PART A: Introduction				
Program: **Certificate**		Class: **B.C.A.**	Year: **I Year**	Session: **2025-26**
Subject: **Computer Applications**				
1.	Course Code			
2.	Course Title	**Programming Methodology (Theory)**		
3.	Course Type (Core Course/DSE/Minor/MD-ID/ SEC/VOC)	**Major – II** (Core Course)		
4.	Pre-Requisite (if any)	To study this course, a student must have basic knowledge of Computers.		
5.	Course Learning Outcomes (CLO)	**After the completion of this course, a successful student will be able to do the following**: 1. Develop simple algorithms and flow charts to solve a problem with programming using top down design principles. 2. Writing efficient and well-structured computer algorithms/programs. 3. Learn to formulate iterative solutions and array processing algorithms for problems. 4. Use recursive techniques, pointers and searching methods in programming.		
6.	Credit Value	**Theory – 4 Credits**		
7.	Total Marks	Max. Marks : **30 + 70**	Min. Passing Marks: **35**	

PART B: Content of the Course		
No. of Lectures (in hours per week): **2 Hrs. per week**		
Total No. of Lectures: **60 Hrs.**		
Module	**Topics**	**No. of Lectures**
I	**Indian Knowledge System:** Ancient Indian Contribution: Brahmagupta "Chakravala method", Aryabhata Algorithm. The Panini Grammar System (Ashtadhyayi). Modern Contribution: Origin of Julia Programming Language, Indian Scientist who designed new programming languages and open source languages. ***Suggested Activities:*** *Discuss how Panini's grammar rules resemble formal grammar in programming languages, Aryabhata Algorithm.*	02

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II	**Introduction to Programming** - Program Concept, Characteristics of Programming, Stages in Program Development, Algorithms, Notations, Design, Flowcharts, Types of Programming Methodologies. **Basics of C++:** A Brief History of C++, Application of C++, Compiling & Linking, Tokens, Keywords, Identifiers & Constants , Basic Data Types, User-Defined Data Types, Symbolic Constant, Type Compatibility, Reference Variables, Operator in C++, Scope Resolution Operator, Member Dereferencing Operators, Memory Management Operators, Manipulators, Type Cast Operator. Conditional Statements if construct, switch-case construct. Iterative Statements: while, do-while, and for loops, use of break and continue in loops, Using Nested Statements (Conditional as well as Iterative). ***Suggested Activities:*** *Implement a console-based quiz using formatted I/O, Use flowcharts and pseudocode tools to map variable types and memory usage.*	12
III	**Functions In C++:** The Main Function, Function Prototyping, Call by Reference Call by Address, Call by Value, Return by Reference, Inline Function, Default Arguments, Constant Arguments, Function Overloading, Function with Array.	10
IV	**Classes & Objects:** A Sample C++ Program with class, Defining Member Functions, Making an Outside Function Inline, Nesting of Member Functions, Private Member Functions, Arrays within a Class, Memory Allocation for Objects, Static Data Members, Static Member, Functions, Array of Objects, Object as Function Arguments, Friend Functions, Virtual functions, Returning Objects, Constant member functions, Pointer to Members, Local Classes. ***Suggested Activities:*** *Combine all the modules to create a comprehensive Library Management System with features like adding books, managing users, calculating late fees, and tracking library statistics. Design a Simple Banking System in C++.*	12
V	**Constructor & Destructor:** Constructor, Parameterized Constructor, Multiple Constructors in a Class, Constructors with Default Arguments, Dynamic Initialization of Objects, Copy Constructor, Dynamic Constructor and Destructor. **Inheritance:** Defining Derived Classes, Single Inheritance, Making a Private Member Inheritable, Multilevel Inheritance, Hierarchical Inheritance, Multiple Inheritance, Hybrid Inheritance.	12

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	Suggested Activities: *Building a Simple Student Management System, Designing a Vehicle Management System. Implement dynamic memory allocation for managing multiple vehicles.*	
VI	**Various types of Classes:** Virtual Base Classes, Abstract Classes, Constructor in Derived Classes, Nesting of Classes. **Operator Overloading** & Type Conversion, Polymorphism. **Pointers:** Pointers with Arrays C++. **Streams**: C++ Stream Classes, Unformatted I/O Operation, Formatted I/O Operation, Managing Output with Manipulators, Exception Handling.	12
	Suggested Activities: *Create a Shape Management System to manage different geometric shapes like Circle, Rectangle, and Triangle. Develop a Payroll System for managing employee salaries.*	

