2920/103
STRUCTURED PROGRAMMING
November 2011
Time: 3 hours

THE KENYA NATIONAL EXAMINATIONS COUNCIL

DIPLOMA IN INFORMATION COMMUNICATION TECHNOLOGY

MODULE I

STRUCTURED PROGRAMMING

3 hours

INSTRUCTIONS TO CANDIDATES

You should have the following for this examination:

Answer booklet.

*Answer any **FIVE** of the following **EIGHT** questions.*

All questions carry equal marks.

This paper consists of 5 printed pages.

Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.

1. (a) (i) List **two** examples of *fourth generation* programming languages. (1 mark)

(ii) State **three** items that can be placed in an *appendix* of program documentation. (3 marks)

(b) Describe the procedure for performing a *quick sort*. (6 marks)

(c) Differentiate between *modular* and *monolithic* design as used in programming. (4 marks)

(d) Write a Pascal program that generates all the even numbers in the range 50 to 100, determines their sum and displays the even numbers and the sum. Use *for ...loop*. (6 marks)

2. (a) (i) State **two** *structured programming* languages other than C and Pascal. (1 mark)

(ii) Outline **two** contents of an *index* as used in program documentation. (2 marks)

(b) (i) Describe the term *parameter passing* as used in programming. (4 marks)

(ii) Distinguish between *random* and *sequential* file organization methods as used in programming. (3 marks)

(c) The following is a C program segment. Use it to answer the question that follows.

```
main()
{
    int a,b,c;
```

(d) Write a C program to produce the following output. Use *while...loop* structure.

```
2
3   4
4   5   6
5   6   7   8
```

(6 marks)

6. (a) Define each of the following terms as used in programming.

(i) record;

(ii) linked list. (3 marks)

(b) Describe each of the following terms as used in programming:

(i) debugging;

(ii) dry running. (4 marks)

(c) (i) Adams, an ICT student, would like to develop a program to sort the following numbers in ascending order using a selection sort algorithm:

4 1 0 3 2

Describe the logic of the program. (5 marks)

(ii) Differentiate between global and local variable. (4 marks)

(d) Write a C program that accepts a 4 digit number and then outputs it in the reverse order. Use *for...loop* control structure. (4 marks)

7. (a) Define the term *stack* as used in programming. (2 marks)

(b) (i) Explain **two** categories of *test data* used in programming. (4 marks)

(ii) Interpret the following Pascal program segment.

```
        x:integer;
        function multiplication(n:integer):integer;
var
```

(d) (i) Differentiate between *while* and *do while* control structures. (2 marks)

(ii) Write a Pascal program that accepts the heights of five students and then calculates and outputs the average of the heights through the use of a procedure. (6 marks)

8. (a) State two advantages of using the *binary* search algorithm. (2 marks)

(b) Describe a *tree* data structure as used in programming. (3 marks)

(c) (i) Differentiate between *merge* sort and *insertion* sort as used in programming. (2 marks)

(ii) The following is a Pascal program segment. Use it to answer the questions that follow.

```
If mark>=80 then
        Z:='Grade A'
Elseif mark>=70 then
        Z:='Grade B'
Elseif mark>60 then
        Z:='Grade C'
Else
        Z:='Grade D';
```

I. Given that mark is equal to 60 evaluate the value of Z. (2 marks)

II. Rewrite the program segment using *case ... of* control structure. (2 marks)

(d) (i) Ufanisi Company Limited uses the following information to compute its employees net pay.

Rate of pay = Ksh. 1000 per hour
Rate of taxation=11%

Write a C program that accepts an employee's name and number of hours worked then computes the net pay and outputs the name, hours worked, gross pay and net pay.

Hint :

gross pay=hours worked*rate of pay
taxation= gross pay* taxation
net pay=gross pay – taxation. (5 marks)

(ii) Write a Pascal program that accepts two numbers and determines if the two numbers are the same, otherwise it computes the remainder of the first number when divided by the second number and then outputs all the numbers and the appropriate comment. (4 marks)