

Kumaun University, Nainital, Uttarakhand
BACHELOR OF COMPUTER APPLICATION
Session 2019-2020

SYLLABUS FOR BCA

Year	Semester	Paper Code	Title of Paper
First Year	I	BCA 111	Communicative English
		BCA 112	Basic Mathematics
		BCA 113	Computer Fundamentals
		BCA 114	Introduction to C Language
		BCA 115	Lab: Practical (C & Unix basics)
	II	BCA 211	Discrete Mathematics
		BCA 212	Introduction to C++
		BCA 213	Data Structures
		BCS 214	Digital Electronics
		BCS 215	Lab: Practical (C++)

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BCA 111: Communicative English

Unit I

Communication:

What is Communication, Levels of Communication, Importance, Scope and Process of communication, Essentials of good communication, 7 Cs of communication, Channels of communication, Verbal and Non-Verbal communication, Formal and Informal communication, Barriers to communication.

Unit II

Written Communication:

Objectives of written Communication, Media of written communication, Merits and demerits of written communication. Words and Phrases, Guidelines for Effectiveness, Sentence Construction, Paragraph Development, Essay writing, Precise Writing.

Unit III

Oral Communication:

Principles of effective oral communication, Media of oral communication, Advantages of oral communication, Disadvantages of oral communication, Styles of oral communication.

Unit IV

Oral Forms of Communication:

Effective listening, Active vs. Passive Listening, Effective Presentation Strategies, Effective Use of Visual Aids, Interviews, Types of Interviews, Group Discussion, Meetings, Conferences

Unit V

Written Forms of Communication:

Business letters, Preparation of resume, Office memorandum, Letter writing, Memorandums, E-mails, Report Writing, Technical Proposals.

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BCA 112: Basic Mathematics

Unit I

Integral Calculus: Integral as an inverse of Differentiation. Integration by parts. Methods of substitution & use of partial fractions, standard forms and simple examples, Definite integral & their applications to areas and length & Curves.

Unit II

Limits and Continuity: Definition of Limit, Algebra of limits, Right & left-hand limits, Infinite limits, Continuity (Definitions & examples, Algebra of Continuous functions), Differentiability, Rolle's. Mean value theorem with numerical problems.

Unit III

Co-ordinate Geometry: System of lines, System of Circles, Standard equations & properties of parabola & ellipse.

Unit IV

Matrices: Definition, Types of matrices, Laws of operations on matrices, Transpose, adjoint and inverse of matrices, solution of linear system of equations, and Cramer's rule, Rank of Matrices, square Matrices, Eigen values, Eigen Vectors, Characteristic polynomials, Cayley Hamilton theorem.

Unit V

Differential Equation: First order and first-degree differential equations, separation of variables, Homogeneous, linear, exact differential equations, second order linear equations with constant coefficients, Orthogonal trajectories.

Recommended Books:

1. Bansi lal & S. Arora" Two-Dimensional Co-ordinate Geometry" S. chand
2. S.C.Gupta 'Matrices", S. Chand
3. R.S. Agarwal Differential Calculus S. Chand
4. Harikrishna Real Analysis S.Chand

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BCA 113: Computer Fundamentals

UNIT I

Introduction to Computer: Evolution of computers, Generation of Computers, Classification of Computers, Analog Digital and Hybrid Computers, Classification of Computers according to size, Super Computers, Mainframe Computers, Personal Computers (Different Types), Components of Computer System, Advantages and Disadvantages of Computer System, Block Diagram of a Digital Computer, Basic introduction to Input/ Output Devices.

UNIT II

Data Representation: Different number systems and their conversions (Decimal, Binary, Octal, and Hexadecimal), 1's Complement and 2's complement, Floating Point numbers, Binary arithmetic, Coding Techniques – BCD, EBCDIC, Gray, and Excess-3.

UNIT III

Memory: Memory hierarchy, Registers (Types of Registers), Cache Memory, **Primary Memory** (RAM, how data is stored in a RAM, DRAM and SRAM. ROM (BIOS/ Firmware & Types of ROM). **Secondary Memory** (Hard disk: Structure of a hard disk, how data is stored in a hard disk, concept of tracks, sectors, clusters, cylinders, Various Storage Devices (Magnetic Tape, Floppy Disks, Optical Disks, SD/MMC Memory cards, USB Pen drive).

