2920/103
STRUCTURED PROGRAMMING
July 2021
Time: 3 hours

THE KENYA NATIONAL EXAMINATIONS COUNCIL

DIPLOMA IN INFORMATION COMMUNICATION TECHNOLOGY

MODULE I

STRUCTURED PROGRAMMING

3 hours

INSTRUCTIONS TO THE CANDIDATES

This paper consists of EIGHT questions.
Answer any FIVE questions in the answer booklet provided.
Candidates should answer all questions in English.

This paper consists of 4 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) Study the following program and then answer the questions that follow.

```
INC COUNT
MOVE TOTAL 20
ADD A, B
```

      (i)   Identify the programming language used in this program.   (1 mark)

      (ii)   Outline **two** advantages of the language identified in (i).   (2 marks)

(b) Distinguish between *local* and *global* variables as used in programming.   (4 marks)

(c) Write a program in Pascal language that computes and displays the product of two assigned values 20 and 40.   (4 marks)

(d) (i)   A college intends to store the following student's details in a computer; name, age and address. Declare a Pascal language record that would store these details.   (4 marks)

      (ii)   Write a program in C language that prompts a user to enter a student's name and age. The program then writes the name and age into a text file.   (5 marks)

2. (a) The following are program statements in C language. Use them to answer the question that follows: (2 marks)

      (i)   x *=2;

      (ii)   x%=3.

    Given that the value of x is 60. State the output generated when each of the statement is executed.

(b) Differentiate between *rewind()* and *getw()* as used in C programming.   (4 marks)

(c) Write a program in Pascal language that prompts a user to enter a character. Then the program determines whether the character input is a vowel or not and displays an appropriate message. Use *case* statement.   (5 marks)

(d) (i)   Explain **two** statement used to change the flow of execution in a C program loop.   (4 marks)

      (ii)   Write a program in C language that displays even numbers up to a given number input.   (5 marks)

3. (a) State **four** sorting techniques used in programming.   (4 marks)

(b) (i)   Describe the purpose of *writeln;* statement as used in Pascal programming language.   (2 marks)

      (ii)   Write a program in Pascal language that prompt a user to enter the amount of money borrowed and the repayment period. The program then passes these values to a procedure, computes and displays the simple interest at rate of 14% per annum. Hint: interest =money borrowed x period x rate.   (5 marks)

(c) Distinguish between *call by reference* and *call by value* as used in programming.   (4 marks)

(d) The following Pascal program was created by a student during a practical lesson. Use it to answer the question that follows.

```
Program alpha(input, output);
Var
x:char;
y:integer;
Procedure beta(var x:char; var y:integer);
Begin
y:=ORD(x);
End;
Begin
x:='A';
Beta(x,y);
Writeln('ASCII code for  ',x, 'is' ,y);
End.
```

Interpret the program. (5 marks)

4. (a) (i) Outline **three** reasons for preparing a program documentation. (3 marks)

(ii) Explain **two** inbuilt Pascal functions used to manipulate an enumerated data type. (4 marks)

(b) Outline the purpose of each of the following operators in a C program: (3 marks)

(i) &&

(ii) ||

(iii) !=

(c) Write a program in C language that prompts a user to enter a positive integer. The program then determines and output the factors of the integer. (5 marks)

(d) Write a program in Pascal language that generates the following output when executed: (5 marks)

$$$$
$$$$
$$$$

5. (a) State the differences between $r+$ and $w+$ file commands as used in C programming. (4 marks)

(b) Describe **two** types of file organisation techniques that could be adopted during program writing. (4 marks)

(c) Write a Pascal program that prompts a user to read a number. The program check to determine whether the number is a positive integer. The program then computes and output the square root of the number using a predefined function. (6 marks)

(d) Given the nodes: 6, 2, 5, 1, 7, 4 and 3:

(i) Construct a binary tree. (4 marks)

(ii) Write the output generated when the tree in (i) is traversed using pre-order traversal strategy. (2 marks)

6. (a) (i) Outline **two** operations that could be performed on a stack data structure. (2 marks)

(ii) Explain the purpose of a packed array in Pascal programming. (2 marks)

(b) (i) Outline **three** factors considered when selecting an appropriate programming language. (3 marks)

(ii) Explain each of the following approaches to programming: (4 marks)

(I) monolithic;

(II) visual.

(c) Differentiate between *bubble* and *selection* sort techniques. (4 marks)

(d) Write a segment code in C programming language that deletes an element from queue data structure. (5 marks)

7. (a) Explain **two** benefits of a compiler in programming. (4 marks)

(b) Outline **four** factors to consider when naming constant identifier. (4 marks)

(c) Write a program in Pascal language that would prompt a user to enter two numbers. The program then computes the sum of the two numbers using a function and displays the results. (6 marks)

(d) The following elements are stored in an array; 45, 34, 65, 30, 25 and 56. Write a program in C language that would search for the element 30 and display an appropriate message. Use linear search technique. (6 marks)

8. (a) Outline **six** conversion specifiers used in C programming language. (3 marks)

(b) (i) Outline **two** importance of creating subprogram when programming. (2 marks)

(ii) Susan created a documentation for a program. Outline **four** elements that she could have included to it for easy referencing. (4 marks)

(c) Draw a program flowchart that would declare two sides of a rectangle as constant with values 70 and 130 respectively. The program then calculates and output the area of the rectangle. (6 marks)

(d) Write a program in C language that prompts a user to enter three different numbers. The program then determines and displays the largest among the numbers. (5 marks)

THIS IS THE LAST PRINTED PAGE.