JSS College of Arts, Commerce and Science
(Autonomous)

B N Road, Mysuru 570025

Bachelor of Science

Computer Science

First and Second Semester Syllabus (SEP) 2024

University of Mysore

Curriculum

Program: B.Sc.
Subject: Computer Science

Semester	Course Code	Theory/ Practical	Credits	L-T-P	No. of Hours	Course Title	Marks	
							SEE	CIE
I	GCS101	Theory	03	3-0-0	03	Computer Concepts and Problem-Solving using C++	80	20
	GCS102	Practical	02	0-0-2	04	Computer Basics and Programming in C++	40	10
II	GCS201	Theory	03	3-0-0	03	Data Structures	80	20
	GCS202	Practical	02	0-0-2	04	Data Structures using C++	40	10

Semester: I

Course Code: GCS101	**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	
Introduction To Computers: Definition And Characteristics Of Computers, Brief History Of Computers, Classification Of Computers Based On Size And Processing Ability. Applications Of Computers. **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.	11 Hours
Unit-2	
Problem Solving Techniques: Problem, Definition, Analysis, Design Tools [Algorithm & Flow Chart], Coding, Testing, Maintenance. Basics Of Algorithm Analysis: Time Complexity, Space Complexity, Asymptotic Notations. **Basic Programming Concepts:** Tokens Of Programming Language, Identifier, Constant, Variable, Data Types, And Operators. Introduction To Programming Concepts. Comparison Of POP And OOP.	11 Hours
Unit-3	
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.	11 Hours
Access Specifiers: Public, Private, Protected. Pointers In C++.	

Unit-4	
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.	11 Hours

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: GCS102	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

Practical Evaluation [50 Marks]
- **Internal assessment: C1= 05 Marks, C2= 05 Marks [Total = 10 Marks]**
  ### Semester End Examination[practical]
- **Writing:** One program from both Part A and Part B (10 Marks each): **10 + 10 = 20 Marks**
- **Debug and Execution:** (05 Marks each) **05 + 05 = 10 Marks**
- **Viva: 05 Marks**
- **Record: 05 Marks**

Semester: II

Course Code: GCS201	**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.	11 Hours
Unit-2	
Queue: Definition, Memory Representation, Linear Queue, Circular Queue, Enqueue, Dequeue. Applications Of Queue. **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.	11 Hours
Unit-3	

Tree: Definition, Memory Representation Using Array and Linked List.	11 Hours
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.	
Advanced Tree Structures AVL And B-Trees: Definition and Applications.	
Unit-4	
Graph: Definition, Memory Representation of Graph. Adjacency Matrix, Adjacency List. Graph Traversal Algorithms: Breadth-First Search (BFS), Depth-First Search (DFS).	11 Hours
Sorting Techniques: Bubble Sort, Selection Sort [Algorithm, Time & Space Complexity].	
Searching Techniques: Linear And Binary Search Sort [Algorithm, Time & Space Complexity].	
Heap: Heap Operations and Applications.	

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: GCS202	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.

Practical Evaluation [50 Marks]
- **Internal assessment: C1= 05 Marks, C2 =05 Marks [Total = 10 Marks]**
    Semester End practical Examination C3=40 marks
- **Writing:** One program from both Part A and Part B (10 Marks each): **10 + 10 = 20 Marks**
- **Debug and Execution:** (05 Marks each) **05 + 05 = 10 Marks**
- **Viva: 05 Marks**
- **Record: 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 the   following Questions.
1. **a)**
        OR
   b)

2. **a)**
        OR
   b)

3. **a)**
        OR
   b)

4. **a)**
        OR
   b)

   Each question carries 15 Marks. (4 X 15 =60)
   (Each question with internal choice and with maximum of 3 sub questions)