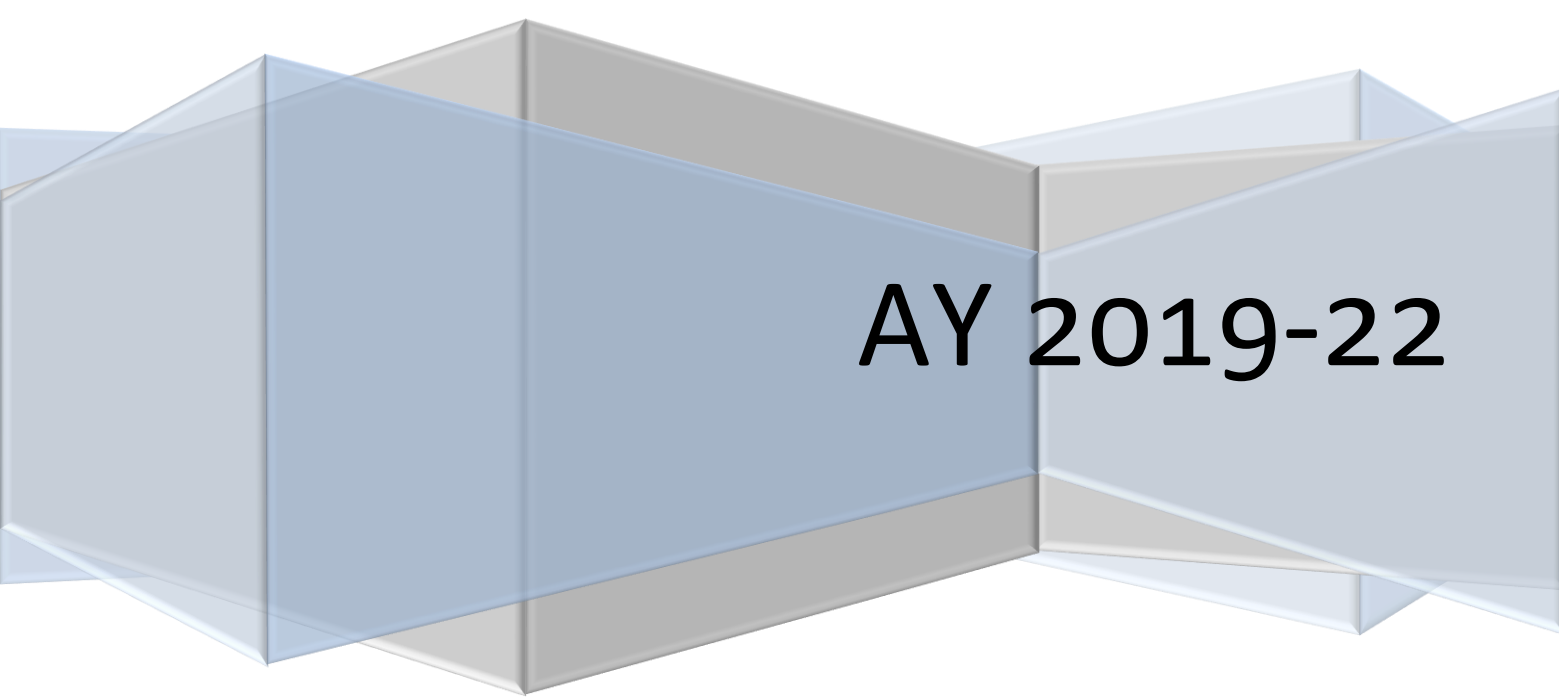**Gangadhar Meher University, Amruta Vihar, Sambalpur**

Curriculum for MCA Programme

Department of MCA, School of CS & IT

AY 2019-22

INDEX

MCA101

Discrete Mathematics

UNIT-I
Fundamentals of Logic: Propositional Logic, Propositional Equivalences, Predicate and Quantifiers, nested Quantifiers, Rules of Inference.
Set Theory: Sets, Set Operations.
Introduction to proofs: proof by Induction, proof by contradiction, proof by cases with examples.
Mathematical Induction: Introduction to Induction, strong Induction, Recursion.
Relations: Relations and their properties, n-ary Relations and their applications, Representing relations, Closures of relations, Equivalence relations, and Partial Orderings.

UNIT-II
Algebraic structures and application
Binary operation, semi groups, groups, subgroups, cosets, Lagrange's theorem, codes, group codes.

UNIT-III
Basic properties of lattices, distributive and complemented lattices, Boolean algebra, finite Boolean algebra.
Graph theory:
Directed and undirected graphs, basic terminology, paths and circuits, shortest paths in weighted graphs, Eulerian paths and circuits, Hamiltonian paths and circuits, Trees; definition and properties, rooted trees, binary trees, spanning trees, cut sets, minimal spanning trees.

UNIT-IV
Permutation, Combination, Probability axiom, Addition and multiplication theorems on probability, Conditional
Probability, Independent events, Bayes Theorem, Random variable, Expectation, Probability distribution function, Binomial, Poisson, Normal, Geometric and Exponential distribution.

Text Book:
1.   C.L.Liu, "Elements of Discrete Mathematics", McGraw Hill International Student Edition.
2.   Alan Doerr, Kenneth Levasseur, "Applied discrete structure for Computer Science", Galgotia Publication Private Limited. Articals 1.1 to 1.5, 3.1-3.4, 3.6, 3.7, 4.1,4.3-4.6, 5.1-5.4, 5.6, 5.7, 6.1,6.2, 6.3, 6.6, 6.7, 11.2,11.3,11.5,11.7,12.1-12.6.

Reference Books:
1. Bernardi Kolman, Robert C. Bussby, "Sharon Ross, "Discreate Mathematical Structures" Prentice Hall of India.
2. N.Ch. S.N. Lyengar, Chankrasekaran, Venkatesh, Arunachalam, "Discrete Mathematics", Vikas Publication.
3. "Discrete Mathematics and its Application", Kenneth H. Rasen, 5th edition (TMH).

MCA102

Computer System Architecture

UNIT-I
Digital Logic Circuits & Components: Logic gates, Boolean algebra, K-Map, Combinational Circuits, Adders, Flip-flops, Sequential Circuits. Integrated Circuits, Decoders, Multiplexes, Registers, Shift registers, Binary Counters, Memory Units: RAM and ROM.

UNIT-II
Data Representation Basics of Registers Transfer and Micro Operations: Data types, Number Systems, Decimal number, Octal numbers, Hexadecimal number representation and Conversion, BCD, Fixed point and floating-point representation. Registers, Register transfer, Bus and Memory transfers, Three-state bus buffers, Memory transfers: Memory read, Memory write.

Arithmetic micro operations: add micro operation, Subtract micro operation, Binary Adder, Binary Adder Substractor, Binary incrementer, Arithmetic Circuit, 4-bit arithmetic circuit.

