

1920/203
STRUCTURED PROGRAMMING
November 2018
Time: 3 hours



THE KENYA NATIONAL EXAMINATIONS COUNCIL
CRAFT CERTIFICATE IN INFORMATION TECHNOLOGY

MODULE II

STRUCTURED PROGRAMMING

3 hours

INSTRUCTIONS TO CANDIDATES.

This paper consists of TWO sections; A and B.

Answer ALL the questions in section A and any FOUR in section B in the answer booklet provided.

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.

SECTION A (40 marks)

Answer ALL the questions in this section.

1. James, a program designer, would like to develop a program for a client.
 - (a) State **two** nonlinear data structures that he could use. (2 marks)
 - (b) Outline **two** benefits that he would realise from using data structures in the program. (2 marks)
2. Describe **two** items that could be added to program documentation to makes the details easy to access. (4 marks)
3. A student wrote a computer program during a programming lesson. Outline **three** functions the program would be expected to perform. (3 marks)
4. Write a program in C language that could generate odd numbers between 1 and 9. Use the *for* loop. (5 marks)
5. State **two** examples of each of the following as used in C programming language:
 - (i) logical operator, (4 marks)
 - (ii) relational operator. (4 marks)
6. Differentiate between *modular* and *bottom-up* programming approaches. (4 marks)
7. Assuming C programming language, determine the value of x in each of the following expressions given that a=20, b=10 and c=2:
 - (i) $x = a * (b - 2) / \sqrt{c + 2}$;
 - (ii) $x = 2^c + (a + 1) * c$. (4 marks)
8. Ann, a programmer at Cymba Solutions included a function in program. Outline **four** properties that this function should possess. (4 marks)
9. Differentiate between *linear* and *binary* search techniques. (4 marks)
10. The following program segment was created by a student. Use it to answer the question that follows.


```
main()
{
    int n;
    printf("enter a number :");
    scanf("%d", &n);
    printf("the result of %d is %d\n", n, cube(n));
}
cube (int k)
{
    return (k*k*k);
}
```

Interpret the program segment. (4 marks)

SECTION B (60 marks)

Answer any **FOUR** questions in this section

11. (a) Outline **four** characteristics of assembly programming language. (4 marks)
- (b) Write a program in C language that could read the content "Student details" in a text file named *datafile*. The program then closes the test file. (4 marks)
- (c) A client approached you to design a program from scratch. State **three** design tools that you may use. (3 marks)
- (d) Describe **two** commands that are used with switch statement in a C programming language. (4 marks)
12. (a) Outline **two** functions of a *compiler* software in a structured programming language. (2 marks)
- (b) Explain a reason for using each of the following types of test data during program testing:
- (i) real data;
- (ii) exceptional data;
- (iii) dummy data. (6 marks)
- (c) Write a program in C language that prompts a user to enter two different integers. The program then compares the numbers and outputs the smaller integer. (4 marks)
- (d) A student would like to add a comment in a program she is creating. Outline **three** reasons for this. (3 marks)
13. (a) Outline **three** properties of an array data structure. (3 marks)
- (b) Simple interest (I) accrued when a principal amount (P) is deposited in bank for a period of (T) years at a rate (R) is given by $I = P \times T \times R$. Write a program in C programming language that would prompt a user to enter the principal amount and the number of years. The program then computes and displays the simple interest given that the rate is 10%. (5 marks)
- (c) Differentiate between *runtime* and *logical* errors as used in programming. (4 marks)
- (d) The following is a C program segment code statement. Use it to answer the question that follows.
- ```
m=2;
n=++m;
```
- (i) Re-write the segment using the postfix increment statement.
- (ii) Evaluate the values of m and n in (i). (3 marks)
14. (a) Outline the technique used to access data elements in each of following data structures:
- (i) queue;
- (ii) array;
- (iii) stack. (3 marks)

- (b) Outline **four** rules that should be observed when composing identifiers in a program. (2 marks)
- (c) Given the following data elements; *O, T, J, Y, W, M, R, K, Z* and *F*, draw a binary tree data structure to store them. (6 marks)
- (d) The following is a C program code created by a student. Use it to answer the question that follows.

```
#include <iostream.h>
void main()
{int i, j;
printf "input two non integers';
scanf ("%d %f", &i, &j);
cout ("\n addition=%f subtraction=%d\n" i+j, i-j);
}
```

Rewrite the program by correcting the errors. (4 marks)

15. (a) Outline **three** sorting techniques that could be used in C programming language. (3 marks)
- (b) Mercy wrote a program using C programming language to compute the value of  $R$  in the expression;  $R = (x+y) / (p-q)$
- (i) Explain the type of error that is likely to occur when the value  $p$  is equal to the value  $q$ . (2 marks)
- (ii) Explain a way in which the error in (i) could be trapped. (2 marks)
- (c) Peter wrote a program using monolithic programming approach. Outline **two** challenges that he may have encountered as he wrote the program. (2 marks)
- (d) Table 1 shows the criteria used at Masomo College to admit students in various courses. Use it to answer the question that follows.

| Grade     | Courses              |
|-----------|----------------------|
| A         | ICT                  |
| B         | Building Engineering |
| C         | Business             |
| D         | Hospitality          |
| Any other | Artisan              |

Table 1

Write a program in C programming language that would prompt a user to enter the grade scored by the applicant. The program then outputs the course the applicant qualifies for. (6 marks)

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