SEMESTER- I

COURSE CODE : - MJ-101T
COURSE TITLE : - PROGRAMMING USING C/C++
CREDIT : - 3

The questions must cover the entire syllabus with equal distribution of marks as far as practicable.

Module 1: Introduction to C and C++:
About C, Evolution of C/C++**,** Overview of Procedural Programming Language and Object Oriented Programming Languages, Structure of a C/C++ Program, Compilers & Interpreters, Compiling a C/C++ Program, A Simple C/C++ Program.

Module 2: Data Types, Variables, and Constants: Data Types Variables, Constants Operators, Type Modifiers and Expressions Operators, Type Modifiers Expressions, Formatted Console I/O(printf(),scanf(),cin,cout) Unformatted Console I/O Functions**. Control Constructs in C/C++:** Control Statements, Conditional Statements, Loops in C, the break Statement, the Continue Statement.

Module 3: Arrays : Introduction to Arrays, One-Dimensional & Two-Dimensional Arrays, Introduction to strings **Functions**: Introduction to Functions, Function Declaration and Prototypes, Recursion in Function.

Module 4: Pointers: Introduction to Pointers, Pointer Notation**.** Pointer Declaration and Initialization, Accessing Variables through Pointers, Pointer to Pointer, Pointer Expressions, Dynamic memory Allocation, passing pointers as function arguments, Passing array to function, Pointers and One-Dimensional Arrays. **Structures:** Structure Definition, Structure Initialization, Arrays of Structures, and Arrays within Structures. Structures within Structures, Passing Structures to Functions.

Module 5: Using Classes in C++: Defining class and Object, member functions, Inline function, Static function, Friend function, Function overloading, Constructor, parametrized constructor, copy constructor, overloading constructor, and Destructor.

Operator overloading, Inheritance, and polymorphism: Operators overloading: Unary operator (++, --,-) binary operators(+,-*,\) using member function and friend function **Inheritance:** Derived class and base class, protected access specifier, Types of Inheritance(Multilevel, Multiple, Hierarchical, Hybrid Inheritance) , derived class constructors, abstract base class, public and private inheritance, containership **Polymorphism:** "New" & "delete" pointer to objects, pointer to pointer, Pointer to derived class and "this" pointer, virtual function.

Module 6: File Handling in C/C++: What is a File, Defining and Opening a File, Functions for Random Access to Files.

Book Recommended:
1. Programming in C By E. Bala Guruswamy
2. Programming in C By Yashwant Kanetkar
3. Programming in C++ by E.Bala Guruswamy

Course Outcomes

After the completion of this course, students will be able to:

1	Demonstrate an understanding of algorithms in the problem-solving process.
2	Identify the necessary properties of good problem-solving techniques.
3	Create and analyze algorithms for solving simple problems.
4	Use incremental program development to create, test, and debug algorithms for solving simple problems.

SEMESTER- I

COURSE CODE : - MJ-101P
SUBJECT : - LAB of C/C++ Programming
CREDIT : - 1

List of C Programs as Assignments:

1. Write a Hello World Program in C.
2. Write a C program to check whether the given number is positive or negative.
3. Write a C Program to find greatest of three numbers.
4. Write a C Program to print Fibonacci series in a given range.
5. Write a C Program to find factorial of a given number.
6. Write a C program to find Prime numbers in a given range.
7. Write a C Program to check if given number is Armstrong or not.
8. Write a C Program to check if given number is palindrome or not.
9. Write a C program to display palindrome numbers in a given range
10. Write a C Program to check if number is odd or even
11. Write a C Program to find out the ASCII value of a character
12. Write a C Program to find the size of int, float, double and char
13. Write a C Program to check whether an alphabet is vowel or consonant.

14. Write a C Program to check leap year.
15. Write a C Program to find sum of first n natural numbers.
16. Write a Program to convert string from upper case to lower case.
17. Write a Program to convert string from lower case to upper case.
18. Write a C program to Sort a set of strings in ascending alphabetical order.
19. Write a C program Find length of a string without using strlen()
20. Write a C program to String concatenation without using strcat.
21. Write a Program to sort array in ascending order.
22. Write a C program to find largest element of given array.
23. Write a C program to find sum of array elements.
24. Write a C Program to find number of elements in an array.
25. Find the value of nPr for given value of n & r.
26. Find the value of nCr for given value of n & r.
27. C Program to multiply two floating numbers.
28. C Program to find out Quotient and Remainder.
29. C Program to find average of two numbers
30. Binary to decimal conversion
31. C Program to convert Decimal to Binary
32. Write a c program to find multiplication of two matrices.
33. Write a c program to add two matrices.
34. Write a program in C to find the sum of the series 1!/1+2!/2+ 3!/3+4!/4+5!/5
35. WAP to display the following pattern:

```
                    11
                11  10  11
            11  10  9   10  11
        11  10  9   8   9   10  11
```

FUNCTION

Write the following programs using function:

1. Write a C program to Reverse an input number using recursion.
2. Write a C program to Reverse a String using recursion.
3. Write a C programming to find out maximum and minimum of some values using function which will return an array.
4. Write a C Program to find greatest of three numbers.
5. Write a C Program to print Fibonacci series in a given range.

