

SYLLABUS
FOR
MASTER OF COMPUTER APPLICATIONS
(MCA 2014-2017)



DEPARTMENT OF COMPUTER SCIENCE

RAVENSHAW UNIVERSITY

CUTTACK, 753003

Ravenshaw University
Course Structure of MCA

1ST SEMESTER

Subject Code	Subject Name	Mid Term Marks	End Term Marks
MCC - 1.1	Discrete Mathematical Structures	20	80
MCC - 1.2	Written and Oral Technical Communication	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 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 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 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 : eɪ / 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 English – 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 - 1.3 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 –Mergan 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 specifier, 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. Lewish 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 naïve 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" Addition 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.

MCL 3.6 Networking Lab

1. Write a tcl script for creating network animator.
2. Write a tcl script for creating a simple topology with two nodes and a link.
3. Write a tcl script for creating nodes, links and orientation.
4. Write a tcl script for creating nodes, links , orientation and labelling.
5. Write a tcl script for creating nodes, links, bandwidth and delay description.
6. Write a tcl script for creating eight nodes , bandwidth, delay and queue of the link
7. Write a tcl script to set identification colors to the links.
8. Write a tcl script for UDP communication between two nodes.
9. Write a tcl script for UDP communication in a network topology having ten number of nodes.
10. Write a tcl script for TCP communication between two nodes.
11. Write a tcl script for TCP communication between two sources and two destinations.
12. Write a tcl script for TCP communication for more number of nodes.
13. Write a tcl script to drop down packets in a link.
14. Write a tcl script to drop down packets in a router and end server at a particular time.
15. Write a tcl script to drop down packets in a link at particular time interval.

MCL 3.7 Operating Systems Lab

1. WAP to create a child process.
2. WAP to get the process id of child, parent, grandparent process.
3. WAP to find the square and square root of 25 by child and parent process respectively.
4. WAP where parent process display the Fibonacci series upto 50 term and child process display all the even numbers less than 100.
5. WAP to use `exit()` and `wait()` system call.
6. WAP to create a zombie and orphan process.
7. WAP to make init process as a parent of an orphan process.
8. WAP to copy one file to other using system calls.
9. WAP to use `exec()` system call.
10. WAP where parent process run one program and child process run another program.
11. WAP to create a thread.
12. WAP to cancel a thread.
13. WAP to kill a thread.
14. WAP a program so that one thread finds the square of a number and other thread finds the square root of the same number.
15. WAP to implement mutex lock.
16. WAP to implement semaphore.
17. WAP for the Peterson's solution.
18. WAP for bounded-buffer problem using semaphore.
19. WAP for readers-writers problem using semaphore.
20. WAP for dining philosopher problem using semaphore.
21. WAP to implement FCFS CPU scheduling algorithm.
22. WAP to implement SJF CPU scheduling algorithm.
23. WAP to implement paging.
24. WAP to implement segmentation.
25. WAP using shell script to find largest of three numbers.
26. WAP using shell script to check whether a number is prime or not.
27. WAP using shell script to run a shell command.
28. WAP using shell script to check whether an alphabet is vowel or consonant.
29. WAP using shell script to find the sum and average of an array.
30. WAP using shell script to sort an array.

31. WAP using shell script to copy one file to other.

32. WAP using shell script to delete a file.

FOURTH SEMESTER

MCC - 4.1 Optimization Techniques

Unit I

Graphical solution of linear programming problems, 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 (TSP)

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/1, 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

Reference Books:

1. Operations Research - Kanti Swarup, P. K. Gupta & Man Mohan, Sultan Chand & Sons Pub.
2. Operations Research – S. D. Sharma, Kedar Nath Ram Nath Pub.
3. Operation Research - Hamdy A. Taha, McMillan Pub.

MCC - 4.2 Cryptography and Computer Security

Unit I

Overview of Cryptography, Substitution and affine cipher , Polyalphabetic Cipher and their cryptanalysis, Perfect Security, Block Cipher, Data Encryption Standard (DES), 2DES, 3DES, Differential and linear Cryptanalysis, Block Cipher Design Principles, Block Cipher modes of operation, Advanced Encryption Standard..

Unit II

Principles of Public-Key Cryptosystems, The RSA Algorithm, Key Management, Diffie-Hellman Key Exchange and Cryptanalysis, Authentication Functions, Message Authentication Codes (MAC), Hash Functions, Security of Hash Functions and MAC, Secure Hash Algorithm, HMAC.

Unit III

Discrete Logarithms, ElGamal System, Schnorr signature scheme, The ElGamal signature scheme, The digital signature algorithm, Provable secure signature schemes

Unit IV

Elliptic curve over the reals, Elliptic curves modulo a prime, Properties of Elliptic curves Point compression and ECies, Computing point multiples on Elliptic curves, Elliptic curve digital signature algorithm, ECElGamal Cryptosystem, ElGamal EC Digital signature scheme, Elliptic curve factorization, Elliptic curve primality test.

Unit V

Network Security Practice: Kerberos, X.509 Authentication Service, Public Key Infrastructure, E-Mail Security (Pretty Good Privacy), IP Security (Architecture, Authentication Header, Encapsulation Security Payload, Combining Security Associations, Key Management), Web Security (Secure Sockets Layer and Transport Layer Security).

Reference Books:

1. W. Stallings – Cryptography and Network Security Principles and Practice, Pearson Education Asia, 3rd Edition, 2000.
2. D. Stinson - Cryptography : Theory and Practice, CRC Press, 2006
3. Bernard Menezes, " Network Security and Cryptography", Cengage Learning.
4. Atul Kahate, "Cryptography and Network Security", TMH

MCC - 4.3 Java Programming

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 Super class, 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. Herbert Schildt, "Complete reference of Java" 7th edition, TMH, New York
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.

