

U.G. 1st Semester

**Paper: BCA101C (Core)
Fundamental of Computer & C Programming**

Credits: 5 = 3+1+1 (48 Lectures)

UNIT I: Fundamentals of Computer [4 lectures]

Basic concepts of computer organizations. CPU. Memory Unit. Memory Hierarchy, I/O units, Number System Representation.

UNIT II: Introduction to programming languages [8 lectures]

Evolution of programming languages, structured programming, the compilation process, object code, source code, executable code, operating systems, interpreters, linkers, loaders, fundamentals of algorithms, flow charts.

UNIT III: C Language Fundamentals [6 lectures]

Character set, Identifiers, Keywords, Data Types, Type Casting, Constant and Variables, Statements, Expressions, Operators, Precedence of operators, Bit wise operators, Input-output Assignments, Control structures, Decision making and Branching, Decision making & looping.

UNIT IV: C Functions [8 lectures]

User defined and standard functions, Formal and Actual arguments, Functions category, function prototypes, parameter passing, Call-by-value, Call-by-reference, Recursion, Storage Classes.

UNIT V: Arrays and Strings [8 lectures]

One dimensional Array, Multidimensional Array declaration and their applications, String Manipulation.

UNIT VI: Pointers, Structures & Unions [8 lectures]

Pointer variable and its importance, Pointer Arithmetic, passing parameters by reference, pointer to pointer, linked list, pointers to functions, dynamic memory allocation. Declaration of structures, declaration of unions, pointer to structure & unions.

UNIT VII: File Handling [6 lectures]

Console input output functions, Disk input output functions, Data files.

Text Books:

1. Programming in C - Gottfried B.S., TMH
2. The 'C' programming language - B.W. Kernighan, D.M. Ritchie, PHI
3. Programming in C, T. Jayapavan, Vikash Publishing House PVT.LTD

Recommended Books:

1. Programming in ANSI C - Balaguruswami, TMH
2. C The Complete Reference - H. Schildt, TMH
3. Let us C - Y. Kanetkar, BPB Publications
4. A Structured Programming Approach using C – B.A. Forouzan & R.F. Gillberg, THOMSON Indian Edition
5. Computer fundamentals and programming in C – Pradip Dey & Manas Ghosh, OXFORD

Paper: BCA102C (Core)

Discrete Mathematics

Credits: 5 = 4+1+0 (64 Lectures)

UNIT I: Sets & Relations [12 Lectures]

Sets: Types of sets, algebra of sets, Cardinal number in a set, inclusion exclusion principle, power set, intervals, partition of a set, multi sets, ordered pairs, Cartesian product, principles of cartesian product, computer representation of sets; Relations: domain of a relation, range of a relation, types of relations,

properties of relations, equivalence relation, equivalence class, properties of equivalence classes, partitions; partial order relations, closure of relations.

UNIT II: Lattice and Functions [12 Lectures]

Hasse and lattice diagrams for posets; Special elements in posets: Greatest elements, Least elements, Maximal elements, Minimal elements; Lattice : least upper bounds, greatest lower bounds, Algebra of Lattice, Distributive inequalities, Principle of duality, homomorphic image of a lattice, sub lattice, complete lattice, bounded lattice, complemented lattice, distributive lattice, modular lattice; functions, types of functions, composition of functions.

UNIT III: Graph theory [10 Lectures]

Basic Definition of graph. Types of Graph, Undirected Graphs, Directed Graphs, connectivity of graph, cut points cycles, Hamiltonian graphs, trees, different characteristic of trees, bipartite graph, Algorithms on graph, Breadth first search, Depth first search.

UNIT IV: Combinatorics [10 Lectures]

Basic of counting principles, principle of inclusion-exclusion, application of inclusion and exclusion. Pigeonhole principle, generalized Pigeonhole principle and its applications, permutations and combinations, permutations with repetitions, combinations with repetitions, permutations of sets with indistinguishable objects.

UNIT V: Matrices [10 Lectures]

Row and column operations, vectors and matrices, partitioning of matrices, representing relations using matrices, Determinant of a square matrix, minor, cofactor, the Cayley- Hamilton theorem, inverse of a matrix, product form of inverse. Rank of a matrix. Solutions of simultaneous linear equations, existence of solutions, solution by Gaussian elimination, Eigen values and Eigen vectors.

UNIT VI: Logic [10 Lectures]

Connectives, truth tables, Normal forms- CNF, DNF, Converting expressions to CNF and DNF, Theory of inference, Propositional calculus. Boolean Algebra. Predicate calculus (only introduction), predicates and quantifiers.

Textbooks:

1. Discrete Mathematics, S.K. Sarkar, S Chand.

Recommended Books:

1. Elements of Discrete Mathematics, C. L. Liu, Mc-Graw Hill International Ed.
2. Discrete Mathematics and its Applications, K. H. Rosen, Mc-Graw Hill International Ed.
3. Discrete Mathematics structures with applications to Computer Science, J. P. Tremblay and R. Manohar, Mc-Graw Hill
4. Discrete Mathematics, N. Ch.SN Iyengar, K.A. Venkatesh, V. M. Chandrasekaran, P. S.Arunachalam, Vikash Publishing House Pvt Ltd.
5. Logic for Computer Science, J. H. Gallier, J. Wiley and sons.