1st Semester

MCA - 501   MATHEMATICAL   FOUNDATIONS   OF COMPUTER SCIENCE

UNIT - I

Prepositional and predicate calculus: Logic Propositions and logical operations truth tables and proposition generated by a set equivalence and implication. The laws of first order predicate logic, mathematical systems. Fuzzy sets, operations on fuzzy sets, Fuzzy Relations, properties and operations on fuzzy relations.

UNIT - II

Relations : Definitions, graphs of relations, properties of relations, matrices of relations, equivalence relations, Posets,   Lattices , Complemented Lattices, Sub lattices. Distributive and Modular lattices. Boolean Algebra.

UNIT - III

Graph Theory: Notions & terminology, directed and undirected graphs, incidence and degrees, Sub-graphs, Walks paths, cycles, circuits, components, connectedness algorithms, shorter path algorithm. Euclidian and Hamiltonian graphs, The traveling Salesman Problem, Trees: Spanning trees, rooted trees and binary trees.

UNIT - IV

Discrete numeric functions, Generating functions,   Recursion and recurrence relation, many faces of recursion, sequences solving a recurrence relation including non-homogeneous finite order linear relations.

UNIT - V

Coding Theory, Binary symmetric channel, Coding Process, decoding, error detection and correction codes. Vector Spaces :   Linear Independence, bases, Subspaces, dimensionality, Linear mapping, linear in-equality, inner products, norms.

TEXT BOOK

Applied Discrete Structures for Computer Science by A Doerr and K Levasser.

Text & Reference Books

1)   Discrete Mathematical Structures for Computer Science by B Kolman & R.C. Busby.
2)   Discrete Mathematical Structures with Application to Computer Science by J.P. Trembley & R.P.Manohar.
3)   Graph Theory by F.Harary.
4)   Elements of Discrete Mathematics by C.Liu.
5)   Graph Theory with Application to Computer Science by N.Deo.

MCA - 502   COMPUTER ORGANISATION & ARCHITECTURE

UNIT - I
Digital computers, Logic gates, Boolean Algebra, Map simplification, Combination circuits, Gates flip-flops, Sequential circuits, Integrated circuits, Decoders, Multiplexes, Registers, Shift registers, Binary circuits, Memory.

UNIT - II
Timing and Control unit, Arithmetic's Micro-operation, Introduction to cycle, Introduction to Central Processing unit, General Register Organization, Stack Organization, Instruction Formats, Addressing Models, Data Transfer and Manipulation, Program control, Reduced Instruction set computer.

UNIT - III
Input-output Organization: Peripheral Devices, Input-output Interface, Asynchronous Data Transfer, Mode of Transfer, Priority Interrupt, Direct Memory Access, Input-output Processor, Serial Communication, Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory, Virtual Memory, Memory Management Hardware.

UNIT - IV
Theory of Parallelism : Evolution of Computer architecture, multiprocessor and multicomputers, multi vector and SIMD Comp, PRAM models, conditions of parallelism, Program partitioning and scheduling.

UNIT - V
Program Flow mechanism, System interconnect architecture, performance metrics and measures (efficiency, utilization and quality), standard performance measures, basics of linear pipeline processor, nonlinear pipe line processor, instruction pipeline design.

Text & Reference Books

1) Computer System Architecture by M.Mano
2) Advanced Computer Architecture by Kai Hwang, McGraw Hill International

MCA - 503   DATA STRUCTURE

UNIT - I

Introduction to data structure, Primitive data structure, Static and Dynamic storage, Sub-algorithm function, procedure, parameters, parameter passing call by value, call by ref. Introduction to Algorithm analysis for time and space requirement, Rate of growth and Order of notation Basic time and space analysis of an algorithm, String Manipulation and Pattern matching Markov Algorithm Primitive and composite function, string manipulation Application - Text handling only, Abstract Data Types.

UNIT - II

Non-linear data structures - Concept and Technology of Storage structure of arrays row major column major Stacks Definition, concepts, operation and application of Stacks, Recursion and Polish notations. Queue, Priority Queue definition concepts operation and application of Queue, Dqueue.

UNIT - III

Linear data structures - Pointers and linked allocation concepts and operations on singly linked list, circular linked list, doubly linked lists Associative list Application of linked linear list, Polynomial Manipulation, Multiple precision arithmetic.

UNIT - IV

Trees - Definition and concepts storage representation and Manipulation of Binary tree conversion of general tree to Binary trees, Threaded Binary tree, Multi-linked structure, sparse matrices, Height balance tree, Multi weight tree, B-tree, B+ tree, graph and their representation Matrix representation of graph Breadth first and depth first search, shortest path algorithm.

UNIT - V

Internal Sorting External sorting - Selection sort, Bubble sort Merge sort quick sort, radix sort, Tape sorting; Shell sort, Poly phase and Oscillating sorting, (taking best case/worst case examples) sorting on Disk, Searching-Sequential search, Binary search, Search trees, Hash table methods.

Text & Reference Books

1)   Data Structure - Tremble & Sorenson
2)   Data Structure in `C' Language : by Tanenbaum
3)   Data Structure by Bhagat Singh
        4) Data Structure by Horowitz & Sohani

HUM - 504 Businesses Organization & Financial Management

UNIT-I

Management-evolution, development and modern philosophy, management in India, Scientific Management, Rationalization, Quality Circle Movement, Principals of Management, Nature and Function of Management, Management by Objectives (MBO) and Management by Exception (MBE)-importance, characteristics, applications.