MCC - 4.4 Computer Graphics

Unit I

A survey of computer graphics: Computer Aided Design, Presentation graphics, Computer Art, Entertainment, Education and training, Visualization, Image processing, Graphical User Interfaces.

Overview of graphics Systems: Video display devices, Raster Scan Displays, Random Scan Displays, Input devices, Hard-copy devices, Graphics software. Output Primitives: Points and Lines, Line drawing Algorithms (DDA and Bresenham's Line algorithm), Mid-point circle algorithm, Ellipse generating algorithms, Filled-Area Primitives. Attributes of Output Primitives: Line Attributes, Curve Attributes, Color and Grayscale Levels, Area-Fill Attributes and Character Attributes, Bundled attributes and anti-aliasing.

Unit II

Two dimensional geometric Transformation: Basic Transformation(Translation, Rotation, Scaling), Matrix representation and Homogenous Coordination, Composite Transformation, Reflection Shear, Transformation between coordinate systems, Two dimensional viewing: The Viewing Pipeline, Viewing coordinate reference frame, window to viewport coordinate transformation, Line Clipping: (Cohen-Sutherland & Liang-Barsky algorithm) and Polygon Clipping (Sutherland-Hodgeman Algorithm).

Unit III

Three dimensional object Representation: Polygon Surfaces, Quadratic Surfaces, Spline Representation, Beizer Curves and Surfaces, B-Spline Curves and Surfaces, Fractal Geometry Methods: Fractal Generation Procedures, Classification of Fractals, Fractal Dimension, Geometric Construction of Deterministic Self Similar Fractals, Self Squaring fractals.

Unit IV

Three Dimensional Geometric and Modeling Transformations: Translation, Rotation, Scaling. Reflections, Shears, Composite Transformations, Modeling and coordinate Transformations.

Three Dimensional Viewing: Viewing Pipeline, Viewing Coordinates, Projections (Parallel and Perspective) Clipping.

Unit V

Visible Surface Detection Methods: Classification of Visible-Surface Detection Algorithms, Back-Face Detection, Depth-Buffer Method, A-Buffer Method, Scan line and Depth Sorting,

Illumination Models and Surface-Rendering Methods: Basic Illumination Models, Displaying Light Intensities, Halftone Patterns and Dithering Techniques, Polygon-Rendering Methods (Gouroud Shading, Phong Shading),

Text Book:

1. Donald Hearn & M. Pauline Baker, "Computer Graphics with OpenGL", Third Edition, 2004, Pearson Education, Inc. New Delhi.

Reference Books:

1. J.D. Foley, A.Dam, S.K. Feiner, J.F. Hughes: Computer Graphics Principle and Practice Addison Wisely.
2. ISRD group: Computer Graphics, Tata McGraw-Hill Education.

Elective I

MCE - 4.5 Advanced Software Engineering

Unit I

Overview of Object Oriented Concepts: Basic mechanisms, Key concepts, related technical terms, Advantages of OOD. Object oriented vs. function-oriented design, Object oriented modeling. Introduction to UML: Overview, conceptual model Architecture, software development life cycle, RUP

Unit II

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

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

Unit III

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

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

Unit IV

Component Based Software Engineering: Component, Component based software engineering process, conceptual modeling, analytical model and logical modeling for component based system, Economics of component based system engineering.

Unit V

CASE: Building blocks for CASE, Classification of CASE Tools, CASE Tools, Tools for Project Management, Integrated Case Environment, Web Engineering.

Reference Books:

1. Sommerville, I, Software Engineering, 9th Edition, Pearson
2. Grady Booch, Rumbaugh, Ivar Jacobson, "The Unified Modeling Language Reference Manual" Pearson.
3. Roger S. Pressman, "Software Engineering – A Practitioner's approach" 5th Ed.
4. H. Srimathi, H. Sriram, A. Krishnamurthy, Scitech, "Object Oriented Analysis & Design Using UML"
5. Satzinger, Jackson, Burd, "Object-Oriented Analysis & Design with the Unified Process" Cengage Learning

MCL – 4.6 JAVA programming lab

1. Introduction to java, Compiling & executing a java program.
2. Program with data types & variables.
3. Program with decision control structures: if, nested if etc.
4. Program with loop control structures: do, while, for etc.
5. Program with classes and objects.
6. Implementing data abstraction & data hiding.
7. Implementing inheritance.
8. Implementing and polymorphism.
9. 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 Computer Graphics lab

1. Implementing line drawing algorithms.
2. Implementing circle drawing algorithms.
3. Implementing ellipse drawing algorithms.
4. Implementing Line Clipping Algorithms.
5. Implementing Polygon Clipping Algorithms.
6. Implementing 2-d Transformations.
7. Implementing 3-d Transformations.
8. Implementing scan fill, boundary fill algorithms.
9. Implementing seed fill, flood fill algorithm.
10. Writing program on B-Splines, Bezier Curves

FIFTH SEMESTER

MCC - 5.1 Compiler Design

Unit I

Introduction: Overview and phases of compilation.

Non-deterministic and deterministic finite automata (NFA & DFA), Conversion of NFA to DFA
Classification of grammars, regular grammar, regular expressions and regular languages,
Context free grammars, ambiguous grammar

Unit II

Scanners: Top down parsing, LL grammars, Bottom up parsing, Operator precedence grammar,
LR grammars, Comparison methods Error handling

Unit III

SLR parsers and construction of SLR parsing tables, LR(1) parsers and construction of LR(1)
parsing tables, LALR parsers and construction of efficient LALR parsing tables, parsing using
ambiguous grammars

Symbol table handling techniques, Organization for non-block and block structured languages

Unit IV

Syntax Directed Translation: Syntax directed definitions (SDD), inherited and synthesized
attributes, dependency graphs, semantic rules, application of syntax directed translation.

