	80
MCC - 2.3	Data Structure using C	20	80
MCC - 2.4	Accounting for Management and Control	20	80
MCC - 2.5	Probability Combinatorics	20	80
MCL - 2.6	Data Structure using C Lab.	25	50
MCL - 2.7	C++ Programming Lab.	25	50
<u>THIRD SEMESTER</u>			
Subject Code	Subject Name		
MCC - 3.1	Database Management System	20	80
MCC - 3.2	Computer Network	20	80
MCC - 3.3	Operating Systems	20	80
MCC - 3.4	Design and Analysis of Algorithm	20	80
MCC - 3.5	Numerical & Statistical Computing	20	80
MCL - 3.6	DBMS Lab.(Oracle)	25	50
MCL - 3.7	Operating Systems Lab	25	50

<u>FOURTH SEMESTER</u>			
Subject Code	Subject Name		
MCC - 4.1	Object Oriented Analysis with UML	20	80
MCC - 4.2	Computer Graphics	20	80
MCC - 4.3	Programming with JAVA	20	80
MCC - 4.4	Theory of Computation	20	80
MCC - 4.5	Optimisation Techniques	20	80
MCL - 4.6	Programming with Java Lab.	25	50
MCL - 4.7	Comp. Graphics & Multimedia Lab.	25	50
<u>FIFTH SEMESTER</u>			
Subject Code	Subject Name		
MCC - 5.1	Artificial Intelligence and Expert System	20	80
MCC - 5.2	Internet Technology and Enterprise Java	20	80
MCC - 5.3	Elective-I	20	80
MCC - 5.4	Elective-II	20	80
MCC - 5.5	Elective-III	20	80
MCL - 5.6	Enterprise Web Computing Java Lab.	25	50
MCL - 5.7	.NET Lab	25	50
MCL - 5.8	Seminar	50	
<u>SIXTH SEMESTER</u>			
Subject Code	Subject Name	Project Report+Presentation+VIVA	
MCL - 6.1	Project work		200+50+50

Elective-I	Digital Image Processing
Elective-I	Parallel Computing
Elective-I	Software Testing
Elective-II	Managerial Economics
Elective-II	Management Information System
Elective-II	E-Commerce and ERP
Elective-III	Compiler Design
Elective-III	Advanced Operating System
Elective-III	Computer Security

FIRST SEMESTER

MCC - 1.1: Computer Organizations and Architecture

Unit 1

Information representation : Number systems, Fixed and Floating point, Binary numbers, Sign Magnitude & 2's complement representation. Precision and range, BCD code, ASCII and EBCDIC.

Digital Electronics : Boolean Algebra, Logic gates, Truth Tables, Karnaugh map, Flipflops.

Unit 2

Principles of Computer Design : Software, hardware interaction, Layer in Computer architecture, Processor – Memory structure, RTL structure. Hardware description language (HDL)

Logic circuit level structure :

Combination RTL Components : Multiplexer, Demultiplexer, Decoder, Encoder, Parity generators and checkers, Adder/ Subtractor, Programmable Logic Devices. Sequential RTL components : Registers counters.

Unit 3

Central Processing Unit : Machine Language instructions, Addressing modes, Instruction types, Instruction set selection, Instruction cycle and execution cycle. Arithmetic & Logic Unit. Fundamentals of assembly language Programming using 8085 microprocessor.

Control Unit : Data path and control path design. Microprogramming vs hardwired control, RISC vs CISC, Pipelining in CPU design, Superscalar processors.

Unit 4

Memory subsystem : Storage technologies, Memory array organization, Memory hierarchy, Interleaving, Cache and virtual memories and architectural aids to implement them.

Unit 5

Input – Output devices and characteristics.

Input-output Processing : Bus interface, data transfer techniques, IO interrupts, channels.

Performance evaluation –SPE marks, Transaction Processing Benchmarks.

Reference Books:

1. Pal Chaudhuri P (1994) Computer Organization and Design (PHI)
2. Mano M, Computer System and Architecture (3rd Ed) (PHI)
3. Rajaraman V. and Radhakrishnan T (1994) Computer Organisation and Design (4th Ed) (PHI)
4. Stalling W, Computer System and Architecture (3rd Ed) PHI 1995

MCC - 1.2 Programming in C

Unit 1

Introduction to algorithms : Flowcharts, C character set, Identifiers and keywords, Data types, Constants, Variables and arrays, Declarations, Expressions, Statements, Symbolic constants.

Arithmetic, unary, logical, bit-wise, Assignment and conditional operators, Library functions, Data input and output : getchar, putchar, scanf, printf, gets and puts functions. Pre-processors commands : # include, define, ifdef.

Unit 2

Control statements : while, do – while, for statements, nested loops, if – else, switch, break, continue and goto statements, comma operators.

Function : Defining and accessing, passing arguments, Function prototypes, Recursion, Storage classes, automatic, external and static variables, multifile programs.

Unit 3

Arrays : Defining and processing, passing arrays to a function.

Multidimensional arrays.

Strings : Operation on strings

Pointers : Declarations, Passing to a function, Pointer and arrays, Operation on pointers,.

Unit 4

Structures : Defining and processing, user – defined data types, Structures and pointers, passing structures to a function, Unions.

Unit 5

Data Files : Opening, closing, creating and processing data file.

Unformatted data files.

Reference Books:

1. Hutchison R, Programming in C (McGraw Hill)
2. Rajaraman V, Computer Programming in C (Prentice Hall of India)

MCC - 1.3: Written and Oral Technical Communication

Written Communication

- 1.1 Developing a topic, Sentence into a paragraph of about 100 words. Identifying the topic sentence. Identifying paragraph division when three or more paragraphs are given as one paragraph. Arranging three or more paragraphs in right order. Arranging five sentences into a paragraph with suitable sentence linkers. Writing a transition paragraph when preceding and succeeding paragraphs are given.
- 1.2 Technical Report writing
- 1.3 Essay writing
- 1.4 Writing an official / Business letter, Preparation of Bio-Data
- 1.5 Note-making, Summarizing form a given passage
- 1.6 Communicative Grammar
 - a) Time, Tense and Aspect
 - b) Verbs of states and events
 - c) Statements, Questions, Responses
 - d) Mood, Emotions, Attitude

Oral Communication

- 2.1 Listening to spoken utterances with reasonable comprehension and speaking with clarity, fluency and accuracy in common everyday situation and formal occasions. The basic sounds of English shall be introduced I bare outlines. Vowels Long and short vowels : e / X / N, Consonants : /f, v. o, x, s, z 3/ Stress including weak forms and intonation (falling and rising)
 - a) To introduce self and others.
 - b) To ask for information, help, permission, etc.
 - c) To instruct, command, request, invite, refuse, prohibit, suggest, persuade and promise, etc.
 - d) To describe objects, processes.
 - e) To define, compare, classify, example life and emphasis.
 - f) To face an interview
 - g) Some polite formulate expression (Official invitations etc) along with their appropriate responses shall be taught.
- 2.2 Seminar Presentation
- 2.3 Group Discussion

Reference Books

- 1. Oxford guide to writing & speaking English – John Sealy
- 2. On your own – J.Carrol Brekdear
- 3. A millennium guide to writing & speaking Englist – Chand & B.C.Das
- 4. A communicative grammar of English – Geoffrey Leach & Jan Sartvik
- 5. Better English Pronunciation – J.D.O.Conner
- 6. The essence of effective communication – Ludlow, Ron, Panton

MCC - 1.4: Introduction to Management Functions

Unit 1

Fundamental of Mgmt. ,Management function, nature and scope.

Principles of management – Planning, organization, coordinating, staffing, directing and controlling (Conceptual Knowledge).

Unit 2

Marketing Mgmt ,Evolution of modern marketing and its importance.

Elements of marketing and its importance.

Elements of marketing mix (Product, Pricing, Place and Promotion)

Unit 3

Product Mgmt Concepts, scope and importance of production mgmt. Production planning and control.

Quality control

Unit 4

Financial Mgmt.Concept, nature, scope and objectives of financial mgmt.

Financing decision.

Investment decision.

Unit 5

Human Resources Mgmt. Evolution and development of HR mgmt.

Selection and recruitment process.

Performance appraisal

Reference Books:

1. Principles & Practice of Mgmt, L.M. Prasad, Sultan Chand & sons, New Delhi
2. Essentials of Mgmt Joseph L. Massie, PHI, New Delhi
3. Fundamentals of Financial Mgmt., Prasanna Chandra, TMH
4. Marketing Mgmt., Rajan Saxena, TMH
5. Human Resources Mgmt K. Aswasthapan, TMH
6. Production Mgmt., S. N. Charry, TMH

MCC - 1.5: Discrete Mathematical Structures

Unit 1

Logic :

Fundamentals of logic, Logical inferences, Methods of proof of an implication, First Order Logic and other methods of Proof, Rules of Inference for quantified Propositions, Mathematical induction.

Unit 2

Relations and Diagraphs :

Relations and Directed Graphs special Properties of Binary

Relation, Equivalence Relations, Ordering Relations, Lattices and Enumerations.

Operations on Relations, Paths and Closures, Directed Graphs and Adjacency matrices.

Unit 3

Graphs :

Basic Concepts, Isomorphism and Subgraphs, Trees and their Properties, Spanning Trees, Directed Trees, Binary Trees, Planar Graphs, Euler's Formula, Multi Graphs and Euler Circuits, Hamiltonian Graphs.

Unit 4

Boolean Algebra :

Introduction to Boolean Algebra, Boolean Functions, Switching Mechanisms, Minimisation of Boolean Functions.

Unit 5

Algebraic structures & Applications to Finite State Machines and Language: Binary Operations, Semi Groups, Groups, finite State Machines, Semi Groups, Machines and Languages, simplifications of Machines.

Reference Books:

1. Discrete Mathematics for Computer Scientists & Mathematics J. Mott, A. Kandel, T. P. Baker PIII (1999) [Chapters 1.5-1.10,4.1-4.7,5.1-5.10,6.1-6.5]
2. Discrete Mathematical Structures for Computer Science, Bernard Kolman, Robert C. Busby, Saaron Ross, PIII (1999) [Chapters 9.1,9.2,9.4,10.3,10.6]

MCL - 1.6: Ms- Office Lab.

Windows, Ms-Word, Ms-Excel, Ms-Power point

MCL - 1.7: C Programming Lab.

C Programming: variables and expression assignment, simple arithmetic.

Loops, if else, case statements, break, continue, goto.

Single and multidimensional arrays.

Functions, recursions, file handling in C.

Pointers, address operators, declaring pointers and operations on pointers.

Address of an array, structures, pointers to structures, dynamic memory allocation.

SECOND SEMESTER

MCC - 2.1: Object Oriented Programming Using C++

Unit I

Introduction to object oriented Programming , Features of OOPS . Getting started with c++ syntax –Data type , variables , operators , strings, Functions & recursion ,exception and namespace ,Flow of control .Array of objects, structures . Function overloading ,Default arguments.

Unit II

Abstraction Mechanism – Classes , Private, Public & Protected access, specifiers, Members function , static data member & member function, inline function ,friend function , references. Constructor, Copy Constructor, Destructor

Unit III

Operator overloading – Overloading of unary & binary operators, overloading using operators function & friend function Overloading of insertion and extraction operator .Pointer to object , this pointer , copying object.
Type Conversion – Class to basic conversion , Basic to Class conversion .

Unit IV

Inheritance – What is inheritance .Advantages of inheritance, single, multiple multilevel, hierarchical, multipath & hybrid inheritance.Virtual Base class, Object slicing polymorphism-Run time polymorphism & virtual function, Need of V-TABLE in virtual function.

Unit V

Exception Handling : Exception and derived classes, try catch throw statements ,catching all exception ,unexpected exception, rethrowing an exception.
Templates and standard Template Library : Function template , Templates and standard template Library : Function template, Templates function , class template template class, Introduction to STL –Algorithm ,Container ,Iterator

Reference Books:

1. A.N. Kamthane, "Object Oriented Programming with ANSI & Turbo C++", Pearson Education.
2. E. Balguruswamy, "Object Oriented Programming with C++", TMH Publisher.
3. K.R.Venugopal, Rajkumar,,T Ravishankar, "Mastering C++", TMH Publisher
4. Trilochan Tarai, "Object Oriented C++", SM Publication

MCC - 2.2: Software Engineering

Unit I

Introduction to Information System Development: Overview of System Analysis and Design, Categories of Information Systems, System development Strategies, Implementation and Evaluation, Tools for System development

Unit II

Introduction to software Engineering: Basic concepts about software and program and Evolution of Software Engineering, Basic concepts on process and life cycle models.

