



SARDAR PATEL UNIVERSITY, BALAGHAT

School of Computer Application

Syllabus under NEP

Course: Bachelor of Computer Applications (BCA)

Semester: II

Branch: Computer Science and Application

w.e.f. Academic Session: 2025-26

Subject: Programming in C++ (BCAMA201T)

UNIT – I

Object oriented Programming, Concepts, Advantages, Usage. C++ Environments: Program Development, Environment C++ language standards. Introduction to Various C++ compilers, C++ Standard Libraries, Prototype of main() Function, Data types. Classes & Objects- Classes, Structure & Classes, Union & Classes, Friend Function, Friend classes, Inline Function, Scope Resolution Operator, Static Class Members, Static Data Member, Static Member Function, Passing Objects to Function, Returning Objects, Object Assignment.

UNIT – II

Array, Pointers References & The Dynamic Allocation operators Array of Objects, Pointers to Object, Type Checking C++ Pointers, The This Pointer, Pointer to Derived Types, Pointer to Class Member, Reference parameter, Passing references to objects, Returning Reference, Independent Reference. C++ S Dynamic Allocation Operators, Initializing Allocated Memory, Allocating Array, Allocating Objects.

UNIT – III

Constructor & Destructor: Introduction, Constructor, Parameterized constructor, Multiple Constructor in a class, Constructor with Default Argument, Copy Constructor, Default Argument, Destructor, Function & Operator Overloading Function Overloading, Overloading Constructor Function Finding the address of an Overloaded Function.

UNIT – IV

Operator Overloading: Creating a member, Operator Function, Creating Prefix & Postfix forms of the increment & decrement operation, Overloading the shorthand operation (i.e. +=, -=, etc.), Operator overloading restriction, Operator overloading using friend function, Overloading New & Delete, Overloading some special operators, Overloading [], (), -, comma operator, Overloading <<.

UNIT – V

Inheritance- Base Class Access Control, Protected Member, Protected Base Class Inheritance, Inheriting Multiple Base classes, Constructors, Destructors, Destructors & Inheritance, When Constructor & Destructor Function, Passing parameters to base class constructors. Granting access, Virtual base classes. Virtual functions & Polymorphism: Virtual function, Pure Virtual function, Early vs. Late binding.

Text and Reference Books:

1. Herbert Shield, C++ The complete Reference, TMH Publication.
2. R. Subburaj, Object Oriented Programming with C++ Vikas Publishing House, New Delhi.
3. E. Balguruswamy, C++, TMH Publication.
4. M. Kumar Programming in C++, TMH Publications.
5. R. Lafore, Object Oriented Programming C++.
6. Ashok. N. Kamthane, "Object Oriented Programming With ANSI & Turbo C++", Pearson Education Publication.



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Programming in C++ Lab:

1. Write a program that just outputs "Hello" World.
2. Write a program that output value as number and as character.
3. Implementation of the function that calculates the cross sum of an integer.
4. Determine number of characters in a string.
5. Write a program to find factorial of a given number.
6. Write a program to demonstrate use of static data member.
7. Write a program to demonstrate use of static member function.
8. Write a program to create array of objects.
9. Write a program to demonstrate use of friend function.
10. Write a program to illustrate use of copy constructor.
11. Write a program to demonstrate Constructor overloading.
12. Write a program to illustrate use of destructor.
13. Write a program to overload a unary operator.
14. Write a program to overload a binary operator.
15. Write a program to demonstrate single Inheritance.
16. Write a program to demonstrate multiple Inheritance.
17. Write a program to demonstrate multilevel Inheritance.
18. Write a program to demonstrate hierarchical Inheritance.
19. Write a program to demonstrate hybrid Inheritance.
20. Write a program to demonstrate the use of function overloading.

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Subject: Data Structure using C (BCAMA202T)

UNIT - I

The Concept of Data Structure, Abstract Data Types, Concept of List & Array, Introduction to Stack, stack as an Abstract Data Types, Primitive Operation on Queues, Stack's Application – Infix, Postfix, Prefix and Recursion. Introduction to Queues, Primitive Operations on Queues, Queues as an Abstract Data type, Circular Queue, Dequeue, Priority Queue, Applications of Queue.