DAG for expressions, three address codes - quadruples and triples, types and declarations,
translation of expressions, array references, type checking and conversions, translation of
Boolean expressions and control flow statements, back patching, intermediate code generation
for procedures.

Run time storage administration, Static and Dynamic allocation

Unit V

Intermediate forms of source program, Semantic analysis and code generation.

Code optimization folding, peephole optimization, Redundant sub-expression evaluation,
redundant and un-reachable codes, Optimization with interactive loops. Basics of flow of control
optimization

Reference Books:

1. A.V. Aho, R. Sethi & J.D. Ullman "Compilers Principles Techniques and Tools" Pearson Education
2. Kenneth C. Louden "Compiler Construction Principles & Practice "Cengage Learning Indian Edition.

MCC - 5.2 Artificial Intelligence

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, Modes 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. Nilson Norvig "Artificial Intelligence a Modern Approach"

MCC - 5.3 Advance 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.)

Elective-II

MCE - 5.4 Data Mining & Data Warehousing

Unit I

Introduction: Fundamentals of data mining, Data Mining Functionalities, Classification of Data Mining systems, Data Mining Task Primitives, Integration of a Data Mining System with a Database or a Data Warehouse System, Major issues in Data Mining. Data Preprocessing: Need for Preprocessing the Data, Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and Concept Hierarchy Generation.

Unit II

Data Warehouse and OLAP Technology for Data Mining: Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, Further Development of Data Cube Technology, From Data Warehousing to Data Mining Data Cube Computation and Data Generalization: Efficient Methods for Data Cube Computation, Further Development of Data Cube and OLAP Technology, Attribute-Oriented Induction.

Unit III

Mining Frequent Patterns, Associations and Correlations: Basic Concepts, Efficient and Scalable Frequent Itemset Mining Methods, Mining various kinds of Association Rules, From Association Mining to Correlation Analysis, Constraint-Based Association Mining

Unit IV

Classification and Prediction: Issues Regarding Classification and Prediction, Classification by Decision Tree Induction, Bayesian Classification, Rule-Based Classification, Classification by Backpropagation, Support Vector Machines, Associative Classification, Lazy Learners, Other Classification Methods, Prediction, Accuracy and Error measures, Evaluating the accuracy of a Classifier or a Predictor, Ensemble Methods

Unit V

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

Reference Books:

1. Data Mining – Concepts and Techniques - Jiawei Han & Micheline Kamber, Morgan Kaufmann Publishers, Elsevier, 2nd Edition, 2006.
2. Introduction to Data Mining – Pang-Ning Tan, Michael Steinbach and Vipin Kumar, Pearson education.

Elective-III

MCE - 5.5 Digital Image Processing

Unit I

Digital image representation, image formation model, Sampling and quantization, Relationship between pixels

Fourier transforms, Discrete Fourier transforms, Properties of 2-D Fourier transforms, Discrete Cosine Transforms.

Unit II

Image enhancement in the spatial methods, Gray level transformations, Histogram processing, Histogram equalization, Histogram matching, Spatial filtering

Image restoration and degradation process, Noise models, Noise filtering models.

Unit III

Color Image processing: Color models, Converting RGB to HSI and vice-versa, Pseudocolor processing, Full-color image processing, Color transformations, Smoothing and sharpening.

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. Woods - Digital Image Processing, Pearson Education
2. M.Sonka, V. Hlavac, R.Boyle, Image processing Analysis and Machine Vision Thomson Learning.

MCL - 5.6 Seminar

Each student must have an internal supervisor who is a faculty of the department/ Institution. Each student must submit the abstract of the Seminar 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 Seminar to be undertaken to the internal supervisor for approval, preferably, should be of about 1-2 pages. The content should be as brief as is sufficient enough to explain the objective and implementation of the Seminar that the candidate is going to take up. The write up should include the followings-

1. Name / Title of the Seminar
2. Statement about the Problem
3. Why is the particular topic chosen?
4. Objective and scope of the Seminar
5. Advantages and Disadvantages

Guidelines for preparation of the Seminar reports

Good quality white 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 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 Seminar report

Cover page

Certificate of the internal supervisor

Self certificate

Acknowledgement

List of abbreviations, figures, Tables

Main Report

Objective and scope of the Seminar

Theoretical background

Definition of the problem

References

Every student has to submit the followings

(a) Two hard copies of the Seminar report (For Mid Term one report and for End Term one report)

(c) Five copies of the synopsis of the Seminar

Evaluation of the Seminar

Evaluation of the Seminar will be done by a jury of experts consists of all internal faculty member, Head of the Department, internal supervisor.