UNIT IV

Software: Software and its Need, Types of Software: - System software, Application software. Definition of Operating System, History of Operating System, Function of Operating System, OS classification (Batch, Multiprogramming, Multitasking, Multithreading, Multiprocessing, Multiuser, Time sharing, Real time).

UNIT V

High level language and low-level language, Hardware, Firmware, Compiler, Interpreter and Assembler. **Introduction:** Virtual reality, augmented reality, Bluetooth, Wi-Fi, **Network Fundamental:** Categories, Data flow, Topology. **Introduction:** UNIX, Basic Commands

Recommended Books:

1. Fundamentals of Computers- V. Rajaraman
2. Fundamentals of Computers- P. K. Sinha

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BCA 114: Introduction to C Language

UNIT I:

Evolution of C, Programming languages, Structure of a C program, Compiling a C program, Character set in C, Keywords in C, Hierarchy of operators, Basic data types, Qualifiers used with basic data types, Variables in C, Type declaration, Output function, Input function and format specifiers, arithmetic operators, Unary operators, Relational and logical operators.

UNIT II:

if statement, if else statement, for statement, while loop, do while statements, break statements, continue statements, switch statement, goto statement, ternary operators.

UNIT III:

Advantages of arrays, types of arrays, array declaration, array initialization, accessing data from array, array inside the memory, multidimensional arrays. Character arrays, Array overflow, String Variables, Reading & writing strings, string handling functions.

UNIT IV:

Advantages of functions, declaring a function, calling a function, variables, passing arguments to a function, nested functions, passing array to functions, recursion in functions, Call by value and Call by reference. Pointers and function, Array of pointers, Pointer and Strings, Pointer to structure, Pointers within structure, Introduction of Static and Dynamic memory allocation, Dynamic memory allocation, DMA functions, malloc () function, Size of () operator, Function free (), Function realloc ().

UNIT V:

Introduction, File structure, File handling function, File types, Streams, Text, Binary, File system basics, The file pointer, Opening a file, Closing a file, Writing a character, Reading a character, Using fopen(), getc(), putc(), and fclose(), Using feof().

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BCA 211- Discrete Mathematics

Unit I

Propositional Logic: Propositions, Logical connectives, Compound propositions, Conditional and biconditional propositions, Truth tables, Tautologies and contradictions, Contrapositive, Logical equivalences and implications, DeMorgan's Laws, Normal forms, Principal conjunctive and disjunctive normal forms, Rules of inference, Arguments, Validity of arguments.

Unit II

Predicate Calculus: Predicates, Statement function, Variables, Free and bound variables, Quantifiers, Universe of discourse, Logical equivalences and implications for quantified statements, Theory of inference, The rules of universal specification and generalization, Validity of arguments.

Unit III

Set Theory: Basic concepts, Notations, Subset, Algebra of sets, The power set, Ordered pairs and Cartesian product, Relations on sets, Types of relations and their properties, Relational matrix and the graph of a relation, Partitions, Equivalence relations, Partial ordering, Poset, Hasse diagram, Lattices and their properties, Sublattices, Boolean algebra, Homomorphism.

Unit IV

Functions: Definitions of functions, Classification of functions, Type of functions, Examples, Composition of functions, Inverse functions, Binary and n-ary operations, Characteristic function of a set, Hashing functions, Recursive functions, Permutation functions.

Unit V

Groups: Algebraic systems, Definitions, Examples, Properties, Semigroups, Monoids, Homomorphism, Sub semigroups and Submonoids, Cosets and Lagrange's theorem, Normal subgroups, Normal algebraic system with two binary operations, Codes and group codes, Basic notions of error correction, Error recovery in group codes.

Recommended Books:

1. Trembly J.P and Manohar R, "Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw-Hill Pub. Co. Ltd,
2. Ralph. P. Grimaldi, "Discrete and Combinatorial Mathematics: An Applied Introduction", Fourth Edition, Pearson Education Asia,

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BCA 212: Introduction to C++

UNIT I:

Procedural vs. Object oriented programming, The main function, C++ preprocessors and the <iostream.h> file, C++ input and output with cin and cout. Simple variables, naming simple variables, Integer types, Floating types, Operators, Operator precedence and associativity, Type conversion, symbolic constants, Derived data types, Arrays, strings, structure, reference variables, new and delete operators. Relational expression in C++, relational operators, for loop, while loop, do-while loop, if-else statement, logical operators, conditional operators, switch statements, break and continue statements.

