

**Indian Institute of technology, Guwahati**  
**Department of Computer Science and Engineering**  
**Data Structure Lab: (CS210)**  
**Lab Test-2**

**Date: 4<sup>th</sup> September 2017**

**Total Marks: 20**

1. You are required to write two programs, each of which has the same function, but a different underlying algorithm. The programs take inputs from file, containing a list of household salaries. The first entry in the file indicates the number of families, followed by the household income of each of these families (each of these entries is separated by a newline). The program reads this file and asks for an input integer k, less than the total number of salaries. The program then outputs the k lowest salaries in ascending order. The two programs implement this heap building functionality in the following two ways:
- The first program makes a heap of the numbers by inserting the numbers one at a time into the heap and then removing the k minimum numbers from the heap (while maintaining the heap). **(10)**
  - The second program builds a heap bottom up and removes the k minimum numbers from the heap (while maintaining the heap). **(10)**

Implement these two algorithms as two different programs. Test these programs on sample input from **test.dat** (provided as separate file).

Test your code for following data as well.

**Test 1:**

9  
45  
23  
56  
223  
44  
22  
11  
999  
45