**School of Computer Science and Engineering**

**UPES, Dehradun**

Programme :**B. Tech. (CSE), 3rd Sem –IBM-All branches**  
Course : **Advanced Data Structures LAB**

**EXPERIMENT NO – 1: Class and Objects (Unit 1)**  
**Objective: - To understand the concept of classes, objects, data hiding and encapsulation.**

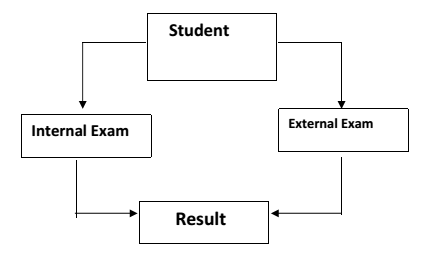
1. WAP to input the distance in inches, then display the distance in feet and inches (more than 12 inches should be converted into feet) by using classes and objects.
2. Write a C++ program to create a class called QUEUE with member function to add an element and to delete an element from the queue of integer and double. Demonstrate the operation by displaying the content of the queue after every operation.

**EXPERIMENT NO-2 :Constructor and Destructor (Unit 2)**  
**Objective: - To understand the concept of Constructor and destructor.**

1. Supply the above classes with the constructors and destructors.
2. Exercise the concept of constructor overloading with parametric constructor and copy constructor..
3. Write a program for stack implementation.

**EXPERIMENT-3: Inheritance and Polymorphism: (Unit 2)**  
**Objective: - To understand the concept of Inheritance and polymorphism.**

1. Friend Function: WAP to read molecular values for Oxygen, Hydrogen and Sulpher in three different classes named Oxygen, Hydrogen and Sulpher, then find out chemical compound that to be formed based on the given input molecular values.
2. Design the following hierarchy: Shape — Base class Rectangle --- Derived class of Shape Triangle --- Derived class of Shape main() should show the following menu: 1. Rectangle 2. Triangle 3. Exit. (Enter choice:\_) A function calculate\_area() should be made to calculate the area of the chosen shape.(Hint: Use concepts of inheritance, late binding, virtual functions and abstract class in the above program).
3. Write a C++ program to implement the above multi-path inheritance, declaring the base class (i.e. Student) as virtual. Take functions as student\_Details ( ) and display\_Student\_Details ( ) and name, roll no, and gender as data members. Members of Internal Exam class are array of internal exam for six subjects and a function get\_InternalMarks () for getting internal marks and display\_InternalMarks (). Members of External Exam class are array of external exam for six subjects and a function get\_ExternalMarks () for getting external marks and display\_ExternalMarks (). Members of Result class are and display Results ( ).



**Experiment No 4: operator overloading (Unit 2)**

**Objective: - To understand the concept of operator overloading in C++.**

1. Write a program to implement the Binary Operator Overloading with and without using friend functions
2. To write a program to find the complex numbers using unary operator overloading.

**Experiment No 5: Template (Unit 2)**

**Objective: - To understand the concept of Generic functions in oops.**

1. Write a program which designs a template that performs multiplication of : a. ‘int’ type data b. ‘float’ type data
2. Write a generic function to sort the given elements in any order. This generic function must support int, char, and double types

**Experiment No 6: File handling (Unit -3)**

**Objective: - To understand the concept of File handling in C++**

1. Create one file and copy its contents to other file.
2. File Random Access handling and writing objects.
3. Insert 10 students record in a file.

**Experiment No 7: Exception Handling (Unit 3)**

**Objective: - To understand the concept of exception handling in C++.**

1. Write a program which accepts a number and a divisor to divide it. If the divisor is zero the program terminates abruptly. Modify the program by adding exception handling in it and prevent abnormal termination**.**
2. Program on linked lists using Object Oriented Concepts.

**Experiment No 8: Hashing (Unit -3)**

**Objective: - To apply the hashing data structures to solve the various problem.**

1. Write a program that implements a hash function on student roll no and categorize them in their families. Like 5000423, last 2 digits 23, 2+3=5, so belongs to family 5.
2. C++ program to implement Hash Table insert, delete and search operations

**Experiment No 9: Trees (Unit -4 and 5)**

**Objective: - To understand the concept of tree.**

1. Create a binary tree using an array/Inked List
2. Implement Heap Sort.

**Experiment No 10 Trees (Unit -4 and 5)**

**Objective: - To implement the of tree operations.**

1. Create a binary search tree by inserting one node at a time.
2. Search an element from a BST.
3. Delete a node from BST
4. Display tree content

**Experiment No 11: Graphs (Unit -6)**

**Objective: - To understand the graph traversing methods.**

1. Create a graph Data Structures using array/Linked List  
2. Implement DFS Graph Traversal  
3. Implement BFS Graph Traversal

**Experiment No 12: Graphs (Unit -6)**

**Objective: - To implement the shortest path algorithm and spanning tree algorithm.**

1. For a given graph, implement the Floyds algorithm to find shortest path.
2. Implement the prims algorithm to construct the spanning tree