



**Government Holkar (Model, Autonomous) Science
College, Indore (M.P.)**

Computer Science Department

Part A - Introduction			
Programme - B.Sc. (Computer Science - Major)	Class – B.Sc. II Semester	Year- 2025	Session- 2024-25
Course Type (Computer Science) – Major			
1	Course Code	S2-CSC1T	
2	Course Title	Programming Methodologies & Data Structures	
3	Pre – requisite (if any)	To study this course, a student must have had the subject Physics/ Mathematics in 12th class	
4	Course Learning Outcomes (CLO)	On completion of this course, learners will be able to: <ol style="list-style-type: none">1. Recall the basic principles of algorithm design and their application in problem-solving. (Remembering)2. Explain the importance of efficiency and readability in computer programming and demonstrate understanding by writing efficient and well-structured algorithms.(Understanding)3. Analyze complex problems and apply recursive techniques, pointers, and searching methods to devise efficient solutions and assess the tradeoffs among different data structure implementations. (Analyzing)4. Formulate iterative solutions and develop array processing algorithms for problems, utilizing appropriate control structures and data manipulation techniques. (Applying)5. Evaluate the applications and efficiency of algorithms for searching, sorting, and other operations in different contexts. Recognize and evaluate the contributions made by Indian programmers and computer scientists in the field of programming and data structures. (Evaluating)	
5	Credit Value	4 Credits	
6	Total Marks	Formative Assessment (CCE) – 40 Marks Summative Assessment (End Semester Exam) – 60 Marks Total 40+60= 100 Marks	Minimum Pass Marks – 35

Dr. Pradeep Sharma

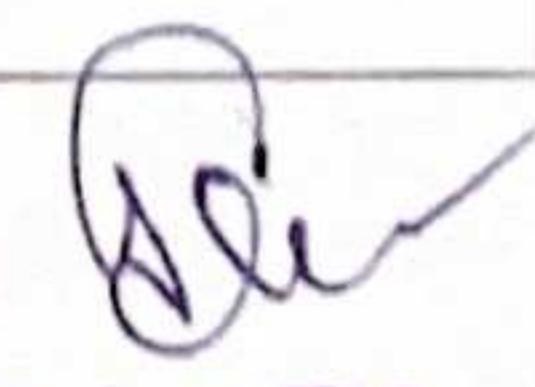
Part A - Introduction

Programme - B.Sc. (Computer Science - Major)	Class - B.Sc. II Semester	Year - 2025	Session - 2024-25
Course Type (Computer Science) - Major			
Course Code	S2-CSC11		
Course Title	Programming Methodologies & Data Structures		

Part - B Content of the Course

Total no. of lectures – As per UGC rules (1 Credit = 15 Lectures)

S. No.	Topics	No. of Lectures
1	Introduction to Programming - Program Concept, Characteristics of Programming, Stages in Program Development, Algorithms, Notations, Design, Flowcharts, Types of Programming Methodologies. Introduction to C++ Programming - Basic Program Structure in C++, Data Types, Variables, Constants, Operators and Basic I/O. Variables - Declaring, Defining and Initializing Variables, Scope of Variables, Using Named Constants, Keywords, Casting of Data Types, Operators (Arithmetic, Logical and Bitwise), Using Comments in programs, Character I/O (getc, getchar, putc, putchar etc.), Formatted and Console I/O (printf(), scanf(), cin, cout), Using Basic Header Files (stdio.h, iostream.h, conio.h etc.). Simple Expressions in C++ (including Unary Operator Expressions, Binary Operator Expressions), Understanding Operators Precedence in Expressions 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).	10


Prof. Pradeep Sheth
HEAD
Department of Computer Science
Govt. Holkar Science College
INDORE (M. P.)

