GANGADHAR MEHER UNIVERSITY
AMRUTA VIHAR,SAMBALPUR,ODISHA

DEPARTMENT OF MCA

Syllabus for
MASTER OF COMPUTER APPLICATIONS

(3-Year Programme*)*

(2018-2021)

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 axion, 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", Mc Graw 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

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

Text Books :

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   Publisher

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

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.

Recommended Texts:
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. Nasir S.F.B., P.K.Srimani "A text book on Automata Theory ", Cambridge Univ. press India Pvt. Ltd.
2. Peter Linz, "An Introduction to Formal Language and Automata". Fourth Edition, 2007, Narosa Publishing House, New Delhi.
3. John C. Martin, "Introduction to Language and the Theory of Computation". Third Edition, 2003, Tata McGrew-Hill (TMH) Publication Pvt. Ltd., New Delhi

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.   Data Structures in C by Tanenbaum.

2.   Fundamentals of Data Structure.

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

VISUAL BASIC AND UNIX.

UNIT-I

Introduction to Visual Basic & some features about vb. Using of all controls of tool box in vb form (small starting program).Some Graphics Interface(using Picture control, image control, Line, shape, Timer).

UNIT-II

Conditional statement and Switch case statement and array(calculator program).Control structure (looping) (matrix programming). Input Box & Message Box & Preserve statement (program taking preserve statement).User defines data type (program student details). Validation (program for student, data are name; mark, grade, date of birth; percentage)

UNIT-III

.Function (a small program), string handling. Menu forms (program color).MDI form (program for Notepad). File I/O (program taking file controls (Drive List Box, File List Box, Dir List Box)). Database (DAO, ADO, RDO using database Access 7.0 & Access 2000 and Oracle 8.0).Data Report.

UNIT-IV

Introduction to UNIX operating system, General commands (pwd, path, cal, date, banner, type, man, uname, passwd, who, clear, bc, echo, tput, spell, more). Handling files (cat, mkdir, cd, rmdir, cp, rm, mv, lp, split, cmp, comm.., diff, head, tail, wc, cut, paste, sort, uniq, tr,, grep, fgrep, ps, kill, nice, find), Vi editor, Shell programming.

TEXT BOOK;
1. Evangelos Petroutsos: Mastering Visual Basic 6.0
2. David jung & Cos:Visual Basic 6 SuperBible
3. Complete Reference Visual Basic 6.0
4. Sumitabha Das : UNIX Concepts & Applications.

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 UNIX

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.

Advanced topics: Object-Oriented and Object Relational Databases. Logical Databases, Web Databases, Distributed Databases, Data Warehouse and Data Mining.

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

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 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:
Evolution of operating systems, Types of the operating systems, Different view of the operating system, operating system concepts and structure.
The process concept, system programmer's view of processes. The operating system view of processes, operating system services for process management scheduling algorithms. Performance evaluation.

UNIT-II
Inter process Communication and synchronization & Memory Management
The need for the intercrosses synchronization, mutual exclusion, semaphore, hardware support for mutual exclusion, queuing implementation of semaphores, classical problems in concurrent programming, critical region and conditional critical region, monitors, messages, deadlocks.
Memory Management without swapping or paging, swapping, virtual memory, page replacement algorithms, modeling-paging algorithms, design issues for paging systems, segmentation.

UNIT-III
Input/Output
Principles of input/output Hardware, I/O device, device controllers, direct memory access, principles of I/O software Goals, interrupt handler, device drivers, device independent I/O software, user space I/O software, Disks, Disks hardware, scheduling algorithms, Error handling, track at a time caching, RAM Disks, clocks clock hardware, clock software, terminals, Terminal hardware, Memory Mapped terminal, I/O software, processes and processors in distributed systems. Threads, system models, processor allocation, scheduling. Distributed File system, Design, implementation, trends.

UNIT-IV
File Systems &Performance Measurement, Monitoring and evaluation:
File system, directories; file system implementation, security protection mechanisms.
Introduction, important trends affecting performance issues, why performance monitoring and evaluation are needed, performance measures, evaluation techniques, bottlenecks and saturation, feedback loops.
<u>Case studies:</u> MS DOS, MS WINDOWS, LINUX (UNIX) operating system.

<u>Text Books</u>:
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

Programming in C++ & Relational Data Base Management System

MCA 401

ANALYSIS AND DESIGN OF ALGORITHMS

UNIT-I
Algorithms and Complexity – asymptotic notations, orders, worst-case and average-case, amortized complexity. Basic Techniques – divide & conquer, dynamic programming, greedy method, backtracking.

UNIT-II
Randomization. Data Structures- heaps, search trees, Dynamic Programming.: Multistage graphs, Traveling Salesman Problem, LCS problem. Applications sorting & searching, combinatorial problems.

UNIT-III
Optimization problems, All pairs shortest path problems, string matching, Graph Algorithm-BFS and DFS.