UNIT-III
Basic Computer Organisation & CPU Organisation: CPU structure and function, Micro operation (Register transfer, arithmetic logic and shift micro operations) , stack organization (Register and memory stack),control unit organization(Hardware control and micro programmed control), types of instruction formats based on number of addresses of operands, Addressing modes, Instruction set architecture (RISC and CISC).
Classifying Instruction Set Architectures, Memory Addressing, Addressing modes,
Operations in the instruction set.

UNIT-IV
Basics of Input/ Output Organisation and Memory Organisation & Pipelining and Multiprocessing: Input-output organization External devices, Input -output Interface: I/O Bus and interface Modules, I/O Versus memory Bus, I/O Modules structure and their functions, Modes of Transfer: Programmed I/O, Interrupt driven I/O, Direct Memory Access: DMA Controller and Transfer, DMA Configurations, Privileged and Non-privileged instructions, Software Interrupts and exceptions

Parallel Processing, Pipelining, Linear Pipelining, Arithmetic Pipeline, Instruction Pipe line, Vector Processing, Characteristics of Multiprocessor, Interconnection Structures, Timeshared bus, Multi port memory, Cross bar Switch, MIN, Hypercube interconnection.

Text Book:
1. M. Mano, Computer System Architecture, Pearson Education 1992

Reference Books:
1. W. Stallings, Computer Organization and Architecture Designing for Performance, 8th Edition, 2009, Prentice Hall of India
2. V. C. Hammacher, Z. G. Vranesic, S. G. ZAky – Computer Organization McGraw Hill, 5 ed, 2011

MCA-103

PROGRAMMING IN C

UNIT-I
Introduction to programming and programming languages & Fundamentals: Evolution of programming languages, flow charts, structured programming, the compilation process, object code, source code, executable code, operating systems, interpreters, linkers, loaders etc.
Introduction to C Language - Background, C Identifiers, Data Types, Operators, Variables, Constants, Input / Output, Expressions, C Programs, Precedence and Associativity, Evaluating Expressions, Type Conversion, Statements, Bitwise Operators.
Selection: Logical Data and Operators, if-else, switch Statements, Standard Functions.
Repetition: loops, while, for, do-while statements, Loop examples, break, continue, goto.

UNIT-II
Arrays and Strings: Arrays - Concepts, Using Arrays in C, Array Applications, Two-Dimensional Arrays, Multidimensional Arrays.

Strings - Concepts, C Strings, String Input / Output Functions, Arrays of Strings, String Manipulation Functions.

UNIT-III
 C Functions, Pointers: Functions: Designing Structured Programs, Functions Basics, User Defined Functions, Inter Function Communication, Standard Functions, Scope, Storage Classes-auto, Register, Static, Extern, Scope Rules, and Type Qualifiers. Recursion-Recursive Functions, Preprocessor Commands.
Pointers - Introduction, Pointers to Pointers, Compatibility, void Pointers, Arrays and Pointers, Pointer constants, Pointers and Strings, Pointers to Functions, Pointers to Constant Objects, Constant Pointers, Pointer Arithmetic. Call-by-reference: Pointers for Inter-Function Communication, Passing Arrays to a Function.
UNIT-IV
Structures, Union and File handling: Understanding utility of structures and unions, Declaring, initializing and using simple structures and unions, Manipulating individual members of structures and unions, Array of Structures, Individual data members as structures, Passing and returning structures from functions, Structure with union as members, Union with structures as members.
Input and Output: Files, Streams, Standard library Input Output Functions, Character Input Output Functions.

Text Books:
1. H. Schildt, "C The Complete Reference", Tata McGraw Hill
Reference Books:
1.   E. Balaguruswamy "Programming in C", Tata McGraw Hill
2.   Y. Kanetkar, "Let us C", BPB Publications.
3.   Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, PHI.

MCA104

Communicative English

<u>Rationale / Objectives</u>

This is a practice-oriented, need-based, functional-communicative course. It seeks to develop the student's skills of communication in listening, speaking and writing. Reading, though formally not included, is still a recommended activity. The student is advised to cultivate the habit of reading newspapers, magazines and books in a free, extensive manner to consolidate the skills already achieved. A more interactive process of teaching/learning is called for in order to achieve the skills of effective communication.

Specific Objectives
The course attempts to

A) Familiarize the student with the sounds of English in a nutshell, particularly long and short vowels, some consonants, stress and intonation.
B) Provide adequate listening and speaking practice so that the learner can speak with ease, fluency and reasonable clarity in common everyday situations and on formal occasions.
C) Use grammar in meaningful contexts.
D) Things with words, i.e. to perform functions like ordering, requesting, inviting and so on.

UNIT-I
Communication and Communicative Grammar

1.1 Verbal and non-verbal spoken and written
1.2 Language functions-descriptive, expressive and social
1.2 To inform, enquire, attract, influence, regulate and entertain
1.3 Bias-free and plain English
1.4 Formal and informal style
Time, tense and aspect
Verbs of states and events
Statements, questions and responses
Omission of information
Expressing emotion and attitude: hope, pleasure, disappointment, regret, approval, surprise.

UNIT-II
The Sounds of English and things with words

1.1 Length of vowels-Long vowels/ / I:, a:,)., U:, 3:/ as in feel, card, court, food and first respectively.
1.2 Short vowels / e, x, n / as in pen, bag, and sun respectively.
1.3 Consonants / f, v, Q, x, s, z, _____/ as in fine, vast, through, them, sosng, zoo, shame, pleasure and judge respectively.
1.4 Stress pattern
1.5 Intonation- Rising and falling.

1.6 Friendly communication-greetings, farewells, introductions, thanks, apologies, regrets, good wishes, congratulations, condolences, offers.

1.7   To ask for information, help, permission

1.8   To instruct, command, request, accept, refuse, prohibit, persuade, and promise.

Business Communications in English.

Objectives:
   The objectives are to prepare the student to

a) Produce written communication of different forms such as paragraph, report, letter, etc.

b) Make notes/summarize from a given passage.

c) Organise Meetings prepare agenda, draft resolutions and write minutes.

d) Make presentations and face interviews.

e) Documents source and prepare bibliographies.

f) The objectives of managerial oral communication; improving the facility of oral communication. Both Transmission and reception in six managerial situations such as.

i) Information sharing ii) Conversation iii) Interview iv) Committee v) Negotiation viii) Presentation.

UNIT-III
Writing – II

2.1 Preparing notes – writing business letters and E-Mail messages

2.2 Documentation. References, notes and bibliographies.

3.1 Writing curriculum vitae (both chronological and functional) along with an applicant for a job.

3.2 Public relations – concept and relevance – PR in a business oranisation – handling the media.

UNIT-IV
Meeting and presentation

1.1 Organising a meeting an agenda, chairing a meeting drafting resolutions, writing minutes.

1.2 Making an oral Presentation

1.3 Facing an interview

Text Books:

1. (John Sealy) Oxford Guide to Writing and Speaking English, OUP.

