



**Information Technology and
Computing**

ARAB OPEN UNIVERSITY

Faculty of Computer Studies

ITC 450 Data Structure TMA01 cut off date: 5 Aug 2008

The TMA consists of 2 questions.

Each carries the weight of 50.

You must write your solution in a word file

Question 1 [50 marks]

A text editor is a computer program that lets a user enter, change, store, and usually print text (characters and numbers, each encoded by the computer and its input and output devices, arranged to have meaning to users or to other programs). Typically, a text editor provides an "empty" display screen (or "scrollable page") with a fixed-line length and visible line numbers. You can then fill the lines in with text, line by line. After saving a document, you can then print it or display it. Before printing or displaying it, you may be able to format it for some specific output device or class of output.

A)

A line-based text editor reads from a student file (line by line) and inserts the lines in one of the Data Structures you took at Class. What do you think is the most suitable ADT to maintain the internal copy of the file which have the student information? Identify the Data members needed to maintain this problem (each line holds the information of a single student)? What is the key? [10]

B)

In order to scroll through the file up and down, which ADT must you maintain? [5]

C)

Your program should view this menu to the user

Write the algorithms for all the Menu items.[5 for each algorithm]

Menu	
1	Add a student in the front
2	Add a student at the end
3	Add a student in the sorted list
4	Search the list
5	Delete from the list
6	Print the contains of the file
0	Exit

Question2 [50 marks]

A) Write the following algorithms without using the Linked List ADT:

I. An algorithm to add a new node with key 23 just after the 4th node of a given list. Assume that there are at least four nodes on that list. [6]

II. An algorithm that takes doubly linked list to print the data of the linked list in reverse order:[12]

1- Suppose that you do not have rear pointer.

2- Suppose that you have the rear pointer.

B) Write the following algorithm using Linked List ADT:

An algorithm that takes a list of integers as input and prints out the number of elements in this list and the sum of the data.[6]

C)

I.What is efficiency? [2]

II.What do we mean by the Big O notation?[3]

III.Why the Binary search is more efficient than the linear search?[3]

D)

I. Write an algorithm that receives a string and reverses it.[6]

II. Write an algorithm to check whether the contents of two stacks are identical or not.[6]

III. Write an algorithm Swap Queue to exchange the front two elements of a queue.[6]