Name: _____ Index No.: _____/_____

2920/103
STRUCTURED PROGRAMMING
November 2015
Time: 3 hours

Candidate's Signature: _____

Date: _____

THE KENYA NATIONAL EXAMINATIONS COUNCIL

DIPLOMA IN INFORMATION COMMUNICATION TECHNOLOGY

MODULE I

STRUCTURED PROGRAMMING

3 hours

INSTRUCTIONS TO CANDIDATES

Write your name and index number in the spaces provided above.
Sign and write the date of examination in the spaces provided above.
*Answer any **FIVE** of the **EIGHT** questions in this paper in the spaces provided after each question.*
Candidates should answer the questions in English.

For Examiner's Use Only

Question	1	2	3	4	5	6	7	8	Total Score
Candidate's Score									

This paper consists of 16 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

1. (a) Describe *compilation* as used in programming. (2 marks)

(b) Differentiate between *iteration* and *recursion as* used in programming. (4 marks)

(c) Peter, a student in a college, was presented with the following ten numeric values: 56, 49, 70, 83, 23, 45, 67, 76, 55 and 37. He was asked to create a data structure that would allow him to have access to each value directly.

(i) Identify the most appropriate data structure that he would create. (1 mark)

(ii) Using the data structure in (i), write a C program that would display the data. (5 marks)

3. (a) State **four** characters that are used for data conversion specification in C program input and output functions. (2 marks)

(b) Explain **two** uses of a RESET function as used in Pascal programming language. (4 marks)

(c) An ICT company intends to develop a new program. The team leader is faced with a challenge over which programming language to use. Explain **three** factors that the leader should consider when making a decision. (6 marks)

(ii) Differentiate between *PRED* and *SUCC* predefined functions as applied in Pascal programming. (4 marks)

(c) Write a C program that could print all numbers that are divisible by 9 from 1 to 99. Use *for* loop. (5 marks)

(d) A student was given a computer program code to study. Outline **four** characteristics that he may use to ascertain that the program is written using structured programming language. (4 marks)

(d) (i) Describe **two** items that could be added to a user manual in order to assist in the access of details and information. (4 marks)

(ii) Explain **two** importance of documenting all the stages during program development. (4 marks)

2. (a) Write operators *order of precedence* for evaluating mathematical expressions as used in Pascal programming. (3 marks)

(b) (i) David wrote a program with the seven days of a week declared as enumerated type in Pascal programming. Write **two** statements that would be used to generate a message "IT'S A WEEKDAY" if the day is not Sunday or Saturday in the program. (4 marks)

(d) Figure 1 shows a decision tree that was used by a programmer in a company to compute the discount offered to customers. Use it to answer the question that follows.

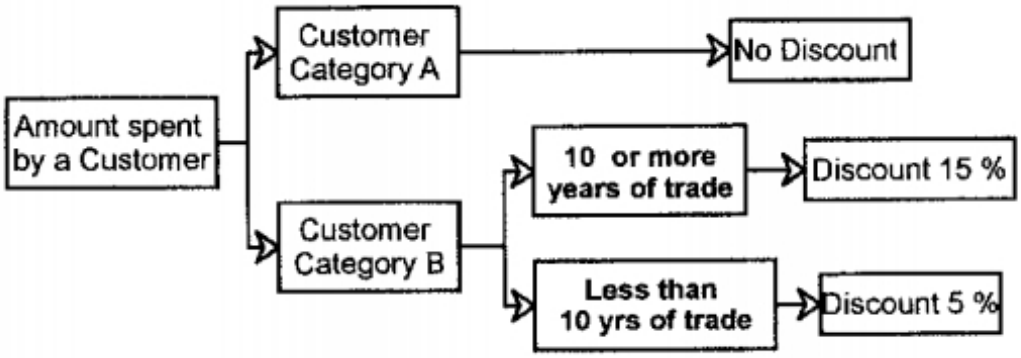

Figure 1

Write a Pascal program that prompts a user to enter the amount spent by the customer. The program then computes and displays the discount offered using the logic depicted in Figure 1. (8 marks)

4. (a) Write the output of each of the following logical operators when executed using C programming language.