2. (Bovee et al) Business Communication Today Person Education.

3. (Rovi and Rai) Business Communication.

4. (J.V. Cilanilm) More Elective Communication, Sage Publications.

5. (J.K. Chand and B.C. das) A Millennium Guide to Writing and Speaking, (Friends Publishers)

6. The Chicago Manual of style (Part 2 section 15) Prentice-Hall of India.

7. (Sushil Bahi) Business communication Today, Sage Publications.

Reference Books:

1   Geoffrey Leech and Jan Svartvik, Longman, A communicative Grammar of English,

2   J.D. O'connor, Better English Pronunciation, ELBS

3   J.K. Chand and B.C. Das, A Millennium Guide to writing and Speaking English, Friend's Publishers.

MCA - 105

Engineering Economics and Costing

UNIT-I

Time Value of Money: Introduction, Simple Interest, Compound Interest, Project Cash Flows and its diagram, Interest factor/ Interest formula.

Economic Equivalence: Concept, Equivalence calculation involving single factor, Equivalence calculation involving Cash flows, Principles of Equivalence.

Evaluation of a single investment project: P.W. method, F.W. method, Annual Worth Method, Rate of Return Method.

Methods of comparison of Assets: With equal lives, with unequal lives, with infinite lives, IRR.

UNIT-II

Concepts of Challenger & Defender: Cash flow Approach, Opportunity Cost Approach

Methods of Depreciation of Assets: Straight line Method, Declining balance method,

Evaluation of Public Projects: Cash Benefit Analysis (CBA), Steps in CBA, Advantages and Limitations of CBA

UNIT-III

Cost Concepts: Classification of Cost, Preparation of Cost Sheet

Process Costing: Concept, Comparison of process costing & job costing, Advantages and Disadvantages of process costing, Preparation of process A/c with process loss (Normal loss/ Abnormal loss) and process gains, Joint Product, By Product, Marginal Cost, Limitation of Marginal costing.

UNIT-IV

Methods of Segregation of Cost in Fixed & Variable Cost Cost Volume Profit Analysis.

Break even Analysis Standard Costing : Standard costing & Marginal Costing, Standard Cost vs Target Cost, Standard Cost vs Estimated Cost, Advantages & limitations of Standard Costing

Variance analysis

Objectives. Types : Reasons for Variance, Direct Material Variance, Direct Labour Variance, Overhead Variance, Sales Variance, Relevant Cost and Revenue, Outsourcing decision, Sources of Finance – Short term & long term sources, Working Capital Analysis

<u>**Text Books**</u> :

1. Engineering Economics and Costing by P.K.Mishra & S.K.Mishra, Alok

Publication, Bhubaneswar.

2. Advance Cost and Management Accounting by S.K.Gupta & R.K.Sharma, Kalyani

MCA106 Lab

Lab: Computer Fundamental & Programming In C

1. MS OFFICE (Word, Excel, Power Point, Access)
2. Introduction to OS: Linux/Unix, DOS, Windows,
3. vi editor, Shall Programming (on Unix),
4. File handling, directory structures, file permissions, creating and editing simple C programme, compilation and execution.
5. C programming on variables and expression assignment, simple arithmetic
6. Loops, If-else, Case statements, break, continue, go to
7. Single & Multidimensional arrays
8. Functions, recursion, file handling in C
9. Pointers, address operator, declaring pointers and operations on operators
10. Address of an array, structures, pointers to structure, dynamic memory allocation

MCA 201

Probability & Statistics

UNIT-I

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-II

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

Continuous probability Distribution: Uniform, Normal, Exponential Distribution, Weibull's Distribution, Chi-square distribution, Sampling Distribution: Sampling distribution of S2, t-distribution, F-distribution

UNIT-III

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-IV

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, Coeficients of determination and its application.

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.

3. Ross, S.M., Introduction to Probability and Statistics for Engineers and Scientists (4th Edition), Academic Press, 2011.

MCA 202

Data Structure Using C

UNIT-I
Development of Algorithms: Notations and Analysis. Storage structures for arrays-sparse matrices structures and arrays of structures. Stacks and Queues: Representations and applications.

UNIT-II
Linked Lists: Singly linked lists – Linked stacks and queues- operations on Polynomials – Linked Dictionary – Doubly Linked Lists – Circularly Linked Lists. Dynamic storage management- Garbage collection and compaction.

UNIT-III
Binary Trees: Binary Search Trees- General Trees- Tree Traversing- Operations on Binary Trees- Expression Manipulations- Symbol Table construction- Height Balanced Trees.

UNIT-IV
Graphs: Representation of Graphs- Path Matrix- BFS, DFS- Bi-connected Graphs – Topological sort shortest path problems. String- Representation- Manipulations- Patten Matching.

Sorting Techniques: Selection, Bubble, Insertion, Merge, Heap, Quick, Radix and address calculation. Linear searching – Binary Searching**.** Hash Table Methods.

Text Books:
1.   Aaron M. Tenenbaum, Moshe J. Augenstein, YedidyahLangsam, "Data Structures Using C and C++:, Second edition, PHI, 2009..

2.   Ellis Horowitz, Dinesh Mehta, S. Sahani. Fundamentals of Data Structures in C++, Universities Press. 2007.

Reference Book:
1. Data Structures, by Tremblay and Sorenson.

MCA 203

Computer Based Numerical Methods

UNIT-I

Fixed point arithmetic, rounding error, truncation error, loss of significance and error propagation and stability, computational methods for error estimation, convergence of sequences, some mathematical preliminaries.

UNIT-II

1. Roots of f(x) by bisection method, method of false position, secant method, Newton-Raphson methods, fixed point iteration method.

2. Solution of Ax = b: Solution of simultaneous liner equations by Cramer's rule, Gauss' ellmination method, Grauss-Jordan method, Gauss-Seidel method, matrix inversion by Gauss-Jordan method.

3. Curve Fitting: Least square approximation of functions by liner regressing, polynomial regression.

UNIT-III

Numerical differentiation and integration: Differentiation formulae, integration by trapezoidal rule, Simpson's 1/3 rule and 3/8 rule. Numerical solution of Ordinary Differential Equation:

Euler's method, modifications of Euler's, Runge-Kulta methods of the third and fourth order, Predictor-corrector methods.

UNIT-IV

Miscellaneous topics: Determination of eigen values and eigen vectors of a matrix by iteration, Inverse of a matrix.

