

2920/103
STRUCTURED PROGRAMMING
November 2017
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.
ALL questions carry equal marks.
Candidates should answer the 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) Outline **four** characteristics of low level programming languages. (4 marks)
(b) Explain the term *algorithm* as used in programming. (2 marks)
(c) During a programming lesson, a student was required to write a program that would generate and display even numbers between 2 and 50. Represent the program logic using a flowchart. (5 marks)
(d) (i) Describe **two** modes that are used to write a file in a C Program. (4 marks)
(ii) Write a program in C language that implements a *null pointer*. (5 marks)
2. (a) Explain each of the following terms as used in programming:
(i) coupling; (2 marks)
(ii) cohesion. (2 marks)
(b) Jane, a programmer, intends to write a program for a client. Explain **three** factors that she could consider when selecting a programming language to use. (6 marks)
(c) (i) Outline **three** properties of an array. (2 marks)
(ii) Explain the purpose of the command *packed* in Pascal programming language. (3 marks)
(d) Write a program in Pascal language that prompts the user to enter the radius of a circle in the main program. The program then passes the value of the radius to a subprogram named *calculate* which computes the circumference and the area of the circle. The subprogram then returns the results to the main program for output. (5 marks)
3. (a) Outline **four** reasons for compiling a program. (4 marks)
(b) A student was required to prepare documentation for a program.
(i) Describe **two** areas of technical information that the student may include in this documentation. (4 marks)
(ii) Outline **three** user-oriented contents that should be included. (3 marks)
(c) Write a program in C language that prompts a user to input a four-digit year. The program then determines whether the year entered is a leap year or not and displays an appropriate message. (Hint: A leap year is divisible by 4) (5 marks)
(d) Distinguish between an *array* and a *record* as used in Pascal programming language. (4 marks)
4. (a) Explain each of following terms as used in programming:
(i) dry run; (2 marks)
(ii) debug. (2 marks)
(b) (i) Outline **three** elements that constitute a *for* control structure as used in C programming language. (3 marks)

- (ii) With the aid of a chart, describe a *repeat...until* control structure as used in Pascal programming. (4 marks)

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

```
{
a=14
b=0;
If (c=a/b) then
{
    printf("a", divided by " b", "is" , c);
Else
    Printf("a", divided by b is not ",c);
}
Return 0;
}
```

Rewrite the program segment correctly. (4 marks)

- (d) Write a program in Pascal language that prompts the user to enter an alphabetic character. The program then displays its equivalent numeric ASCII code. (5 marks)
5. (a) Outline **three** advantages of using a pseudocode when designing a program. (3 marks)
- (b) Write a program in C language that calls a function that returns the absolute value of a number passed to it. (5 marks)
- (c) With the aid of a diagram in each case, distinguish between a *stack* and a *queue*. (4 marks)
- (d) Dorcas wrote a program during a programming lesson.
- (i) State **two** categories of test data that she could use. (2 marks)
- (ii) Describe **three** types of errors that she could have encountered while testing the program citing an example in each case. (6 marks)
6. (a) (i) Outline **two** reasons for declaring a variable as global. (2 marks)
- (ii) State **two** syntax used to add comments in each of the following languages:
- I. C; (2 marks)
- II. Pascal. (2 marks)
- (b) Peter, a programmer, would like to create a program file to store numerous data items. Describe a search technique that would be the most appropriate for this program. Justify your answer. (4 marks)
- (c) Distinguish between *selection* and *quick* sort methods. (4 marks)
- (d) Write a program in Pascal language that would be used to store rainfall readings at four different times in a day from three different locations. (6 marks)

7. (a) Outline **three** characteristics of a sequence control structure. (3 marks)
- (b) Explain the term *error handling* as used in programming. (2 marks)
- (c) (i) Describe **two** approaches a programmer would use to improve the readability of a program. (4 marks)
- (ii) Distinguish between *source* and *object* codes. (4 marks)
- (d) Mawezo College hired a programmer to design a hostel rooms allocation program. The requirements are as follows:
- There are two categories of students; regular and part time. Part time students are not allowed to stay in the college's hostels. First year regular student are allocated double room if they have cleared the fees. Other students are allocated a hostel as follows; fees clearance, a single room otherwise a double room. Draw a decision tree to represent this program logic. (7 marks)
8. (a) Outline the use of each of the following in C programming language:
- (i) []
- (ii) #
- (iii) { } (3 marks)
- (b) Outline the order of evaluation of logical operators in C programming language. (2 marks)
- (c) Write a program in Pascal language that enumerates the days of the week. The program then displays a message "IT IS A WEEKDAY" if the day ranges between Monday and Friday otherwise "IT IS A WEEKEND". Use relational operators. (6 marks)
- (d) (i) Draw a *four* level complete binary tree. Serialise the nodes from A. (5 marks)
- (ii) Write the order of the nodes when the tree in (i) is traversed using each of the following strategies:
- I. Pre-order; (2 marks)
- II. Post-order. (2 marks)

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