Models: Waterfall, Prototype, Evolutionary, Incremental, spiral, V, RADM etc.

Requirement Analysis: Introduction to software specification, its needs and importance, formal specification methods.

SRS: attributes of good SRS and organization of SRS document.

Unit III

Software design: Methods and strategies, desirable design attributes, Concept of good design, Cohesion and coupling.

Function-Oriented Software Design: structured system analysis and structured design, formal approach design, data flow oriented design.

Software coding and testing: coding standard and guidelines, code review, software inspection

Testing: Unit, integration, system testing, black box and white box testing Incremental testing, formal proof of correctness, software matrix. Introduction to software verifications.

Unit IV

Software Reliability and Quality Management: S/W and H/W reliability, Reliability Matrices,

Software engineering management: introduction to capability maturity model, quality assurance and software cost estimation (Delphi, COCOMO). Introduction to computer-aided, software engineering. Software reuse and maintenance.

Unit V

S/W quality, ISO 9000: *Modern Trends and Emerging Technologies:* Humphrey's Capability Maturity Model, CMMI (Capability Maturity Model Integration), Agile software development, Extreme Programming (XP), Security Engineering, Service-oriented Software Engineering, Aspect-oriented Software Development.

Reference Books:

1. Rajib Mall, "Fundamentals of Software Engineering", PHI.
2. James A. Senn, "Analysis and Design of Information Systems", McGraw Hill
3. R.S. Pressman, "Software Engineering – A Practitioner's Approach", McGraw Hill.
4. P. Jalote, "An Integrated Approach To Software Engineering", Narosa, New Delhi.
5. G. Booch, "Object-Oriented Analysis and Design", Benjamin / Cumming Publishing Co. New York.

MCC - 2.3: Data Structure using C

Unit I

Algorithms, Asymptotic notations and analysis, Measuring time and space complexities, Data structure and C: Functions, storage structures for arrays, sparse matrices, strings, pattern matching, structures and arrays of structures, Abstract data type, Stacks and Queues: representation and Applications.

Unit II

Linked Lists: Singly linked lists, Linked stacks and queues, Operation on polynomial, Linked dictionary, Doubly linked list, Circular linked list, Doubly circular linked lists.

Unit III

Trees: Binary trees, Terminologies and memory representation, Binary search trees, General trees, Tree traversing, Operations on binary trees, - Expression manipulations, Threaded binary trees, Height balancing trees, Heaps, forest, File structures, Introduction to multi-way search trees, B-tree and B⁺-trees.

Unit IV

Graphs: Terminologies and representation, Path matrix, graph traversal, - DFS and BFS, shortest path problems, Bi-connected graphs, Topological sort.

Unit V

Dynamic storage Management, Garbage collection and compaction, Hashing functions. Hash tables and collision resolution techniques.

Sorting techniques: Bubble sort, selection sort, Insertion sort, Merge sort, Quick sort, Heap sort, Radix sort, Shell sort and address calculation sort, Linear search and binary search.

Reference Books:

1. D.Samantha," Data Structure using C", PHI Publication.
2. Richard Gilberg, Behrouz A. Forouzan, "Data Structures: A pseudo code approach with C", Second Edition, 2007, CENGAGE India Pvt. Ltd., New Delhi.
3. G.A. V. Pai, " Data Structure and Algorithms", McGraw Hills Education India

MCC - 2.4: Accounting for Management and Control

Unit I

Basics : Meaning, Objectives, Need and branches of Accounting Merits and Limitations of financial Accounting, Basic accounting terms, Accounting concepts and conventions, Journal and ledger, Sub-division of journal.

Unit II

Trial Balance, Error and Suspense Account (Without rectification of error), Capital and Revenue (Income and expenditure), Depreciation Accounting Meaning, Causes and Types of depreciation (Simple problems from Straight line method and fixed percentage on Diminishing Balance Method only).

Unit III

Final Account (Simple), Final Account (With adjustment), (Simple problems only)

Unit IV

Meaning, Objects, Functions and Elements of cost, Cost sheet or statement of cost (Simple problems without tender and quotations), Classification of costs, Budget and Budgetary control, Meaning of Budget and Budgetary control, Objectives, Merits and Limitations of Budgetary control, Classification and types of Budgets (Simple problems only from flexible budgets and Receipt and payment method of cash budgets), Responsibility Accounting and Reporting, Nature and Requirements of Responsibility Accounting, Cost control through Responsibility Accounting (Without problems).

Unit V

Standard Costing, Meaning and steps involved in standard costing, Standard costing Vs. Budgetary Control, Types of Standards, Merits and limitations of standard costing, Analysis of variances, Meaning and types of variances, Direct material Variance, Direct Labour variance, Overhead Variance and Sales Variance. (Simple or no problem), Marginal Costing, Meaning, Characteristics and assumptions of marginal costing, Marginal Costing Vs. Absorption Costing, Contribution and P/V Ratio, Cost-Volume-Profit Analysis. Ascertainment of BEP and Margin of safety, (Simple problems), Managerial Decisions, Pricing, Profit Planning, Make or Buy. Key of Limiting factors, Suitable sale Mix, Alternative methods of production, Optimum Level of Activity and Evaluation of Performance. (Simple Problems).

Reference Books:

1. Study material developed by the MCA Dept. of Ravenshaw College.
2. Mayadhar Satapathy, Ansuman Sahoo, "Financial and management accounting"
Vrinda Publication
3. S P Jain & K L Narang "Cost Accounting", Kalyani Publication

MCC - 2.5: Probability Combinatorics

Unit I

Basic Concepts & Discrete Random Variables : Motivation, Probability models, Sample space, Events, Algebra of events, Graphical method of representing events, Bayes rule, Bernoulli trial, Random variable and their event space, The probability mass function, Distribution function, Special discrete distribution, The probability generating function, Discrete random vectors, Independent random variables.

Unit II

Continuous Random variables : Introduction to random variables. The exponential distribution, The reliability, Failure density and hazard, Some important distribution, Function of a random variable, Jointly distributed random variable, Order statistics, Distribution of sums, Functions of normal random variables.

Unit III

Expectation : Moments, Expectation of functions of more than one random variable, transform methods, Moments and transforms of some important distribution, Computation to mean time to failure, inequalities and limit theorem, Mixture distribution, Conditional expectation, Imperfect fault coverage & Reliability, Random sums.

Unit IV

Elementary Combinatorics: Basic of counting, Combination and permutation with repetition, binomial coefficient, The Binomial and multinomial theorem. The principle of inclusion and exclusion.

Unit V

Recurrence Relation: Generating functions of sequences, calculating coefficients of generating functions, recurrence relation, solving recurrence relation by substitution and generating functions. The method of characteristic roots, solution of inhomogeneous recurrence relations.

Reference Books:

1. Probability and statistics with Reliability, queuing & Computer science application By Kishore Trivedi, PHI(1992) Ch 1,2(excluding 2.6), 3, 4, 5
2. Discrete Mathematics for Computer Scientists & Mathematicians- J. L. Mott, A. Kandel, T. P. Baker, PHI(1992) Ch 2 & 3.

MCL - 2.6: Data Structure using C Lab.

- 01.....Matrix Operations-Add, Multiply, Rank, Det.etc.
- 02.....Stack & Queue operations using Arrays. 03.....Self-referential structures & single linked list operations.
- 04.....Implementing Stack and queues using linked lists.
- 05.....Implementing Polish Notations using Stacks.
- 06.....Circular and double linked list operations.
- 07.....Implementing priority queue & dequeue using lists.
- 08.....Evaluating polynomial operations using Linked lists.
- 09.....Implementing set related operations & Hashing.
- 10.....linear & binary search, bubble sort technique.
- 11.....Insertion sort, selection sort & merge sort techniques.
- 12.....Quick sort, counting sort and Shell sort techniques.
- 13.....Radix (bucket) and address calculation sort methods.
- 14.....Binary tree traversals (preorder, inorder, postorder).
- 15.....Heap sort & AVL tree implementations.
- 16.....Graph representation with matrix & adjacency lists.

MCL - 2.7: C++ Programming Lab.

- 01..... Implementing classes and creation of objects.
- 02..... Checking Precedence of operators & side effects.
- 03..... Implementing various control structures & loops.
- 04..... Making structured programming & stepwise refinement.
- 05..... Implementing Procedural abstraction with functions.
- 06..... Implementing Constructors and destructors.
- 07..... Implementing Data abstraction & inheritance.
- 08..... Implementing Multiple & hybrid inheritance.
- 09..... Implementing Polymorphism concepts.
- 10..... Implementing Operator overloading & friend's functions.
- 11..... Working with new & delete, object copying.
- 12..... Implementing Object slicing, this operator.
- 13..... Exception handling mechanisms.
- 14..... Implementing class templates & function templates.
- 15..... Creating files in C++ and file related operations.

THIRD SEMESTER

MCC - 3.1: Database Management System

Unit 1

Database and data users. Database system concept .Data abstraction instance, Schemas Data independence .DDL,DXA, DBMS architecture Data modeling using the entity relationship model .enhanced entity relationship model. Overview of Network and Hierarchical models.

Unit II

The relational data model, Relational constraints .Relational algebra .ER and ERR to relational mapping ,Relational calculus. The domain relational calculus.

Unit III

SQL: Basic queries .Complex queries ,Insert delete and update statement in SQL, Views, Constraints and assertion .

ORACLE: Basic structure of a oracle system. Database structure and its manipulation . Storage organization ,Oracle tools, QBE.

Unit IV

Functional dependencies and normalization for relational databases. Relational database design algorithms. Multivalued join and inclusion dependencies. Practical database design and tuning.

Unit V

Query processing and Optimization : Basic algorithms for Query operations, Using heuristics ,selectivity & cost estimates in query optimization ,semantic query optimization .

Transaction Processing: Transaction and system concept .Desirable properties ,Schedules and recoverability ,serializability of schedules. Transaction support in SQL Concurrency control techniques : Checking time stamp ordering .Multiversion and validation techniques, granularity .

Reference Books:

1. R.Elmarsari and S.B.Navate "Fundamental of Database systems" Addison Wesley
2. R.Ramakrishnan "Database Management system "Mc Graw Hill
3. J.D Ullman "Principles of Database System " Galgi\otia Publication
4. A.Silberschatz H.F.Korth .S.Sudarshan "Database System concepts, Mc Graw Hill
5. C.J.Date "An introduction to Database System" Addition Wesley

MCC - 3.2: Computer Network

Unit I

Introduction : A Data Communication ,Network Protocols and standards, point to point and multi point line configuration ,Network topologies ;Mess, star, Tree ,Bus, Ring
Transmission Models : Simplex ,Half Duplex, Networks :LAN , MAN ,WAN.The OSI
Models : Function of layers .TCP IP protocol suit
Signals: Analog and digital signals, Periodic and Aperiodic signal ,
Encoding And Modulating : Digital to digital conversion .Unipolar .Polar Bipolar ,Analog to Digital conversion AM,FM,PM

Unit II

Transmission of Digital data : Parallel and serial transmission .DTEDCE interface
.Modems, Guided and unguided transmission media. Transmission impairment ,Performance.
Multiplexing : Frequency division .Wave division and time division multiplexing ,the telephone system ,digital subscribe line(DSL) .Error detection and correction :Type of errors, redundancy Cheeks (VRC,LRC,CRC) ,Error Correction .

Unit –III

Data Link Control : Line discipline ,flow Control ,Error control .
Data link protocol : Asynchronous and synchronous , protocols ,Character ans bit oriented protocols.
Local Area Networks : IEEE 802 standards, Ethernet Token bus, token Ring ,FDDI
Switching : Circuit Switching ,Packet Switching ,Message Switching .

Unit IV

Integrated services Digital Network (ISDN), services, History , Subscribers access to ISDN ,the ISDN layers ,Broadband ISDN.
X.25 : X.25 Layers ,Protocols releted to x.25
Frame Relay : Introduction, Frame Relay operation . Frame Relay layers, Congestion control , leaky bucket algorithm . Traffic Control .