The evaluation will be done on the basis of the followings

- i. Mid Term Evaluation 25 Marks
- ii. End Term Evaluation 50 Marks

MCL - 5.7 Advance Java Lab

1. Design a web page having blue colour background and white colour text with title 'student details'.
2. Design a web page having three paragraphs with different alignment, text colour and font size.
3. Design a web page to demonstrate physical style tags.
4. Design a web page having three hyperlinked text and two hyperlinked images.
5. Design a web page that contains an ordered list of operating system and an unordered list of programming languages.
6. Design a web page that contains a nested list.
7. Design a web page to display mark sheet of a student in table format.
8. Design a web page to create an image gallery of six images arranged in 2X3 table.
9. Design a web page to create a registration form having name, address, password, gender, course, nationality, skill and CV with appropriate GUI control.
10. Develop a HTML document having three vertical frame of equal size.
11. Design a web page having four paragraphs with different font, text and background properties using external CSS.
12. Design a web page having three shadowed images and four rounded corner buttons using inline style sheet.
13. Develop a JavaScript program that accepts student details and displays accepted information in formatted manner.
14. Develop a JavaScript program that reads a string and then displays the string 10 times with alternate red and blue colour.
15. Develop a JavaScript program that reads an integer and displays its multiplication table in html table format.
16. Develop a JavaScript program that reads p and n and calculates $P(n,r)$ using user defined factorial function.
17. Develop a JavaScript program to demonstrate `parseInt()`, `parseFloat()` and `eval()` function.
18. Develop a JavaScript program that accept n values in an array and perform the following operation
(i) Sort (ii) Reverse (iii) Insert element at the beginning (iv) Delete element from the end
19. Develop a JavaScript program that calculates reverse the number entered in first text field referring DOM hierarchy. The result is stored in second text field.
20. Develop a JavaScript for validation of mobile number and mandatory fields in a HTML form.
21. Develop a DHTML program to change background colour of a web page on clicking the corresponding button.
22. Develop a DHTML program for GUI calculator that performs all arithmetic operation.
23. Develop an XML document that contains employee (eid, ename, designation) details using internal DTD.
24. Develop an XML document that contains student (roll, name (first name, last name), address, contact) using external DTD.
25. Develop a Generic Servlet program to display message 'Welcome to Servlet' .Run this program in Apache Tomcat Web server.

26. Develop anHttp Servlet program to display message 'Hello World' in first level heading and red colour.
27. Develop a Servlet program to generate dynamic HTML that displays personal details in formatted manner. The details are accepted from client HTML page
28. Develop a Servlet that accepts basic pay, DA%, HRA%, Deduction% from client HTML page and generates payslip in table format using request response model.
29. Develop a Servlet for hit counter using session concept. The counter will be increased by 1 for every request.
30. Develop a JSP program to display current date and time. Run this program in Apache Tomcat web server.
31. Develop a JSP program that accepts two numbers x and y from client HTML page and calculates x^y .
32. Develop a JSP program that accepts a number n and display factorial of all numbers from 1 to n in table format.
33. Develop a JSP program that inserts records to table emp(eid,ename,salary) using JDBC. The data is accepted from client HTML page.
34. Develop a JSP program displays message "Welcome" for first client request. The message should be "Welcome Back" for second request onwards. Use the concept of session.
35. Develop a JSP program that manipulates a bean named student. Bean student has two property roll and name.
36. Develop a login application using JSF framework.
37. Develop a RMI program showing marshalling and unmarshalling processes.
38. Develop a stateless session bean that calculates mean of 3 numbers.
39. Develop a stateful session bean to perform deposit, withdraw and balance check operation on a bank account.
40. Develop a web based project university management system using JSP and database.

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 s 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 department, 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

SYLLABUS
FOR
MASTER OF COMPUTER APPLICATIONS
(MCA 2015-2018)



DEPARTMENT OF COMPUTER SCIENCE

RAVENSHAW UNIVERSITY

CUTTACK, 753003

Ravenshaw University
Course Structure of MCA

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 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 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:

3. 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]
4. 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, ConCORDS, 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:

4. Kanetkar Y, Let us C (bpb)
5. Hutchison R, Programming in C (McGraw Hill)
6. 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:

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

Reference Books:

3. K. Hwang – Advanced Computer Architecture, McGraw Hill, 1993
4. 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:

2. 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

15. Learning basic DDL and DML commands
16. Learning basic DCL and TCL commands.
17. Insertion, Deletion, Updating to a table using SQL commands
18. Working with dual table.
19. Data retrieval using Select & where clause.
20. Oracle inbuilt functions-Date, aggregate, group by etc.
21. Use of Joins and Sub queries.
22. Views, sequences and indexes.
23. Managing users, privileges and roles.
24. PL/SQL-Data types, control structures.
25. Creating procedures with PL/ SQL.
26. Error handling in PL/ SQL.
27. Cursor Management in PL/ SQL.
28. 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:

3. Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers & Keying Ye, "Probability & Statistics for Engineers & Scientists", Eighth Edition, 2007, Pearson Education Inc., New Delhi.
4. 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:

9. Keith Davis, Organizational Behaviour, McGraw – Hill.
10. K.Aswhappa, Organizational Behaviour, Himalaya Publishing House.
11. Stephen P. Robbins, Organizational Behaviour, Prentice Hall of India.
12. Organisational Behaviour: L.M. Prasad
13. Organisational Behaviour: Rao & Narayan
14. Environmental Studies & OB: Sharma & Gupta
15. Organizational Behaviour: Gupta and Joshi (KP)
16. 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 specifier, 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:

4. A.N. Kamthane, "Object Oriented Programming with ANSI & Turbo C++", Pearson Education.
5. E. Balguruswamy, "Object Oriented Programming with C++", TMH Publisher.
6. 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:

4. D.Samantha," Data Structure using C", PHI Publication.
5. Richard Gilberg, Behrouz A. Forouzan, "Data Structures: A pseudo code approach with C", Second Edition, 2007, CENGAGE India Pvt. Ltd., New Delhi.
6. 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

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

Reference Books:

5. Introduction to Theory of Computation – M.Sipser, Thomson Learning
6. P. Linz, "An Introduction to formal Languages and Automata", Norasa, 2000
7. Mishra, Chandrashekharan, "Theory of Computer Science", PHI
8. Lewish Papadimitra: Theory of Computations, Prentice Hall of India, New Delhi

MCL - 2.6 C++ Lab

16. Implementing classes and creation of objects.
17. Checking Precedence of operators & side effects.
18. Implementing various control structures & loops.
19. Making structured programming & stepwise refinement.
20. Implementing Procedural abstraction with functions.
21. Implementing Constructors and destructors.
22. Implementing Data abstraction & inheritance.
23. Implementing Multiple & hybrid inheritance.
24. Implementing Polymorphism concepts.
25. Implementing Operator overloading & friend's functions.
26. Working with new & delete, object copying.
27. Implementing Object slicing, this operator.
28. Exception handling mechanisms.
29. Implementing class templates & function templates.
30. Creating files in C++ and file related operations.