UNIT – II

Linked List – Introduction to Linked List, Memory Representation of Linked List, Operations on Linked List, Linked List Representation of stack and Queue, Header Nodes. Types of Linked List – Doubly Linked List, Circular Linked List, Application of Linked List.

UNIT - III

Trees – Basic Terminology of Trees, Binary Trees, Trees Representations as Array & Linked List. Binary Tree Representation. Traversal of Binary trees – In order, Preorder & Post order, Application of Binary Tree, Threaded Binary tree, Height Balanced tree, B – tree.

UNIT – IV

Analysis of Algorithm, Complexity with Big'O' Notation, Searching – Sequential Search, Binary Search and their Comparison, Sorting – External & Internal Sorting, Insertion Sort, Selection Sort, Quick Sort, Bubble Sort, Heap Sort, Comparison of Sorting Methods.

UNIT – V

Graphs – Introduction to Graphs, Basic Terminology, Directed, Undirected & Weighted graph, Representation of Graphs, Graph Traversals – Depth First & Breadth First Search, Spanning trees, Minimum Spanning Tree, Applications of Graphs: Shortest path Problem using Dijkstra Method.

Text Books:

1. Lipschuists, "Data Structure", Schaum's Outline Series, Mcgraw Hill publication.
2. Ellis Horowitz and Sartaj Sawhney, "Fundamentals of Computer Algorithm"

Reference Books:

1. T Ramble & Sorenson." Data Structure"
2. S. Shawnee & E. Horowitz," Fundamentals of Data Structure"
3. Adam Drozdek, Data Structures and algorithm in C++", Third Edition, Engage Learning, 2012.
4. Sartaj Sahni, "Data Structures, Algorithms and Application in C++", Second Edition, Universities Press, 2011.
5. Aaron M. Tenenbaum, Moshe J. Algorithms Yedidyah Langsam, "Data Structures Using C and C++", Second edition, PHI, 2009.
6. Robert L. Kruse, "Data Structure and Program Design in C++", Pearson.

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Data Structure Lab:

1. Program to maintain a Linked List.
2. Program to add a new node to the ascending order Linked List.
3. Program to maintain a Doubly Linked List.
4. Program to implement Stack as an Array.
5. Program to implement Stack as a Linked List.
6. Program to convert an A.E. from index form to postfix form.
7. Program to evaluate an Expression entered in Postfix form.
8. Program to Implement Non-Recursive function for Factorial of a Number.
9. Program to implement recursive function for Factorial of a Number.
10. Program to Implement a Queue as an Array.
11. Program to Implement a Queue as a Linked List.
12. Program to Implement a Circular Queue as a Linked Array.
13. Program to Implement a Circular Queue as a Linked List.
14. Program to Implement a Dequeue using an Array.
15. Program to Implement Linear Search in an Unsorted Array.
16. Program to Implement Binary Search in a Sorted Array.

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Subject: Digital Electronics (BCAMI203T)

UNIT - I

Data representation Data Types and Number Systems, Binary Number System, Octal & Hexa-Decimal Number System, Fixed Point Representation, 1's & 2's Complement, Binary, Arithmetic Operation on Binary Numbers, Overflow & Underflow, Floating Point Representation, Codes, ASCII, EBCDIC Codes, Gray Code, Excess-3 & BCD, Error Detection & Correcting Codes Binary Storage and Registers.

UNIT - II

Boolean algebra and digital logic circuits – Logic Gates, AND, OR, NOT,, NOR, NAND & XOR Gates and their Truth Tables, Boolean Algebra, Basic Definition and properties, Basic Boolean Law's Demorgan's Theorem, Minimization Techniques, K Map – Two, Three and More Variables maps, Sum of product & Product of Sums, Don't care conditions.

UNIT - III

Combination Circuits – Half adder & Full adder, Full Subtract or, Full Subtract or and decimal adder, code Conversion, Multilevel NAND and NOR Circuits, Decimal adder, decoders, Multiplexers and DE multiplexers.

UNIT - IV

Sequential logic- Flip-Flops – RS, D, JK & T Flip-Flop, Triggering flops in flip, Analysis of Clocked Sequential Circuits, state Reduction and Assignment, flip flop excitation tables, Design procedure and design of counters. Design with equations.