Unit V

Networking and Internetworking devices: Repeaters, Bridges, Routers, Gateways.
Routing Algorithms.
TCP IP Protocol Suite: Overview ,Network Layer ,Addressing subnetering, Transport layer
.Application layer : Client server model ,BOOTP ,DHCP, DNS ,Telnet ,FTP ,SMTP ,SNMP, HTTP,WWW.

Reference Books:

1. Forouzen B.a “Data Communicationas and Networking “ Tata MC Graw Hill
2. Black U “ Computer Network Protocols, Standards and interface “Prentice Hall
3. Salling W “Computer Communication Networks “ Prentice Hall
4. Tannenbaum A.S “ Computer Networks” PHI
5. Bartee T.C “data Communication ,Network and systems” BPB
6. Schweber W>L”Data Communication “Mc Graw Hill
7. Steven W.R: TCP/IP Illustrated ,Vol 1 ,The protocols” Addition Wesley

MCC - 3.3: Operating Systems

Unit I

Introduction: What is an Operating System, Simple Batch Systems, Multiprogramming and Time Sharing systems. Personal Computer Systems, Parallel Systems, Distributed Systems and Real time Systems.

Operating system structures: OS Services, system calls, operating system structure

Process Management: Process concept, Process Scheduling, Operation on Processes, Cooperating Processes. Interprocess communication. Threads.

CPU Scheduling: Basic concepts, scheduling criteria, scheduling algorithms.

Unit II

Process synchronization: Background , Critical section problem, Semaphore, Overview of classical synchronization problem, Monitors

Deadlocks: System model, Deadlock Characterization Methods for Handling Deadlocks, Deadlock Prevention, Deadlock avoidance, Deadlock Detection, Recovery from Deadlock.

Unit III

Memory management: Background, address Binding, Logical versus Physical Address space, Overlays, contiguous Allocation. Paging, Segmentation. Segmentation with paging

Virtual Memory: Background, Demand paging, performance of Demand paging, Page Replacement Algorithms. Allocation of frames, Thrashing,

Unit IV

File-system: File concept, Access Methods, Directory structure & implementation, Allocation Method, Free space management.

I/O systems: Overview, I/O Hardware, Application of I/O interface, Kernel I/O – subsystem Transforming I/O requests to Hardware Operations. Secondary storage Structure: Disk Structure, Disk Scheduling, Disk Management, Swap space Management, Disk Reliability.

Unit V

Case Studies: MS-DOS, MS Windows, LINUX (UNIX) Operating System and Shell Programming.

Reference Books:

1. Abraham Silberschatz and Peter Bear Galvin, "Operating System Concepts", Addison Wesley.
2. P. Blkeiahn Prasad. Moswen, SCITECH, "Operating Systems and System Programming",
3. Milenkovic, "Operating Systems Concepts and Design", Tata Mcgrawhill
4. Andrew, S Tannenbaum , "Operating System", PHI
5. Y. Kanetkar "UNIX Shell Programming.",BPB .
6. Deitel & Deitel, " Operating System", Pearsons

MCC - 3.4: Design and Analysis of Algorithm

Unit I

Introduction to design and analysis of algorithms. Growth of functions, Recurrences. Application to analysis of heap sort: Priority queues & Rabin. - Karp string matching algorithms.

Unit II

Algorithm design & Analysis techniques (I) : Divide and conquer & randomization. (Examples : Quick sort. Miller - Rabin Primality test. Lower bound for sorting,

Unit III

Algorithm design & Analysis techniques (II) : Dynamic Programming (Examples : Matrix chain multiplication. Travelling salesman problem). Greedy Method (Examples : Activity - Selection problem. Job sequencing with deadlines). Backtracking (Examples : 8-Queens problem and Subset sum problem).

Unit IV

Graph Algorithms : Data structure for disjoint sets. Minimum spanning tree (Algorithm of Kruskal & Prim), Single source shortest paths (Dijkstra's Algorithm), All pairs shortest paths (Floyd - Warshall algorithm).

Unit V

NP-Completeness & Approximation Algorithms : Polynomial time Polynomial time verification, NP-Completeness & reducibility. NP-completeness proofs XP-Completeness problems, (Hamiltonian-Cycle problem & Travelling-salesman problem). Approximation algorithms for travelling-sales man problem.

Reference Books:

1. Introduction to Algorithms [J.H.Cormen. C.E.Leiserson. R.L.Rivest(PHI 2000)
Ch 1,2,4 (excluding 4.1). 7, 8, 9(9.1), 16(16.1,16.2). 17(17.1,17.2), 22(22.1 -22.3),
24 25(25.1. 25.2). 26(26.2), 34(34.2), 36, 37(37.2)
2. Fundamentals of Computer Algorithms - E.Horowitz, S.Sahni,
S.Rajasekharn (Galgotia-2000)
Ch 4(4.4^5(5.9), 7(7.1 - 7.3)
3. The Design & Analysis of Computer Algorithms -- Alio, Hopcroft, Ullman,
Addison Wesley Longmans, 1998
4. Fundamentals of Algorithms - G.Brassard. P.Bratley, Pearson Education-1998

MCC - 3.5: Numerical & Statistical Computing

Unit 1

Solution of linear system of equations : Gaussian Elimination and Pivoting, Matrix Inversion, Triangular Factorization, Iterative methods for linear systems.

Polynomial approximation : Newton Polynomials, Chebyshev Polynomial.

Unit 2

Curve Fitting : Least-Square line, Curve fitting, Interpolation by Spline Functions.

Integration : Composite Trapezoidal and Simpson's Rule, Adaptive Quadrature, Gauss-Legendre Integration.

Unit 3

Statistical Inference : Parameter Estimation. The method moments, Maximum likelihood estimation, Confidence intervals, Sampling for normal, Exponential and poisson distribution, Estimation with dependent samples, Hypothesis testing, Test on population mean and two means.

Unit 4

Regression, Correlation : Introduction, Least squares curve fitting, The coefficient of determination, Confidence intervals in linear regression. Correlation analysis, Simple nonlinear regression, Higher dimensional least square fit.

Unit 5

Small sampling theory : χ^2 test-hypothesis concerning variance, Goodness of fit, Test of independence of attributes, F-test-test of variance of two populations, Analysis of variance (One way & two way classified data).

Reference Books:

1. Numerical Methods doe Mathematics, Science & Engineering – J.H.Mathews, PHI
2. S. Rajasekaran, "*Numerical methods in Science and Engineering: a practical approach*", S. Chand and company Ltd., New Delhi.
3. T. Veerarajan and T. Ramachandran, "*Theory and problems in Numerical methods*", Tata McGraw-Hill Publications, New Delhi.

MCL - 3.6: DBMS Lab.(Oracle)

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01. Learning basic DDL and DML commands
02. Learning basic DCL and TCL commands.
03. Insertion, Deletion, Updating to a table using SQL commands
04. Working with dual table.
05. Data retrieval using Select & where clause.
06. Oracle inbuilt functions-Date, aggregate, group by etc.
07. Use of Joins and Sub queries.
08. Views, sequences and indexes.
9. Managing users, privileges and roles.
10. PL/SQL-Data types, control structures.
11. Creating procedures with PL/ SQL.
12. Error handling in PL/ SQL.
13. Cursor Management in PL/ SQL.
14. Writing Programs on Packages & triggers.

MCL - 3.7: Operating Systems Lab

01. UNIX introduction ,
- 02.UNIX/LINUX Command,.
03. vi/vim editor basics,
- 04.creating & managing files with vi/vim.
05. Shell scripting, shell variables, data types.
06. Shell programming-control structures,
- 07.IShell Prog using Different Loops etc.

FOURTH SEMESTER

MCC - 4.1: Object Oriented Analysis with UML

Unit I

Overview of Object Oriented Concepts: Basic mechanisms, Key concepts, related technical terms, Advantages of OOD.

Object-Oriented S/W design: Object oriented vs. function-oriented design, Object oriented modeling.

Unit II

Introduction to UML: Overview, conceptual model Architecture, software development life cycle, RUP

Unit III

Basic structural Modeling: Classes, Relationships, Common mechanisms, Diagrams, class diagrams.

Advanced structural Modeling: Interfaces, types and Roles Object diagrams, packages

Unit V

Basic behavioral Modeling: Use cases, use case diagrams, Interaction diagram, Activity diagrams, state chart diagrams, component diagrams, deployment diagrams, patterns and frame works.

Unit V

A Case Study:

(Ex: - ATM, Trading System, Banking System, Library Information System, Student Information System etc.)

Reference Books:

1. Grady Booch, Rumbaugh, Ivar Jacobson, "Unified Modeling Language", User Guide Pearson.
2. Rajib Mall, "Introduction to S/W Engineering", PHI.
3. Pankaj Jalote, "An Integrated Approach to SW Engineering"
4. H. Srimathi, H. Sriram, A. Krishnamurthy, Scitech, "Object Oriented Analysis & Design Using UML"
3. Craig Larman , "Applying UML and Patterns".
4. Satzinger, Jackson, Burd, "Object-Oriented Analysis & Design with the Unified Process" Cengage Learning

MCC - 4.2: Computer Graphics

Unit – 1

A survey of computer graphics: Computer Aided Design, Presentation graphics, Computer Art, Enhancement, Education and training, Visualization, Image processing, Graphical user interfaces.

Overview of graphics System: Video display devices, Raster scan and Random scan, Input devices, Hard-copy devices, Graphics software.

GUI and interactive input methods: The user dialog, Input of graphical data, Input functions, Initial values for Input device parameters, Interactive picture construction.

Output Primitives: Point and lines, Bresenham's line algorithm, Mid point circle algorithm, Filled- area primitives.

Attributes of output primitives: Line curve, color, area fill and character Attributes, Bundled attributes and anti aliasing.

Unit – 2

Two dimensional geometric Transformation: Basic Transformation(Translation, Rotation, Scaling), Matrix representation and Homogenous coordination, Composite transformation, Reflection shear, Transformation between coordinate system, Two dimensional viewing: The viewing pipeline, Viewing coordinate reference, frame, window to view point coordinate transformation, Line clipping: (Cohen-Sutherland & Liang-Barsky algorithm) and polygon clipping-(Sutherland-Hodgeman Algorithm).

Unit – 3

Three dimensional object Representation: Polygon Surfaces, Quadratic surfaces, spline representative, Bezier Curves, and surfaces, B-spline curves and surfaces, Fractal geometry methods: Fractal generation Procedure, Classification of Fractal, Fractal dimension, Geometric construction of Deterministic self similar Fractals, Self squaring fractals, Mandelbort set and Julia set.

Unit – 4

Three dimensional geometry and modeling Transformation: Translation, Rotation, scaling. Reflections shears, Composite Transformation, Modeling and coordinate transformation,.

Three dimensional viewing: Viewing pipeline, Viewing coordinate, Projections (Parallel and perspective) Clipping.

Unit – 5

Visible- Surface dictation methods: Backface Detection. Depth Buffer, A-Buffer, Scan-line and depth sorting.

Illumination Models: Basic Models, Displaying Light Intensities, Halftone patterns and Dithering techniques.

Surface tendering Methods: Polygon Rendering Methods, Gouraud & Phong Shading. Quick introduction to Computer animation.

Reference Books:

1. Donald **Hearn** & M. Pauline **Baker**, "*Computer Graphics with OpenGL*", Third Edition, 2004, Pearson Education, Inc. New Delhi.
2. J.D. Foley, A.Dam, S.K. Feiner, J.F. Hughes: *Computer Graphics Principle and Practice* Addison Wesley.

MCC - 4.3: Programming with JAVA

Unit I

Introduction to Java Programming Language, Data Types and Operations, Structured Programming, Selection Statements, Loops, Methods, Method Abstraction and Stepwise Refinement, Arrays, Object-Oriented Programming: Classes and Objects, Constructors, Implementing & Designing Classes,

Unit II

Use of Keywords: static, final, this, Class Abstraction and Encapsulation, Strings and Text I/O, Inheritance and Polymorphism, use of super keyword, Overriding vs. Overloading, Object: The Cosmic Superclass, Abstract Classes and Interfaces, Packages, Object-Oriented Design and Patterns.

Unit III

GUI Programming: GUI Basics, Graphics, Event-Driven Programming, Creating User Interfaces, Applets and Multimedia, Exception Handling, Binary I/O,

Unit IV

Files & Streams, Recursion, Dynamic Binding, Generics & Generic Programming, Java Collections Framework, Algorithm Efficiency, Searching & Sorting.