MCL - 2.7 Data Structure Lab

17. Matrix Operations-Add, Multiply, Rank, Det.etc.
18. Stack & Queue operations using Arrays.
19. Self-referential structures & single linked list operations.
20. Implementing Stack and queues using linked lists.
21. Implementing Polish Notations using Stacks.
22. Circular and double linked list operations.
23. Implementing priority queue & dequeue using lists.
24. Evaluating polynomial operations using Linked lists.
25. Implementing set related operations & Hashing.
26. linear & binary search, bubble sort technique.
27. Insertion sort, selection sort & merge sort techniques.
28. Quick sort, counting sort and Shell sort techniques.
29. Radix (bucket) and address calculation sort methods.
30. Binary tree traversals (preorder, inorder, postorder).
31. Heap sort & AVL tree implementations.
32. 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:

3. John H. Mathews, "Numerical Methods for Mathematics, Science and Engineering" PHI Private Ltd., New delhi.
4. 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 naïve 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:

5. Introduction to Algorithms: T. H. Cormen, C. E. Leiserson, R. L. Rivest (PHI), Second Edition.
6. E. Horowitz, S. Sahani, S. Rajsekharan, "Fundamentals of Computer Algorithms", Second Edition, Universities Press, 2007
7. Algorithm Design – Goodrich, Tamassia, Wiley India.
8. 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:

7. Behrouz A Forouzen "Data Communications and Networking " Tata McGraw Hill.
8. Stalling W "Computer Communication Networks " Prentice Hall
9. Tannenbaum A.S "Computer Networks" PHI
10. Bartee T.C "Data Communication ,Network and systems" BPB
11. Schweber WL"Data Communication "Mc Graw Hill
12. Steven W.R: TCP/IP Illustrated ,Vol 1 ,The protocols" Addition 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:

7. Abraham Silberschatz and Peter Bear Galvin, "Operating System Concepts", Addison Wesley
8. P. Blkeiahn Prasad. Moswen, SCITECH, "Operating Systems and System Programming",
9. Milenkovic, "Operating Systems Concepts and Design", Tata Mcgrawhill
10. Andrew, S Tannenbaum , "Operating System", PHI

11. Y. Kanetkar "UNIX Shell Programming.",BPB
12. 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:

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

MCL 3.6 Networking Lab

16. Write a tcl script for creating network animator.
17. Write a tcl script for creating a simple topology with two nodes and a link.
18. Write a tcl script for creating nodes, links and orientation.
19. Write a tcl script for creating nodes, links , orientation and labelling.
20. Write a tcl script for creating nodes, links, bandwidth and delay description.
21. Write a tcl script for creating eight nodes , bandwidth, delay and queue of the link
22. Write a tcl script to set identification colors to the links.
23. Write a tcl script for UDP communication between two nodes.
24. Write a tcl script for UDP communication in a network topology having ten number of nodes.
25. Write a tcl script for TCP communication between two nodes.
26. Write a tcl script for TCP communication between two sources and two destinations.
27. Write a tcl script for TCP communication for more number of nodes.
28. Write a tcl script to drop down packets in a link.
29. Write a tcl script to drop down packets in a router and end server at a particular time.
30. Write a tcl script to drop down packets in a link at particular time interval.

MCL 3.7 Operating Systems Lab

33. WAP to create a child process.
34. WAP to get the process id of child, parent, grandparent process.
35. WAP to find the square and square root of 25 by child and parent process respectively.
36. WAP where parent process display the Fibonacci series upto 50 term and child process display all the even numbers less than 100.
37. WAP to use `exit()` and `wait()` system call.
38. WAP to create a zombie and orphan process.
39. WAP to make init process as a parent of an orphan process.
40. WAP to copy one file to other using system calls.
41. WAP to use `exec()` system call.
42. WAP where parent process run one program and child process run another program.
43. WAP to create a thread.
44. WAP to cancel a thread.
45. WAP to kill a thread.
46. WAP a program so that one thread finds the square of a number and other thread finds the square root of the same number.
47. WAP to implement mutex lock.
48. WAP to implement semaphore.
49. WAP for the Peterson's solution.
50. WAP for bounded-buffer problem using semaphore.
51. WAP for readers-writers problem using semaphore.
52. WAP for dining philosopher problem using semaphore.
53. WAP to implement FCFS CPU scheduling algorithm.
54. WAP to implement SJF CPU scheduling algorithm.
55. WAP to implement paging.
56. WAP to implement segmentation.
57. WAP using shell script to find largest of three numbers.
58. WAP using shell script to check whether a number is prime or not.
59. WAP using shell script to run a shell command.
60. WAP using shell script to check whether an alphabet is vowel or consonant.
61. WAP using shell script to find the sum and average of an array.
62. WAP using shell script to sort an array.

63. WAP using shell script to copy one file to other.

64. WAP using shell script to delete a file.

FOURTH SEMESTER

MCC - 4.1 Optimization Techniques

Unit I

Graphical solution of linear programming problems, 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 (TSP)

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/1, 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

Reference Books:

4. Operations Research - Kanti Swarup, P. K. Gupta & Man Mohan, Sultan Chand & Sons Pub.
5. Operations Research – S. D. Sharma, Kedar Nath Ram Nath Pub.
6. Operation Research - Hamdy A. Taha, McMillan Pub.

