Time: 1 hour 30 minutes | **B-JET Training Program** | Marks: 50

Start Time: 3:00 PM | **Question Paper**

Set-A

Note: Each question has 10 marks.

Please use any standard Computer Programming Language like C/C++, Java, Python etc. to solve the following problems:

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1. Given a string, that contains alphabets ('a' to 'z' and 'A' to 'Z'), write a function to print string by inserting the frequency of each unique character after it and also eliminating all repeated characters.

   Example:
   Input : CLeeeEEMMMss
   Output : C1L1e3E2M3s2

   Input : ccccOddEEE
   Output : c4O1d2E3

2. State the output of below method for func(6,2).

```
int func(int x, int y) {
        if (x == 0){
                return y;
        }
        else{
                return func(x - 1, x + y);
        }
}
```

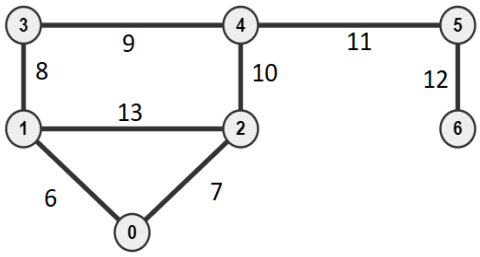
   Example:
   Input: func(6,2)

3. You have a one-dimensional array, A with n number of integer value. You have to write a program to sorting them and also eliminating all repeated integer values.

   Example:

   Input: A[] = [-2, 12, 45, -9, 1, 5, 12, -2]
   Output: [-9, -2, 1, 5, 12, 45]

4. You have given a two dimensional array, int graphList[][] with equal numbers of rows and columns. The indices of the rows and columns represent the indices of the nodes in a graph, and the value in a row r and column c represents the weight between the nodes with the indices r and c respectively. If there is no edge between two nodes, the corresponding value will be 0.



Please write a program that will display adjacent list as well as two-dimensional array (matrix). Finally show the summation of the edges.

Example:
Output: Adjacency List:

0--> 1 --> 2
1 --> 0 --> 2 --> 3
2 --> 0 --> 1 --> 4
3 --> 1 --> 4
4 --> 2 --> 3 --> 5
5 --> 4 --> 6
6-->5

Output: Adjacent Matrix:

0	6	7	0	0	0	0
6	0	13	0	0	0	0
7	13	0	0	10	0	0
0	8	0	0	9	0	0
0	0	10	9	0	11	0
0	0	0	0	11	0	12
0	0	0	0	0	12	0

Output: Total Summation=144

5. Suppose in a school, student admission is going on. They are taking students in three groups namely Group-A, Group-B and Group-C. Students have to select courses in three categories such as general, special and optional. General courses are applicable for all groups like Bangla and English.

Special courses differ from group to group. Optional Courses can be considered as extra in each group if any student desires. Design the model and implement in program from OOA, OOD and OOP concept to save and get the course list against student id.

i. **Abstraction**: Define abstract class or interface i.e Course and assign the general courses so that it can be included in course list of all students.

ii. **Inheritance**: Extend or implement the class or interface in three classes like CourseForA, CourseForB and CourseForC. To include optional courses, implement multilevel inheritance.