Unit V

Multithreading, Networking, JDBC, Internationalization, Advanced GUI Programming: MVC, JavaBeans and Bean Events, Containers, Layout Managers, and Borders, Menus, Toolbars, Dialogs and Swing Models, JTable and JTree, New Features of Java.

Reference Books:

1. Y. Daniel **Liang**, "*Introduction to Java Programming: Comprehensive Version*", 7th Edition, 2009, Pearson Education Inc., New Delhi.
(Book Chapters: 1 to 24, 26, 29 to 37)
2. Cay S. **Horstmann**, "*Big Java*", 3rd Edition, Wiley India Pvt. Ltd., New Delhi.
3. Richard A. **Johnson**, "*An Introduction to Java Programming and Object Oriented Application Development*", First Edition, 2007, CENGAGE Learning India Pvt. Ltd., New Delhi.
4. E. **Balagurusamy**, "*Programming with Java: A Primer*", 3rd Edition, 2008, McGraw-Hill Education (India), New Delhi.
5. Harvey M. **Deitel** & Paul J. **Deitel**, "*Java How to Program*", 8th Edition, 2009, PHI Learning Pvt. Ltd., New Delhi.
6. Mahesh P. **Bhave** & Sunil A. **Patekar**, "*Programming with Java*", First Edition, 2009, Pearson Education, Inc. New Delhi.
7. P. **Radha Krishna**, "*Object-Oriented Programming through Java*", First Edition, 2007, Universities Press (India) Pvt. Ltd., Hyderabad.

MCC - 4.4: Theory of Computation

Unit 1

Introduction to finite automata, Central concepts of automata theory, Informal picture of finite automata, Deterministic finite automata, Non-deterministic finite automata, Application.

Unit 2

Regular expressions, Finite automata and Regular expressions, Applications of regular expressions, Algebraic laws of regular expressions, Pumping Lemma and its application for regular languages, Closure and Decision properties of regular languages.

Unit 3

Context-Free Grammars, Parse trees, Ambiguity in Grammar & Languages, Pushdown automata, The language of PDA, Equivalence of PDA's and CFG's. Deterministic pushdown automata, Change key normal form, The pumping Lemma for context free languages, Decision properties of CFL's.

Unit 4

The Turing machine, Programming techniques for Turing machines, Extension to the basic Turing machine, Restricted Turing machine, Turing machines and computers.

Unit 5

Non-Recursively enumerable languages, Undecidable problem that is recursively enumerable, Undecidable problem about Turing machines, Post's correspondence problem, Other undecidable problems.

Text Books

Introduction to Automata Theory, Languages and Computation- J.Hopcroft, R.Motwani, J.D. Ilman – Pearson Education

Reference Books:

1. Introduction to Theory of Computation – M.Sipser, Thomson Learning
2. Fundamentals of the Theory of Computation, Principles and Practice – R.Greenland, H.J.Hoorer

MCC - 4.5: Optimisation Techniques

Unit I

The Simplex Method : Computational procedure, .Artificial variable techniques, Two-phase simplex method.

Duality in linear programming : Concept of duality. Formulation of primal dual pairs, Duality and simplex method, Dual simplex method and algorithm, Computational procedure of the revised simplex method.

Unit II

Transportation Problems : Mathematical formulation, Vogel's method with optimality test - MODI method, Unbalanced transportation problem. Assignment problem - Mathematical formulation, Hungarian assignment method, The travelling salesman's problem.

Unit III

Sequencing problems : Problems with n jobs & 2 machines, n jobs and k machines, 2 jobs and k machines.

Integer Programming : Gomory's methods, Branch & Bound method.

Network Scheduling : Basic terms, Critical path methods, PERT.

Unit IV

Queuing Theory : Characteristics of queuing systems, Poisson process and exponential distribution, Steady state M/M/T, M/M/C (Models I, II, IV, V)

Unit V

Inventory Control : Inventory Costs, Economic order quantity, Deterministic inventory problems, EOQ problems with no shortage, With shortage. Production problem with no shortage, with shortage.

Replacement Problem : Replacement of items that deteriorate, Replacement of items that fail - Group and individual replacement, Recruitment and promotion problems.

Reference Books:

1. Operation Research - Kanti Swaroop, Gupta & Manmohan, Sultan Chand Ch 3(3.3, 3.5), 4(4.1, 4.2, 4.5-4.7), 5(5.2), 6(6.2,6.5 restricted, 6.6,6.8,6.9) 7(7.2,7.3,7.5), 10(10.2-10.5), 11(11.2-11.4), 21(21.2-21.7), 17(17.3-17.8.2) 18(18.4-18.6), 19(19.2-19.4)
2. Mathematical Programming Techniques - N.S.Kambo. McGraw Hill
3. Operation Research - Hamdy A. Taha, McMillan Pub.

MCL - 4.6: Programming with Java Lab.

01. Introduction to java , Compiling & executing a java program.
02. Program with data types & variables.
03. Program with decision control structures: if, nested if etc.
04. Program with loop control structures: do, while, for etc.
05. Program with classes and objects.
06. Implementing data abstraction & data hiding.
07. Implementing inheritance.
08. Implementing and polymorphism.
09. Implementing packages.
10. Program with modern features of java.
11. Implementing interfaces and inner classes
12. Implementing wrapper classes
13. Working with files.
14. Working with AWT
15. Working with JDBC

MCL - 4.7: Comp. Graphics Lab

01. Introduction to OpenGL Programming.
02. Implementing line drawing algorithms.
03. Implementing circle drawing algorithms.
04. Implementing ellipse drawing algorithms.
05. Implementing Line Clipping Algorithms.
06. Implementing Polygon Clipping Algorithms.
07. Implementing 2-d Transformations.
08. Implementing 3-d Transformations.
09. Implementing scan fill, boundary fill algorithms.
10. Implementing seed fill, flood fill algorithm.
11. Writing program on B-Splines, Bezier Curves

FIFTH SEMESTER

MCC - 5.1: Artificial Intelligence and Expert System

Unit – I

Introduction to AI, Application areas of AI, State-Space-Search: Production system design, Production system characteristic.

Search Techniques

Blind search: Depth first search, Breadth first search.

Heuristic search Techniques: Hill Climbing, Best first search, Branch and bound, A*, AO*.

Unit- II

Game playing: Min-Max Search, Alpha-Beta Cutoff.

Knowledge Logic: Skolemizing queries, Unification algorithm, Modus Ponens, Resolution.

Unit- III

Structured knowledge representation: Semantic nets, Frames, Conceptual dependencies, Scripts.

Unit – IV

Expert System: Expert System need & Justification, Rule based architecture, Non production system architecture, Case studies of expert system: MYCIN, R1. Learning: Concept of learning, Types of learning, Genetic algorithm, Neural network.

Unit – V

Natural language processing: Introduction syntactic processing, semantic analysis, discourse and pragmatic processing.

Handling uncertainty: Probabilistic reasoning, Use of certainty factor. Knowledge organization & management: Introduction, HAM.

Reference Books:

1. Rich & Knight(Chapters 1.1,2,3,5,9,10.1,10.2,12.1, 12.2, 12.3, 15.1-15.4, 17.1-17.6)
2. Dan W. Patterson(Chapters 4.1-4.4, 5.3, 11.1,11.4, 15.1-15.4)
3. N.J. Nilsson "Artificial Intelligence a new Synthesis"
4. Russel & Norvig "Artificial Intelligence a Modern Approach"

MCC - 5.2: Internet Technology and Enterprise Java

Unit I

Internet and Web Technology: Introduction and overview, Internetworking concept and architectural model, classful internet addresses, classless and subnet address extensions (CIDR), Protocol Layering, , Mobile IP, Client Server model, World wide web, Voice and Video over IP.

Unit II

Web Programming:- Web 2.0, Web Browsers, Web Servers, URLs, URN, URI, Basics of HTML & XHTML Programming: Syntax, Document structures, images, hyperlinks, List, Tables, Forms, Frames, CSS, Basic JavaScript Programming: DOM, Loops, function and arrays. XML: Document structure, DTD, Namespaces, XML Schema, and Parsing XML documents.

Unit III

Enterprise Java Programming: Overview, Java EE 6 API, Web Applications, Java Servlet Technology: - Lifecycle of a Servlet, Servlet API, Servlet Packages, Types of servlets, Database Access, Stateless and Stateful protocols, Session Tracking. JSP Technology: - Architecture & Anatomy of JSP Page, JSP life cycle, JSP with MVC Architecture, Dynamic webpage Creation, Scripting Elements, Session Tracking, Database access, JSTL, RMI Architecture and Application, JavaServer Faces (JSF) Technology, Facelets, Ajax.

Unit IV

Web Services: Building Web services with JAX-WS, Enterprise JavaBeans Technology: EJB Component Architecture, Role of EJB & its life cycle, Types of Beans, Stateless and stateful beans, Security features of EJB.

Unit V

Advance Features of Web Services: Contexts and Dependency Injection for the Java EE Platform; Java Persistence API, Security in Java EE, Java EE Supporting Technologies: Introduction, Transactions and Resource Connections.

Reference Books:

1. Douglas E. **Comer**, "*Internetworking with TCP/IP, Volume 1: Principles, Protocols and Architecture*", Fifth Edition, 2006, PHI Learning Pvt. Ltd., New Delhi. (Chapters: 1, 3, 4, 9, 10, 18, 20, 27, 28.)
2. Ralph **Moseley**, "*Developing Web Applications*", 2008, Wiley India, New Delhi.
3. Eric **Jendrock**, D. Carson, I. Evans, D. Gollapudi, K. Haase, C. Srivastha, "*The Java EE6 Tutorial*", Volume-1, Fourth Edition, 2010, Pearson India, New Delhi. (Chapters: 1, 3, 4, 5, 7, 9 to 12, 14 to 16, 17, 19, 23, 26, 27, 28.)

MCE - 5.3: Digital Image Processing

Unit I

Digital image representation, Digital image processing systems, Visual perception, Sampling and quantization, Relationship between pixels, Fourier transforms, Discrete Fourier transforms, Properties of 2-D Fourier transforms, Hadamard and Discrete conic Transforms.

Unit II

Image Enhancement: Spatial and frequency domain methods, Enhancement by point processing, Spatial filtering, Enhancement in frequency domain, Generation of spatial marks from frequency domain specification, Colour Image processing.

Unit III

Image restoration: Degradation model, Diagonalisation of circulant and Block circulant matrices, Algebraic approach to restoration, inverse filtering, Least mean square filter, constrained least square restoration, interactive restoration, Restoration in the spatial domain.

Unit IV

Image Compression: Fundamentals, Image compression model, Element of information theory, Error-free compression, Lossy compression standards.

Unit V

Image segmentation: Detection of discontinuities, Edge linking and boundary dictation, Thresholding, Region-oriented segmentation, the use of motion in segmentation.

Reference Books:

1. R. C. Gonzalez & R.E. Wood- Digital Image Processing and Analysis, PHI
2. M.Sonka, V. Hlavac, R.Boyle= Image processing Analysis and Machine Vision Thomson Learning.

MCE - 5.3: Parallel Computing

Unit I

Introduction to Parallel Computing; Motivating Parallelism, Scope of Parallel Computing; Parallel Programming; Platforms : Implicit parallelism, Limitation of Memory System Performance, Dichotomy of Parallel Computing Platforms, Physical Organization of Parallel Platforms, Communication Costs of Parallel Machines, Routing Mechanism for Interconnection Networks, Impact of Process-processor Mapping and Mapping Techniques.

Unit II

Principles of Parallel Algorithm Design : Preliminaries, Decomposition Techniques, Characteristics of Tasks and Interactions, Mapping Techniques for Load Balancing, Methods for containing interaction Overheads, parallel Algorithm Models.

Unit III

Analytical Modelling of Parallel Programs : Sources of Overhead in Parallel Programs, Performance metrics for parallel systems, the effect of Granularity on Performance, Scalability of Parallel Systems, minimum Execution time and minimum cost-optional Execution Time, Asymptotic Analysis of Parallel Programs, other Scalability Metrics.

Unit IV

Basic Communication Operations: One-to-All Broadcast and All-to-One Reduction, All-to-All Broadcast and Reduction, Scatter and Gather, All-to-All Personalized Communication, Circular Shift.