MCC - 4.2 Cryptography and Computer Security

Unit I

Overview of Cryptography, Substitution and affine cipher , Polyalphabetic Cipher and their cryptanalysis, Perfect Security, Block Cipher, Data Encryption Standard (DES), 2DES, 3DES, Differential and linear Cryptanalysis, Block Cipher Design Principles, Block Cipher modes of operation, Advanced Encryption Standard..

Unit II

Principles of Public-Key Cryptosystems, The RSA Algorithm, Key Management, Diffie-Hellman Key Exchange and Cryptanalysis, Authentication Functions, Message Authentication Codes (MAC), Hash Functions, Security of Hash Functions and MAC, Secure Hash Algorithm, HMAC.

Unit III

Discrete Logarithms, ElGamal System, Schnorr signature scheme, The ElGamal signature scheme, The digital signature algorithm, Provable secure signature schemes

Unit IV

Elliptic curve over the reals, Elliptic curves modulo a prime, Properties of Elliptic curves Point compression and ECies, Computing point multiples on Elliptic curves, Elliptic curve digital signature algorithm, ECElGamal Cryptosystem, ElGamal EC Digital signature scheme, Elliptic curve factorization, Elliptic curve primality test.

Unit V

Network Security Practice: Kerberos, X.509 Authentication Service, Public Key Infrastructure, E-Mail Security (Pretty Good Privacy), IP Security (Architecture, Authentication Header, Encapsulation Security Payload, Combining Security Associations, Key Management), Web Security (Secure Sockets Layer and Transport Layer Security).

Reference Books:

5. W. Stallings – Cryptography and Network Security Principles and Practice, Pearson Education Asia, 3rd Edition, 2000.
6. D. Stinson - Cryptography : Theory and Practice, CRC Press, 2006
7. Bernard Menezes, " Network Security and Cryptography", Cengage Learning.
8. Atul Kahate, "Cryptography and Network Security", TMH

MCC - 4.3 Java Programming

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 Super class, 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:

7. 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)
8. Herbert Schildt, "Complete reference of Java" 7th edition, TMH, New York
9. Richard A. Johnson, "An Introduction to Java Programming and Object Oriented Application Development", First Edition, 2007, CENGAGE Learning India Pvt. Ltd., New Delhi.
10. E. Balagurusamy, "Programming with Java: A Primer", 3rd Edition, 2008, McGraw-Hill Education (India), New Delhi.
11. Harvey M. Deitel & Paul J. Deitel, "Java How to Program", 8th Edition, 2009, PHI Learning Pvt. Ltd., New Delhi.
12. Mahesh P. Bhave & Sunil A. Patekar, "Programming with Java", First Edition, 2009, Pearson Education, Inc. New Delhi.

MCC - 4.4 Computer Graphics

Unit I

A survey of computer graphics: Computer Aided Design, Presentation graphics, Computer Art, Entertainment, Education and training, Visualization, Image processing, Graphical User Interfaces.

Overview of graphics Systems: Video display devices, Raster Scan Displays, Random Scan Displays, Input devices, Hard-copy devices, Graphics software. Output Primitives: Points and Lines, Line drawing Algorithms (DDA and Bresenham's Line algorithm), Mid-point circle algorithm, Ellipse generating algorithms, Filled-Area Primitives. Attributes of Output Primitives: Line Attributes, Curve Attributes, Color and Grayscale Levels, Area-Fill Attributes and Character Attributes, Bundled attributes and anti-aliasing.

Unit II

Two dimensional geometric Transformation: Basic Transformation(Translation, Rotation, Scaling), Matrix representation and Homogenous Coordination, Composite Transformation, Reflection Shear, Transformation between coordinate systems, Two dimensional viewing: The Viewing Pipeline, Viewing coordinate reference frame, window to viewport coordinate transformation, Line Clipping: (Cohen-Sutherland & Liang-Barsky algorithm) and Polygon Clipping (Sutherland-Hodgeman Algorithm).

Unit III

Three dimensional object Representation: Polygon Surfaces, Quadratic Surfaces, Spline Representation, Beizer Curves and Surfaces, B-Spline Curves and Surfaces, Fractal Geometry Methods: Fractal Generation Procedures, Classification of Fractals, Fractal Dimension, Geometric Construction of Deterministic Self Similar Fractals, Self Squaring fractals.

Unit IV

Three Dimensional Geometric and Modeling Transformations: Translation, Rotation, Scaling. Reflections, Shears, Composite Transformations, Modeling and coordinate Transformations.

Three Dimensional Viewing: Viewing Pipeline, Viewing Coordinates, Projections (Parallel and Perspective) Clipping.

Unit V

Visible Surface Detection Methods: Classification of Visible-Surface Detection Algorithms, Back-Face Detection, Depth-Buffer Method, A-Buffer Method, Scan line and Depth Sorting,

Illumination Models and Surface-Rendering Methods: Basic Illumination Models, Displaying Light Intensities, Halftone Patterns and Dithering Techniques, Polygon-Rendering Methods (Gouroud Shading, Phong Shading),

Text Book:

2. Donald Hearn & M. Pauline Baker, "Computer Graphics with OpenGL", Third Edition, 2004, Pearson Education, Inc. New Delhi.

Reference Books:

3. J.D. Foley, A.Dam, S.K. Feiner, J.F. Hughes: Computer Graphics Principle and Practice Addison Wisely.
4. ISRD group: Computer Graphics, Tata McGraw-Hill Education.

Elective I

MCE - 4.5 Advanced Software Engineering

Unit I

Overview of Object Oriented Concepts: Basic mechanisms, Key concepts, related technical terms, Advantages of OOD. Object oriented vs. function-oriented design, Object oriented modeling. Introduction to UML: Overview, conceptual model Architecture, software development life cycle, RUP

Unit II

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

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

Unit III

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

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

Unit IV

Component Based Software Engineering: Component, Component based software engineering process, conceptual modeling, analytical model and logical modeling for component based system, Economics of component based system engineering.

