Assignment No.	Suggested List of Assignments
	GROUP - A (Object Oriented Programming using C++)
1	Define a class to represent a bank account which includes the following members as: Data members: a. Name of the depositor b. Account Number c. Withdrawal amount d. Balance amount in the account Member Functions: e. To assign initial values f. To deposit an amount g. To withdraw an amount after checking the balance h. To display name and balance. Implement the program by using features of OOP in C++. Note: I Instructor will suggest students to identify and implement classes for their application to be developed as a part of PBL-I project.
2	Write a program using C++ to create a student database system containing the following information: Name, roll number, Class, division, Date of Birth, Blood group, Contact address, telephone number. Use Class, object, inline function. Use static variables and static functions to maintain count of the number of students. Use constructor and destructor. Note: I Instructor will suggest students to identify the use of inline function, static variables and static functions for their application to be developed as a part of PBL-I project. II Instructor will suggest students to implement identified OOP features for their application to be developed as a part of PBL-I project. III Instructor will suggest students to implement Constructor and Destructor in all classes of their selected applications.
3	Consider we want to store the information of different vehicles. Create a class named Vehicle with two data member named mileage and price. Create its two subclasses: *Car with data members to store ownership cost, warranty (by years), seating capacity and fuel type (diesel or petrol). *Bike with data members to store the number of cylinders, number of gears, cooling type(air, liquid or oil), wheel type(alloys or spokes) and fuel tank size(in inches). Make another two subclasses Audi and Ford of Car, each having a data member to store the model type. Next, make two subclasses Bajaj and TVS, each having a data member to store the make-type. Now, store and print the information of an Audi and a Ford car (i.e. model type, ownership cost, warranty, seating capacity, fuel type, mileage and price.). Note: Instructor will suggest students to implement reusability feature of OOP using inheritance in their application to be developed as a part of PBL-I project.
4	Implement a class Complex which represents the Complex Number data type. Implement the following operations: a. Constructor (including a default constructor which creates the complex number 0+0i). b. Overloaded operator + to add two complex numbers. c. Overloaded operator * to multiply two complex numbers. d. Overloaded << and >> to print and read Complex Numbers.

	Write a C + + program to read and display all project information using Operator Overloading. Note: I Instructor will suggest students to identify the use of function overloading and operator overloading for their application to be developed as a part of PBL-I project. II Instructor will suggest students to implement identified function overloading and operator overloading for their application to be developed as a part of PBL-I project.
5	Create a base class called 'SHAPE' having-two data members of type double -member function get-data( )to initialize base class data members - pure virtual member function display-area( )to compute and display the area of the geometrical object. Derive two specific classes 'TRIANGLE' and 'RECTANGLE' from the base class Using these three classes, design a program that will accept the dimension of a triangle / rectangle interactively and display the area. Implement using C++. Note: I Instructor will suggest students to identify the use of function overloading and operator overloading for their application to be developed as a part of PBL-I project. II Instructor will suggest students to implement identified function overloading and operator overloading for their application to be developed as a part of PBL-I project.
6	Implement matrix class as ADT. Write a program to perform matrix addition, subtraction, and multiplication. In read matrix function, raise an exception if any attempt is made to have rows and columns beyond the array size. Raise an exception if any attempt is made to perform matrix operations on matrices which does not satisfy the matrix order criteria. Implement using C++. Note: I Instructor will suggest students to identify the use of exception handling for their application to be developed as a part of PBL-I project. II Instructor will suggest students to implement identified exception handling for their application to be developed as a part of PBL-I project.
7	Write a class template to represent a generic vector. Include member functions to perform the following tasks: a To create the vector. b To modify the value of a given element. c To multiply the vector by a scalar value. d To display the vector in the form (10, 20, 30) Note: I Instructor will suggest students to identify the use of generic programming for their application to be developed as a part of PBL-I project. II Instructor will suggest students to implement identified generic programming handling for their application to be developed as a part of PBL-I project.
8	Write a program to maintain an employee database in binary file with employee information such as empId, name, age, department, post and salary. Write function for adding new record, displaying all records, searching for a particular employee, updating employee salary and post. Note: I Instructor will suggest students to identify the use of file handling for their application to be developed as a part of PBL-I project. II Instructor will suggest students to implement identified file handling for their application to be developed as a part of PBL-I project.

9	a. Write C++ program using STL to add binary numbers (assume one bit as one number); use STL stack. b. Write C++ program using STL map for managing Person Record (Name, birth date, telephone no). Perform operations – add, display, search, delete, and update. Note: I Instructor will suggest students to identify and use STL for their application to be developed as a part of PBL- I project.
GROUP - B (Data structures using C++)	
10	Set A of customers like pizza and set B of customers like a burger. Write a C + +program to store two sets using an array. compute and display- a. Set of customers who like either pizza or burger or both b. Set of customers who like both pizza and burger. c. Set of customers who like only pizza, not burger. d. Set of customers who like only burger not pizza. e. Number of customers who like neither pizza nor burger. Note: I Instructor will suggest students to identify suitable data structure for their application to be developed as a part of PBL-I project. II Instructor will suggest students to implement identified data structure for their application to be developed as a part of PBL-I project.
11	The ticket booking system of Cinemax theatre has to be implemented using C++ program. There are 15 rows and 10 seats in each row. Doubly linked lists have to be maintained to keep track of free seats in rows. Assume some random booking to start with. Use an array to store pointers (Head pointer) to each row. On demand a. The list of available b. seats is to be displayed c. The seats are to be booked d. The booking can be cancelled Note: I Instructor will suggest students to identify suitable data structure for their application to be developed as a part of PBL-I project. II Instructor will suggest students to implement identified data structure for their application to be developed as a part of PBL-I project.
12	A Dictionary stores keywords & its meaning. Provide facility for adding new keywords, deleting keywords, updating values of any entry. Provide a facility to display whole data sorted in ascending/ Descending order. Also find how many maximum comparisons may require for finding any keyword. Use Binary SearchTree for implementation. Note: I Instructor will suggest students to identify suitable data structure for their application to be developed as a part of PBL-I project. II Instructor will suggest students to implement identified data structure for their application to be developed as a part of PBL-I project.
GROUP – C (C++ on Online Judge Platform)	
13	Write a C++ program to print all the repeated numbers with their frequency in an array in minimum time complexity

14	Write a C++ program to sort N names in alphabetical order.
15	Write a C++ Program to Check Character is Uppercase, Lowercase, Digit or Special Character.
GROUP - D (Mini project)	
16	Develop a Mini project using Object Oriented Programming and appropriate Data structure Concepts: (The sample list of statements is provided as below, but not limited to) a. Student Management System b. Library Management System c. Airline Reservation System d. Hospital Management System e. Hotel Management System f. Billing System g. Bus / Railway Reservation System h. Build a Snakes & Ladders game i. Sudoku Solver j. Maze generator k. Dictionary implementation

Reference Books:

1. Richard F. Gilberg& Behrouz A. Forouzan, "Data Structures, Pseudo code Approach with C", Cengage Learning India Edition, 2nd Edition, 2007, ISBN 10: 8131503143 / ISBN 13: 9788131503140.
2. Herbert Schildt, "C++: The Complete Reference", McGraw Hill Education, 4th Edition, July 2017, ISBN-10 : 007053246X (ISBN-13 : 978-0070532465).
3. Y. Langsam, M. Augenstin and A. Tannenbaum, "Data Structures using C", Pearson Education Asia, First Edition, 2002, ISBN 978-81-317-0229-1.
4. Bjarne Stroustrup, "The C++ Programming language" , Pearson Education , Third edition, 2008, ISBN 9780201889543.