**Assignment 1**

1. Define a class bank account, which includes name of the depositor, Account Number, Type of the account and Balance amount in the account. You need functions to set the initial values, to deposit an amount, withdraw amount after checking balance and finally display name, account number with updated balance. Write a menu driven C++ program.
2. Write a program to print the area of a rectangle by creating a class named 'Area' taking the values of its length and breadth as parameters of its constructor and having a function named 'returnArea' which returns the area of the rectangle. Length and breadth of the rectangle are entered through keyboard.
3. Write a program by creating an 'Employee' class having the following functions and print the final salary.  
   1 - 'getInfo()' which takes the salary, number of hours of work per day of employee as parameters  
   2 - 'AddSal()' which adds $10 to the salary of the employee if it is less than $500.  
   3 - 'AddWork()' which adds $5 to the salary of the employee if the number of hours of work per day is more than 6 hours.
4. Write a function to perform insertion sort. Trace the function to sort the numbers 66, 7, 53, 100, 8, 19
5. Write a function to print duplicate characters along with its frequency in a user entered string.

Examples:

List of duplicate characters in String 'Programming' g : 2 r : 2 m : 2

List of duplicate characters in String 'Combination' n : 2, o : 2, i : 2

List of duplicate characters in String 'Java': a: 2

**DS Assignment 2 Questions**

1. Explain how to implement two stacks in one array A[1..N] in such a way that neither stack overflows unless the total number of elements in both stacks together is N.
2. Write a program to implement multiple queues using a single array
3. Write a user defined function to that takes two sparse matrices A and B as input represented in <row, column, value> format and displays C which is the result of addition of A and B in <row, column, value> format. Also display C in 2D matrix format.
4. Write a user defined function to delete an element (read only element from user) from the array of object representation of sparse matrix.
5. Convert (A+B)\*C/D^E/F-G\*H infix expression into prefix form. Show each step along with stack contents properly.

**Assignment 3**

Q1. Develop a C++ class to implement a set data structure using singly linked list. (Set is represented using singly linked list). Include the functions for

1. performing intersection of two sets (ii) union of two sets

Q2a. Develop a C++ class to implement a set data structure using singly linked list. (Set is represented using singly linked list). Include the functions for difference of two sets

Q2b. How to find middle element of singly linked list in one pass? Explain with the code.

Q3. Create a ‘student’ class with data members roll\_no(integer), name (Character array) , marks(interger array of size 5), CGPA(float) and member functions read and display.  Create another class named ‘studentList’, with it’s data member as an object of student class and member functions are insert(). Read the details of ‘n’ students from user and store each student details as a node of the studentList. For the class studentList (given in Q7) add the member function sort. The sort function should sort the list according to student’s roll\_no.

**Q4.** Write a user defined function to read a two dimensional matrix and represent all non-zero values in (row, column, value) format in a doubly linked list. Write another user defined function which takes the already created doubly linked list as input and deletes the nodes which have same row and column index values.

Eg: 1 0 0

0 2 0 [0| 0| 1] 🡨🡪[1| 1| 2]🡨🡪[2|0| 3] [2| 0| 3]

3 0 0

Q5. Develop a C++ class to implement a set data structure using singly linked list. (Set is represented using singly linked list). Include the functions for

(i) to check whether one set is subset of another set (ii) to check whether one set is superset of another set

**Assignment 4**

1A) Write a user defined function to represent a polynomial using circular doubly linked list with a header node.

Also, write a function to delete nodes with negative coefficient values and display the list.

1B)Construct a binary tree given its inorder sequence and preorder sequence:

Preorder: PASTQEDXMRCF, inorder: TSQAEDPMXCRF

2A) A binary search tree is generated by inserting in order the following integers:

50, 15, 62, 5, 20, 58, 91, 3, 8, 37, 60, 24.

2B) Write the inorder, preorder, postorder and level order sequence for the constructed tree.

3A. Construct a tree with the list representation ( X( B ( E ( Y, Z ), P(Q,R), V ( G,N ), L ( H ( D ), I, A ) ) ).

What is the degree and depth of the constructed tree? Write the descendants and ancestors of node L.

4A) Construct an expression tree for the given expression (show each step) A + B - C \* D / E + F + G \* H and

write the preorder, inorder, level-order and postorder traversal sequence of the resultant expression tree.

5A) Write the complete class definition for a Binary tree with member functions to perform following operations.

1. Iterative post order traversal
2. Testing whether two given binary trees are equal
3. Convert a given tree into its mirror image