Unit V

CASE: Building blocks for CASE, Classification of CASE Tools, CASE Tools, Tools for Project Management, Integrated Case Environment, Web Engineering.

Reference Books:

6. Sommerville, I, Software Engineering, 9th Edition, Pearson
7. Grady Booch, Rumbaugh, Ivar Jacobson, "The Unified Modeling Language Reference Manual" Pearson.
8. Roger S. Pressman, "Software Engineering – A Practitioner's approach" 5th Ed.
9. H. Srimathi, H. Sriram, A. Krishnamurthy, Scitech, "Object Oriented Analysis & Design Using UML"
10. Satzinger, Jackson, Burd, "Object-Oriented Analysis & Design with the Unified Process" Cengage Learning

MCL – 4.6 JAVA programming lab

16. Introduction to java, Compiling & executing a java program.
17. Program with data types & variables.
18. Program with decision control structures: if, nested if etc.
19. Program with loop control structures: do, while, for etc.
20. Program with classes and objects.
21. Implementing data abstraction & data hiding.
22. Implementing inheritance.
23. Implementing and polymorphism.
24. Implementing packages.
25. Program with modern features of java.
26. Implementing interfaces and inner classes
27. Implementing wrapper classes
28. Working with files.
29. Working with AWT
30. Working with JDBC

MCL – 4.7 Computer Graphics lab

11. Implementing line drawing algorithms.
12. Implementing circle drawing algorithms.
13. Implementing ellipse drawing algorithms.
14. Implementing Line Clipping Algorithms.
15. Implementing Polygon Clipping Algorithms.
16. Implementing 2-d Transformations.
17. Implementing 3-d Transformations.
18. Implementing scan fill, boundary fill algorithms.
19. Implementing seed fill, flood fill algorithm.
20. Writing program on B-Splines, Bezier Curves

FIFTH SEMESTER

MCC - 5.1 Compiler Design

Unit I

Introduction: Overview and phases of compilation.

Non-deterministic and deterministic finite automata (NFA & DFA), Conversion of NFA to DFA
Classification of grammars, regular grammar, regular expressions and regular languages,
Context free grammars, ambiguous grammar

Unit II

Scanners: Top down parsing, LL grammars, Bottom up parsing, Operator precedence grammar,
LR grammars, Comparison methods Error handling

Unit III

SLR parsers and construction of SLR parsing tables, LR(1) parsers and construction of LR(1)
parsing tables, LALR parsers and construction of efficient LALR parsing tables, parsing using
ambiguous grammars

Symbol table handling techniques, Organization for non-block and block structured languages

Unit IV

Syntax Directed Translation: Syntax directed definitions (SDD), inherited and synthesized
attributes, dependency graphs, semantic rules, application of syntax directed translation.

DAG for expressions, three address codes - quadruples and triples, types and declarations,
translation of expressions, array references, type checking and conversions, translation of
Boolean expressions and control flow statements, back patching, intermediate code generation
for procedures.

Run time storage administration, Static and Dynamic allocation

Unit V

Intermediate forms of source program, Semantic analysis and code generation.

Code optimization folding, peephole optimization, Redundant sub-expression evaluation,
redundant and un-reachable codes, Optimization with interactive loops. Basics of flow of control
optimization

Reference Books:

3. A.V. Aho, R. Sethi & J.D. Ullman "Compilers Principles Techniques and Tools" Pearson Education
4. Kenneth C. Loudon "Compiler Construction Principles & Practice "Cengage Learning Indian Edition.

MCC - 5.2 Artificial Intelligence

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, Modes 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:

4. 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)
5. Dan W. Patterson (Chapters 4.1-4.4, 5.3, 11.1,11.4, 15.1-15.4)
6. N.J. Nilson Norvig "Artificial Intelligence a Modern Approach"

MCC - 5.3 Advance 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:

4. 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.)
5. Ralph Moseley, "Developing Web Applications", 2008, Wiley India, New Delhi.
6. 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.)

Elective-II

MCE - 5.4 Data Mining & Data Warehousing

Unit I

Introduction: Fundamentals of data mining, Data Mining Functionalities, Classification of Data Mining systems, Data Mining Task Primitives, Integration of a Data Mining System with a Database or a Data Warehouse System, Major issues in Data Mining. Data Preprocessing: Need for Preprocessing the Data, Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and Concept Hierarchy Generation.

Unit II

Data Warehouse and OLAP Technology for Data Mining: Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, Further Development of Data Cube Technology, From Data Warehousing to Data Mining Data Cube Computation and Data Generalization: Efficient Methods for Data Cube Computation, Further Development of Data Cube and OLAP Technology, Attribute-Oriented Induction.

Unit III

Mining Frequent Patterns, Associations and Correlations: Basic Concepts, Efficient and Scalable Frequent Itemset Mining Methods, Mining various kinds of Association Rules, From Association Mining to Correlation Analysis, Constraint-Based Association Mining

Unit IV

Classification and Prediction: Issues Regarding Classification and Prediction, Classification by Decision Tree Induction, Bayesian Classification, Rule-Based Classification, Classification by Backpropagation, Support Vector Machines, Associative Classification, Lazy Learners, Other Classification Methods, Prediction, Accuracy and Error measures, Evaluating the accuracy of a Classifier or a Predictor, Ensemble Methods

Unit V

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

Reference Books:

3. Data Mining – Concepts and Techniques - Jiawei Han & Micheline Kamber, Morgan Kaufmann Publishers, Elsevier, 2nd Edition, 2006.
4. Introduction to Data Mining – Pang-Ning Tan, Michael Steinbach and Vipin Kumar, Pearson education.

