Section B

Q 7: Attempt the following questions

a) Differentiate between a **queue** and a **stack** (2 **marks**)
b) Using array implementation of stacks, write a function to push **float** data into the stack (5 **marks**)
c) Using linked list implementation of stacks, write a simplified function to pop from the stack (5 marks)

Q 8: Respond to the following questions

a) What is the advantage of a structure over an array? (1 **mark**)
b) Provide the syntax for a structure definition (2 **marks**)
c) Given that one structure has members *int age* and *char name[]* while the other structure contains *float salary* and all members of the first structure. Which means the first structure can be nested in the second structure.
   i. Write the code fragments to define these two structures (4 **marks**)
   ii. Declare a variable of the second structure's type (1.5 **marks**)
   iii. Assign the **age** member of the variable in (ii) above to be 45 (1.5 **marks**)
   iv. Declare an array of second structure's type, of size **100** (2 **marks**)

Q 9:

a) List three advantages of using functions in C programming (3 **marks**)
b) Briefly differentiate between passing by values and passing by parameters (2 **marks**)
c) Write a C programming function that converts Celsius temperature to Fahrenheit and vice versa, depending on the user's choice. The function takes in temperature and choice (to Celsius or to Fahrenheit) as arguments. **Note:** The formula for conversions are; $C = 5/9\ (F-32)$ and $F = 9/5\ (C+32)$. (7 **marks**)

Q 10:

a) Convert the following program to use **while** loop instead of **for** loop (2 **marks**)

```
main()
{
   int i = 0, j = 8;
   printf("Times 8 Table\n");
   for(i = 0; i <= 12; i = i + 1) {
      printf("%d x %d = %d\n", i, i, j*i);
   }
```

b) List the three ways in which pointers can be used in C (3 **marks**)
c) Write a programme, using arrays, that accepts marks of a test from a number of students marks (the number of students to be provided by the user) and deduct 7 from each. If the resulting mark for an individual is less than 4 it should set the marks to be 40 (7 **marks**)

Q 11

a) Explain what is *sorting* and how useful it is in computing? (3 **marks**)
b) Write the function in C implementation to swap values of two variables (3 **marks**)
c) Describe the algorithm for **bubble sort** and then write a function in C language that implements **bubble sort** algorithm (if need be, you may use the swap function above (6 **marks**)