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.

Turn over

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;

   (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=PxTxR. 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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