UNIT - V

Registers, Counters and the memory unit, Shift registers, Ripple counters and synchronous counters, Inter-register Transfer, Arithmetic Logic and Shift Micro Operation, Conditional Control Statement, Statement, Instruction Codes, Processor organization, design of a simple computer.

Reference Books:

1. Digital Logic And computer Design By Morris Mano.
2. Computer System Architecture By Morris Mano.



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Subject: Communicative English (BCAAEC204T)

UNIT - I: Basics of Communication:

Introduction, Definition, Importance of Communication, Modes of Communication, The Communication Process – Source, Message, Encoding, Channel, Decoding, Receiver, Feedback, Context.

Barriers to Communication: Physiological Barriers, Physical Barriers, Cultural Barriers, Language Barriers, Gender Barriers, Interpersonal Barriers, Psychological Barriers, Emotional barriers Perspectives in Communication: Introduction, Visual Perception, Language, Other factors affecting our perspective - Past Experiences, Prejudices, Feelings, Environment.

UNIT - II: Elements of Communication:

Introduction, Face to Face Communication – Tone of voice, Body Language (Non-Verbal Communication), Verbal Communication Physical Communication

Communication Styles: Introduction, The Communication styles Matrix with example for each, Direct Communication style, Spirited Communication style, Systematic Communication style, Considerate Communication style.

UNIT - III: Basic Listening Skills:

Introduction, Self-awareness, Active Listening, Becoming an Active Listener, Listening in Difficult Situations

UNIT - IV: Identifying Common Errors in Writing:

Articles, Subject-Verb Agreement, Prepositions, Active and Passive Voice, Reported Speech: Direct and Indirect, Sentence Structure.

UNIT - V: Vocabulary Building and Comprehension:

Acquaintance with prefixes and suffixes from foreign languages in English to form derivatives, synonyms, antonyms, Reading comprehension.

Text Books

1. Communication Skill, Sanjay Kumar and Pushp Lata , OUP2011.
2. Communication Skills And Soft Skills: An Integrated Approach by Suresh Kumar, Sreehari, Savithri [Pearson].
3. Communication Skill by Dr. Gajanan Malviya, Prof. R.N. Shukla, [S. Chand.].



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Subject: Environmental Studies (BCAVAC205T)

UNIT – I: Study of Environment and Ecology

Definition and importance. Public participation and public awareness. Ecology – Introduction Ecosystem – Concepts, components structure & function, energy flow, food, chain, food web, ecological pyramids and types.

UNIT – II: Environmental Pollution and Population

Air, Water, noise, heat and nuclear pollution – definition causes, effect and Prevention of pollution. Population growth, disparities between countries Population explosion, family welfare program. Environment and human health. Cleanliness and disposal of domestic waste.

UNIT – III: Natural resources, Problems and Conservation

Water resources

Forest resources

Land resources

Food resources

Energy resources

UNIT – IV: Bio – diversity and its Protection

Introduction – Genetic, species and ecosystem diversity. Value of bio-diversity – Consumable use: Productive use, Social, Moral and Aesthetic values. India as a nation of mega bio – diversity centre, bio – diversity at national and local levels. Threats to bio-diversity – Loss of habitat, poaching of wildlife, man and wildlife conflicts.

UNIT – V: Disaster Management and Environment laws

Disaster Management – flood, earthquake, cyclones and landslides. Conservation of laws for air and water pollution. Wildlife conservation laws. Role of information technology in protecting environment and health.

Reference Books

1. **Environmental Studies** by Erach Bharucha – A widely adopted text across Indian universities, covering ecological concepts, biodiversity, pollution, and sustainable development.
2. **Fundamentals of Environmental Studies** by S.V.S. Rana – Provides a clear introduction to environmental science with practical examples.
3. **Environmental Science: Principles and Practices** by M. C. Dash – Focuses on environmental issues, conservation, and management strategies.
4. **Ecology and Environment** by P.D. Sharma – A comprehensive book that explains ecological principles and environmental challenges in detail.
5. **Environmental Studies: From Crisis to Cure** by Rajagopalan – Discusses environmental problems and solutions with case studies relevant to India.