Part A - Introduction

Programme - B.Sc. (Computer Science - Major)	Class – B.Sc. II Semester	Year- 2025	Session- 2024-25
Course Type (Computer Science) – Major			
Course Code	S2-CSC1T		
Course Title	Programming Methodologies & Data Structures		

II	Functions Top-Down Design, Pre-defined Functions, Programmer - defined Functions, Local Variables and Global variables, Functions with Default Arguments, Call-By-Value and Call-By-Reference Parameters. Introduction to Arrays - Declaration and Referring Arrays, Arrays in Memory, Initializing Arrays. Arrays in Functions, Multi-Dimensional Arrays.	10
	Structures - Member Accessing, Pointers to Structures, Structures and Functions, Arrays of Structures. Unions - Declaration and Initialization. Strings - Reading and Writing Strings, Arrays of Strings, String and Function, Strings and Structure, Standard String Library Functions. File Handling - Use of files for data input and output, merging and copying files.	
III	Data Structure - Basic concepts, Linear and Non-Linear data structures. Algorithm Specification- Introduction, Recursive algorithms, Data Abstraction, Performance analysis. Linked List - Singly Linked Lists, Operations, Concatenating, circularly linked lists-Operations for Circularly linked lists, Doubly Linked Lists- Operations.	20
	Array - Sparse matrices-array and linked representations. Stack- Operations, Array and Linked Implementations, Applications: Infix to Postfix Conversion, Postfix Expression Evaluation, and Recursion Implementation. Queue- Definition, Operations, Array and Linked Implementations. Circular Queue-Insertion and Deletion Operations, Dequeue (Double Ended Queue), Priority Queue- Implementation.	

Pradeep Sharma

HEAD

**Department of Computer Science
Govt. Holkar Science College
INDORE M.D.**

Part A - Introduction			
Programme - B.Sc. (Computer Science - Major)	Class – B.Sc. II Semester	Year- 2025	Session- 2024-25
Course Type (Computer Science) – Major			
Course Code		S2-CSC1T	
Course Title		Programming Methodologies & Data Structures	

IV	Trees - Representation of Trees, Binary tree, Properties of Binary Trees, Binary Tree Representations- Array and Linked Representations, Binary Tree Traversals, Threaded Binary Trees. Heap- Definition, Insertion, Deletion Search Trees - Binary Search Trees, AVL Trees- Definition and Examples. Graphs - Graph ADT, Graph Representations, Graph Traversals, Searching.	10
V	Hashing- Introduction, Hash tables, Hash functions, Overflow Handling. Searching Algorithms - Linear Search, Binary Search. Sorting Methods: Bubble Sort, Selection Sort, Insertion Sort, Quick Sort, Merge Sort, and Comparison of Sorting Methods. Indian Contribution to the field : Innovations in India, origin of Julia Programming Language, Indian Engineers who designed new programming languages, open source languages, Dr. Sartaj Sahni – computer scientist - pioneer of data structures, Other relevant contributors and contributions.	10

Dr. Pradeep Sharma

HEAD

Department of Computer Science

Govt. Holkar Science College

INDORE (M.P.)

Part A - Introduction

Programme - B.Sc. (Computer Science - Major)	Class – B.Sc. II Semester	Year- 2025	Session- 2024-25
---	------------------------------	------------	------------------

Course Type (Computer Science) – Major

Course Code	S2-CSC1T
Course Title	Programming Methodologies & Data Structures

Part – C Learning Resources

Text Books, Reference Books, Other Resources

Suggested Readings:

Text Books:

1. Lipschutz: Schaum's outline series Data structures, Tata McGraw-Hill.
2. E. Balguruswamy, "C++" TMH Publication ISBN 0-07-462038-X.
3. Herbertz Shield, "C++ The Complete Reference "TMH Publication ISBN 0-07-463880-7
4. Sartaj Sahani, Data Structures, Algorithms and Applications with C++, McGraw Hill.

Reference Books:

1. Problem Solving and Program Design in C, J. R. Hanly and E. B. Koffman, Pearson, 2015.
2. R. Lafore, 'Object Oriented Programming C++'
3. N. Dale and C. Weems, Programming and problem solving with C++: brief edition, Jones & Bartlett Learning.
4. Adam Drozdek, "Data Structures and algorithm in C++", Third Edition, Cengage Learning. Robert L. Kruse, "Data Structures and Program Design in C++", Pearson.
5. D.S. Malik, Data Structure using C++, Second edition, Cengage Learning.
6. M. A. Weiss, Data structures and Algorithm Analysis in C, 2nd edition, Pearson.

