CS291 – Data Structures Lab

July 5, 2024 *Final Exam* *Maximum Marks: 50*

Q1. For this question, you need to write ADT code for an **array-based stack**. [CLO 1] [6+6+3=15]

a) Implement constructor, pop, top, and clear functions.

b) Implement the push function in a way that when the stack gets full, the memory of the stack should be doubled. There should be no loss of data or memory leak.

c) What will be the time complexities of all the functions you have implemented in parts a and b?

Q2. For this question, you need to write ADT code for a **linked-structures-based queue**. [CLO 1] [6+6+3=15]

a) Implement the constructor, push, and pop functions.

b) Implement the operator== and operator< functions. Use lexicographical comparison, if required.

c) What will be the time complexities of all the functions you have implemented in parts a and b?

Q3. Implement the ReheapUp and ReheapDown functions for the **min-heap** data structure. [CLO 1] [4+6=10]

Q4. Let's assume we have a list of words (strings) stored in an array. Some words might appear multiple times in the list. Write client code using suitable data structure(s) to solve the following: [CLO 2] [4+4+2=10]

a) Count how many times each word appears in the list?

b) Display the words in alphabetical order along with their frequencies.

c) Find the time complexities of the solutions given in parts (a) and (b).