Text Books:

1.   Numerical Methods for Engineers – S.C. Chopra and R.P. Canole.

2.   Elementary Numerical Analysis – S.D. Conte and C. de Boor.

Reference Books:

1.   Applied Numerical Analysis – C.F.Gerald, P.O.Wheatly.

2.   Numerical Methods for Scientific and Engineering Computation by M.K.Jain, S.R.K. lyengar and R.K.Jain.

MCA 204

OBJECT ORIENTED PROGRAMMING USING C++

UNIT-I
Introduction to object oriented programming, user defied types, polymorphism, and encapsulation. Getting started with C++ syntax, data-type, variables, strings, functions, exceptions and statements, namespaces and exceptions, operators. Flow control, functions, recursion. Array and pointers, structures.

UNIT-II
Abstraction Mechanisms: Classes, private, public , constructors, destructors , member functions, static members, references etc. Class hierarchy, derived classes.

Inheritance: simple inheritance, polymorphism, object slicing, base initialization, virtual functions.

UNIT-III
Prototypes, linkages, operator overloading, ambiguity, friends, member operators, operator function, i/o operators etc. Memory management: new, delete, object copying, copy constructors, assignment operator, this Input/Output.

Exception handling: Exceptions and derived classes, function exception declarations, unexpected exceptions, Exceptions when handling exceptions, resources capture and release etc.

UNIT-IV
Templates and Standard Template library: temple classes, declaration, template functions, namespaces, string, iterators, hashes, iostreams and other type.

Design using C++ design and development, design and programming, role of classes.

Text Books:

1. Herbert Schildt- C++. The Complete Reference, Tata McGraw Hill publication.

2. BALAGURU SWAMY – C++, Tata McGraw Hill publication.

MCA 205

Microprocessor and Assembly Language Programming

UNIT-I
Microprocessors: Their emergence from 8-bit, Introduction to the basic features of RISC and CISC processors, Micro controllers. Their areas of use Introduction to 8085 Microprocessor: Architecture, Bus organization, registers, ALU, Control section, Basic Fetch and Execute cycle of a program, Timing diagrams, Instruction set of 8085, Instruction format, Types of instructions, Addressing modes.

Memory Interfacing: Logic devices for interfacing: Tri-state devices, Buffers, Bi-directional buffers, Decoders, Encoders and Latches. R/W and ROM models, Memory map addresses, Memory address range of a 1K memory chip, Memory address lines, memory word size, Memory and instruction fetch, Memory classification. Memory structure and its requirements, Basic concepts in memory interfacing, Address decoding and memory addresses, Interfacing the 8155 memory segment, Absolute vs. partial decoding and multiple address ranges.

UNIT-II

Assembly Language Programming Instruction and data format, How to write, Assemble and execute a simple program, Writing assembly language programs, Debugging a program, Programming techniques such as rotate and compare, Dynamic debugging, Counters and delays, Stacks and subroutines, Advanced subroutine concepts.

UNIT-III
Data Transfer Techniques: Programmed data transfer, Parallel data transfer using 8155, Programmable peripheral interface (8255) and handshake input/output, Asynchronous and data transfer using 8251A, Programmable interrupt controller 8259A transfer, DMA transfer, Cycle stealing and burst mode of DMA, 8257-DMA controller.

Various Interfacing Protocols: Polling Interrupts of various types (software, hardware, vectored), Interrupt service routines, CALL vs. hardware & software interrupts, Preliminary concepts of Exceptions/Traps, DMA and its use.

UNIT-IV

Analog Digital Interfacing: A/D/ & D/A converters, Analog Signal Conditioning circuits, Data Acquisitions Systems.

Some Standard Interfaces: Data communication buses such as IEEE 488 and CAMAC standard, Serial data communication Standards such as 20-mA current and Rs-232C, Network communication protocol such as SDLC.

Text Books:
1. Ramesh S. Gaonkar, "Microprocessor Architecture, Programming and Applications with the 8085", Fourth Editions, Penram International Publishing (India).
2. F. Cady "Micro controllers and Microcomputers: Principles of hardware and software"' OXFORD Press.

MCA206 Lab

Lab: Data Structure using C and OOP using C++

Experiments:

DS using C:

1. Representation of Polynomials using Arrays and Linked List and the different operations that can be performed on Polynomials
2. Representation of Sparse Matrix using Arrays and Linked List and the different operations that can be performed on Sparse Matrices
3. Representation of Stacks using Arrays and Linked List and the different operations that can be performed on Stacks
4. Representation of Queues using Arrays and Linked List and the different operations that can be performed on Queues
5. Representation of Double Ended Queue using Arrays and Linked List and the different operations that can be performed on Double Ended Queue
6. Representation of Priority Queues using Arrays and Linked List and the different operations that can be performed on Priority Queues
7. Representation of Binary Trees using Arrays and Linked List and the different operations that can be performed on Binary Trees
8. Representation of Graphs using Arrays and Linked List and the different operations that can be performed on Graphs
9. Infix, Postfix and Prefix conversions.
10. Different Sorting and Searching methods.
11. String representation using Arrays and Linked List and different pattern matching algorithms
12. Implementation and operations on B-Tree and B+ Tree

C++:

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

MCA 301

Relational Database Management System

UNIT-I

Database System Architecture – Data Abstraction, Data Independence, Data Definitions and Data Manipulation Language.

Data Models – Entity Relationship (ER), Mapping ER Model to Relational Model, Network, Relational and Object Oriented Data Models, Integrity Constraints and Data Manipulation Operations.

UNIT-II

Relation data model

Relational Algebra and Calculus: Relational Algebra - Selection and Projection, Set operations, Renaming, Joins, Division, Examples of Algebra Queries, Relational calculus - Tuple relational Calculus - Domain relational calculus - Expressive Power of Algebra and calculus. Form of Basic SQL Query - Examples of Basic SQL Queries, Introduction to Nested Queries, Correlated Nested Queries, Set - Comparison Operators, Aggregate Operators, NULL values - Comparison using Null values - Logical connectives - AND, OR and NOT - Impact on SQL Constructs, Outer Joins, Disallowing NULL values.

UNIT-III

Database design

Introduction to Schema Refinement - Problems Caused by redundancy, Decompositions - Problem related to decomposition, Functional Dependencies - Reasoning about FDS, Normal Forms - FIRST, SECOND, THIRD Normal forms - BCNF - Properties of Decompositions - Loss less join Decomposition, Dependency preserving Decomposition.

UNIT-IV

Transaction processing: Recovery and Concurrency Control, Locking and Timestamp based Schedulers, Multiversion and Optimistic Concurrency Control Schemes.
Storage Strategies: Indices, B-Trees, Hashing.

Text Books:

1. R. Ramakrishanan, J. Gehrke, Database Management Systems 3rd Edition, McGraw-Hill, 2002.
2. Elmaski & Navathe – Fundamentals of Database Systems, 4th Edition, Pearson Education.
3. C.J. Date – An Introduction to Database Systems, Pearson Education.
4. Bipin Desia – An Introduction to Database System, Galgotia Publication.

