2920/103
STRUCTURED PROGRAMMING
July 2022
Time: 3 hours

THE KENYA NATIONAL EXAMINATIONS COUNCIL

DIPLOMA IN INFORMATION COMMUNICATION TECHNOLOGY

MODULE I

STRUCTURED PROGRAMMING

3 hours

INSTRUCTIONS TO CANDIDATES

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

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) Outline **four** advantages of high-level programming languages. (4 marks)

(ii) Explain the term bug as used in programming. (2 marks)

(b) Differentiate between *function call* and *function definition* as used in C language. (4 marks)

(c) The following was executed in a C language program.

*(7%2) * 3 + 4 < 5*

Showing the working, state the Boolean output generated. (4 marks)

(d) A student is graded based on exam performance and class attendance. When the performance is above 50% and class attendance greater than 75%, the student is awarded "Pass". When the class attendance is less than 75%, the student retakes the course. Otherwise, the student sits for a supplementary exam.

Draw a program flowchart to represent this logic. (6 marks)

2. (a) (i) State **two** symbols for comments in a Pascal program. (2 marks)

(ii) Explain the purpose of each of the following statements in a program.

(I) goto; (2 marks)

(II) continue. (2 marks)

(b) Martin used global variables in a program. Explain **two** errors he is likely to encounter when executing the program. (4 marks)

(c) Write a program in Pascal language that prompts a user to enter an amount in shillings then the program computes and displays the number of data bundles purchased.
Take KShs 1 = 5MB (5 marks)

(d) A student wrote the following C language program. Use it to answer the question that follows.

```
1. #include<stdio.h>
2. main()
3. {
4. int i, sum =0;
5. int num[6] = {30, 40, 60, 10, 25, 38};
6. for (i=0; i<6; i++)
7. {
8.     sum=sum +num[i];
9.     if(i==3)
10.    break;
11.    }
12. printf("%d", sum);
13. }
```

Interpret the program line by line. (5 marks)

3. (a) (i) Explain the term modular design as used in programming. (2 marks)

(ii) Explain **two** importance of pointers in programming. (4 marks)

(b) Differentiate between *sequence* and *iteration* control structures. (4 marks)

(c) A footballer is offered a position at an international club based on two of the following; academic qualification, experience of 5 years or more and discipline.

Draw a limited entry decision table to represent this information. (5 marks)

(d) Table 1 shows outcomes of a competency based test. Use it to answer the question that follows.

Outcome	**Meaning**
E	Exceed Expectation
M	Met Expectation
A	Approaching Expectation
B	Below Expectation
	Enter a valid outcome

Table 1

Write a program in Pascal language that prompts a user to enter the outcome. The program then displays the corresponding meaning. Use *case* statement. (5 marks)

4. (a) (i) Outline **four** disadvantages of monolithic programming approach. (4 marks)

(ii) Describe **two** documentations used in programming. (4 marks)

(b) With the aid of a diagram, describe a doubly linked list. (4 marks)

(c) The following Pascal program has errors. Use it to answer the question that follows.

```
program StudAge(input, output)
var
int: Age;
        begin
writeln("Enter the age")
readln(age);
if (Age>=18)
writeln("Admit");
else

        writeln("Dismiss;
end;
```

Rewrite the program correctly. (3 marks)

(d) Write a program in Pascal language that accepts 5 numbers and stores them in an array. The program then displays the numbers in reverse order. (5 marks)

5. (a) (i) State **six** stages in the program development process. (3 marks)

(ii) Explain each of the following terms as used in programming.

(I) Dry run; (2 marks)

(II) Compilation. (2 marks)

(b) Distinguish between *fixed* and *dynamic* data structures. (4 marks)

(c) State an inbuilt Pascal function that could perform each of the following:

(i) join two strings; (1 mark)

(ii) convert a character to its ASCII code; (1 mark)

(iii) count the number of characters in a string; (1 mark)

(iv) display the previous number in an enumerated list. (1 mark)

(d) A student would like to store the following details in a C language program.

Name, Date of Birth, height, weight, Subcounty.

Declare the most appropriate data structure that he could use. (5 marks)

6. (a) State **four** items that are included in a program documentation to ease access to information. (4 marks)

(b) Differentiate between *event driven* and *object-oriented* programming approaches. (4 marks)

(c) The following are elements in an array.

69, 80, 78, 42, 30, 56, 48, 62

Showing all the passes, sort the array in ascending order using selection technique. (6 marks)

(d) Write a program in C language that prompts a user to enter two numbers. The program then uses a compound operator to determine the larger of the two numbers and displays the result. (6 marks)

7. (a) (i) Outline **four** escape sequence characters used in C programming language. (4 marks)

(ii) Explain the term *portability* as used in programming. (2 marks)

(b) State a file operation used to perform each of the following in Pascal language.

(i) Detect end of a file. (1 mark)

(ii) Open a file for reading. (1 mark)

(iii) Attach a file handle to a binary file. (1 mark)

(c) The following are names of students in a class:

Levi, Jane, Bethel, David, Arthur, Zoe and Martin.

(i) Draw a binary search tree to store the names. (4 marks)

(ii) Traverse the tree in (i) using pre-order strategy. (2 marks)

(d) Write a program in C language that accepts a character value and displays its memory address. (5 marks)

8. (a) (i) **Outline two** advantages of binary search algorithm. (2 marks)

(ii) Explain **two** reasons for passing parameters by reference in a subprogram. (4 marks)

(b) Differentiate between *serial* and *sequential* file organization methods. (4 marks)

(c) Write a program in C language that prompts a user to enter a number. The program then computes and displays the square root of the number. (4 marks)

(d) Write a program in Pascal language that prompts a user to enter weight in kilograms and height in meters. The program then computes Body Mass Index (BMI) using a function. The program then displays underweight when the BMI is less than 18, Normal when the BMI range is between 18 and 25, otherwise overweight.
(Hint: BMI=Weight/(Height)^2) (6 marks)

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