Unit V

Introduction to MPI Principles of Message - Passing Programming, The Building Blocks (Send and Receive Operations), MPI (the Message Passing Interface), Collective Communication and Computation Operations, Examples of Matrix - Matrix multiplication, One dimensional Matrix Vector Multiplication using MPI.

Reference Books:

1. Ananth **Grama**, George **Karypis**, Vipin **Kumar**, Anshul **Gupta**, "*Introduction to Parallel Computing*", 2nd Edition, 2004, Pearson Education, Inc. New Delhi.
2. Michael J. **Quinn**, "*Parallel Computing: Theory and Practice*", 1994, McGraw-Hill Education (India), New Delhi.
3. Calvin **Lin**, Larry **Snyder**, "*Principles of Parallel Programming*", 1st Edition, 2009, Pearson Education, Inc. New Delhi.
4. Michael J. **Quinn**, "*Parallel Programming in C with MPI and OpenMP*", 2004, McGraw-Hill Education (India), New Delhi.
5. Barry **Wilkinson**, "*Parallel Programming: Techniques and Applications Using Networked Workstations and Parallel Computers*", 2nd Edition, 2005, Pearson Education, Inc. New Delhi.

MCE - 5.3: Software Testing

Unit I

Software Testing Strategy, Environment & Methodology

Establishing testing policy, structured approach to testing, test factors, Economics of System Development Life Cycle (SDLC) Testing. Defects hard to find, verification and validation, functional and structural testing, workbench concept, eight considerations in developing testing methodologies, testing tactics checklist

Unit II

Software Testing Techniques

Black-Box, Boundary value, Bottom-up, Branch coverage, Cause-Effect graphing, CRUD, Database , Exception, Gray-Box, Histograms, Inspections, JADs, Pareto Analysis, Prototyping, Random Testing, Risk-based Testing, Regression Testing, Structured Walkthroughs, Thread Testing, Performance Testing, White-Box Testing

Unit III

Software Testing Tools

Taxonomy of Testing tools, Methodology to evaluate automated testing tools, Load Runner, Win runner and Rational Testing Tools, Java Testing Tools, JMetra, JUNIT and Cactus.

Unit IV

Testing Process

Eleven Step Testing Process: Assess Project Management Development Estimate and

Status, Develop Test Plan, Requirements Phase Testing, Design Phase Testing, Program

Phase Testing, Execute Test and Record Results, Acceptance Test, Report test results, testing software installation, Test software changes, Evaluate Test Effectiveness.

Unit V

Testing Specialized Systems and Applications

Testing Client/Server – Web applications, Testing off the Shelf Components, Testing Security, Testing a Data Warehouse

Text Books

1. Effective Methods for Software Testing, 2nd Edition
by *William E. Perry* , Second Edition, published by Wiley
2. Software Quality, by *Mordechai Ben-Menachem/Garry S. Marliss*, by Thomson Learning publication
3. Software Testing Techniques, by Bories Beizer, Second Edition, Dreamtech Press
4. Managing the Testing Process, by Rex Black, Wiley
5. Software Testing and continuous Quality Improvement, by William E.Lewis, Gunasekaran Veerapillai, Second Edition, Auerbach Publications
6. Dorothy Graham, Erik Van Veenendaal, Isabel Evans, Rex Black”Foundations of SoftwareTesting”CENGAGE Learning,INDIA EDITION.

MCE - 5.4: Managerial Economics

Unit I

Nature and scope of managerial economics, Objective of the firm. Managerial and behavioural theories of the firm.

Unit II

Concept of opportunity cost .Incremental time perspective, Principal of discounting and equimargins .Demand analysis - Purpose and concepts, Elasticity of demand , Methods of demand forecasting .

Unit III

Product and cost analysis, Short run and Long run average cost curves.
Law of supply, Economies and diseconomies of scale, Law of variable proportions.

Unit IV

Production function -Single output isoquants.
Pricing prescriptive approach. Price determination under perfect competition .Monopoly, Oligopoly and monopolistic competition .Full cost pricing, Product line pricing, Pricing strategies.

Unit V

Profits. Nature and measurement policy .Break even analysis .Case study.

Reference Books:

1. Dean J.(1982), "Managerial Economics " ,Prentice Hall of India
2. Mote YL et al (1980), "Managerial Economics -Concept and classes",Tata McGraw Hill.

MCE - 5.4: Management Information System

Unit I

Fundamentals of Information Systems, Systems approach to problem solving, Developing information system solutions. Information system components, Information quality, Data resource management,

Unit II

Database, Data models, Information Systems in marketing, manufacturing, HRM, Accounting and Finance.

Unit III

Information analysis and design tools : Decision tools, Decision Table, Structured Analysis, Dataflow Analysis, Tools for dataflow strategy, Developing dataflow diagrams, Leveling, Data dictionary, Structured flow chart, HIPO, Warnier/ORR diagram.

Unit IV

Planning & implementation of Information Systems, Transaction Processing Systems, Executive information Systems.

Unit V

Decision Support Systems, Expert Systems, Knowledge Management. Computer crime, Security (Goals, risks, controls, security & recovery measures of IS, economics of information security) & ethical challenges.

Reference Books:

1. James A. O'Brien, George M. Marakas, "Management Information Systems", Eighth Edition, 2008, McGraw-Hill Education (India), New Delhi.
2. Kenneth C. Laudon, Jane P. Laudon, "Management Information Systems", Tenth Edition, Pearson Education Inc., New Delhi.
3. Kenneth E. Kendall, Julie E. Kendall "System Analysis and design", PHI Learning Pvt. Ltd., New Delhi.
4. James A. Senn "Analysis & Design of Information Systems", McGraw-Hill Education, New Delhi
5. Effy Oz, "Management Information Systems", Sixth Edition, 2009, CENGAGE Learning India Pvt. Ltd., New Delhi.
6. Robert G. Murdick, Joel E. Ross, James R. Claggett, "Information Systems for Modern Management", Third Edition, PHI Learning Pvt. Ltd., New Delhi.

MCE - 5.4: E-Commerce and ERP

Unit I

Introduction to e-commerce: Business models, revenue models and business processes, economic forces & e-commerce, identifying e-commerce opportunities, international nature of e-commerce, technology infrastructure-internet & WWW; Business strategies for e-commerce: Revenue models in transaction, revenue strategic issues, creating an effective web presence, website usability; Marketing on the web: Web marketing strategies, communicating with different market segments, customer behavior and relationship intensity, advertising on the web, e-mail marketing, technology enabled CRM, search engine positioning and domain names.

Unit II

Business to business strategies: (Overview strategic methods for Developing E-Commerce) Purchasing, logistics and supply activities, electronic data interchange (EDI), electronic data interchange on the internet, supply chain management using internet technologies, electronic market place & portals (Home shopping, E-marketing, Tele marketing), auctions, online auctions, virtual communicative & web portals; legal, ethical & tax issues in e-commerce — use and protection of intellectual property in online business, online crime, terrorism & warfare, ethical issues. Four C's (Convergence, Collaborative computing, Content management & Call centre)

Unit III

Technologies for e-commerce-I: web server hardware & software, e-commerce software, e-commerce security — online security issues, security for client computers, communication channel security, security for server computers, organizations that promote computer security;

Unit IV

Technologies for e-commerce-II: Payment statements in e-commerce(Payment through card system, E-cheque, E-cash, E-payment threats and protection), planning for e-commerce— planning e-commerce initiatives, strategies for delivering e-commerce web sites, managing e-commerce Implementations.

Unit V

Enterprise resource planning: Business functions, processes & data requirements, development of ERP systems, marketing information systems & sales order process, production & supply chain management information systems, accounting in ERP systems, human resource processes with ERP, process modeling, process improvement and ERP implementations, Relationship between e-commerce and ERP.

Reference Books:

1. Dave **Chaffey**, "*E-Business and E-Commerce Management*", Third Edition, 2009, Pearson Education Inc., New Delhi.
2. Ellen **Monk**, Bret **Wagner**, "*Concepts in Enterprise Resource Planning*", Second Edition, CENGAGE Learning India Pvt. Ltd., New Delhi.
3. Gary P. **Schneider**, "*Electronic Commerce*", Seventh Edition, CENGAGE Learning India Pvt. Ltd., New Delhi.

MCE - 5.5: Compiler Design

Unit -1

Classification of grammars, Context free grammars. Deterministic finite state automata (DFA), Non -DFA

Unit -2

Scanners : Top down parsing , LL grammars, Bottom up parsing ,Polish expressions. Operator precedence grammar , ER. grammars , Comparison methods Error handling.

Unit-3

Symbol table handling techniques. Organisation for non-block and block structured languages.

Unit - 4

Run time storage administration , Static and Dynamic allocation . Intermediate forms of source program, Polish N-tuple and syntax trees. Semantic analysis and code generation.

Unit-5

Code optimization folding. Redundant sub-expression evaluation ,Optimization with interactive loops.

Reference Books:

1. Tremblay " The Theory and Practice of Compiler Writings ". McGraw Hill.
2. A.V. Aho, R. Sethi & J.D. Ulman "Compilers Principles Techniques and Tools"
Pearson Education
3. Kenneth C. Louden " Compiler Construction Principles & Practice " Cengage
Learning Indian Edition.

MCE - 5.5: Advanced Operating System

Unit I

Process Synchronization: Concept of process, Concurrent process, Threads, Overview of different classical synchronization problem, monitoring communication sequential processes (CSP), **Process deadlocks:** Introduction causes of deadlocks, Deadlock handling strategies Models of deadlock.

Unit II

Distributed operating system: Architectures, issues in Distributed operating systems, Limitation of Distributed Systems, Lamports logical clock, Global states Chandy Lamport's global state recording algorithm, Basic concepts of Distributed Mutual Exclusion, Lamport Algorithm, Ricat-Agrawal Algorithm.

Unit III

Distributed File System : Distributed File System Architecture, Design issues, SUN Network File system. Basic concepts of Distributed shared memory, Basic concepts of Distributed Scheduling, Load balancing, Load sharing.

Distributed OS Implementation: Models, Naming, Process migration, Remote Procedure Calls.

Unit IV

Multiprocessor System: Motivation, Classification, Multiprocessor Interconnections, Types, Multiprocessor OS functions & requirements. Design & implementation Issue. Introduction to parallel programming. Multiprocessor Synchronization.

Unit V

Performance & Processor Design

Performance measures, Performance Evaluation Techniques, Bottlenecks & saturation, Feedback loops.

Security and Production: Security-threats & goal penetration attempts, Security Policies & mechanisms, Authentication, Protections & access control Formal models of protection

Cryptography worms & viruses.

Reference Books:

1. Mukesh singhal and Niranjana G. Shivaratri, "Advanced Concepts in Operating System", TMH
2. Milan Milenkovic, "Operating System Concepts & Design", TMH
3. P.K. Sinha, "Distributed Operating System Concepts & Design" PHI
4. H.M. Deitel, "Operating System", Pearsons.

MCE - 5.5: Computer Security

Unit I

The Security Problem in Computing: The meaning of computer Security, Computer Criminals, Methods of Defense; Elementary Cryptography: Substitution Ciphers, Transpositions, Making “Good” Encryption Algorithms, Private-Key Cryptosystems, The Data Encryption Standard, The AES Encryption Algorithm, Public-Key Cryptosystems, Public Key Encryptions, Uses of Encryption, Pseudo-randomness, and Hashing.

Unit II

Program Security : Secure Programs, Non-malicious Program Errors, viruses and other malicious code, Targeted Malicious code, controls Against Program Threats, Protection in General-Purpose operating system protected objects and methods of protection memory and address protection, File protection Mechanisms, User Authentication Designing Trusted O.S : Security polices, models of security, trusted O.S. design, Assurance in trusted OS, Implementation examples.

Digital Signatures, Authentication, Secret Sharing, Group-oriented cryptography, Identification.

Unit III

Data base & Network Security: Security requirements, Reliability and integrity, Sensitive data, Inference, multilevel database, proposals for multilevel security; Security in Network; Threats in Network, Network Security Controls, Firewalls, Intrusion Detection Systems, Secure E-mail.

Unit IV

Administering Security: Security Planning, Risk Analysis, Organizational Security policies, Physical Security; The Economics of Cyber security; Privacy in Computing.

Unit V

Advanced Administering Security: Legal and Ethical Issues in Computer Security: Protecting Programs and data, Information and the law, Rights of Employees and Employers, Software failures, Computer Crime, Case studies of Ethics.