UNIT-IV
Minimum cost Spanning trees, single source shortest paths. NP-completeness, Approximation algorithms.

Text Books:
1. Horowitz E. & Sahni S., Fundamentals of Computer Algorithms, Galgotia Publications.
2. Aho, Hopcroft & Ullman, The design and Analysis of Algoritm, Addison- Wesley.
3. Coreman, Rivest, The design and Analysis of Algoritm – PHI

MCA-402

MANAGEMENT INFORMATION SYSTEMS (MIS)

UNIT-I
Fundamentals of Information Systems, Systems approach to problem solving, Developing is solutions.

UNIT-II
Corporate databases & database management, Data Organisatiion, Data models, Data security & information quality.

UNIT-III
Transaction Processing Systems, Executive information systems, Decision support systems, Expert Systems, Information Systems in marketing, manufacturing, HRM, Accounting and Finance.

UNIT-IV
Information Resource Management, planning implementating & controlling information Systems, Computer crime, Ethics & Society.

Text Books:
1. Brein James O. – Management Information Systems.
2. Murdick & Ross – Information Systems for Modern Management.
3. Parker C.S. – Management Information Systems- Strategy and Action.
4. Aktas A. Ziya – Structured Analysis and Design of Information Systems.

MCA 403

COMPUTER GRAPHICS

UNIT-I

INTRODUCTION: - The origin of computer graphics, how the In Interactive Graphic Display device works, new display devices, general purpose graphics software, the user interface, the display of solid objects.
POINT-PLOTTING TECHNIQUES: - Coordinate Systedms, Incremental methods, Line-drawing algorithms, circle generators.
LINE – DRAWING DISPLAY: - Display devices and controllers, display devices, the CRT.
TWO DIMENSIONAL TRANSFORMATIONS: - Transformation principles, concatenation, matrix representations, use of homogeneous coordinate system.

UNIT-II
CLIPPING AND WINDDOWING: - A line clipping algorithm, mid point subdivision, clipping other graphic entities, polygon clipping viewing transformations, the windowing transformation.
A SIMPLE GRAPHICS PACKAGE: - Ground rules for graphic software design, functional domains graphic primitives, windowing functions miscellaneous functions, implementation of the function.
SEGMENT DISPLAY FILES: - Segments functions for segmenting the display file, posting and un posting segments, segment naming schemes.
GEOMETRIC MODELS: - A simple modeling example, geometric modeling, symbols and instances instance transformation.

UNIT-III
GRAPHICAL INPUT DEVICES: - Keyboards touch panels Hornlightpens, graphics tables, joysticks, trackball, mouse.
GRAPHICAL INPUT TECHNIQUES: - Introduction, positioning techniques, panting and selection, inking and painting.
RASTER GRAPHIC FUNDAMENTALS: - Introduction, generating raster image: the frame buffer display.
SOLID AREA SCANS CONVERSION: - Geometric representation of areas, scan-converting polygons, the Y-X algorithm properties of scan conversion algorithms.

UNIT-IV
CURVES AND SURFACES: - Shape description, requirements, Bezier methods, B-Spine methods.
THREE DIMENSIONAL TRANSFORMATION AND PERSPECTIVE: - Transformation, transformation in viewing, the prospective transformation, Three dimensional graphic packages, rotating about an arbitrary axis as an example of transformation.
HIDDEN-SURFACE AND HIDDEN-LINE REMVOAL: - Classification of algorithms, depth-buffer method, scan line method, depth-soling method, area subdivision method.

SHADING: - A shading model, applying the shading models, special effects.

TEXT BOOKS:
1. NEWMAN, W.M.AND SPROULL, F.F.: PRINCIPALS OF INTERACTIVE COMPUTER GRAPHICS.
 2. Hearn, D. And Baker, M.F. : Computer Graphics.

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. Cay S. Horstmann, Gary Corness, "Core Java 2 Volume 1 - Fundamentals)", 9th Edition, Printice Hall.
4. Cay S. Horstmann, Gary Corness, "Core Java 2 Volume 2 - Advanced Features)", 9th Edition, Printice Hall.
5. Bruce Eckel, "Thinking in Java", 3rd Edition, PHI, 2002.
6. E. Balaguruswamy, "Programming with Java", 4th Edition, McGraw Hill.

MCA 405

INTERNET TECHNOLOGY

UNIT-I
Internet Architecture:
Internet Overview, evolution of Internet. Internet Components – Local Area Networks, Access Networks, Core Networks, Routers, Transmission Infrastructure, ISPs. Packet switching fundamentals – Packet Switching versus Circuit Switching, Connectionless packet switching (IP). Internet Standards: Standards bodies and the standards process, IETF, ITU, IEEE, ATM Forum.

