For Performance Measurement

ZIMBABWE SCHOOL EXAMINATIONS COUNCIL

General Certificate of Education Advanced Level

COMPUTER SCIENCE 6023/2

PAPER 2 Practical

NOVEMBER 2019 SESSION 3 hours

Additional materials:
CD for each candidate
Printing facility
Bond paper

TIME 3 hours

INSTRUCTIONS TO CANDIDATES

This is a purely practical examination. All answers should be printed. Handwritten answers will **not** be marked.

This paper consists of **three** sections.

Section	A	20 marks
Section	B	50 marks
Section	C	30 marks

Answer **one** question from each section.
Each answer sheet should include the following information in the header section:

- Candidate Name and Candidate Number
- Centre Name and Date
- Subject Code

When answering programming questions, indicate the language used.
All work should be backed up by a soft copy on a CD.
If you print on more than one sheet, fasten the sheets together.
All answers should be correctly and clearly numbered.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets [ ] at the end of each question or part question.

This question paper consists of 6 printed pages and 2 blank pages.

Section A [20 marks]

Answer any **one** question from this section.

1 **(a)** Draw a logic network and truth table for the following logic problem:

A sprinkler (s) is ON if either temperature alarm (T) is ON and cooler alarm (C) is ON or vent alarm (V) is OFF and cooler alarm (C) is ON. [8]

(b) Construct a diagram to illustrate system buses in a Von Neumann architecture. [12]

2 **(a)** Illustrate with a diagram, the buses connecting the processor to memory. [5]

(b) With the aid of a diagram, show how pipelining can increase the throughput of a computer. [5]

(c) Draw a logic circuit represented by the statement below.

X = 1 if (A is NOT 1 AND B is NOT 1)
OR
(B is NOT 1 AND C is 1).

Provide the truth table. [10]

Section B [50 marks]

Answer any **one** question from this section.

3 **(a)** A gas board has about 500 customers, each with a gas meter identified by a unique code of 8 digits which include a check digit. The meter readings are taken every 3 months. If a meter cannot be read, an estimated reading is calculated.

(i) Write specifications of the data structure for the customer including the following details: field name, type, size and validation. [4]

(ii) Write a program that accepts gas meter code, previous reading, current meter reading and calculates the amount of gas used using a rate of $3 per kg, calculates the amount due for payment and displays the information on the screen. [14]

(b) Write a program to grade marks for 12 courses for a college student. Use any selection statement of your choice. The grades are as follows:

>= 75 Distinction
60 – 74 Merit
50 – 59 Pass
40 – 49 Supplementary
<= 39 Fail

[12]

(c) **(i)** Produce a trace table for the following algorithm using the number 8271. [4]

```
1   INPUT N
2   LET x = INT (N/10)
3   PRINT N – 10 * x
4   IF x = 0 THEN STOP
5   N = x
6   GOTO 2
```

(ii) Deduce the purpose of the algorithm. [1]

(d) **(i)** Draw a flow chart of a program that reads a number of seconds from the user and displays the number of hours, minutes and seconds. For example, if 10 000 is typed in, the program should display 2 hours, 46 minutes and 40 seconds. [6]

(ii) Write a program and print the source code for the scenario in **(i)**. [9]

4 **(a)** Study the following algorithm:

```
1   x = 1
2   Repeat
3   A = x * x
4   Output X, A
5   X = x + 1
6   Until x = 3
7   End
```

Using a trace table, dry run the algorithm. [8]

(b) Factorial is a mathematical function which is defined as follows:

Factorial of n = n* factorial of n -- 1
If $n > 1$
Otherwise factorial of 0 = 1

This function is defined for all positive integers i.e whole numbers greater or equal to zero.

$$\text{Factorial } (n) = \begin{cases} n * \text{factorial } (n-1) \text{ where } x > 0 \\ 1 \text{ where } x = 0 \end{cases}$$

Code a recursive function which returns the factorial, given a positive integer argument. [9]

(c) A bank allows its customers to invest a minimum of $500 and accrue interest using the interest rates below.

amount invested	interest rate
> = 500 and < = 1 000	10 %
> 1 000 and < = 2 000	15 %
> 2 000	20 %

(i) Design and print an interface for the above scenario. [3]

(ii) Code a program that
- accepts the invested amount and number of years,
- calculates interest, balance and interest rate
- displays interest, rate, balance, invested amount and number of years [30]

Section C [30 marks]

Answer any **one** question from this section.

5 **(a)** In a library database, authors have written books about various subjects. Different libraries in the system may carry those books. Authors have an ID number, name, and telephone number. Books have an ISDN and title. Subjects have a subject name. Libraries have a library name.

Produce a normalised ER diagram to depict the scenario above. [14]

(b) A supermarket sells groceries to customers on account. The shopkeeper then produces an invoice as shown below.

Customer A/C: 6065913
Ruth Chakanyuka
Ngozil Mine
Bulawayo
Cell: 0772 023 011

Date: 21/01/17
Time: 10:42 am
INV: D10059012

Code	Qty	Description	Unit	Sub Total
60092317651	10	Chimombe milk 500 ml	0.65	6.50
60051621153	1	Mazoe Raspberry 2L	2.39	2.39
60031005913	4	Bakers Inn Superior	0.90	3.60
Sub Total				10.62
VA Tax	@15.06			1.87
Total				12.49

(i) Present all the information in the above invoice as a database in first Normal Form. [4]

(ii) Normalise your answer in **(i)** into second Normal Form showing all relationships amongst the resulting tables. [12]

6 **(a)** There are persons at a school. Each person has a surname, first name, Registration number and address. The person can be an employee or a student. Each employee has a salary while each student has a class. The employee can be a teacher or ancillary worker. Each teacher has an E.C number and leave days. Each ancillary worker is paid according to hours worked.

Draw a normalised ER diagram to illustrate the above scenario. [15]

(b) A company realised that some of its customers are defaulting in payment. It is decided to add an extra file for the debtors which include the following fields:
customer name, address, 30 days, 60 days, 90 days and 120 days.

The company wants to produce a mailing list for customers with 60 day debts of at least $30, in descending order of debts.

Write an SQL statement to retrieve the required information. [8]

(c) One of the debtors, Mr Mara has fully cleared his debt. The company wants to remove his name from the list.

Write the correct command for this action. [3]

(d) Create a database and show how to connect to the IDE language. [4]

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