

Computer Science 3
795

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CAMEROON GENERAL CERTIFICATE OF EDUCATION BOARD
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ADVANCED LEVEL

Subject Title	Computer Science
Paper No.	Paper 3 – Practical
Subject Code No.	795

Three Hours

Carry out ALL the tasks given. For your guidance, the approximate mark for each part of a task is indicated in brackets.

Great importance is attached to the accuracy, layout and labelling of the drawings and computer generated outputs.

You are reminded of the necessity for good English and orderly presentation of your answers.

Write algorithms in the answer booklet provided. Also record in your answer booklet any information requested or that you believe would make it easier to understand how you carried out tasks or answered questions.

When an imperative programming language is required to write program code, either **Standard [ISO] Pascal** or the **[ANSI] C (or C11)** programming language may be used.

If need be, supervisors will assist you in recording details of intermediate work carried out on the computer.

Turn Over

CASE STUDY: SONEL BILLING SYSTEM

SONEL is a cooperation that provides electricity in Cameroon. SONEL charges its clients according to units of electricity consumed. When the number of units exceeds a certain level, the rate of payment changes from domestic to industrial scale. We suggest that the rating for domestic consumption should be 65F CFA per unit, while industrial rating should be 100F CFA per unit.

When the total number of units consumed in a month is far greater than 100 units, the electricity consumption is considered industrial, otherwise it remains domestic. SONEL also charges a fixed rent (RENT) of 500F CFA per month on each of its electricity meters.

Value added tax (VAT) is charged on the total amount payable for consumption (i.e not including taxes). The VAT is 1.8% of this amount. That is, if number of units consumed is X, and rate per unit is Y then the total untaxed amount (TUA) = XY and VAT = 1.8% of XY.

The net amount payable (NET) by client is the sum of RENT, TUA and VAT. That is:

$$\text{NET} = \text{TUA} + \text{VAT} + \text{RENT}$$

To calculate the units consumed in a month, previous meter readings (R1) below, subtracted from the current readings (R2).

TASK 1: Understanding the Problem

R 1	Meter N ^o	1	2	3	4	5	6
	Reading	1023	1101	1011	1199	1110	1210
R 2	Meter N ^o	1	2	3	4	5	6
	Reading	1103	1225	1110	1203	1210	2100

- (i) In your answer booklet produce a histogram of the consumption of the meters. (4 marks)

TASK 2: Abstraction

- (ii) Using either C or Pascal programming environment, write a program that has the tables (arrays): **R1**, **R2** and **R3** to hold units consumed for the six meter readings. Each array should be able to hold six (6) elements.

The program should prompt the user to enter the previous and current readings for each meter. It reads these entries into **R1** and **R2** respectively, and then prints a table with columns for the previous reading, the current reading and the units consumed, in that order. For example, for the first two meters we have the table:

Previous Reading	Current Reading	Units Consumed
1023	1103	80
1101	1225	124

Copy the code of your program and paste in your text editor and save the file as Task2.txt. Capture the [terminal] output of your program and store the pdf file as Task2.pdf append to your program code. Save the files as Task2.txt and Task2.pdf in your candidate folder and print a copy. (Files could also be save in a single file that is in odt or Microsoft docx format)

(Note: to tabulate use \t in the printf command for C and for Pascal use chr(9) as an argument in the writeln command).

(15 marks)

Task 3

- (iii) Write a programming language function that takes as parameter the number of units consumed (UC) and then calculates and returns the net amount payable (NET) by client. (15 marks)
- (iv) Test this function by calling it in your program from **TASK 2**, using UC, as parameter. Update the program to print the net amount payable in a fourth column of the table (see **Task 2**), for various units consumed (elements of **R3**).

Using your text editor, copy the modified code of your program into a new file called **Task3.txt**. Copy and save terminal output to the code in the pdf file, **Task3.pdf**. Save the files **Task3.txt** and **Task3.pdf** in your candidate folder and print a copy (files could also be saved in a single file that is in an odt or Microsoft docx format).

(8 marks)

Task 4

- (v) Write down in your answer booklet a spreadsheet formula for each of the following quantities:
- Units Consumed
 - Amount Per Unit
 - Gross Amount
 - VAT
 - Net Amount Payable

Write the formulae for meter1 using cell numbers corresponding to those from meter1 in the table below.

(5 marks)

	meter 1	meter 2	meter 3
Current Reading	1103	1225	1110
Previous Reading	1023	1101	1011
(a) Units Consumed			
(b) Amount Per Unit			
(c) Gross Amount (consumption × unit price)			
(d) VAT			
(e) Net Amount Payable			

- (vi) Implement the formulae from (v) in a spread sheet package and copy them into other cells needing similar calculations. Save your work in a spreadsheet file, **Task4**. Print your output. (3 marks)