MCA 302

THEORY OF COMPUTATION

UNIT-I
Introduction of Automata, Computability, and Complexity; Mathematical notations and terminology; Finding proof and types of profs.
Finite Automata and regular languages: Formal definitions, Designing finite automata, Deterministic finite automata, Non-deterministic finite automata, Equivalence of NFAs and DFAs, finite automata with e-transition: regular expressions and language, Properties of Regular languages. Conversion of RE to FA and vice versa.

UNIT-II
Push down Automata and Context free languages: Context free grammars, Designing context free grammar, Ambiguity in CFG and its removal, Chomsky normal form.
Push down Automata: formal definition, graphical notations, Languages accepted by PDA and CFG, Non-context free languages.

UNIT-III
Turing Machines and Computability: Formal definition of Turing machines with examples, Graphical notations, Variants of Turing machines, Church-Turing thesis, Hilbert's problem.

UNIT-IV
Decidability, undesirability and reducibility: Decidable languages: Decidable problems concerning regular language and context free languages. The halting problem, Post correspondence problems, Undecidable problems, Mapping reducibility, Decidability of logical theories, Turing reducibility.

Text Books:
1. Michael Sipser, "Introduction to the theory of Computation", Second Edition, 2007, CENGAGE learning India Pvt. Ltd., New Delhi.
2. John E. Hopcroft, Rajeev Motwani & Jefrey D. Ullman, " Introduction to Automata Theory, Language and Computation". Third Edition, 2007. Pearson Education Inc., New Delhi.

Reference Books:
1. Peter Linz, "An Introduction to Formal Language and Automata". Fourth Edition, 2007, Narosa Publishing House, New Delhi.
2. John C. Martin, "Introduction to Language and the Theory of Computation". Third Edition, 2003, Tata McGrew-Hill (TMH) Publication Pvt. Ltd., New Delhi

MCA 303

QUANTITATIVE TECHNIQUES – I

UNIT-I
General Linear programming Problem (LPP). Solution of LPP by Graphical and Simplex method. Method of penalty and Two phase method. Duality and Dual simplex method.

UNIT-II
Special L.P Problems: Transportation problem, Mathematical formulation and North west corner Rule, least cost method, Vogel's approximation method, Assignment problem. Hungarian method for solving assignment problem.

UNIT-III
Dynamic Programming problem and sequencing problem.
Queuing Theory: Characteristic of Queue model, Kendall's notation, Simple Problem on Model 1 (M/M/1:∞ / FCFS).

UNIT-IV
Game Theory: Arithmetic method, Graphical method and obtaining value of game using dominance principle. .

Text Books:
1. Kanti Swaroop : - Operation Research.
2. K.S. Tridev :- Probability, Statistic with computer applications.
Reference Books:
1. H.A.Taha: Operation Research.
2. S.D.Sharma: Operation Research.
3.S.P.Gupta:Probability,Statistic.

MCA 304

DATA COMMUNICATION AND NETWORKING

UNIT-I
Introduction to data communication and networking:
Networking goals, application of computer networks, Basic concept of WAN, MAN and LAN, Computer network viz, distributed system, Network structure and network topologies.
Fundamental concepts of Data transmission and communication:
Overview of Data Communications and Networking. **Physical Layer**: Analog and Digital, Analog Signals, Digital Signals, Analog versus Digital, Data Rate Limits, Transmission Impairment, More about signals. Digital Transmission: Line coding, Block coding, Sampling, Transmission mode. Analog Transmission: Modulation of Digital Data; Telephone modems, modulation of Analog signals. Multiplexing: FDM , WDM , TDM , Transmission Media: Guided Media, Unguided media (wireless) Circuit switching and Telephone Network: Circuit switching, Telephone network.

UNIT-II
Data Link Layer: Error Detection and correction: Types of Errors, Detection, Error Correction Data Link Control and Protocols: Flow and Error Control, Stop-and-wait ARQ. Go-Back-N ARQ, Selective Repeat ARQ, HDLC, Point –to- Point Protocol, Multiple Access, Random Access, Controlled Access, Channelization. Local area Network: Ethernet, Traditional Ethernet, Fast Ethernet, Gigabit Ethernet. Wireless LANs: IEEE 802.11, Bluetooth virtual circuits: Frame Relay and ATM.

UNIT-III
Network Layer: Host to Host Delivery: Internetworking, addressing, Routing. Network Layer Protocols: ARP, RARP, NAT, BOOTP, DHCP, IPV4, ICMP, IPV6, ICMPV6 and Unicast routing protocols Transport Layer: Process to Process Delivery: UDP, TCP, congestion control and Quality of service.

UNIT-IV
Application Layer: Client Server Model, Peer to peer network, Domain Name System (DNS): Electronic Mail (SMTP) and file transfer (FTP) HTTP and WWW.

Text Books:
1.   Computer Networks: A.S.Tanenbaum (PHI publication, 2nd Edition)
2.   B. A. Forouzan, Data Communications and Networking (4th Ed.), Tata McGraw-Hill Publishing Company Limited.
3.   Data and Computer Communicationss: William stalling (PHI Publication, 2nd Edition).

MCA-305

OPERATING SYSTEMS

UNIT-I
Introduction and Processes:
Operating System Introduction- Functions, Characteristics, Structures - Simple Batch, Multi programmed, timeshared, Personal Computer, Parallel, Distributed Systems, Real-Time Systems, System components, Operating-System services, System Calls, Virtual Machines. Process and CPU Scheduling - Process concepts and scheduling, Operation on processes, Cooperating Processes, Threads, and Interposes Communication Scheduling Criteria, Scheduling Algorithm, Multiple -Processor Scheduling, Real-Time Scheduling

UNIT-II
Memory Management
Memory Management and Virtual Memory - Logical versus Physical Address Space, Swapping, Contiguous Allocation, Paging, Segmentation, Segmentation with Paging. Demand Paging, Performance of Demanding Paging, Page Replacement, Page Replacement Algorithm, Allocation of Frames, Thrashing.

UNIT-III
File System and IPC
File System Interface and Implementation -Access methods, Directory Structure, Protection, File System Structure, Allocation methods, Free-space Management, Directory Management, Directory Implementation, Efficiency and Performance. Process Management and Synchronization - The Critical Section Problem, Synchronization Hardware, Semaphores, and Classical Problems of Synchronization, Critical Regions, Monitors.

UNIT-IV
Deadlocks - System Model, Dead locks Characterization, Methods for Handling Deadlocks Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, and Recovery from Deadlock. **I/O Management** – I/O software and its types, Disk Scheduling. **Shell Programming:** Concept of shell, Types of shell, Editors for shell programming (e.g. vi), basics of Shell programming. **Case Study**- UNIX, LINUX, and Windows NT.

