

**Harcourt Butler Technological University,
Kanpur-208002**



Revised Syllabus

**First Semester
Master of Computer Applications**

(Effective from the session 2010-11)

Unit – I

Introduction To Computers: Computer hardware Components, peripherals and their functions, Number Systems and conversion methods, Concept of an algorithm; termination and correctness. Algorithms to programs: specification, top-down development and stepwise refinement. Introduction to Programming Environment, Use of high level programming language for the systematic development of programs. Introduction to the design and implementation of correct, efficient and maintainable programs, Structured Programming, Trace an algorithm to depict the logic.

Unit – II

Basic operating System Concepts: Introduction of MS-DOS, WINDOWS, and LINUX Operating Systems, Functional Knowledge of these operating systems. Introduction of Basic Commands of LINUX and Editors, Managing Files and Directories in LINUX. Programming Environment in LINUX, Writing and executing programs in LINUX.

Unit – III

Programming in C: History, Introduction to C Programming Languages, Structure of C programs, compilation and execution of C programs, Debugging Techniques, Data Types and Sizes, Declaration of variables, Modifiers, Identifiers and keywords, Symbolic constants, Storage classes (automatic, external, register and static), Enumerations, command line parameters, Macros, The C Preprocessor.

Unit – IV

Operators: Unary operators, Arithmetic & logical operators, Bit wise operators, Assignment operators and expressions, Conditional expressions, Precedence and order of evaluation. **Control statements:** if-else, switch, break, and continue, the comma operator, goto statement. **Loops:** for, while, do-while. **Functions:** built-in and user-defined, function declaration, definition and function call, and parameter passing: call by value, call by reference, recursive functions, Multi file programs. **Arrays:** linear arrays, multidimensional arrays, passing arrays to functions, Arrays and strings.

Unit – V

Structure and Union: definition and differences, self-referential structure. **Pointers:** value at (*) and address of (&) operator, pointer to pointer, Dynamic Memory Allocation, calloc and malloc functions, array of pointers, function of pointers, structures and pointers. **File Handling in C:** opening and closing a data file, creating a data file, read and write functions, unformatted data files.

Text and References Books:

1. Kernighan, Ritchie, "The C Programming Language", P HI
2. V. Rajaraman, "Fundamentals of Computers", PHI
3. Peter Norton's, "Introduction to Computers", TMH
4. Gottfried, "Programming in C", Schaum's Series, Tat a McGraw Hill
5. Yashwant Kanitkar, "Working with C", BPB
6. E. Balagurusamy, "Programming in ANSI C", TMH

COMPUTER ORGANIZATION (ICA-102)

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Unit-I (Representation of Information and Basic Building Blocks)

Introduction to Computer, Computer hardware generation, Number System: Binary, Octal, Hexadecimal, Character Codes (BCD, ASCII, EBCDIC), Logic gates, Boolean Algebra, K-map simplification, Half Adder, Full Adder, Subtractor, Decoder, Encoders, Multiplexer, Demultiplexer, Carry lookahead adder, Combinational logic Design, Flip-Flops, Registers, Counters (synchronous & asynchronous), ALU, Micro-Operation. ALU- chip, Faster Algorithm and Implementation (multiplication & Division)

Unit-II (Basic Organization)

Von Neumann Architecture, Operational flow chart (Fetch, Execute), Instruction Cycle, Organization of Central Processing Unit, Hardwired & micro programmed control unit, Single Organization, General Register Organization, Stack Organization, Addressing modes, Instruction formats, data transfer & Manipulation, I/O Organization, Bus Architecture, Programming Registers

Unit-III (Memory Organization)

Memory Hierarchy, Main memory (RAM/ROM chips), Auxiliary memory, Associative memory, Cache memory, Virtual Memory, Memory Management Hardware, hit/miss ratio, magnetic disk and its performance, magnetic Tape etc.

Unit-IV (I/O Organization)

Peripheral devices, I/O interface, Modes of Transfer, Priority Interrupt, Direct Memory Access, Input-Output Processor, and Serial Communication. I/O Controllers, Asynchronous data transfer, Strobe Control, Handshaking.

Unit-V (Processor Organization)

Basic Concept of 8-bit micro Processor (8085) and 16-bit Micro Processor (8086), Assembly Instruction Set, Assembly language program of (8086): Addition of two numbers, Subtraction, Block Transfer, find greatest number, Table search, Numeric Manipulation, Introductory Concept of pipeline, Flynn's and Feng's Classification, Parallel Architectural classification, Concept of Pipelining and Multi-Core.

Text and Reference Books:

1. William Stalling, "Computer Organization & Architecture", Pearson education Asia
2. Mano Morris, "Computer System Architecture", PHI
3. Zaky & Hamacher, "Computer Organization", McGraw Hill
4. B. Ram, "Computer Fundamental Architecture & Organization", New Age
5. Tannenbaum, "Structured Computer Organization", PHI.

