For Performance Measurement

ZIMBABWE SCHOOL EXAMINATIONS COUNCIL

General Certificate of Education Advanced Level

COMPUTER SCIENCE 6023/2

PAPER 2 Practical

SPECIMEN PAPER 3 hours

Additional materials:
CD

TIME 3 hours

INFORMATION FOR 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 a candidate prints on more than one sheet, fasten together with string. All answers should be correctly and clearly numbered.

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

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[Turn over

Section A [20 marks]

Answer **one** question from this section.

1 **(a)** Given the following logic statement:

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

(i) draw the logic circuit, [6]

(ii) create the truth table. [8]

(b) Draw a well-labelled diagram that illustrates how a processor, 1/0 devices and the memory unit are linked by connections known as buses. [6]

2 **(a)** Produce a flowchart showing the 3 stages of the straight line sequencing of the fetch-execute cycle, describing each stage. [8]

(b) Draw a diagram that illustrates the sequence of instructions that are carried out during interrupt servicing. [8]

(c) Draw a well-labelled diagram showing the structure of a Harvard computer architecture. [4]

Section B [50 marks]

Answer **one** question from this section.

3 The following is an array named Exams that stores 5 examination marks. Index positions are in square brackets below the array elements.

Exams

50	60	30	43	19
[0]	[1]	[2]	[3]	[4]

(a) Produce a binary tree of the array elements. [5]

(b) Assuming that the element 50 is completely deleted and removed from the tree structure drawn in **(a)**, draw the new binary tree structure after 50 has been removed. [2]

(c) Using the binary tree diagram drawn in **(a)** and the Exams array structure, complete the table below to illustrate how a binary tree can be implemented using an array.

	Data	**Left Pointer**	**Right Pointer**
Exams [0]	50	2	1
Exams [1]	60		
Exams [2]	30		
Exams [3]	43		
Exams [4]	19		

[8]

(d) Using a programming language of your choice;

(i) declare the Exams array as in this question paper. [3]

(ii) declare a 2-dimensional array called STUDENTS that stores student names using 4 rows and 3 columns. [4]

(e) Write a program code that implements a linear search algorithm to find the value 19 from the array Exams. If the value exists in the array, it displays the message "Value has been Found", otherwise it displays "Value does not exist".
Use a text editor to type the program code. [17]

(f) A sailing club has both junior and senior members. Each member has a unique membership number, name and address recorded. Three classes have been identified, namely:
Member, Junior Member, Senior Member

The classes Junior Member and Senior Member are related by single inheritance to the class member.

(i) Draw an inheritance diagram for the classes. [3]

(ii) Programs that use objects of the class member need to add a new member's details and show member's details and also amend a member's details. No other form of access is to be allowed. Write a class definition for this class.

member = class [8]

4 **(a)** Using a looping structure of your choice, write a program which outputs the following result.

```
**********
**********
*********
********
*******
******
*****
****
***
**
*
```
[12]

(b) Modify the code you wrote in **(a)** so that it prints the shape upside down. [6]

(c) The following is a pseudo code of a program that was designed to add 10 positive numbers.

```
Counter = 1
For counter = 1to 10
Repeat
Print "Enter a positive whole number"
Input number
Until number <0
Total = Total + counter
Counter = counter +1
Output Total
Next
```

(i) The pseudo code contains several errors. Identify and write down all the errors. [7]

(ii) Rewrite the algorithm so that it is effective and error free. [5]

(d) Write a program that accepts names of 30 students and the marks they obtain in a test. The program then displays the name, mark and grade in one line. Grades are obtained using the following grading scale:

70 – 100	A
60 – 69	B
50 – 59	C
45 – 49	D
40 – 44	E
0 – 39	F.

[20]

Section C [30 marks]

Answer **one** question from this section.

5 The following is an un-normalised table named Delivery Note.

Delivery Note

Cust Numb	Cust Name	City	Country	Prod Numb	Prod Description
209	Peter	Mutare	Zim	19, 20, 21, 22	Bag, shoes, socks, Umbrella
198	Bruce	Gwanda	Zim	20, 21	Shoes, socks

(a) **(i)** Draw the 1NF of the above table. Underline Primary Key field(s). [5]

(ii) Come up with the 2NF of the table you created, indicating Primary Key field(s). [14]

(b) A shop sells drinks. The shop has name, address and licenceno fields. Drinks have name and manufacturer fields. Customers like drinks. Customers have name and address.

Draw an ER Diagram to illustrate the above relationship. [11]

6 **(a)** At ABC High School, a teacher teaches many subjects. A student enrols in many subjects and attends four lessons per week for each subject. Each subject is taught by several teachers.

Draw an entity-relation diagram to show relationships between the entities. On the diagram, show the primary key and at least one attribute for each entity. [15

(b) **(i)** Draw a well-labelled diagram showing the different views of the Database Management System Structure. [8]

(ii) Using examples, describe the different views of the Database Management System. [7]

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