

JSS COLLEGE FOR WOMEN (Autonomous)
Saraswathipuram Mysore-9

**Model Curriculum Structure for
Bachelor of Computer Science (B.Sc)**

**First and Second Semester Syllabus (SEP)
2024**

2024-25 onwards

DEPARTMENT OF COMPUTER SCIENCE

**JSS COLLEGE FOR WOMEN (AUTONOMOUS)
SARASWATHIPURAM MYSURU-570009**

SEP Syllabus – B.Sc. for 2024-25 onwards

Year	Semester	Course code	Title	Hours/ Week			Credits			Maximum marks						Exam Duration	Total Marks
										Th. IA		Pr.IA		Exam			
I	I			L	T	P	L	T	P	C1	C2	C1	C2	Th	Pr		
		HMA210	Computer Concepts and Problem-Solving using C++	3	0	0	3	0	0	10	10	-	-	80	-	3 Hours	100
		HMA210P	Computer Basics and Programming in C++	0	0	4	0	0	2	-	-	05	05	-	40	3 Hours	50
	II	HMB210	Data Structures	3	0	0	3	0	0	10	10	-	-	80	-	3 Hours	100
		HMB210P	Data Structures using C++	0	0	4	0	0	2	-	-	05	05	-	40	3 Hours	50

Curriculum

Program: B.Sc.

Subject: Computer Science

Semester	Course No.	Theory/ Practical	Credits	L-T-P	No. of Hours	Course Title	Marks	
							SEE	CIE
I	CSM11T	Theory	03	3-0-0	03	Computer Concepts and Problem-Solving using C++	80	20
	CSM11P	Practical	02	0-0-2	04	Computer Basics and Programming in C++	40	10
II	CSM21T	Theory	03	3-0-0	03	Data Structures	80	20
	CSM21P	Practical	02	0-0-2	04	Data Structures using C++	40	10

B.Sc Semester: I

Course Code: CSM11T	Course Title: Computer Concepts and Problem solving using C++
Course Credits: 03 (3-0-0)	Hours/Week: 03
Total Contact Hours: 44	Formative Assessment Marks: 20
Exam Marks: 80	Exam Duration: 03

Course Outcomes (COs):

On successful completion of this course, students will be able to:

1. Understand the basics of computer.
2. Understand problem-solving strategies and techniques.
3. Describe the Object-Oriented Programming principles and concepts.
4. Understand of the syntax and semantics of the C++.

Course Contents

Unit-1	
<p>Introduction To Computers: Definition And Characteristics Of Computers, Brief History Of Computers, Classification Of Computers Based On Size And Processing Ability. Applications Of Computers.</p> <p>Computer Architecture: CPU, ALU, Control Unit, Registers, Cache Memory, RAM, ROM, Input/Output Components, Buses, Ports. Hardware And Software: System Software [Operating System, Interpreters], Application Software. Languages Of Computer, ASCII And EBCDIC, Computer Threats And Safety Measurements.</p> <p>Problem Solving Techniques: Problem, Definition, Analysis, Design Tools 11 [Algorithm & Flow Chart], Coding, Testing, Maintenance. Basics Of Algorithm Hours</p> <p>Analysis: Time Complexity, Space Complexity, Asymptotic Notations.</p>	15 Hours
Unit-2	
<p>Basic Programming Concepts: Tokens Of Programming Language, Identifier, Constant, Variable, Data Types, And Operators. Introduction To Programming Concepts. Comparison Of POP And OOP.</p> <p>Introduction To C++: Overview Of Programming Languages, History and Features of C++, Structure of C++ Program, Data Types In C++. Control Structures: Decision Making: If, If-Else, Nested If, Switch Statement. Looping: While, Do-While, For. Unconditional Statements: Break And Continue Statements.</p>	15 Hours
Unit-3	

Access Specifiers: Public, Private, Protected. Pointers In C++. Objects, Classes: Base And Derived Classes, Data Encapsulation, Data Abstraction, Friend Function, Inheritance: Single, Multiple, Multilevel, Hierarchical. Polymorphism: Function Overloading, Operator Overloading, Virtual Functions. Constructors And Destructors: Exception Handling.	14 Hours
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Reference:

1. "Programming: Principles and Practice Using C++" by Bjarne Stroustrup.
2. "C++ Primer" by Stanley B. Lippman, Josée Lajoie, and Barbara E. Moo.
3. "Object-Oriented Programming with C++" by E. Balagurusamy
4. "Problem Solving and Object-Oriented Programming with C++" by Tanenbaum and Mukherjee:

Course Code: CSM11P	Course Title: Computer Basics and Programming in C++
Course Credits: 02 (0-0-2)	Hours/Week: 04
Total Contact Hours: 60	Formative Assessment Marks: 10
Exam Marks: 40	Exam Duration: 03

Course Outcomes (COs):

On successful completion of this course, students will be able to:

1. Illustrate the hardware components of Computer.
2. Use Open-Source Office tools.
3. Demonstrate simple programming skills through C++ programming language.

Laboratory Program List

PART -A

1. Demonstration of Desktop computer Hardware components.
2. Demonstration of Word Processor software [Open-Office].
3. Demonstration of Spreadsheet software [Open-Office].
4. Demonstration of Presentation software [Open-Office].
5. C++ program to print user name.
6. C++ program to swap 2 numbers.
7. C++ Program to Find Largest Among 3 Numbers
8. C++ program to perform arithmetic operations.