Text Books:
1. James L.Peterson, Abraham Silberschaatz.”Operation system concepts”. Addison Wesley publishing Company 1989

Reference Books:
1. Milan Milenkovic,”Operation systems-Concepts and design”. McGraw Hill
2. Harvey M.Deitel,”An Introduction to the Operation systems.” Addison Wesely Publishing Company 1984.
3. Andrew S.Tanenbaum,”Modern Operating Systems”. Prentice Hall of India pvt.ltd. 1995

Lab: MCA306

Lab: Relational Database Management System

Experiments:

Experiments to implement the following

1. Relational algebra operations select, project and join.
2. Determination of Attribute Closure, Candidate Key, Functional Dependency.
3. Checking Serializability of a Schedule.
4. Dynamic Hashing.

Experiments in any relational database for the following

1. Creation, Insertion, Updation, Deletion of Tables, Indexes, Views.
2. Simple Queries, Nested Queries, Use of Arithmetic and String Functions.
3. Simple PL/SQL Programs, Use of Exceptions, Cursor, Procedure, Function, Trigger, Sequence.

Lab: OS Lab

1. UNIX commands
2. Shell Scripting
3. Implementation of scheduling algorithms.
4. Implementation of the memory management schemes.

MCA 401

ANALYSIS AND DESIGN OF ALGORITHMS

UNIT-I

Fundamentals of the Analysis of Algorithm Efficiency: Computational Tractability, Pseudo code for expressing algorithms, Time and Space Complexity, Rate of Growth, Asymptotic Notations, Common Running Times, Analysis for Recursive and Non-recursive Algorithms , Analysis of Sorting Algorithms

Divide and Conquer Algorithms: Merge Sort, Recurrence Relations, Methods of Solving Recurrences, Quick Sort, Median, Matrix Multiplication

UNIT-II

Graphs: Basic Definitions and Applications, Depth-first and Breadth-first Search, Topological Sort, Strongly Connected Components, Dijkstra's algorithm and Priority Queue Implementation

Greedy Algorithms: Minimum Spanning Trees, Implementing Kruskal's Algorithm - Union-Find Data Structure, Fractional Knapsack Problem, Huffman Codes and Data Compression

UNIT-III

Dynamic Programming: 0/1 Knapsack Problem, Longest increasing subsequences, Edit distance, Chain Matrix Multiplication, All-pairs Shortest Paths in Graph

UNIT-IV

String Matching: The naïve string-matching algorithm, The Rabin-Karp algorithm.

NP-Complete Problems: Search Problems, Polynomial Time Verification, NP-completeness and reducibility, NP-completeness proof. Approximation Algorithms.

Text Books:
   1. Cormen, Thomas H. *Introduction To Algorithms*. Cambridge, Mass.: MIT Press. Print.

Reference Books:

   1. Horowitz, Ellis and Sartaj Sahni. *Fundamentals Of Computer Algorithms*. Potomac, Md.: Computer Science Press.
   2. Aho, Hopcroft & Ullman, The design and Analysis of Algoritm, Addison- Wesley.

MCA 402

COMPILER DESIGN

UNIT-I
Compiler: Introduction – Programs related to compilers. Analysis of source program, Phases of compiler, modules related to compiler, grouping of phases. Lexical analysis – The role of Lexical Analyser. Input Buffering. Specification of Tokens. Recognition of Tokens. The Lexical-analyser Generator Lex.

UNIT-II
Syntax Analysis – Introduction. Top-Down parsing, Brute Forcing, Recursive Descent, Predicative LL(1),Bottom-Up parsing : Shift reduce parsing, Introduction to LR Parsing, Powerful LR parsers: SLR, CLR,LALR, Parser Generators – Yacc. Error Recovery : Introduction, Error detecting and Reporting in various Phases.

UNIT-III
Syntax Directed Translation – Syntax Directed Definitions. Evaluation Orders for SDDs. Applications of Syntax Directed Translation. Symbol Table Organization - Structure of Symbol table, Symbol Table organization, Data Structures of symbol Table.

Intermediate code generation: Variants of syntax trees. Three-Address Code, Types and Declarations. Translation of Expressions. Type Checking. Control Flow. Activation record, activation tree and run time storage management.

UNIT-IV
Code Generation – Issues in the Design of a Code Generator. The Target Language. Addresses in the Target Code Basic Blocks and Flow Graphs. Optimization of Basic Blocks. Peephole Optimization. Register Allocation and Assignment.

Text Books:
1. Alfred V Aho, Monica S Lam, Ravi Sethi, Jeffrey D Ullman – Compilers: Principles, Techniques & Tools, Pearson Education 2nd Edition 2007.

Reference Books:
1. Keith D Cooper & Linda Tarezon, Engineering a Compiler, Morgan Kafman, Second edition.
2. Kenneth C Louden, Compiler Construction: Principles and Practice , Cengage Learning.
3. Lex&Yacc, John R Levine, Oreilly Publishers.

MCA 403

COMPUTER GRAPHICS

Unit I:
Introduction: Application of Computer Graphics: Computer Aided Design, Presentation Graphics, Computer art, Entertainment, Education and Training, Visualization, Image Processing, Graphical User Interface. Graphics Hardware: Display Devices, Raster-Scan and Random Scan Displays, Direct View Storage Tube, Flat Panel Displays, Input Devices, Hard Copy Devices.
Output Primitives: Points and Lines, Line Drawing Algorithms, Circle Drawing Algorithms, Ellipse Drawing Algorithms, Region Filling Algorithms, Side Effects of Scan Conversion, Antialiasing.

Unit II:
Two-Dimensional Geometric Transformations: Basic Transformations (Translation, Rotation, Scaling), Matrix Representation and Homogeneous coordinates, Composite Transformation, Reflection, Shear, Transformation between coordinate system. Two Dimensional Viewing: Viewing Pipeline, Window-to-viewport Coordinate Transformation. Two-Dimensional Clipping: Point Clipping, Line Clipping (Cohen-Sutherland Algorithm) and Polygon Clipping (Sutherland-Hodgeman Algorithm).
Three-Dimensional Transformation and Projection: Translation Rotation, Scaling, Reflections, Shear, Projection: Types of Projections (Parallel and Prospective), Mathematical Description of Projections Three-Dimensional Viewing and Clipping.

Unit III:
Three Dimensional Object Representations: Curve Design, Blending Functions and its types, Spline Curve, Bezier Curves and Surfaces, B-Spline Curves and surfaces. Fractal Geometry Methods: Fractal Generation Procedure, Classification of Fractals Dimension, geometric Construction of Deterministic self-similar.