Reference Books:

1. Charles P. **Pfleeger** & Shari Lawrence **Pfleeger**, “*Security in Computing*”, Fourth Edition, 2007, Pearson Education, Inc. New Delhi.
2. Josef **Pieprzyk**, Thomas **Hardjono**, Jennifer **Seberry**, “*Fundamentals of Computer Security*”, 2003, Springer & Universities Press India, New Delhi.
3. Dieter **Gollmann**, “*Computer Security*”, Second Edition, 2006, Wiley India Pvt. Ltd., New Delhi.
4. William **Stallings** & Lawrie **Brown**, “*Computer Security: Principles and Practice*”, First Edition, 2008, Pearson Education, Inc. New Delhi.

MCL - 5.6: Enterprise Web Computing Java Lab.

01. HTML & XHTML Programming: basic tags, text formatting tags, creating hyperlinks.
02. HTML & XHTML Programming: tables, lists, frames, forms, maps, Creating CSS.
03. JavaScript Programming: Data types, loops, functions.
04. JavaScript Programming: DOM, arrays, forms, frame, GUI design.
05. XML Programming: page creation, making a DTD, Parsing XML files.
06. Creating, installation and running a web server (e.g. GlassFish).
07. Creating, Compiling and Running a Servlet. Program (both http & generic servlet).
08. Implementing session tracking mechanisms in servlets.
9. Generating Dynamic web content using Servlet basing upon request response model.
10. DHTML programming: GUI designs.
11. Creating a JSF program showing framework based application development.
12. Creating, Compiling and Running a JSP Program.
13. Implementing Session tracking through JSP Program.
14. Access to a database using Servlet/JSP program.
15. Creating a simple Java Bean Application programs using BDK. Tools.
16. Deploying of beans, implementing entity beans and session beans of EJB.
17. Creating manifest file, jar file and Deploying a web application.
18. Creating a RMI Program showing Marshalling and Unmarshalling Processes.
19. A Web based Capstone project university management system using JSP and Database..

MCL - 5.7: .NET Lab

1. .NET FRAMEWORK

Introduction, .NET Architecture, CTS / CLS / CLR, Garbage Collector, .NET Servers

2. PROGRAMMING IN VB.NET

Introduction, Implementing OOPS in VB.Net, Working with Form Controls, Data Access using ADO.Net Architecture, Component & Interoperability, User Controls & Custom Controls, Exception Handling

3. XML and WEBSERVICES

Introduction, DTD & XSD, CSS, XSL, XSLT & XPATH, SAX, DOM + ASP.NET web services

MCS - 5.8: Seminar

SIXTH SEMESTER

MCC - 6.1: Project work

Each student must have an internal supervisor who is a faculty of the department/ Institution. Each student must submit the abstract of the project which will be approved by the department on the recommendation of the internal supervisor. .

Guidelines: SUMMARY/ABSTRACT

All students must submit a summary/abstract of the project to be undertaken to the internal supervisor for approval, preferably, should be of about 3-4 pages. The content should be as brief as is sufficient enough to explain the objective and implementation of the project that the candidate is going to take up. The write up should include the followings-

1. Name / Title of the Project
2. Statement about the Problem
3. Why is the particular topic chosen?
4. Objective and scope of the Project
5. Methodology (including a summary of the project)
6. Hardware & Software to be used
7. Testing Technologies used
8. What contribution would the project make?

After the approval, the student is allowed to carry out the project in any organization/ Institution. He/She must immediately inform the internal supervisor about the name and contact details of the external supervisor in the organization/Institution. Moreover he must report to the internal supervisor about the progress of his/her work periodically. After the end of 16 weeks, the student is required to submit the project report in the department after getting approved by the internal and external supervisors.

Guidelines for preparation of the final project report

Good quality white executive bond paper of A4 size should be used for typing and duplication with the following specification

Left margin : 3.0cm

Right margin : 2.0cm

Top margin : 2.5cm

Bottom margin : 2.5cm

Page numbers: All text pages as well as the Program source code should be numbered in the bottom center of the pages.

Font size of the normal Text :12pt Times New Roman

Font size of Paragraph Heading :14pt Times New

Roman Font Size of chapter Heading :18pt Times New

Roman Font size of Code :10pt Courier New

Format of the Project report

Cover page

Certificate of the internal supervisor

Certificate of the external supervisor

Self certificate

Acknowledgement

List of abbreviations, figures, Tables

Synopsis of the project (3-4 pages)

Main Report

- Objective and scope of the project

- Theoretical background

- Definition of the problem

- System Analysis and design

- System planning

- Methodology adopted

- System implementation

- System maintenance and Evaluation

- Cost benefit Analysis

- Detail life cycle of the project

Test reports (print out of the reports)

Print out of the code

References

Every student has to submit the followings

- (a) One hard copy of the Project report

- (b) Soft copy of the project on CD (to be submitted to the University) on a cover mentioning the name of the project, name of the student, Regd No. , name of the college, Year

- (c) Five copies of the synopsis of the project report

Evaluation of the Project

Evaluation of the project will be done by a jury of experts including one external expert, Head of the Department, internal supervisor, two teachers of the department. The evaluation will be done on the basis of the followings

- Presentation : 50 marks

- Viva-Voce : 50 marks

- Project report : 200 marks

Ravenshaw University
Course Structure of MCA (2015-2018 Batch)
1ST SEMESTER

Subject Code	Subject Name	Mid Term Marks	End Term Marks
MCC - 1.1	Discrete Mathematical Structures	20	80
MCC - 1.2	Communicative English	20	40+40
MCC - 1.3	Programming in C	20	80
MCC - 1.4	Computer Organization and Architecture	20	80
MCC - 1.5	Database Management Systems	20	80
MCL - 1.6	Programming in C Lab.	25	50
MCL - 1.7	Database Management Systems Lab	25	50

2ND SEMESTER

Subject Code	Subject Name	Mid Term Marks	End Term Marks
MCC - 2.1	Probability & Statistics	20	80
MCC - 2.2	Management Practices & OB	20	80
MCC - 2.3	Object Oriented Programming Using C++	20	80
MCC - 2.4	Data Structure	20	80
MCC - 2.5	Theory of Computation	20	80
MCL - 2.6	C++ Lab	25	50
MCL - 2.7	Data Structure Lab	25	50

3RD SEMESTER

Subject Code	Subject Name	Mid Term Marks	End Term Marks
MCC - 3.1	Computer Oriented Numerical Methods	20	80
MCC - 3.2	Design and Analysis Algorithm	20	80
MCC - 3.3	Data Communication and Computer Network	20	80
MCC - 3.4	Operating Systems	20	80
MCC - 3.5	Software Engineering	20	80
MCL - 3.6	Networking Lab	25	50
MCL - 3.7	Operating Systems Lab	25	50

4TH SEMESTER

Subject Code	Subject Name	Mid Term Marks	End Term Marks
MCC - 4.1	Optimization Techniques	20	80
MCC - 4.2	Cryptography and Computer Security	20	80
MCC - 4.3	Java Programming	20	80
MCC - 4.4	Computer Graphics	20	80
MCE - 4.5	Elective-I	20	80
MCL - 4.6	Java Programming Lab	25	50
MCL - 4.7	Computer Graphics Lab	25	50

5TH SEMESTER

Subject Code	Subject Name	Mid Term Marks	End Term Marks
MCC - 5.1	Compiler Design	20	80
MCC - 5.2	Artificial Intelligence	20	80
MCC - 5.3	Advance Java	20	80
MCE - 5.4	Elective-II	20	80
MCE - 5.5	Elective-III	20	80
MCL - 5.6	Seminar	25	50
MCL - 5.7	Advance Java Lab	25	50

6TH SEMESTER

Subject Code	Subject Name	
MCP - 6.1	Project work	300

Elective-I	Pattern Classification
Elective-I	Advanced Software Engineering
Elective-I	Systems Modeling & Simulation
Elective-II	Data Mining & Data Warehousing
Elective-II	Machine Learning
Elective-II	Parallel and Distributed Computing
Elective-III	Mobile Computing
Elective-III	Digital Image Processing
Elective-III	Digital Signal Processing

FIRST SEMESTER

MCC - 1.1 Discrete Mathematical Structures

Unit I

Logic: Fundamentals of logic, Logical inferences, Methods of proof of an implication, First Order Logic and other methods of Proof, Rules of Inference for quantified Propositions, Mathematical induction.

Unit II

Relations and Diagrams :Relations and Directed Graphs special Properties of Binary Relation, Equivalence Relations, Ordering Relations, Lattices and Enumerations, Operations on Relations, Paths and Closures, Directed Graphs and Adjacency matrices.

Unit III

Graphs: Basic Concepts, Isomorphism and Subgraphs, Trees and their Properties, Spanning Trees, Directed Trees, Binary Trees, Planar Graphs, Eulers Formula, Multi Graphs and Euler Circuits, Hamiltonian Graphs.

Unit IV

Boolean Algebra: Introduction to Boolean Algebra, Minimization of Boolean Functions, Boolean Functions, Switching Mechanisms

Unit V

Algebraic structures & Applications to Finite State Machines and Language: Binary Operations, Semi Groups, Groups, finite State Machines, Semi Groups, Machines and Languages, simplifications of Machines.

Reference Books:

1. Discrete Mathematics for Computer Scientists & Mathematics J. Mott, A. Kandel, T. P. Baker PIII (1999) [Chapters 1.5-1.10,4.1-4.7,5.1-5.10,6.1-6.5]
2. Discrete Mathematical Structures for Computer Science, Bernard Kolman, Robert C. Busby, Saaron Ross, PIII (1999) [Chapters 9.1,9.2,9.4,10.3,10.6]

MCC - 1.2 Communicative English

Unit I

Basics of Communication: Nature of Communication: Definition, Process, Types (Verbal & Non Verbal), Importance of Communication, Barriers to Communication, Listening Skills. The Seven C's of effective communication.

Unit II

Remedial English: Tense and aspect, Modals, Voice Change, Interrogatives, Concord, Conditionals, Preposition

Unit III

Business Writing: Business letters, Cover letters, Resume, E-mails, Memos and Circulars, Report writing and Proposals. Group Discussions and Interview skills.

Unit IV

Channels of Communication and Phonetics: Channels of Communication - Formal: Upward, Downward, Lateral. Informal: Grapevine; Advantages and Disadvantages of the grapevine. Phonetics: Sounds in English language, Intonation and Stress.

Reference Books:

1. Effective Business Communication by Herta, Hildebrandt and Thomas.(Tata McGraw)
2. Basic Business Communication by Lesikar Flatly (Tata McGraw)
3. Business Communication Today by Bovee, Courtland and John V.Thill (Pearson)
4. Business Communication by Meenakshi Raman and Singh.(OUP)

MCC - 1.3 Programming in C

Unit I

Introduction to algorithms : Flowcharts, C character set, identifiers and keywords, data types, constants, variables and arrays, declarations, expressions, statements, symbolic constants. Arithmetic, unary, logical, bit-wise, assignment and conditional operators, Library functions, data input and output: getchar, putchar, scanf, printf, gets and puts functions. Pre-processors commands: # include, #define, ifdef

Unit II

Control statements: while, do-while, for statements, nested loops, if-else, switch, break, continue and goto statements, comma operators. Function - Defining and accessing, passing arguments, function prototypes, recursion, storage classes, automatic, external and static variables, multifile programs.

Unit III

Arrays: Defining and processing, passing arrays to a function, multidimensional arrays. Strings : Operation on strings

Pointers: Declarations, passing to a function, pointer and arrays, operation on pointers, Types of pointer - Constant pointers, pointer to constant, constant pointer to a constant, NULL pointer, dangling pointer, generic pointers, wild pointer. Dynamic memory allocation: malloc, calloc, realloc, free

Unit IV

Structures: Defining and processing user-defined data types, structures and pointers, passing structures to a function, Unions.

Unit V

Data Files: Opening, closing, creating and processing data file, unformatted data files.

Reference Books:

1. Kanetkar Y, Let us C (bpb)
2. Hutchison R, Programming in C (McGraw Hill)
3. Rajaraman V, Computer Programming in C (Prentice Hall of India)

MCC - 1.4 Computer Organization and Architecture

Unit I

Information Representation: Number systems, Binary numbers, Sign Magnitude & 2's complement representation. Fixed and Floating point, IEEE-754 Single Precision format, IEEE-754 Double Precision format, Precision and range, BCD code, ASCII and EBCDIC

Digital Electronics: Boolean Algebra, Logic gates, Truth Tables, Combinational circuits, Karnaugh map, Flip flops, Sequential circuits.