PART-B

1. C++ Program to Print Multiplication Table of a Number
2. C++ Program to Reverse a Number
3. C++ Program to Check Whether a Number is a Palindrome or Not 4.
C++ Program to Create a Class and Object
5. C++ program for single inheritance.
6. C++ program to demonstrate multi-level inheritance.
7. C++ program to demonstrate operator overloading.
8. C++ Program by using Pointers

Evaluation Scheme for Lab Examination [Marks: 40]

- **Writing:** One program from both Part A and Part B (15 Mark each): $15 \times 2 = 30$
- **Execution:** Any one of the written Program: 05 Marks
- **Viva:** 05

Semester: II

Course Code: CSM21T	Course Title: Data Structures
Course Credits: 03 (3-0-0)	Hours/Week: 03
Total Contact Hours: 44	Formative Assessment Marks: 20
Exam Marks: 80	Exam Duration: 03

Course Outcomes (COs):

On successful completion of this course, students will be able to:

1. Understand the basics of Data Structures.
2. Identify the appropriate data structures and algorithms for solving real world problems.
3. Understand the practical applications of Tree and Graph.

Unit-1	
Introduction: Data Structure Definition, Basic Terminology and Concepts, Importance of Data Structures In Programming. Classification of Data Structures. Primitive Data Structures, Non-Primitive Data Structures. Arrays: Declaration, Initialization, Accessing Elements, Multidimensional Arrays. C++ Strings, String Handling Functions, Applications of Arrays and Strings. Stack: Definition, Memory Representation, Algorithms for Stack Operations (Push, Pop), Applications of Stack. Queue: Definition, Memory Representation, Linear Queue, Circular Queue, Enqueue, Dequeue. Applications Of Queue.	15 Hours
Unit-2	
Linked Lists: Definition, Types. Singly Linked List: Implementation, Insertion [At the Beginning], Deletion [At the End]. Doubly Linked List: Memory Representation of Singly Linked List and Doubly Linked Lists. Applications of Linked List. Tree: Definition, Memory Representation Using Array and Linked List. Binary Tree: Definition, Traversal Algorithms [Pre-Order, In-Order, Post-Order], Construction of Tree from In-Order and Pre-Order, In-Order and Post-Order. Binary Search Trees: Insertion of a Node, Deletion of A Node.	15 Hours

Unit-3	
<p>Advanced Tree Structures AVL And B-Trees: Definition and Applications.</p> <p>Graph: Definition, Memory Representation of Graph. Adjacency Matrix, Adjacency List. Graph Traversal Algorithms: Breadth-First Search (BFS), Depth-First Search (DFS).</p> <p>Sorting Techniques: Bubble Sort, Selection Sort [Algorithm, Time & Space Complexity].</p> <p>Searching Techniques: Linear And Binary Search Sort [Algorithm, Time & Space Complexity].</p> <p>Heap: Heap Operations and Applications.</p>	14 Hours

Reference Books:

1. Data Structures Through C++ (4th Edition) Yashvant Kanetkar.
2. Data Structures and Algorithm Analysis in C++" by Mark Allen Weiss.
3. Data structure and Algorithms using C++ by Sachi Nandan Mohanty, Pabitra Kumar Tripathy.
4. Data Structures and Algorithms in C++, Second Edition by Adam Drozdek.

Course Code: CSM21P	Course Title: Data Structures using C++
Course Credits: 02 (0-0-2)	Hours/Week: 04
Total Contact Hours: 60	Formative Assessment Marks: 10
Exam Marks: 40	Exam Duration: 03

Course Outcomes (COs):

On successful completion of this course, students will be able to:

1. Implement data structures using C++.
2. Demonstrate searching and sorting techniques using ++.
3. Demonstrate simple programming skills through C++ programming language.

Laboratory Program List

Part A:

1. C++ program to find GCD of two numbers.
2. C++ program to implement Tower of Hanoi.
3. C++ program to print Fibonacci series.
4. C++ program to find largest and smallest element in an array.
5. C++ program to perform stack operations.
6. C++ program to perform Linear queue operations
7. C++ program to insert a node at the beginning of a singly linked list.
8. C++ program to delete a node at the end of a singly linked list.

Part B:

1. C++ program to construct a binary search tree
2. C++ program for Binary Tree traversal.
3. C++ program to implement DFS
4. C++ program to implement BFS
5. C++ Program to Sort an Array (Selection Sort)
6. C++ Program to Sort an Array (Bubble Sort)
7. C++ Program to perform Linear Search of an Element in an Array.
8. C++ Program to perform Binary Search of an Element in an Array.

Evaluation Scheme for Lab Examination [Marks: 40]

- **Writing:** One program from both Part A and Part B (15 Mark each) : $15 \times 2 = 30$
- **Execution:** Any one of the written Program: 05 Marks
- **Viva:** 05

CIE, SEE and QP Pattern for Theory Courses:

Total Lecture hours per paper: 44

No. of Units 4 (11 Hours Each)

Internal Assessment C1 = 10 Marks, C2 = 10 Marks

Semester End Theory Exam C3 = 80 Marks

Question paper pattern:

Instructions: Answer Part-A and Part-B:

Part-A

Answer any 10 out of 12 Questions (3 Questions drawn from each unit). Each question carries 2 Marks. (10 X 2 =20) Q. No. 1 to Q. No. 12.

Part-B

Answer all the Questions. Each question carries 15 Marks. (4 X 15 =60)

(Each question with internal choice and with maximum of 3 sub questions)