UNIT-II
Networking Protocols:
Network Protocol Overview : What are networking protocols, and what do they do ? Key protocol architectures. IP Network Overview: What are the key IP network capabilities? How will these capabilities adapt to future networks? IP protocol operation. IP addressing: IP address classes. Why are IP addresses under pressure, and what fixes are in place?
TCP Fundamentals: How does TCP shield end users from IP network problems? TCP protocol operation and capabilities. TCP/IP: routing.

UNIT-III
Access Methods and Internet working:
Access Network Architectures: Access network characteristics. Differences between Access Networks, Local Area Networks and Wide Area Networks.
Access Technologies: Why there is an upper limit on modern speeds. Voice grade modems, ADSL, Cable Modems, Frame Relay.
DNS: Domain Names. Resolving Domain Names to IP addresses (DNS Operation).
Registering Domain Names and solving Domain Name disputes.
Routing: How the key IP routing protocols (OSPF and BGP4) operate. Implications of future Internet growth on routing protocol performance.

UNIT-IV
Internet Applications:
FTP, Telnet, Email, Chat.
World Wide Web: HTTP protocol. Search Engines.
E-Commerce and Security issues including symmetric and asymmetric key, encryption and digital signature, authentication.
Emerging trends, Internet telephony, virtual reality over the web, etc.
Intranet and extranet, firewall.

Text Book:
1. Data & Computer Communications, By William Stallings.
2. Computer Networks, A System approach By Larry L. Peterson, Bruce S. Davie.
3. Internetworking with TCP/IP, Principals, Protocols and Architecture, By Douglas E. Corner.

MCA406 Lab

Lab in PROGRAMMING IN JAVA
&
Internet Technologies

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.

Text Book:

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

MCA 502

Artificial Intelligence

Unit 1. 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.

Prescribed books:
1. Rich & Knight, Artificial Intelligence – Tata McGraw Hill, 2nd edition, 1991.

Reference Books:
1. DAN.W. Patterson, Introduction to A.I and Expert Systems – PHI, 2007.
2. Russell &Norvig, Artificial Intelligence-A Modern Approach**,** LPE, Pearson Prentice Hall, 2nd edition, 2005.
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.

MCA – 503

SOFTWARE ENGINEERING & OOAD

UNIT-I

Introductory concepts: Introduction, definition, objectives, Life cycle-Requirements analysis and specification.

Design and Analysis: Cohesion and coupling, Data flow oriented Design: Transform centered design, Transa centered design. Analysis of specific systems like Inventory control, Reservation system.

UNIT-II

Object-oriented Design: Object modeling using UML, use case diagram, class diagram, interaction diagrams: sequ 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 quality : SEI CMM and ISO-())!. Software reliability and fault-tolerance, software project planning, monitoring and control. Computer-aided software engineering (CASE), Component model of software development, Software reuse.

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

MCA- 504

QUANTITATIVE TECHNIQUES - II

(System Modeling and Simulation)

UNIT-I
Inventory Concepts: The technique Simulation, Major application areas, concept of a System, Environment, Continuous and discrete systems, systems modeling types of models progress of a Simulation Study, Monte Carlo Method, Comparison of Simulation and Analytical Methods. Numerical Computation Technique for discrete and continuous models, Continuous System Simulation.

UNIT-II
Probability Concepts in Simulation: Stochastic variables, Discrete and Continuous Probability Functions, Numerical evaluation of continuous probability functions, continuous uniformaly distributed random numbers, Random Number Generators-Linear congruential Generator, Mid Square Method, Multiplicative Congruential generator, rejection methods, Testing of random numbers, Generation of Stochastic varieties, Arrival patterns service times.

UNIT-III
Discrete System Simulation and GPSS : Discrete Events, Representation of Time, generation of arrival patters, fixed time step versus next event simulation, Simulation of a Telephone System, delayed calls. Introduction to GPSS : Creating and moving transactions, queues,, facilities and storages, gathering statistics, conditional transfers, program control statements, priorities and parameters, standard numerical attributes, functions, gates. Logic switches and tests, Variables, Select and Count.

UNIT-IV
Simulation Languages and Practical Systems: Continuous and discrete systems languages, factors in the selection of discrete system simulation language. Computer model of queuing.

Design and Evaluation of simulation Experiments: Length of simulation runs, analysis of simulation output, Estimation Methods, Replication of Runs, Elimination of Initial Bias.

Text Books:

1. System Simulation – Geoffrey Gordon, 2nd edition, PHI
2. System Simulation with digital computer– Narsingh Deo, PHI

Reference Book:

1. Simulation, Modelling & Analysis- Averill M. Law & W. David Kel'on, TMH.
2. Discrete Event System Simulation – Banks, John, S. Carson, Barry L. Nelson, Davis M. Nicol, PHI.

MCA 505

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.

MCA506 Lab

ENTERPRISE WEB BASED ADVANCE JAVA LAB.

&

MINI PROJECT

MCA-601

Industrial Project and Seminar