Unit IV:
Visible Surface Detection Methods: Hidden Lines and Surfaces, Depth Comparisons, Backface Detection, Z-Buffer, A-Buffer, Area-Subdivision Algorithms Illumination Models: Basic Models, Displaying Light Intensities, Halftone Pattern and Dithering Techniques Surface Rending Methods: Polygon Rendering Methods.

Text books:
1. D.Hearn, Baker: Computer Graphics, Prentice Hall of India 2008.
Reference Books:
1. J.D.Foley, A.Van Dan, Feiner, Hughes Computer Graphics Principles & Practice 2nd edition Publication Addison Wesley1990.
2. D.F.Rogers Procedural Elements for Computer Graphics, McGraw Hill 1997.
3. D.F.Rogers, Adams Mathematical Elements for Computer Graphics, McGraw Hill 2nd edition-1988

MCA 404

PRORAMMING IN JAVA

UNIT I:

Introduction to Java: Java Architecture and Features, Understanding the semantic and syntax differences between C++ and Java, Compiling and Executing a Java Program, Variables, Constants, Keywords Data Types, Operators (Arithmetic, Logical and Bitwise) and Expressions, Comments, Doing Basic Program Output, Decision Making Constructs (conditional statements and loops) and Nesting, Java Methods (Defining, Scope, Passing and Returning Arguments, Type Conversion and Type and Checking, Built-in Java Class Methods), Arrays, Strings and I/O: Creating & Using Arrays (One Dimension and Multi-dimensional), Referencing Arrays Dynamically, Java Strings: The Java String class, Creating & Using String Objects, Manipulating Strings, String Immutability & Equality, Passing Strings To & From Methods, String Buffer Classes. Simple I/O using System.out and the Scanner class, Byte and Character streams, Reading/Writing from console and files.

UNIT II:

Object-Oriented Programming Overview: Principles of Object-Oriented Programming, Defining & Using Classes, Controlling Access to Class Members, Class Constructors, Method Overloading, Class Variables & Methods, Objects as parameters, final classes, Object class, Garbage Collection.

Inheritance, Interfaces, Packages, Enumerations, Autoboxing and Metadata
Inheritance: (Single Level and Multilevel, Method Overriding, Dynamic Method Dispatch, Abstract Classes), Interfaces and Packages, Extending interfaces and packages, Package and Class Visibility, Using Standard Java Packages (util, lang, io, net), Wrapper Classes, Auto-boxing / Unboxing, Enumerations and Metadata.

UNIT III:

Exception Handling, Threading, Networking and Database Connectivity
Exception types, uncaught exceptions, throw, built-in exceptions, Creating your own exceptions; Multi-threading: The Thread class and Runnable interface, creating single and multiple threads, Thread prioritization, synchronization and communication, suspending/resuming threads. Using java.net package, Overview of TCP/IP and Datagram programming. Accessing and manipulating databases using JDBC.

UNIT IV:

Applets and Event Handling: Java Applets: Introduction to Applets, Writing Java Applets, Working with Graphics, Incorporating Images & Sounds. Event Handling Mechanisms, Listener Interfaces, Adapter and Inner Classes. The design and Implementation of GUIs using the AWT controls, Swing components of Java Foundation Classes such as labels, buttons, text fields, layout managers, menus, events and listeners; Graphic objects for drawing figures such as lines, rectangles, ovals, using different fonts. Overview of servlets.

Text Books:
1. Java the complete reference, 7th editon, Herbert schildt, TMH.

Reference Books:
1. Ken Arnold, James Gosling, David Homes, "The Java Programming Language", 4th Edition, 2005.
2. Joshua Bloch, "Effective Java" 2nd Edition,Publisher: Addison-Wesley, 2008.
3. E. Balaguruswamy, "Programming with Java", 4th Edition, McGraw Hill.

MCA 405

Artificial Intelligence

UNIT I. Introduction
Introduction to Artificial Intelligence, Background and Applications, Turing Test and Rational Agent approaches to AI, Introduction to Intelligent Agents, their structure, behavior and environment.

UNIT II: Problem Solving and Searching Techniques
Problem Characteristics, Production Systems, Control Strategies, Breadth First Search, Depth First Search, Hill climbing and its Variations, Heuristics Search Techniques: Best First Search, A* algorithm, Constraint Satisfaction Problem, Means-End Analysis, Introduction to Game Playing, Min-Max and Alpha-Beta pruning algorithms.

UNIT III: Knowledge Representation
Introduction to First Order Predicate Logic, Resolution Principle, Unification, Semantic Nets, Conceptual Dependencies, Frames, and Scripts, Production Rules, Conceptual Graphs. Programming in Logic (PROLOG)

UNIT IV: Understanding Natural Languages & Learning
Parsing Techniques, Context-Free and Transformational Grammars, Recursive and Augmented Transition Nets.
Learning: Introduction to learning, type of learning: Supervised learning: Classification, Prediction, Unsupervised learning: clustering.

Text books:
1. Russell &Norvig, Artificial Intelligence-A Modern Approach**,** LPE, Pearson Prentice Hall, 2nd edition, 2005.

Reference Books:
1. DAN.W. Patterson, Introduction to A.I and Expert Systems – PHI, 2007.
2. Rich & Knight, Artificial Intelligence – Tata McGraw Hill, 2nd edition, 1991.
3. W.F. Clocksin and Mellish, Programming in PROLOG, Narosa Publishing House, 3rd edition, 2001.
4. Ivan Bratko, Prolog Programming for Artificial Intelligence, Addison-Wesley, Pearson Education, 3rd edition, 2000.

MCA406 Lab

Lab in PROGRAMMING IN JAVA

&

AI (Prolog)

MCA 501

ENTERPRISE WEB-BASED COMPUTING WITH JAVA

UNIT-I
Markup Languages: XHTML. An Introduction to HTML History-Versions-Basic XHTML Syntax and Semantics-Some Fundamental HTML Elements-Relative URLs-Lists-tables-Frames-Forms-XML Creating HTML Documents-Case Study
Style Sheets: CSS-Introduction to Cascading Style Sheets-Features-Core Syntax-StyleSheets and HTML Style Rule Cascading and Inheritance-Text Properties-Box Model-Normal Flow Box Layout-Beyond the Normal Flow-Other Properties-Case Study.

UNIT-II
CGI Scripts and Clickable Maps.
Designing web application: JAVA Applets, JAVA Scripts, JAVA Servlets.

UNIT-III
JAVA Server pages, JAVA Server faces, Struts, Perl, DHTML, HML.
Web based application architecture : JSP model 1, MVC Architecture, Struts.

UNIT-IV
J2EE 1.3 including RMI, EJB, JDBC, SERVLETS, JNDI, JTA, JAAS, JMS, JAVA Mail etc.