UNIT II:

Defining a function, function prototyping and function calls, function arguments, passing by reference, inline functions, default arguments.

UNIT III:

Defining classes, implementing member functions, class constructor and destructor, this pointer, friend function, examples based on class and object problems. Base classes, derived classes, implementing and using derived classes, virtual base class, types of inheritance. Problem based on multiple inheritance

UNIT IV:

Stream classes, output with ostream class methods, input with cin, introduction with file handling. Memory Leak, Memory Leak Prevention, Smart pointers, unique_ptr.

UNIT V:

Standard Template Library: STL containers containing vectors, list, queue, map, set, hash_map, hash_set. STL algorithms functions: Sorting Algorithms functions: sort, partial_sort. Searching Algorithms functions: binary_search, lower_bound, upper_bound, equal_range. Non-Modifying Algorithms: count, equal, mismatch, search, search_n. Modifying Algorithms functions: copy, copy_n, fill, fill_n, move, transform, generate etc

Recommended Books:

1. E. Balagurusamy: Object oriented programming with C++
2. K.R. Venugopal: Mastering C++
3. Bjarne Stroustrup: The C++ programming language.

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BCA 213: Data Structure

UNIT I

Introduction: Basic Terminology, Data type, Data object, Need of Data Structure, Types of Data Structure, Elementary Data Organization, Data Structure operations, Algorithm Complexity and Time-Space trade-off.

UNIT II

Arrays, Single and Multidimensional Arrays, address calculation, application of arrays, Linked list: Representation and implementation of Singly Linked Lists, Header List, Traversing and Searching of Linked List, Overflow and Underflow, Insertion and deletion to and from Linked Lists, Doubly linked list.

UNIT III

Stacks: Array and linked representation and implementation of stack, Operations on Stacks: Push & Pop, Applications of stack: Conversion of Infix to Prefix and Postfix Expressions, Evaluation of postfix expression using stack. Recursion: Introduction, recursion in C, example of recursion, recursive functions. Queues: Array and linked representation and implementation of queues, Operations on Queue: Create, Insert, Delete, Full and Empty. Circular queue, Deques, and Priority Queues.

UNIT IV

Trees: Basic terminology, Binary Trees, Binary tree representation, algebraic expressions, Complete Binary Tree., Traversing Binary trees, Binary Search Tree, searching BST, insertion and deletion in BST. Graph: Basic terminology, Traversal: BFS, DFS. Spanning Tree: Prims, Kruskal Algorithm, Dijkstra's Algorithm.

UNIT V

Searching- Sequential search, binary search. Sorting algorithms with efficiency- Bubble sort, Insertion sort, Merge sort, Quick Sort, Selection Sort

Recommended Books:

1. Data Structures- Seymour Lipschutz
2. Data Structures using C and C++- Tanenbaum

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BCA 214: Digital Electronics

Unit I

Fundamental concepts: Digital Computer and Digital Systems, Binary Numbers, Number Base Conversion, Complements, Binary Codes.

Unit II

Boolean algebra and logic gates: Basic Theorem and Properties of Boolean Algebra, Boolean functions, Canonical and standard forms. Digital logic gates, Simplification of Boolean functions: two and three variable Maps, four variable maps. POS simplification, NAND and NOR Implementation, don't care conditions.

Unit III

Combinational Logic Design: Design procedure, Adders, Subtractors, Code conversion, Binary Parallel adder, Decimal adder, Magnitude Comparator, Decoder, Encoder, Multiplexers, De-Multiplexers, Parity generation and checking.

Unit IV

Sequential Logic Design: Flip-flops: Basic flip-flop, RS, JK, D, T, Triggering of flip-flops, Analysis of clocked sequential circuits, state reduction and assignment, flip-flop excitation tables

Unit V

Registers, Counters and the Memory unit Registers, shift registers, Counters, Asynchronous and synchronous counters, Ripple counters. Memory-RAM, ROM, Programmable logic array (PLA).

Recommended Books:

1. "Modern Digital Electronics" - R.P. Jain
2. Digital logic and Computer design- M. Morris Mano