Suggested Digital Platforms Web Links:

1. <https://www.youtube.com/watch?v=BCIS40yzssA>
2. <https://www.youtube.com/watch?v=vLnPwxZdW4Y&vl=en>
3. <https://www.youtube.com/watch?v=UmmIZQ51tZw>
4. <https://www.youtube.com/watch?v=AT141CXUMKI&list=PLdo5W4Nhv3bbKJzrsKfMpogr xuL18LU>

Suggested Equivalent Online Courses:

1. <https://nptel.ac.in/courses/106/105/106105151/>
2. <https://nptel.ac.in/courses/106/106/106106133/>

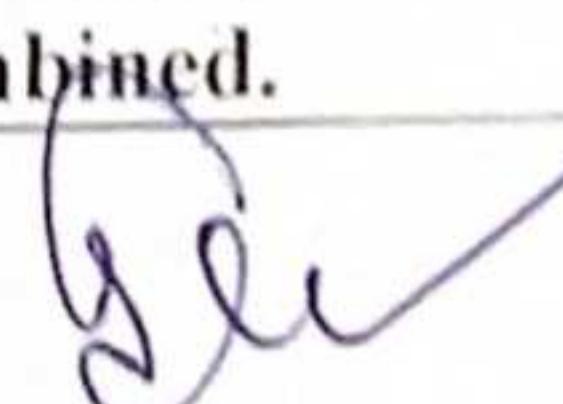
Dr. Pradeep Sharma

HEAD

Department of Computer Science
Om Holkar Science College

Part A - Introduction			
Programme - B.Sc. (Computer Science - Major)	Class – B.Sc. II Semester	Year- 2025	Session- 2024-25
Course Type (Computer Science) – Major			
Course Code	S2-CSC1T		
Course Title	Programming Methodologies & Data Structures		

Part – D Assessment and Evaluation				
Internal Assessment: Continuous Comprehensive Evaluation (CCE)/ Formative Assessment: 40 Marks			External Evaluation (Summative Assessment): End Semester Exam:60 Marks Time: 03 hours	
Formative Assessment shall be based on – Quiz, Seminar, Presentation, Written test, Case Study, Project, Assignment etc.				
The division of marks is as follows:				
Test I	20 Marks	Best two test Marks = $(20 + 20)$	Section (A): 5 Objective Questions (1 mark each)	$5 \times 1 = 5$
Test II	20 Marks		Section (B): 5 Short Questions out of eight questions (200 words each) (7 Marks each)	$5 \times 7 = 35$
Test III	20 Marks		Section (C): Two long questions out of four questions (500 Words each) (10 Marks each)	$2 \times 10 = 20$
Total Internal Assessment (CCE) Marks		40 Marks	Total External Evaluation (Theory) Marks (A+B+ C)	60 Marks
Note:	1.	For Major, Minor, Open Elective, Foundation and Vocational Courses, Part D will be as per the scheme of marks given.		
	2.	The student should secure 35% marks in Internal Assessment (CCE) and External Evaluation (theory) combined.		


Dr. Pradeep Sharma
 HEAD
 Department of Computer Science
 Govt. Holkar Science College
 INDORE (M. P.)
 Date: 27/02/25



Government Holkar (Model, Autonomous) Science College, Indore (M.P.)

Computer Science Department

Part A- Introduction (Practical)

Programme - B.Sc. (Computer Science - Major)	Class – B.Sc. II Semester	Year- 2025	Session- 2024-25
---	------------------------------	------------	------------------