UNIT-II

Organization of industries, nature scope and formation of business organization, various legal forms of Business, Sole Proprietorship, Partnership, Joint Stock Companies, Co-operatives, Labor Co- partnership and Profit sharing, Govt. Ownership, The Joint stock companies, Private Limited, Public Limited, etc.., there characteristics, merits and demerits.

UNIT-III

Objectives and methods of Financial Management, Functions of Financial Management, Source of Finance, Permanent, Long Term, Medium Term, Short Term Sources, The Interest Rates, Simple Interest, Compound Interest, The Cost of Capital, Equity Capital, The Cost of Equity Capital, Retained Earnings, Debt Capital, Gearing, Capital Gearing, Capital Structure Decisions, Tax Planning, Limits of Borrowings, Zero Debt Companies.

UNIT-IV

Financial Statements, Types of Statements, Uses of Financial Statement, Analysis of Financial Statement, Window Dressing, Ratios, Financial Ratios Analysis, Analysis of Balance Sheet, Profit & Loss Account, Fund Flow Analysis, Cash Flow Analysis, Financial Planning.

UNIT-V

Capital Budgeting, Significance, Policies, Capital Investment Appraisal, Risk Evaluation and Sensitivity Analysis, Capital Rationing, Project Finance, Structuring, Risk and Reward, Infrastructure Mechanism, Mega Projects, BOLT, BOT, BOOT, BOO, Revival, Restructuring, Diversifications and Expansion, Sick Industries, SWOT Analysis of a company, Acquisition, Take-Over and Merger, Finance for Take-over, Merger, Valuation.

Text & Reference Books

1) Modern Business   M. C. Shukla.
2) Elements of Management   H. Koontz
3) Fundamentals of Financial Management James c. Van Horne et al
4) Financial Management S. K. Banerjee

MCA - 505   PROGRAMMING FUNDAMENTALS & 'C'

UNIT - I
Programming concepts, C structure, constants, variables and data types different types of operators/expressions. Managing input and output, formatted input and output. Decision making in C, branching looping, if structures, switch, do-while, for and ? : operator, Arrays: one, two and multidimensional arrays.

UNIT - II
Character strings, arithmetic operations on characters, compression of strings, string functions, User defined functions in C, Calling of a function, nesting, and function with arrays, argument passing,, array passing, recursion. Structures, arrays of structures, arrays within structures, structure with in structures. Real life application problem.

UNIT - III
Unions, pointers - definition, initialising pointers, pointer expression, pointers as arrays, pointers and character string, pointers and functions, structures, pointers and Data structure. Dynamic memory allocations and linked list, types of linked lists and applications,

UNIT - IV
Files in C, types of files opening and closing of files, I/O operations, random access to files, macros substitutions, Using and constructing header file, calling functions written in other languages, mathematical functions, functions for date, time. File processes- searching, updating etc.

UNIT - V
Graphics Programming: pixel, identifying pixel position, resolution, video memory, manipulating colors, plotting a graph, cursor, cursor controlling, controlling the screen, mouse programming. Interrupt programming: Accessing ports using DOS, BIOS interrupts, TSR and device drivers, Communication across process: signals, pipes, message queues, semaphores, shared memories.

Text & Reference Books

1) Programming in ANSI C by E Balaguru Swamy (TMM)
2) The spirit of C by M. Cooper
3) Programming in C by Kelly and I.Pohl (Add.Wesley)
4) **Programming with C by B.S. Gottfried (McGraw Hill)**

MCA 541 COMPUTER ORGANIZATION AND ARCHITECTURE

Viva-Voce shall be conducted on Computer Organization and Architecture.

MCA 542 DATA STUCTURE

Viva-Voce shall be conducted on Data Structure. Assignment shall contain implementation of different types of Data Structures in C such as Stack, queue , link list, Tree and different sorting techniques.

MCA 543 PROGRAMMING LAB IN C

Assignment on C on Arrays, Functions, Structures, Pointers, Files and Graphics shall be covered.

Some sample programs
1)   Using pointers write a function that receives a character string and a character as argument and delete all occurrences of this character in the string. The function should return the corrected string with no holes.
2) Given are 2-D arrays A and B which are sorted in ascending order. Write a program to merge them into a single sorted array C that contains every item from arrays A and B, in ascending order.
3) Write a program that dynamically allocates an array large enough to hold any number of test scores the user wishes to enter. Once all the scores are entered, he array should be passed to a function that sorts them in ascending order. Another function should then be called that calculates the average score. The program should display the sorted list of scores and average with appropriate headings. Drop the lowest score, the score should not be included in the calculation of the average.
3) Write a program to create circular link list so that the input order of data item is maintained. Add function to carry out the following operations on circular linked list.
Count the number of nodes
Write out contents
Locate and write the content of a given node
4) Write a program to draw a rectangle and two circles where one circle is inside the rectangle and other is cutting its edges from two opposite sides.
5) Write a program to generate following pyramid of numbers.

```
            0
          1 0 1
        2 1 0 1 2
      3 2 1 0 1 2 3
    4 3 2 1 0 1 2 3 4
  5 4 3 2 1 0 1 2 3 4 5
6 5 4 3 2 1 0 1 2 3 4 5 6
```