(i) !false (1 mark)

(ii) true && false (1 mark)

(iii) true ||false (1 mark)

(b) Given that a=10, b=5 and c=2 determine the values of x in each of the following statements as used in Pascal programming. Show your working:

(i) x=2*a mod (b-3)/sqrt(c+2) (2 marks

(ii) x=2^c + sqr(a+1)*c (2 marks)

(c) Tom would like to use random file in his program:

(i) Outline **three** advantages of this file; (3 marks)

(ii) Explain **two** limitations of this approach to file organization. (4 marks)

(d) Jane, a programmer in a hospital was tasked to develop a program using Pascal programming language. The following data items are considered as input: *Patient name, patient age, gender F/M and amount paid.*

(i) Identify the most appropriate data structure for this data. Justify your answer. (2 marks)

(ii) Write segment codes in Pascal programming language to read data in the structure identified in (i). (4 marks)

5. (a) Explain the function of *default* statement in a C programming language. (2 marks)

(b) With the aid of a flowchart, describe the REPEAT...UNTIL loop as used in Pascal programming. (4 marks)

(c) (i) Outline **four** characteristics of assembly programming language. (4 marks)

(ii) Explain **three** reasons for developing a computer program. (6 marks)

(d) The following is a program written by a student using C programming language. The program could not run due to errors.

```
#include(stadio.h>
void main()
{
float i,j;
printf("input two integers');
fscanf("%d %f",&i,j);
Printf("\n addition=%d subtraction=%d\n" i+j, i-j);
}
```

Identify **eight** errors in the program. (4 marks)

6. (a) Outline **two** similarities between a procedure and a function as used in programming. (2 marks)

(b) Explain **three** typical errors that are likely to occur during file I/O operations in a program. (6 marks)

(c) Differentiate between *merge sort* and *quick sort* techniques as used in programming. (4 marks)

(d) (i) The following are names of students in a programming class: *Leonard, Bancy, Faith, Olive, Quinter, Alice, Patrick, Grace, Helen and Mercy*.
Represent them in a binary tree. (5 mark)

(ii) State the result generated when the tree is traversed using the post order strategy: (3 marks)

7. (a) Patrick, a programmer, developed a program for his client. Outline **four** ways that he could make the program easy to read and understandable. (4 marks)

(b) Maria decided to use a compiler rather than an interpreter during program translation. Outline **four** reasons that could have led her to make this decision. (4 marks)

(c) A student is to develop a program that would prompt a user to enter two integers. The program should then compute the difference between the two integers. The program displays the results when it is positive, otherwise it displays the message "Negative Result".
Write the pseudocode that the student would use to design this program. (5 marks)

(d) James, an ICT student, was given a program to write using Pascal programming language.

(i) Outline the order in which he would declare the categories of variables in the program. (3 marks)

(ii) Outline **four** rules that he should observe when composing the *identifiers* in the program. (4 marks)

8. (a) Cynthia tested a program and she encountered an error when she entered a zero value as input for a mathematical expression.

(i) Describe the type of error that occurred. (2 marks)

(ii) State the possible consequence when the error occurs. (1 mark)

(b) Outline **two** functions of technical documentation in programming. (4 marks)

(c) Outline the procedure that would be followed before performing each of the following in data structures:

(i) Adding an element in a stack; (3 marks)

(ii) Removing an element from a queue. (3 marks)

(d) The interest accrued I for a principal amount P after period of time T at the rate R is given by the formula $I = P \times R \times T$.
Write a Pascal program that prompts a user to enter the principal amount in the main program and then pass this value to a procedure named *compute*. The procedure calculates the interest at a rate of 12% per annum for a period of 5 years. The procedure then returns the interest to main program for output. (7 marks)