Course Type (Computer Science) – Major

1.	Course Code	S2-CSC1TP	
2.	Course Title	Programming Methodology Lab	
3.	Pre-requisite (if any)	To study this course, a student must have had the subject Physics/ Mathematics in 12 th class.	
4.	Course Learning Outcomes (CLO)	<p>On completion of this course, learners will be able to:</p> <ol style="list-style-type: none">1. Create uncomplicated algorithms and flowcharts for problem-solving in programming, employing the principles of top-down design.2. Craft computer algorithms and programs that are both effective and organized in their structure.3. Acquire the knowledge to devise iterative solutions and algorithms for processing arrays in problem-solving scenarios.4. Apply recursive methods, pointers, and search techniques when programming.5. Demonstrate the capability to select an appropriate data structure for accurately representing data in computer applications.6. Execute algorithms for searching and arranging data.	
5.	Credit Value	2 Credits	
6.	Total Marks	Formative Assessment (CCE) – 40 Marks Summative Assessment (End Semester Exam) – 60 Marks Total 40+60= 100 Marks	Minimum Pass Marks – 35

Dr. Praadeep Sharma

B.Sc. II Semester Department of Computer Science, GHSC, Indore

Page 8

Department of Computer Science
Govt. Holkar Science College
INDORE (M.P.)

27/02/2025

Part A- Introduction (Practical)

Programme - B.Sc. (Computer Science - Major)	Class – B.Sc. II Semester	Year- 2025	Session- 2024-25
--	-------------------------------------	-------------------	-------------------------

Course Type (Computer Science) – Major

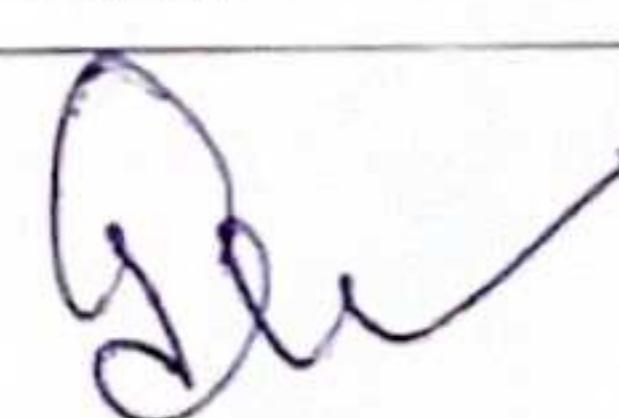
1.	Course Code	S2-CSC1TP
2.	Course Title	Programming Methodology Lab
3.	Pre-requisite (if any)	To study this course, a student must have had the subject Physics/ Mathematics in 12 th class.

Part B- Content of the Course

Total no. of lectures – As per UGC rules: 30

Suggestive List of Practical

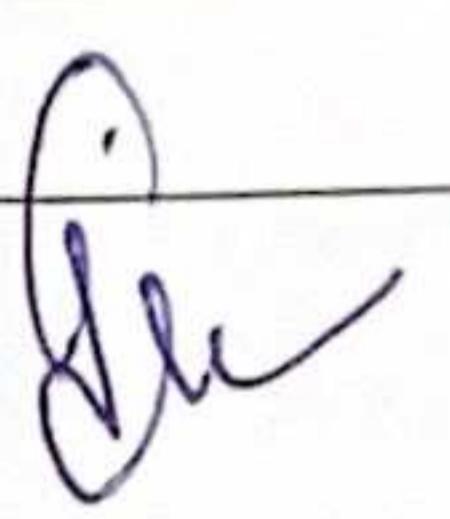
1.	Write a program to swap the contents of two variables.
2.	Write a program for finding the roots of a Quadratic Equation.
3.	Write a program to find area of a circle, rectangle, square using switch case.
4.	Write a program to check whether a given number is even or odd.
5.	Write a program to print table of any number.
6.	Write a program to print Fibonacci series.
7.	Write a program to find factorial of a given number.
8.	Write a program to convert decimal (integer) number into equivalent binary number.
9.	Write a program to check given string is palindrome or not.
10.	Write a program to perform multiplications of two matrices.
11.	Write a program to print digits of entered number in reverse order.
12.	Write a program to print sum of two matrices.
13.	Write a program to print multiplication of two matrices.
14.	Write a program to generate even/odd series from 1 to 100.
15.	Write a program whether a given number is prime or not.
16.	Write a program for call by value and call by reference.
17.	Write a program to generate a series $1+1/1!+2/2!+3/3!+\dots +n/n!$
18.	Write a program to create a pyramid structure. * * * * * *



Dr. Pradeep Sharma

11.1D

19.	Write a program to check entered number is Armstrong or not.
20.	Write a program for traversing an Array.
21.	Write a program to input N numbers add them and find average.
22.	Write a program to find largest element from an array.
23.	Write a program for Linear search.
24.	Write a program for Binary search.
25	Write a program for Bubble sort.
26.	Write a program for Selection sort.