Pointer

1. Write a Program to sort array in ascending order.
2. Write a C program to find largest element of given array.

3. Write a C program to find sum of array elements.
4. Write a C Program to find number of elements in an array.
5. Write a C program of Binary to decimal conversion

Lab of C++ program as assignment:

1. Write a C++ program to find the sum for the given variables using function with default arguments.
2. Write a C++ program to swap the values of two variables and demonstrates a function using call by value.
3. Write a C++ program to swap the values of two variables and demonstrates a function using Call by reference using reference type (&).
4. Write a C++ program to swap the values of two variables and demonstrates a function using Call by reference using pointer (*).
5. Write a C++ program to swap the values of two dynamically allocated variables and release the memory after swapping. (use new & delete operators)
6. Write a program to find the largest, smallest & second largest of three numbers. (use inline function MAX and MIN to find largest & smallest of 2 numbers)
7. Write a program to calculate the volume of different geometric shapes like cube, cylinder and sphere and hence implement the concept of Function Overloading.
8. Write a C++ program to create a class called COMPLEX and implement the following overloading functions ADD that return a complex number:
   (i) ADD (a, s2) – where 'a' is an integer (real part) and s2 is a complex number
   (ii) ADD (s1, s2) – where s1 and s2 are complex number

9. Write a C++ Program to display Names, Roll No., and grades of 3 students who have appeared in the examination. Declare the class of name, Roll No. and grade. Create an array of class objects. Read and display the contents of the array.
10. Write a C++ program to declare Struct. Initialize and display contents of member variables.
11. Write a C++ program to declare a class. Declare pointer to class. Initialize and display the contents of the class member.
12. Write a C++ program to use scope resolution operator. Display the various values of the same variables declared at different scope levels.
13. Write a C++ program to allocate memory using new operator.
14. Write a C++ program to create multilevel inheritance. (Hint: Classes A1, A2, A3)
15. Write a C++ program to create an array of pointers. Invoke functions using array objects.
16. Write a C++ program to use pointer for both base and derived classes and call the member function. Use Virtual keyword.

SEMESTER- II

COURSE CODE : - MJ-201T
COURSE TITLE : - DATA STRUCTURE WITH C
CREDIT : - 3
NO OF LECTURES: - 45

The questions must cover the entire syllabus with equal distribution of marks as far as practicable.

Module 1: Introduction to C Programming: - Basic Concepts, Algorithms, Notations, Data Structure Operations. Implementations of Data Structures, Mathematical Notations, Function

Module 2: Arrays:- Insertion and deletion of the element from an Array, Static Memory Allocation. Searching: Linear or Sequential search, Binary Search **Sorting:** Bubble sort, Selection Sort, Insertion sort, Quick Sort, Merge Sort

Module 3: Stack: Implementation of Stack, Array-based Implementation. Applications of Stack. Evaluating Postfix Expression, Simulating Recursive Function Using stack. **Queue:** Queue Implementation, Array-based Implementation.

Module 4: Linked Lists: Dynamic Allocation of Memory, Representation of Linked List. Implementation of Single Linked List, Insertion, Deletion and traversing through single linked list. Implementation of Doubly Linked Lists, Insertion, deletion and traversing through Double linked list.

Module 5: Trees(Linked list based Implementation): Introduction to Trees, Binary Tree, Implementation of Binary tree, Binary Tree Traversal, Implementation of Binary Search tree, Insertion, Deletion and traversing through BST. Introduction of (Threaded Binary Trees, AVL Tree, B and B+ Tree)

Module 6: Graph: Introduction to Graph, Depth first search (DFS) and Breadth first Search (BFS) graph

Course Outcomes

After the completion of this course, students will be able to:

1	Analyze run-time execution of previous learned sorting methods, including selection, merge sort, insertion sort and Quick sort
2	Have practical knowledge on the applications of data structures
3	Be capable to identity the appropriate data structure for given problem

Books Recommended: i) Data Structures – Lipschutz.

ii) Data Structures through C-Y.P. Kanetkar.

iii) Data Structure – Samanta

SEMESTER-II

COURSE CODE : - MJ-201P
SUBJECT : - LAB of Data Structure with C
CREDIT : - 1

Lab of Data Structure with C as assignment

1. Program to Find the Number of Elements in an Array
2. Develop and implement a menu driven program in C for the following Array operations
   a. Creating Array of N Integer elements.
   b. Display of Array elements with suitable headings.
   c. Inserting an element (ELEM) at a given valid position (POS).
   d. Deleting an element at a given valid position (POS).
   e. Exit
3. Programs for Stack, Queues using Arrays
4. Program to convert an Infix Expression into Postfix and Postfix Evaluation
5. Program to implement stack using arrays
6. Program to implement queue using arrays
7. Program to reverse elements in a queue
8. Program to create add remove & display element from single linked list
9. Program to create add remove & display element from double linked list
10. Program to count number of nodes in linear linked lis

11. Program to concatenate two linear linked lists
12. Program to accept a singly linked list of integers & sort the list in ascending order.
13. Program to reverse linked list
14. Program for the creation of binary tree in c
15. Program for pre-order, post-order & in-order traversals of a binary tree using non recursive.
16. Program to count no, of leaves of binary tree
17. Program for implementation of Binary Search -tree (insertion & deletion)
18. Program to implement bubble sort program using arrays
19. Program to implement merge sort using arrays
20. Program to implement selection sort program using arrays
21. Program to implement insertion sort program using arrays
22. Program to implement bubble sort program using pointers
23. Program to implement linear search using arrays
24. Program to implement Tower of Hanoi problem.
25. Program to implement binary search using arrays