PART C: Learning Resources
Textbooks, Reference Books, Other Resources
Suggested Readings:
Textbooks: 1. Gerard G. Emch, R. Sridharan, M. D. Srinivas: Contributions to the History of Indian Mathematics, Hindustan Book Agency, Vol. 3, 2005. 2. Udayan S. Patankar & Sunil M. Patankar: Elements of Vedic Mathematics, TTU Press, Tallinn 2018. 3. J. R. Hanly and E. B. Koffman, “Problem Solving and Program Design in C”, Pearson, 2015. 4. E. Balguruswamy, "C++ ", TMH Publication ISBN O-07-462038-X 5. Herbert Shildt, "C++ The Complete Reference "TMH Publication ISBN 0-07-463880-7. 6. मध्य प्रदेश हिन्दी ग्रंथ अकादमी की पुस्तकें। **Reference Books:** 1. R. Lafore, 'Object Oriented Programming C++" 2. N. Dale and C. Weems, “Programming and problem solving with C++: brief edition”, Jones & Bartlett Learning.
Suggestive Digital Platform Web Links:
https://www.eshiksha.mp.gov.in/mpdhe
Suggested Equivalent Online Courses:
https://nptel.ac.in/courses/106/105/106105151/ https://nptel.ac.in/courses/106/105/106105234/

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Part D: Assessment and Evaluation		
Suggested Continuous Evaluation Methods: Maximum Marks: **100** Continuous Comprehensive Evaluation (CCE): **30** Marks University Exam (UE): **70** Marks		
Internal Assessment: Continuous Comprehensive Evaluation (CCE)		**Total Marks: 30**
External Assessment: University Exam Section Time: 03.00 Hours	**Section (A) :** Very Short Questions **Section (B) :** Short Questions **Section (C) :** Long Questions	**Total Marks: 70**

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Subject: **Computer Applications**				
1.	Course Code			
2.	Course Title	**Programming Methodology (Practical)**		
3.	Course Type (Core Course/DSE/Minor/MD-ID/ SEC/VOC)	**Major – II** (Core Course)		
4.	Pre-Requisite (if any)	To study this course, a student must have basic knowledge of Computers.		
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6.	Credit Value	**Practical – 2 Credits**		
7.	Total Marks	Max. Marks: **100**	Min. Passing Marks: **35**	

PART B: Content of the Course		
No. of Lab Practicals (in hours per week): **1 hours per week**		
Total No. of Lab.: **30 Hrs.**		
	Suggestive list of Practical's	**No. of Labs.**

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	Given the problem statement, students are required to formulate problem, develop flowchart/algorithm, write code in C++, execute and test it. Students should be given assignments on following: 1. Write a program to swap the contents of two variables. 2. Write a program for finding the roots of a Quadratic Equation. 3. Write a program to find area of a circle, rectangle, square using switch case. 4. Write a program to print table of any number. 5. Write a program to print Fibonacci series. 6. Write a program to find factorial of a given number using recursion. 7. Write a program to convert decimal (integer) number into equivalent binary number. 8. Write a program to check given string is palindrome or not. 9. Write a program to print digits of entered number in reverse order. 10. Write a program to print sum of two matrices. 11. Write a program to print multiplication of two matrices. 12. Write a program to generate even/odd series from 1 to 100. 13. Write a program whether a given number is prime or not. 14. Write a program for call by value and call by reference. 15. Write a program to create a pyramid structure 1 12 123 1234 16. Write a program to check entered number is Armstrong or not. 17. Write a program to input N numbers and find their average. 18. Write a program to find the area and volume of a rectangular box using constructor. 19. Write a program to design a class time with hours, minutes and seconds as data members. Use a data function to perform the addition of two time objects in hours, minutes and seconds. 20. Write a program to implement single inheritance.	30 Hrs.

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2. Udayan S. Patankar & Sunil M. Patankar: Elements of Vedic Mathematics, TTU Press, Tallinn 2018. 3. J. R. Hanly and E. B. Koffman, “Problem Solving and Program Design in C”, Pearson, 2015 3. E. Balguruswamy, "C++ ", TMH Publication ISBN O-07-462038-X 4. Herbert Shildt, "C++ The Complete Reference "TMH Publication ISBN 0-07-463880-7. 5. मध्य प्रदेश हिन्दी ग्रंथ अकादमी की पुस्तकें। **Reference Books:** 1. R. Lafore, 'Object Oriented Programming C++" 2. N. Dale and C. Weems, “Programming and problem solving with C++: brief edition”, Jones & Bartlett Learning.
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PART D: Assessment and Evaluation			
Suggested Continuous Evaluation Methods:			
Internal Assessment	**Marks**	**External Assessment**	**Marks**
Class Interaction/Quiz		Viva voce practical	
Attendance		Practical record file	
Assignments (Charts/ Model/Seminar/Rural Services/ Technology Dissemination/Report of Excursion/Lab visit/ Survey/Industrial Visit)		Table work/Experiment	
Total	**30**		**70**

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