Unit II

Combination RTL Components : Integrated circuits, Multiplexer, Demultiplexers, Decoder, Encoder, Registers, Shift Registers, Binary Counters, Memory Unit - RAM, ROM. Parity

generators and checkers, Adder/Subtractor, Programmable Logic Devices- PLA, PAL, ROM. Sequential RTL components : Registers counters.

Unit III

Central Processing Unit: General Register Organization, Stack Organization, Reverse Polish Notation, Machine Language instructions, Addressing modes, Instruction types, Instruction set selection, Instruction cycle and execution cycle. Fundamental of assembly language Programming using 8085 microprocessor, RISC vs CISC

Unit IV

Memory Organization: Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory, Virtual Memory, Memory Management Hardware.

Multiprocessors: Characteristics of Multiprocessors, Interconnection Structures, Interprocessor Arbitration, Interprocessor communication and Synchronization, Cache Coherence.

Unit V

Pipeline and Vector Processing: Parallel processing, Pipelining, Arithmetic Pipeline, Instruction pipeline, RISC Pipeline, Vector Processing, Array Processing.

Input-Output devices and characteristics, Input-output mechanism: Memory-mapped I/O, Programmed I/O, Interrupts, Direct Memory Access

Text Books:

1. Mano M, Computer System and Architecture (3rd Ed) (PHI)
2. J. L. Hennessy & D. A. Patterson – Computer Architecture – A Quantative approach 2nd Edition –Morgan Kaufman Pub – 1996
3. V. C. Hammacher, Z. G. Vranesic, S. G. Zaky – Computer Organization McGraw Hill 1996

Reference Books:

1. K. Hwang – Advanced Computer Architecture, McGraw Hill, 1993
2. D. Sima, T. Fountation, P. Kacsak – Advanced Computer Architecture – A design space Approach, Addison Wesley, 1997

MCC -1.5 Database Management Systems

Unit 1

Introduction: Introduction to File and Database systems- History- Advantages, disadvantages- Data views – Database Languages – DBA – Database Architecture – Data Models -Attribute types — Keys -ER diagram–EER Diagram- Overview of Network and Hierarchical models.

Unit 2

Relational Model: The relational data model, Relational constraints, Relational calculus, The domain relational calculus, Relational algebra, ER and ERR to relational mapping

Query languages – SQL – Data definition – Queries in SQL – SQL: Basic queries, Complex queries, Insert delete and update statement in SQL, Views, Constraints and assertion, Updates

Unit 3

Database Design: Design Phases – Pitfalls in Design –Functional Dependence – Armstrong Axioms, cover, Minimal Cover, Normalization (1NF, 2NF, 3NF, BCNF, 4NF, 5NF). Lossless join decomposition, Dependency Preservation

Unit 4

Transaction Management: Transaction concept – state- Serializability – Recoverability- Concurrency Control –Locks- Two Phase locking – Deadlock handling– Time stamp ordering, Multiple Granularity, MultiVersion Schemes, File Organization – Organization of Records in files – Indexing and Hashing , B⁺ Tree indexing

Unit 5

Query processing and Optimization: Basic algorithms for Query operations, Using heuristics, selectivity & cost estimates in query optimization, semantic query optimization

Database Recovery: Log based Recovery, shadow paging, Recovery with concurrent Transaction, Advanced Recovery Techniques

Database System Architecture: Centralised and Client Server Architecture, server system Architecture, Parallel systems, Distributed systems. Overview Data mining- Data warehousing

Text Book:

1. Rameez Elmasri, Shamkant B. Navathe, 'Fundamentals of Database Systems', 5th Ed., Pearson Education, 2009.

MCL - 1.6 Programming in C Lab.

C Programming: variables and expression assignment, simple arithmetic. Loops, if else, case statements, break, continue, goto. Single and multidimensional arrays. Functions, recursions, file handling in C.

Pointers, address operators, declaring pointers and operations on pointers. Address of an array, structures, pointers to structures, dynamic memory allocation.

MCL - 1.7 Database Management Systems Lab

1. Learning basic DDL and DML commands
2. Learning basic DCL and TCL commands.
3. Insertion, Deletion, Updating to a table using SQL commands
4. Working with dual table.
5. Data retrieval using Select & where clause.
6. Oracle inbuilt functions-Date, aggregate, group by etc.
7. Use of Joins and Sub queries.
8. Views, sequences and indexes.
9. Managing users, privileges and roles.
10. PL/SQL-Data types, control structures.
11. Creating procedures with PL/ SQL.
12. Error handling in PL/ SQL.
13. Cursor Management in PL/ SQL.
14. Writing Programs on Packages & triggers.

SECOND SEMESTER

MCC - 2.1 Probability & Statistics

UNIT-1

Probability: Introduction, Probability of an event, Sample Space, Calculating Probabilities using Simple events, Useful counting rules, additive rule & multiplication rule, conditional probability Bayes' rule random variable, discrete and continuous probability distribution, Joint probability distribution,

UNIT-2

Mathematical expectation, Variance and co-variance of random variables, Mean and co-variance of linear combination of random variables, Chebyshev theorem, Binomial & Multinomial, Hypo-geometric, Geometric, Poisson distribution.

UNIT- 3

Continuous probability Distribution: Uniform, Normal, Exponential Distribution, Weibull's Distribution, Chi-square distribution, Sampling Distribution: Sampling distribution of S^2 , t-distribution, F-distribution

UNIT-4

Estimation of parameter: methods of estimation, Estimating the mean of a single sample, Standard error, Prediction interval, Tolerance limits, Estimating the difference between means of two samples, Estimating proportion and variance of a single sample, Estimating the difference between two proportions and variances of two samples, maximum likelihood estimation.

UNIT-5

Test of hypothesis: one and two tailed test, test on a single mean when variance is known & variance is unknown. Test on two means, test on a single mean population and test on two populations. One and two sample test for variance. χ^2 test for goodness of fit and test for independence.

Introduction to linear regression: Simple regression models, Method of least square, Properties of least square estimators, Inferences concerning the regression coefficients, Coefficients of determination and its application.

Statistical quality control (Simple idea only)

Text Book:

1. Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers & Keying Ye, "Probability & Statistics for Engineers & Scientists", Eighth Edition, 2007, Pearson Education Inc., New Delhi.
2. William Mendenhall, Robert J. Beaver & Barbara M. Beaver, "Introduction to Probability and Statistics", 13th Edition, 2009, CENGAGE Learning India Pvt. Ltd., New Delhi.

MCC - 2.2 Management Practices & Organizational Behavior

Unit I

Management: Management levels, Skills, Roles of a manager. Principles of Management: Planning, Process & Types. Decision Making, Process and Types.

Unit II

Learning: Meaning & Definition; Classical conditioning, Operant conditioning; Cognitive Theory of Learning; Social Learning Theory.

Communication – Importance, Types, Gateways and Barriers to Communication.

Unit III

Leadership: Nature & Importance of Leadership; Theories- Behavioral theory, Situational theory & Trait theory of leadership.

Motivation: Motivation and Motivation theories.

Unit IV

Organization: Structure, Nature, Formal and Informal organization. Departmentation, Delegation, Centralization, Decentralization. Organizational Behavior, Characteristics. Concept. Individual Dimensions of Organizational Behavior, Perception, Attitudes, Value, Personality.

Unit V

Introduction to Human Resource Management- Fundamentals of Selection, Orientation, Training and Development, Performance Appraisal, International Organizational Behaviour – Trends in International Business, Cultural Differences and Similarities, Individual and Interpersonal Behaviour in Global Perspective.

Reference Books:

1. Keith Davis, Organizational Behaviour, McGraw – Hill.
2. K.Aswathappa, Organizational Behaviour, Himalaya Publishing House.
3. Stephen P. Robbins, Organizational Behaviour, Prentice Hall of India.
4. Organisational Behaviour: L.M. Prasad
5. Organisational Behaviour: Rao & Narayan
6. Environmental Studies & OB: Sharma & Gupta
7. Organizational Behaviour: Gupta and Joshi (KP)
8. OB: S S Khanka, S. Chanda Pub

MCC - 2.3 Object Oriented Programming Using C++

Unit I

Introduction to object oriented Programming, Features of OOPS. Getting started with C++ Data type, variables, expression, control structure. Concept of reference variable, I/O Stream class.

Function: Definition, parameter passing, references, inline function, function overloading, function with arguments and reference, returning by reference.

Unit II

Class: Structure and class comparison Classes & objects , private, public & protected access specifiers, data member and member function , static data member & member function, inline function ,friend function, constructor, types of constructor, destructor.

Unit III

Dynamic memory management (new and delete), pointer to object. Inheritance: What is inheritance? Types of inheritance. Member accessibility, function overriding, derived class by derived by different access specifiers, multipath inheritance and pointer to objects in inheritance. Polymorphism: Run time polymorphism & virtual function, abstract class, object slicing.

Unit IV

Operator Overloading: Overloading of unary & binary operators, overloading using member function & friend function, overloading of Stream operator. Copying object. Type Conversion – Class to basic conversion, basic to class conversion.

Unit V

Exception Handling - Exception and derived classes. try, catch, throw statement ,catching all exception, unexpected exception, re-throwing an exception.

Templates - Function templates, class templates, Introduction to STL - Containers, algorithms, iterators.

Reference Books:

1. A.N. Kamthane, "Object Oriented Programming with ANSI & Turbo C++", Pearson Education.
2. E. Balguruswamy, "Object Oriented Programming with C++", TMH Publisher.
3. K.R.Venugopal, Rajkumar,,TRavishankar, "Mastering C++", TMH Publisher

MCC - 2.4 : Data Structure

Unit I

Algorithms, Asymptotic notations and analysis, Measuring time and space complexities, Data structure and C: Functions, storage structures for arrays, sparse matrices, strings, pattern matching, structures and arrays of structures, Abstract data type, Stacks and Queues: representation and Applications.

Unit II

Linked Lists: Singly linked lists, Linked stacks and queues, Operation on polynomial, Linked dictionary, Doubly linked list, Circular linked list, Doubly circular linked lists.

Unit III

Trees: Binary trees, Terminologies and memory representation, Binary search trees, General trees, Tree traversing, Operations on binary trees, - Expression manipulations, Threaded binary trees, Height balancing trees, Heaps, forest, File structures, Introduction to multi-way search trees, B-tree and B -trees.

Unit IV

Graphs: Terminologies and representation, Path matrix, graph traversal,- DFS and BFS, shortest path problems, Bi-connected graphs, Topological sort.

Unit V

Dynamic storage Management, Garbage collection and compaction, Hashing functions. Hash tables and collision resolution techniques. Sorting techniques: Bubble sort, selection sort, Insertion sort, Merge sort, Quick sort, Heap sort, Radix sort, Shell sort and address calculation sort, Linear search and binary search.

Reference Books:

1. D.Samantha," Data Structure using C", PHI Publication.
2. Richard Gilberg, Behrouz A. Forouzan, "Data Structures: A pseudo code approach with C", Second Edition, 2007, CENGAGE India Pvt. Ltd., New Delhi.
3. G.A. V. Pai, " Data Structure and Algorithms", McGraw Hills Education India

MCC - 2.5 Theory of Computation

Unit I

Introduction to finite automata, Central concepts of automata theory, Informal picture of finite automata, Deterministic finite automata, Non-deterministic finite automata, Application, Formal Language.

Unit II

Regular expressions, Finite automata and Regular expressions, Applications of regular expressions, Algebraic laws of regular expressions, Pumping Lemma and its application for regular languages, Closure and Decision properties of regular languages.

Unit III

Context-Free Grammars, Parse trees, Ambiguity in Grammar & Languages, Pushdown automation. The language of PDA. Equivalence of PDA's and CFG's. Deterministic pushdown

automata, Chomsky Normal form, The pumping Lemma for context free languages, Decision properties of CFL's.

Unit IV

The Turing machine, Programming techniques for Turing machines, Extension to the basic Turing machine, Restricted Turing machine, Turing machines and computers.