PROGRAMMING LAB (ICA-151)

Write C program to find largest of three integers.

1. Write C program to check whether the given string is palindrome or not.
2. Write C program to find whether the given integer is
 - (i). a prime number
 - (ii). an Armstrong number.
4. Write C program for Pascal triangle.
5. Write C program to find sum and average of n integer using linear array.
6. Write C program to perform addition, multiplication, transpose on matrices.
7. Write C program to find fibonacci series of iterative method using user-defined function.
8. Write C program to find factorial of n by recursion using user-defined functions.
9. Write C program to perform following operations by using user defined functions:
 - (i) Concatenation
 - (ii) Reverse
 - (iii) String Matching
10. Write C program to find sum of n terms of series: $n - n*2/2! + n*3/3! - n*4/4! + \dots$
11. Write C program to interchange two values using
 - (i). Call by value.
 - (ii). Call by reference.
12. Write C program to sort the list of integers using dynamic memory allocation.
13. Write C program to display the mark sheet of a student using structure.
14. Write C program to perform following operations on data files:
 - (i) read from data file.
 - (ii) write to data file.
15. Write C program to copy the content of one file to another file using command line argument.

IMA-102: DISCRETE STRUCTURES

UNIT I: Fundamentals of Logic:

Propositional Logic: Propositions, Basic logic operations and truth tables, Tautologies, Contradictions, Contingency, Algebra of propositions, Logical equivalence: the laws of logic, Logical implication: Rules of inference, Logical analysis of arguments, Some computing applications (Normal forms), Functionally complete set of operations, Formal proofs.

First Order Logic: Predicates & quantifiers, Nested quantifiers, Use of quantifiers, Rules of inference, Validity of arguments.

Notion of Proofs: Proof by counter example, the contraposition, proof by contradiction, inductive proofs.

UNIT II: Set Theory, Relations and Functions

Set Theory: sets & subsets, Venn diagrams, Set operations and laws, countable and uncountable sets, Cartesian product, Cardinality, Principle of inclusion- exclusion.

Relations: Relation, Representation & properties, n-ary relations and applications, Composition of relations, Closures of relations, Equivalence relation & partitions, partial orders, compatibility relation.

Functions: Functions and its types, Inverse function, Composition of functions, Special functions, Recursively defined functions, Computational Complexity, Analysis of algorithms.

Theorem Proving Techniques: Mathematical induction, strong induction, and well ordering, structural induction, Pigeonhole principle.

UNIT III: Algebraic Structures and Coding

Algebraic Structures: Definition, Properties, Semi group, Monoid, Group, Properties of groups, Subgroup, Cyclic group, Cosets and Lagrange's theorem, Permutation groups, Normal subgroup, Homomorphism and isomorphism of groups, Congruence relation, Rings and Fields. Example and standard results.

Coding Theory: Elements of coding theory, Hamming matrix, Parity-check and generator matrices, Coding and error detection, Group codes: decoding with coset leaders and error correction, Hamming matrices.

UNIT IV: Partially Ordered Structures

Posets,: Definitions, ordered set, Hasse diagram, isomorphic ordered set, well ordered set, Minimal and Maximal elements, LUB & GLB etc.

Lattices: Definition & Properties, Product Lattices, Isomorphic Lattices, Applications, Types of Lattices

Boolean Algebras: Definitions & Properties, SOP & POS forms, Logic gates and minimization of circuits, Karnaugh maps, Quine-McClusky method.

Trees: Definition & Examples and Properties , Rooted tree, Binary tree, Tree traversal, application in computer science and engineering .

UNIT V: Combinatorics and Graph Theory:

Combinatorics: Basic counting techniques, Discrete numeric functions and properties, Recurrence relations and their applications (modelling), various methods of solutions, system of recurrence relations, OGF & EGF, properties, applications: solution of recurrence relations and combinatorial problems. Polya's enumeration theorem and applications.

Graphs: Graphs and graph models, terminology, matrices associated with graphs, Isomorphism, Special types of graphs, connectedness, Euler and Hamilton graphs with their applications, trees with properties, MST, planer graphs and applications, criteria of planarity, Graph coloring and coloring models, directed graphs.

BOOK REFERENCES:

1. Trembley, J.P. & R. Manohar, "Discrete Mathematical Structures with Applications to Computer Science", McGraw Hill.
2. Kenneth H. Rosen, "Discrete Mathematics and its Applications", McGraw Hill.
3. Ralph, P. Garimaldi, "Discrete & Combinatorial Mathematics" Pearson Publication, Asia.
4. Deo, Narsingh, "Graph Theory with applications to Engineering & Computer Science", PHI.
5. Krishnamurthy, V., "Combinatorics Theory & Application", East-West Press Pvt. Ltd., New Delhi.