Ac/systems

ID #50

THE OPEN UNIVERSITY OF SRI LANKA
B.Sc DEGREE PROGRAMME: LEVEL 03
CLOSED BOOK TEST - 1: 2010/2011
CPU1142: DATA STRUCTURES AND ALGORITHMS

DURATION: **ONE AND HALF HOURS** (1 ½ HOURS)

Date: **11th March, 2011** Time: **4.00 pm – 5.30 pm**

Answer ALL questions.

Q1.

a) What is the difference between *arrays* and *structures*?

b) Define a two dimensional array to store the numeric grade for each student in classes. Assume that, there are 5 classes and a maximum of 45 students per class.

c) Mr. M. P. Perera runs a pizza- analysis service. For each pizza, he needs to record the following information;

- The name of the pizza company, which can consist of more than one word
- The diameter of the pizza
- The weight of the pizza

Define a structure that can hold this information and write a simple C program that uses a structure variable of that type. The program should ask the user to enter the above information and then the program should display that information.

d) What is the output of the following C statements?

```
int *p, *q;
int x;
x = 10;
p = (int *) malloc(sizeof(int));
*p = 3;
q = p;
printf("%d %d \n", *p, *q);
*q = x;
printf("%d %d \n", *p, *q);
```

Q2.

a) What is an *Abstract Data Type* (*ADT*)?

b) Define an ADT for a list of integers. Your ADT should consist of functions that can be performed on lists, with each function defined in terms of its inputs and outputs.

c) When selecting a data structure to solve a problem, what are the steps you should follow?

d) What are the basic operations that can be performed on a data structure?

e) List out three linear data structures.

Q3.

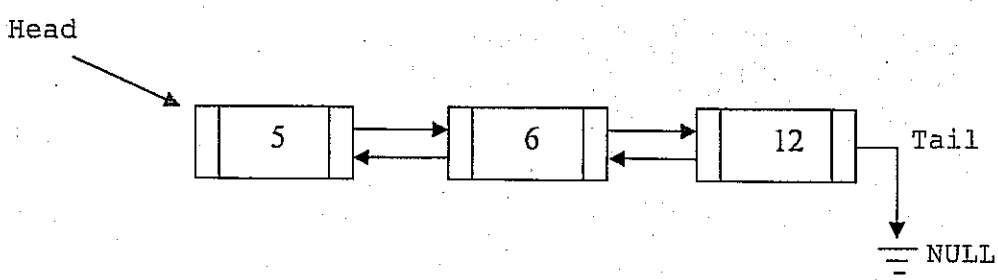
a) Define a *linked list*.

b) What are the disadvantages of the *array implementation* of the linked list data structure?

c) What is a *doubly linked list*?

d) Explain what are the advantages and disadvantages of doubly linked lists.

e) Consider the following doubly linked list.



A user wants to insert an element after the node with value 6. Represent this situation graphically.