Elective-III

MCE - 5.5 Digital Image Processing

Unit I

Digital image representation, image formation model, Sampling and quantization, Relationship between pixels

Fourier transforms, Discrete Fourier transforms, Properties of 2-D Fourier transforms, Discrete Cosine Transforms.

Unit II

Image enhancement in the spatial methods, Gray level transformations, Histogram processing, Histogram equalization, Histogram matching, Spatial filtering

Image restoration and degradation process, Noise models, Noise filtering models.

Unit III

Color Image processing: Color models, Converting RGB to HSI and vice-versa, Pseudocolor processing, Full-color image processing, Color transformations, Smoothing and sharpening.

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. Woods - Digital Image Processing, Pearson Education
2. M.Sonka, V. Hlavac, R.Boyle, Image processing Analysis and Machine Vision Thomson Learning.

MCL - 5.6 Seminar

Each student must have an internal supervisor who is a faculty of the department/ Institution. Each student must submit the abstract of the Seminar 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 Seminar to be undertaken to the internal supervisor for approval, preferably, should be of about 1-2 pages. The content should be as brief as is sufficient enough to explain the objective and implementation of the Seminar that the candidate is going to take up. The write up should include the followings-

1. Name / Title of the Seminar
2. Statement about the Problem
3. Why is the particular topic chosen?
4. Objective and scope of the Seminar
5. Advantages and Disadvantages

Guidelines for preparation of the Seminar reports

Good quality white 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 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 Seminar report

Cover page

Certificate of the internal supervisor

Self certificate

Acknowledgement

List of abbreviations, figures, Tables

Main Report

Objective and scope of the Seminar

Theoretical background

Definition of the problem

References

Every student has to submit the followings

(a) Two hard copies of the Seminar report (For Mid Term one report and for End Term one report)

(c) Five copies of the synopsis of the Seminar

Evaluation of the Seminar

Evaluation of the Seminar will be done by a jury of experts consists of all internal faculty member, Head of the Department, internal supervisor.

The evaluation will be done on the basis of the followings

- iii. Mid Term Evaluation 25 Marks
- iv. End Term Evaluation 50 Marks

MCL - 5.7 Advance Java Lab

41. Design a web page having blue colour background and white colour text with title 'student details'.
42. Design a web page having three paragraphs with different alignment, text colour and font size.
43. Design a web page to demonstrate physical style tags.
44. Design a web page having three hyperlinked text and two hyperlinked images.
45. Design a web page that contains an ordered list of operating system and an unordered list of programming languages.
46. Design a web page that contains a nested list.
47. Design a web page to display mark sheet of a student in table format.
48. Design a web page to create an image gallery of six images arranged in 2X3 table.
49. Design a web page to create a registration form having name, address, password, gender, course, nationality, skill and CV with appropriate GUI control.
50. Develop a HTML document having three vertical frame of equal size.
51. Design a web page having four paragraphs with different font, text and background properties using external CSS.
52. Design a web page having three shadowed images and four rounded corner buttons using inline style sheet.
53. Develop a JavaScript program that accepts student details and displays accepted information in formatted manner.
54. Develop a JavaScript program that reads a string and then displays the string 10 times with alternate red and blue colour.
55. Develop a JavaScript program that reads an integer and displays its multiplication table in html table format.
56. Develop a JavaScript program that reads p and n and calculates $P(n,r)$ using user defined factorial function.
57. Develop a JavaScript program to demonstrate `parseInt()`, `parseFloat()` and `eval()` function.
58. Develop a JavaScript program that accept n values in an array and perform the following operation
(i) Sort (ii) Reverse (iii) Insert element at the beginning (iv) Delete element from the end
59. Develop a JavaScript program that calculates reverse the number entered in first text field referring DOM hierarchy. The result is stored in second text field.
60. Develop a JavaScript for validation of mobile number and mandatory fields in a HTML form.
61. Develop a DHTML program to change background colour of a web page on clicking the corresponding button.
62. Develop a DHTML program for GUI calculator that performs all arithmetic operation.
63. Develop an XML document that contains employee (eid, ename, designation) details using internal DTD.
64. Develop an XML document that contains student (roll, name (first name, last name), address, contact) using external DTD.
65. Develop a Generic Servlet program to display message 'Welcome to Servlet' .Run this program in Apache Tomcat Web server.

66. Develop anHttp Servlet program to display message 'Hello World' in first level heading and red colour.
67. Develop a Servlet program to generate dynamic HTML that displays personal details in formatted manner. The details are accepted from client HTML page
68. Develop a Servlet that accepts basic pay, DA%, HRA%, Deduction% from client HTML page and generates payslip in table format using request response model.
69. Develop a Servlet for hit counter using session concept. The counter will be increased by 1 for every request.
70. Develop a JSP program to display current date and time. Run this program in Apache Tomcat web server.
71. Develop a JSP program that accepts two numbers x and y from client HTML page and calculates x^y .
72. Develop a JSP program that accepts a number n and display factorial of all numbers from 1 to n in table format.
73. Develop a JSP program that inserts records to table emp(eid,ename,salary) using JDBC. The data is accepted from client HTML page.
74. Develop a JSP program displays message "Welcome" for first client request. The message should be "Welcome Back" for second request onwards. Use the concept of session.
75. Develop a JSP program that manipulates a bean named student. Bean student has two property roll and name.
76. Develop a login application using JSF framework.
77. Develop a RMI program showing marshalling and unmarshalling processes.
78. Develop a stateless session bean that calculates mean of 3 numbers.
79. Develop a stateful session bean to perform deposit, withdraw and balance check operation on a bank account.
80. Develop a web based project university management system using JSP and database.

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 s 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 department, 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