Unit V

Non-Recursively enumerable languages, Undecidable problem that in recursively enumerable, Undecidable problem about Turing machines, Post's correspondence problem, other undecidable problems.

Text Book

1. Introduction to Automata Theory, Languages and Computation- J.Hopcroft, R.Motwani, J.D.Ullman – Pearson Education

Reference Books:

1. Introduction to Theory of Computation – M.Sipser, Thomson Learning
2. P. Linz, "An Introduction to formal Languages and Automata", Norasa, 2000
3. Mishra, Chandrashekharan, "Theory of Computer Science", PHI
4. Lewis Papadimitra: Theory of Computations, Prentice Hall of India, New Delhi

MCL - 2.6 C++ Lab

1. Implementing classes and creation of objects.
2. Checking Precedence of operators & side effects.
3. Implementing various control structures & loops.
4. Making structured programming & stepwise refinement.
5. Implementing Procedural abstraction with functions.
6. Implementing Constructors and destructors.
7. Implementing Data abstraction & inheritance.
8. Implementing Multiple & hybrid inheritance.
9. Implementing Polymorphism concepts.
10. Implementing Operator overloading & friend's functions.
11. Working with new & delete, object copying.
12. Implementing Object slicing, this operator.
13. Exception handling mechanisms.
14. Implementing class templates & function templates.
15. Creating files in C++ and file related operations.

MCL - 2.7 Data Structure Lab

1. Matrix Operations-Add, Multiply, Rank, Det.etc.
2. Stack & Queue operations using Arrays.
3. Self-referential structures & single linked list operations.
4. Implementing Stack and queues using linked lists.
5. Implementing Polish Notations using Stacks.
6. Circular and double linked list operations.
7. Implementing priority queue & dequeue using lists.
8. Evaluating polynomial operations using Linked lists.
9. Implementing set related operations & Hashing.
10. linear & binary search, bubble sort technique.
11. Insertion sort, selection sort & merge sort techniques.
12. Quick sort, counting sort and Shell sort techniques.
13. Radix (bucket) and address calculation sort methods.
14. Binary tree traversals (preorder, inorder, postorder).
15. Heap sort & AVL tree implementations.
16. Graph representation with matrix & adjacency lists.

THIRD SEMESTER

MCC 3.1 Computer Oriented Numerical Methods

Unit I

Introduction: Numbers and their accuracy, Chopping and Rounding off, Errors: Absolute and Relative errors, Floating point representations of numbers, Loss of significance

Solution of Algebraic and Transcendental equations: Bisection Method, Newton-Raphson Method, Secant Method, Method of false position, Rate of convergence and comparison of iterative methods

Unit II

Interpolation and Numerical differentiation: Polynomial Interpolation, Interpolating polynomial: Lagrange form, Newton form, Divided difference Interpolation, Errors in polynomial Interpolation

Unit III

Numerical Integration: Trapezoidal Rule, Composite Trapezoidal rule, Simpson's 1/3 rule, Simpson's 3/8 rule, Gaussian quadrature formulae (1-point, 2-point, 3-point)

Unit IV

Solution of system of Linear Equations: Gaussian Elimination method and Pivoting, LU factorization method, ill Conditioning, Iterative Methods: Jacobi iterative method, Gauss Seidel iterative method

Eigen Values and Eigen vectors: Eigen value properties, Computation Eigen values by Power method

Unit V

Solution of Ordinary Differential Equations: Taylor Series method, Runge-Kutta method of order 2 and order 4, Smoothing of Data and the Method of Least squares: Linear and non-linear least square method

Reference Books:

1. John H. Mathews ,“Numerical Methods for Mathematics ,Science and Engineering” PHI Private Ltd., New delhi.
2. B. P. Acharya, “A Course on Numerical Analysis”, Kalyani Publishers

MCC 3.2 Design and Analysis of Algorithm

Unit I

Introduction to design and analysis of algorithms, Growth of functions, Recurrences, Solution of recurrences by Substitution, Recursion tree and Master method, Worst case analysis of Merge sort, Quick sort and Binary search

Heapsort: Heaps, Building a heap, The Heapsort algorithm, Priority Queue, Lower bounds for sorting

Unit II

Dynamic Programming: Matrix-chain multiplication, Elements of dynamic programming, Longest common subsequence

Greedy Algorithms: An activity- selection problem, Elements of greedy strategy, Fractional knapsack problem, Huffman codes

Unit III

Data structures for Disjoint Sets: Disjoint set operations, Linked-list representation of disjoint sets, Disjoint-set forests.

Graph Algorithms: Elementary Graph Algorithms: Representations of graphs, Breadth-first search, Depth-first search, Minimum Spanning Trees: Kruskal and Prim's algorithms, Single-Source Shortest Paths: The Bellman-Ford and Dijkstra's algorithm, All-Pairs Shortest Paths: The Floyd-Warshall Algorithm

Unit IV

Maximum Flow: Flow Networks, The Ford-Fulkerson method, Polynomials and the FFT: Representation of polynomials, The DFT and FFT, String Matching: The naive string-matching algorithm, The Rabin-Karp algorithm.

Unit V

NP-Completeness: Polynomial time, Polynomial-time verification, NP-completeness and reducibility, NP-completeness proofs, NP-completeness problems, Approximation Algorithms: The vertex-cover problem, The travelling-salesman problem, The set-covering problem, The subset-sum problem

Reference Books:

1. Introduction to Algorithms: T. H. Cormen, C. E. Leiserson, R. L. Rivest (PHI), Second Edition.
2. E. Horowitz, S. Sahani, S. Rajsekharan, "Fundamentals of Computer Algorithms", Second Edition, Universities Press, 2007
3. Algorithm Design – Goodrich, Tamassia, Wiley India.
4. Algorithms By Sanjay Dasgupta, Umesh Vazirani – McGraw-Hill Education

MCC 3.3 Data Communication and Computer Network

Unit I

Introduction: Data Communication, Network Protocols and Standards, Point to Point and Multi Point line configuration, Network Topologies: Mesh, Star, Tree, Bus, Ring

Transmission Modes: Simplex, Half Duplex, Networks: LAN, MAN, WAN. The OSI Models: Function of Layers. TCP/ IP Protocol Suit

Signals: Analog and Digital signals, Periodic and Aperiodic signal,

Encoding and Modulating: Digital to Digital conversion. Unipolar. Polar Bipolar, Analog to Digital conversion AM, FM, PM

Unit II

Transmission of Digital data: Parallel and Serial transmission. DTE/DCE interface, Modems, Guided and Unguided transmission media. Transmission impairment, Performance

Multiplexing: Frequency division, Wave division and Time division multiplexing, the Telephone system, Digital Subscriber Line (DSL), Error Detection and Correction: Types of Error, Redundancy Checks (VRC, LRC, CRC), Error Correction

Unit –III

Data Link Control: Line Discipline, Flow Control, Error Control

Data Link Protocol: Asynchronous and Synchronous Protocols, Character and Bit Oriented Protocols.

Local Area Networks: IEEE 802 standards, Ethernet, Token Bus, Token Ring, FDDI

Switching: Circuit Switching, Packet Switching, Message Switching

Unit IV

Integrated Services Digital Network(ISDN), Services, History, Subscribers access to ISDN, The ISDN layers, Broadband ISDN.

X.25: X.25 Layers, Protocols related to X.25

Frame Relay: Introduction, Frame Relay operation. Frame Relay layers, Congestion Control, Leaky bucket algorithm. Traffic control

Unit V

Networking and Internetworking Devices: Repeaters, Bridges, Routers, Gateways, Routing Algorithms.

TCP/IP Protocol Suite: Overview, Network Layer, Addressing Subnetting, Transport Layer, Application Layer: Client Server Model, BOOTP, DHCP, DNS, Telnet, FTP, SMTP, SNMP, HTTP, WWW

Reference Books:

1. Behrouz A Forouzan “Data Communications and Networking “ Tata McGraw Hill.
2. Stalling W “Computer Communication Networks “ Prentice Hall
3. Tannenbaum A.S “Computer Networks” PHI
4. Bartee T.C “Data Communication ,Network and systems” BPB
5. Schweber WL”Data Communication “Mc Graw Hill
6. Steven W.R: TCP/IP Illustrated ,Vol 1 ,The protocols” Addison Wesley

MCC 3.4 Operating Systems

Unit I

Introduction: What is an Operating System, Simple Batch Systems, Multiprogramming and Time Sharing systems. Personal Computer Systems, Parallel Systems, Distributed Systems and Real time Systems, Operating system structures: OS Services, system calls, operating system structure, Process Management: Process concept, Process Scheduling, Operation on Processes, Cooperating Processes. Interprocess communication. Threads, CPU Scheduling: Basic concepts, scheduling criteria, scheduling algorithms

Unit II

Process synchronization: Background, Critical section problem, Semaphore, Overview of classical synchronization problem, Monitors, Deadlocks: System model, Deadlock Characterization Methods for Handling Deadlocks, Deadlock Prevention, Deadlock avoidance, Deadlock Detection, Recovery from Deadlock.

Unit III

Memory management: Background, address Binding, Logical versus Physical Address space, Overlays, contiguous Allocation, Paging, Segmentation, Segmentation with paging, Virtual Memory: Background, Demand paging, performance of Demand paging, Page, Replacement Algorithms, Allocation of frames, Thrashing

Unit IV

File-system: File concept, Access Methods, RAID, Directory structure & implementation, Allocation Method, Free space management, I/O systems: Overview, I/O Hardware, Application of I/O interface, Kernel I/O-subsystem Transforming I/O requests to Hardware Operations, Secondary storage Structure: Disk Structure, Disk Scheduling, Disk Management, Swap space Management, Disk Reliability

Unit V:

Security Environment, Design Principles Of Security, User Authentication, Protection Mechanism: Protection Domain, Access Control List, Development of Unix/Linux, Role & Function of Kernel, System Calls, Elementary Linux command & Shell Programming, Directory Structure, System Administration, Case study: Linux, Windows Operating System

Reference Books:

1. Abraham Silberschatz and Peter Bear Galvin, "Operating System Concepts", Addison Wesley
2. P. Blkeiahn Prasad. Moswen, SCITECH, "Operating Systems and System Programming",
3. Milenkovic, "Operating Systems Concepts and Design", Tata Mcgrawhill
4. Andrew, S Tannenbaum , "Operating System", PHI
5. Y. Kanetkar "UNIX Shell Programming.",BPB
6. Deitel & Deitel, " Operating System", Pearsons

MCC 3.5 Software Engineering

Unit I

Introduction to Information System Development: Overview of System Analysis and Design, Categories of Information Systems, System development Strategies, Implementation and Evaluation, Tools for System development

Unit II

Introduction to software Engineering: Basic concepts about software and program and Evolution of Software Engineering, Basic concepts on process and life cycle models, Models: Waterfall, Prototype, Evolutionary, Incremental, spiral, V, RADM etc., Requirement Analysis: Introduction to software specification, its needs and importance, formal specification methods, SRS: attributes of good SRS and organization of SRS document

Unit III

Software design: Methods and strategies, desirable design attributes, Concept of good design, Cohesion and coupling, Function-Oriented Software Design: structured system analysis and structured design, formal approach design, data flow oriented design, Software coding and testing: coding standard and guidelines, code review, software inspection, Testing: Unit, integration, system testing, black box and white box testing Incremental testing, formal proof of correctness, software matrix, Introduction to software verifications

Unit IV

Software Reliability and Quality Management: S/W and H/W reliability, Reliability Matrices, Software engineering management: introduction to capability maturity model, quality assurance and software cost estimation (Delphi, COCOMO), Introduction to computer-aided, software engineering, Software reuse and maintenance

Unit V

S/W quality, ISO 9000:Modern Trends and Emerging Technologies: Humphrey's Capability Maturity Model, CMMI (Capability Maturity Model Integration), Agile software development, Extreme Programming (XP), Security Engineering, Service-oriented Software Engineering, Aspect-oriented Software Development.

Reference Books:

1. Rajib Mall, "Fundamentals of Software Engineering", PHI.
2. James A. Senn, "Analysis and Design of Information Systems", McGraw Hill
3. R.S. Pressman, "Software Engineering – A Practitioner's Approach", McGraw Hill.
4. P. Jalote, "An Integrated Approach To Software Engineering", Narosa, New Delhi.
5. G. Booch, "Object-Oriented Analysis and Design", Benjamin / Cumming Publishing Co.New York.