



## CL-2001 Data Structures

### Objectives:

- Binary Heap
- Max, Min Heap
- Heapify
- Heap Sort

**Note: Carefully read the following instructions (*Each instruction contains a weightage*)**

1. There must be a block of comments at start of every question's code by students; the block should contain brief description about functionality of code.
2. Comment on every function and about its functionality.
3. Mention comments where necessary such as comments with variables, loop, classes etc to increase code understandability.
4. Use understandable name of variables.
5. Proper indentation of code is essential.
6. Write a code in C++ language.
7. Make a Microsoft Word file and paste all of your C++ code with all possible screenshots of every task **outputs in Microsoft Word and submit word file. submit .cpp file.**
8. First think about statement problems and then write/draw your logic on copy.
9. After copy pencil work, code the problem statement on MS Studio C++ compiler.
10. At the end when you done your tasks, attached C++ created files in MS word file and make your submission on Google Classroom. (Make sure your submission is completed).
11. Please submit your file in this format **19F1234\_L8**.
12. Do not submit your assignment after deadline. Late and email submission is not accepted.
13. Do not copy code from any source otherwise you will be penalized with negative marks.

## Lab # 10 Task(2-weightages)

**Problem: 1 | K largest (or smallest) elements in an array (Using Pointer) 10 Marks**

Write an efficient program for printing k largest elements in an array. Elements in array can be in any order.

For example, if given array is [1, 23, 12, 9, 30, 2, 50] and you are asked for the largest 3 elements i.e., k = 3 then your program should print 50, 30 and 23.

**Note pass array to function as parameter. Perform this task using pointer**

## Lab # 11 Task (3 weightages)

**Problem: 2 | Write the code for Min heap 10 marks**

Update the code given for Max Heap, convert this code for Min Heap.

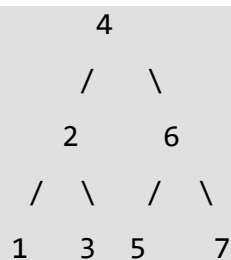
## Lab # 12 Task(2-weightages)

**Problem: 3 | Convert BST to Min Heap 10 marks**

Given a binary search tree which is also a complete binary tree. The problem is to convert the given BST into a Min Heap with the condition that all the values in the left subtree of a node should be less than all the values in the right subtree of the node. This condition is applied on all the nodes in the so converted Min Heap.

**Examples:**

Input:



Output:

```
      1
     / \
    2   5
   / \ / \
  3  4 6  7
```

The given **BST** has been transformed into a

**Min Heap.**

All the nodes in the Min Heap satisfies the given condition, that is, values in the left subtree of a node should be less than the values in the right subtree of the node.

1. Create an array **arr[]** of size **n**, where **n** is the number of nodes in the given BST.
2. Perform the inorder traversal of the BST and copy the node values in the **arr[]** in sorted order.
3. Now perform the preorder traversal of the tree.

While traversing the root during the preorder traversal, one by one copy the values from the array **arr[]** to the nodes

😊 Best of luck