<u>Text Book:</u>

1. Web Technologies – I & II by lvan Byross.
2. Java Server Programming J2EE 1.3 Edition.

MCA 502

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 Item set Mining Methods, Mining various kinds of Association Rules, From Association Mining to Correlation Analysis, Constraint-Based Association Mining.

Classification and Prediction: Issues Regarding Classification and Prediction, Classification by Decision Tree Induction, Bayesian Classification.

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.

Text 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.

MCA – 503

SOFTWARE ENGINEERING & OOAD

UNIT-I
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-II
Object-oriented Design: Object modeling using UML, use case diagram, class diagram, interaction diagrams: sequence and collaboration diagrams, state-chart diagrams, activity diagram, unified development process.

UNIT-III
Implementing and Testing: Programming language characteristics, fundamentals, languages, classes, coding efficiency. Testing: Objectives, black box and white box testing, various testing strategies, Art of debugging. Maintenance, Reliability and Availability: Maintenance: Characteristics, controlling factors, maintenance tasks, side effects, preventive maintenance-Re Engineering-Reverse Engineering-configuration management-Maintenance tools and techniques: Reliability: Concepts, Errors, Faults, Repair and availability, reliability and availability models, Recent trends and developments.

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
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).

Text Book:
1. Mall Rajib, Fundamentals of Software Engineering, PHI.
2. Pressman, Software Engineering Practitioner's Approach, TMH.

MCA- 504

INFORMATION SECURITY

UNIT-I
Need for Security – Attacks, Services and Mechanisms, Security Attacks (Interruption, Interception, Modification and Fabrication), Security Services (Confidentiality, authentication, Integrity, Nonrepudiation, access Control and Availability) and Mechanisms, A model for Internetwork security, Internet Standards and RFCs, Classical encryption Techniques, Block ciphers and data encryption, standard.

UNIT-II
Advanced encryption standard, evaluation criteria of AES, Symmetric ciphers- multiple encryption and triple DES, Block cipher modes of operation, Stream ciphers and RC4, Stream ciphers – Blowfish, Modern Symmetric encryption - IDEA, Confidentiality using Symmetric Encryption, Placement of encryption function, traffic confidentiality, Random number generation.

UNIT-III
Introduction to number theory- Prime numbers, Fermat's and Euler's theorems, Chinese Remainder Theorem, Discrete logarithms, Public key cryptography - Principles of public key cryptosystems and RSA, Key management, Diffie-Hellman key exchange, Elliptic curve arithmetic, Elliptic curve cryptography, Key Distribution, Message authentication and Hash functions-Authentication functions, Security and Hash functions and MACs, HMAC, CMAC, Digital signatures and authentication protocols, Authentication protocols, Digital signature standard.

UNIT-IV
Attacks- Denial-of-service/Distributed denial-of-service attacks, Back door, Spoofing, Manin the-middle, Replay, TCP/Hijacking, Fragmentation attacks, Weak keys, Mathematical attacks, Social engineering, Port scanning, Dumpster diving, Birthday attacks, Password guessing, Software exploitation, Inappropriate system use, Eavesdropping, War driving, TCP sequence number attacks, War dialling/demon dialling attacks.

Text Books:
1. William Stallings, Cryptography and Network Security, Pearson Education, 2006.
Reference books:
1. Cryptography and Network Security – by Atul Kahate – TMH
2. Network Security Essentials (Applications and Standards) by William Stallings Pearson Education.
3. Eric Cole, Dr. Ronald Kurtz and James W. Conley, Network Security Bible, Wiley Publishers, 2009

MCA 505

CLOUD COMPUTING

UNIT I:

Overview of Computing Paradigm: Recent trends in Computing: Grid Computing, Cluster Computing, Distributed Computing, Utility Computing, Cloud Computing, Evolution of cloud computing, Business driver for adopting cloud computing. Cloud Computing (NIST Model), History of Cloud Computing, Cloud service providers.
Properties, Characteristics & Disadvantages: Pros and Cons of Cloud Computing, Benefits of Cloud Computing, Cloud computing vs. Cluster computing vs. Grid computing, Role of Open Standards

UNIT II:

Cloud Computing Architecture: Cloud computing stack: Comparison with traditional computing architecture (client/server), Services provided at various levels, How Cloud Computing Works, Role of Networks in Cloud computing, protocols used, Role of Web services.

Service Models (XaaS): Infrastructure as a Service(IaaS), Platform as a Service(PaaS), Software as a Service(SaaS).

Deployment Models: Public cloud, Private cloud, Hybrid cloud, Community cloud

UNIT III:

Introduction to IaaS: IaaS definition, Introduction to virtualization, Different approaches to virtualization, Hypervisors, Machine Image, Virtual Machine(VM)

Resource Virtualization: Server, Storage , Network, Virtual Machine(resource) provisioning and manageability, storage as a service, Data storage in cloud computing(storage as a service)

Examples: Amazon EC2, Renting, EC2 Compute Unit, Platform and Storage, pricing, customers, Eucalyptus

Introduction to PaaS: What is PaaS, Service Oriented Architecture (SOA), Cloud Platform and Management, Computation , Storage, Examples, Google App Engine, Microsoft Azure, SalesForce.com's Force.com platform

Introduction to SaaS: Web services , Web 2.0 , Web OS , Case Study on SaaS

UNIT IV:

Service Management in Cloud Computing: Service Level Agreements(SLAs), Billing & Accounting, Comparing Scaling Hardware: Traditional vs. Cloud Economics of scaling:

Benefitting enormously. Managing Data, Looking at Data, Scalability & Cloud Services, Database & Data Stores in Cloud, Large Scale Data Processing

Cloud Security:

Infrastructure Security: Network level security, Host level security, Application level security, Data security and Storage, Data privacy and security Issues, Jurisdictional issues raised by Data location, Identity & Access Management, Access Control, Trust, Reputation, Risk, Authentication in cloud computing, Client access in cloud, Cloud contracting Model, Commercial and business considerations

Case Study on Open Source & Commercial Clouds, Eucalyptus, Microsoft Azure, Amazon EC2

Text Books:

1. *Cloud Computing Bible,* Barrie Sosinsky*, Wiley-India,* 2010

2. C*loud Computing: Principles and Paradigms,* Editors: Rajkumar Buyya, James Broberg, Andrzej M. Goscinski*, Wile,* 2011

Reference Books:

1. *Cloud Computing: Principles, Systems and Applications, Editors:* Nikos Antonopoulos, Lee Gillam*, Springer,* 2012
2. *Cloud Security: A Comprehensive Guide to Secure Cloud Computing,* Ronald L. Krutz, Russell Dean Vines*, Wiley-India,* 2010

MCA506 Lab

ENTERPRISE WEB BASED ADVANCE JAVA LAB.

&

SOFTWARE ENGINEERING LAB WITH A MINI PROJECT

MCA 601

INDUSTRIAL PROJECT AND SEMINAR