 Dr. Pratap Sharma
 III II
 Department of Computer Science
 Govt. Holkar Science College
 INDORE (M. P.)

Part A- Introduction (Practical)			
Programme - B.Sc. (Computer Science - Major)	Class – B.Sc. II Semester	Year- 2025	Session- 2024-25
Course Type (Computer Science) – Major			
1.	Course Code	S2-CSC1TP	
2.	Course Title	Programming Methodology Lab	
3.	Pre-requisite (if any)	To study this course, a student must have had the subject Physics/ Mathematics in 12 th class.	

Part – C Learning Resources			
Text Books, Reference Books, Other Resources			
Suggested Readings:			
Text Books:			
1. Lipschutz: Schaum's outline series Data structures, Tata McGraw-Hill. 2. E. Balguruswamy, "C++" TMH Publication ISBN 0-07-462038-X. 3. Herbertz Shield, "C++ The Complete Reference "TMH Publication ISBN 0-07-463880-7 4. Sartaj Sahani, Data Structures, Algorithms and Applications with C++, McGraw Hill.			
Reference Books:			
1. Problem Solving and Program Design in C, J. R. Hanly and E. B. Koffman, Pearson, 2015. 2. R. Lafore, 'Object Oriented Programming C++' 3. N. Dale and C. Weems, Programming and problem solving with C++: brief edition, Jones & Bartlett Learning. 4. Adam Drozdek, "Data Structures and algorithm in C++", Third Edition, Cengage Learning. Robert L. Kruse, "Data Structures and Program Design in C++", Pearson. 5. D.S. Malik, Data Structure using C++, Second edition, Cengage Learning. 6. M. A. Weiss, Data structures and Algorithm Analysis in C, 2nd edition, Pearson.			
Suggested Digital Platforms Web Links:			
1. https://www.youtube.com/watch?v=BCIS40yzssA 2. https://www.youtube.com/watch?v=vLnPwxZdW4Y&vl=en			

3. <https://www.youtube.com/watch?v=Umm1ZQ5ltZw>
4. <https://www.youtube.com/watch?v=AT141CXUMKI&list=PLdo5W4Nhv31bbKJzrsKfMpogr xuL18LU>

Suggested Equivalent Online Courses:

1. <https://nptel.ac.in/courses/106/105/106105151/>
2. <https://nptel.ac.in/courses/106/106/106106133/>

[Signature]
Dr. Pradeep Sharma
M.Tech
Department of Computer Science
Govt. Holkar Science College
INDORE (M. P.)

Part A- Introduction (Practical)

Programme - B.Sc. (Computer Science - Major)	Class – B.Sc. II Semester	Year- 2025	Session- 2024-25
--	-------------------------------------	-------------------	-------------------------

Course Type (Computer Science) – Major

1. Course Code	S2-CSC1TP
2. Course Title	Programming Methodology Lab
3. Pre-requisite (if any)	To study this course, a student must have had the subject Physics/ Mathematics in 12 th class.

Part D- Assessment and Evaluation

Suggested Continuous Evaluation methods:

Internal Assessment/Formative Examination(A):	40 Marks
Lab Record	15 Marks
Attendance in the Lab	05 Marks
Assignments (It can be in different modes)	20 Marks
End Semester External Evaluation (B):	60 Marks
Viva Voce on Practical	10 Marks
Practical Record File	10 Marks
Experiments	40 Marks
Total Marks (A+B)	(40 + 60 = 100 Marks)

Dr. Pradeep Sharma

HEAD

Department of Computer Science

Govt. Holkar Science College,

INDORE (M. U.)