For Performance Measurement

ZIMBABWE SCHOOL EXAMINATIONS COUNCIL

General Certificate of Education Advanced Level

COMPUTER SCIENCE 6023/1

PAPER 1

NOVEMBER 2023 SESSION 3 hours

Additional materials:
Answer paper

TIME 3 hours

INSTRUCTIONS TO CANDIDATES

Write your name, centre number and candidate number provided on the answer paper/answer booklet.

Answer **all** questions.

Write your answers on the separate answer paper provided.

If you use more than one sheet of paper, fasten the sheets together.

INFORMATION FOR CANDIDATES

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

You are reminded of the need for good English and clear presentation in your answers.

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

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1 (a) State the number of bits used for each character in each of the following data representation types:

(i) ASC11

(ii) Unicode

(iii) BCD [2]

(b) Define the following terms with respect to binary representation:

(i) *overflow* [2]

(ii) *underflow* [2]

(c) Convert the following numbers to 8 bit binary form:

(i) 109

(ii) 75 [2]

2 (a) Take the 2's complement of the binary value of 75 and hence compute 109-75 using binary addition.
Give your answer in 8 bit binary form. [3]

(b) Normalise the following floating point numbers.

(i) $0.0001000\ 0001_2$ [2]

(ii) $11011.101\ 1001_2$ [2]

NB the bits for mantisa is 8 and bits for the exponent is 4.

3 (a) Define the term *Domain Name System* (DNS). [2]

(b) For the IP address 192.100.18.33:

(i) identify the class IP address [1]

(ii) state the subnet mask of the IP address, [1]

(iii) convert the IP address in (b) to binary format [2]

(c) For the following URL
http: // www.zimsec.co.zw / Exams / computer science. pdf

identify all the parts of the URL above. [4]

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4 NOCZIM has benefited from the use of cloud computing. Cloud computing has enabled NOCZIM to backup data in the cloud.

(a) Describe any *two* cloud service models. [6]

(b) Explain any *two* disadvantage of cloud computing. [4]

5 **(a)** Draw a clearly labelled diagram to represent the Harvard Architecture. [4]

(b) Explain *three* (3) buses used in the Von Neumann model. [6]

6 Design a logic circuit for the following logical expression.

$$(A + B).\bar{C}$$ [3]

(b) Describe the stages of the fetch / decode / execute cycle, paying attention to how the Special registers in the processor are used.

NB: Exclude a jump statement in your answer. [7]

7 **(a)** A doctor plans to share patients' records on a computer system.

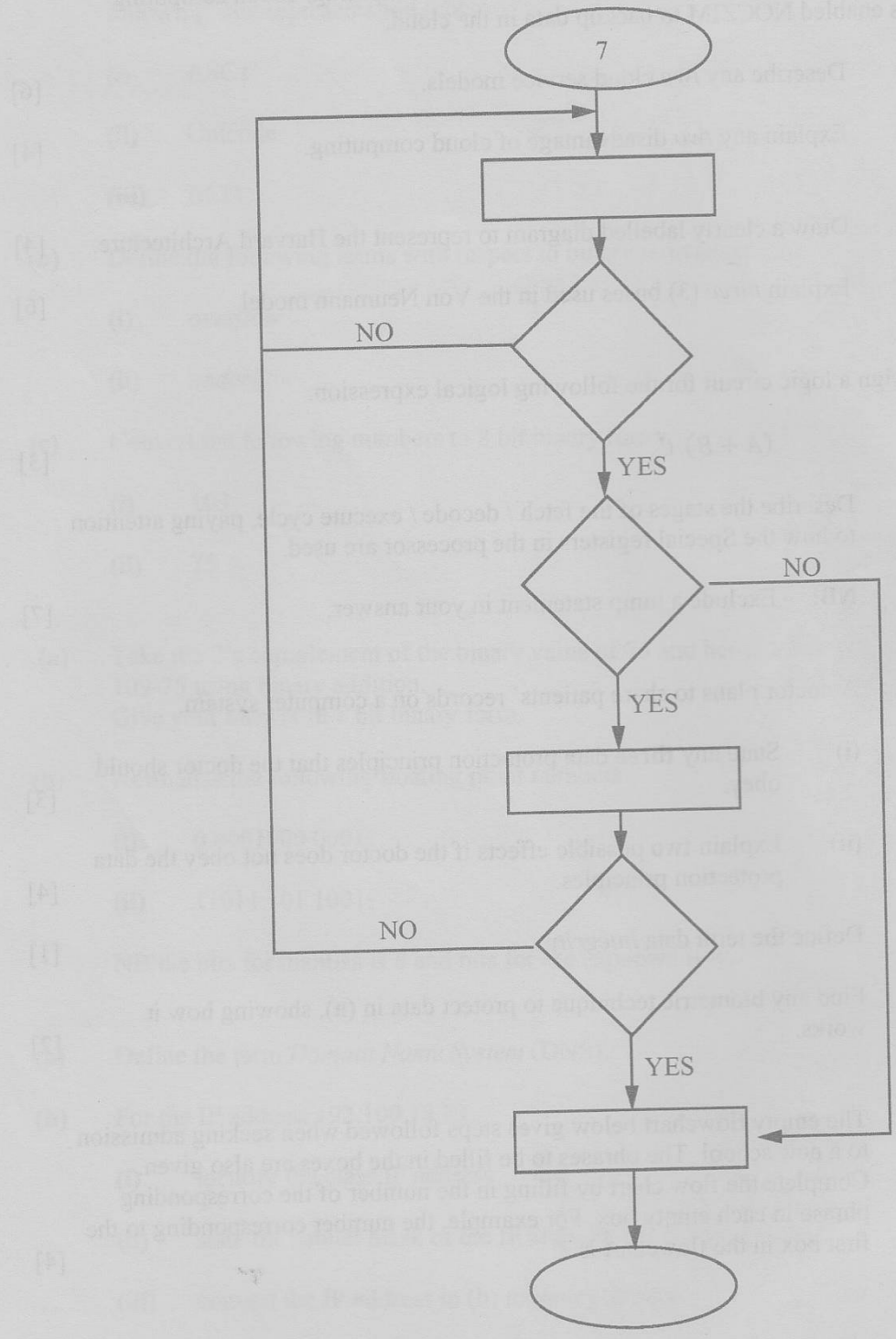
(i) State any **three** data protection principles that the doctor should obey. [3]

(ii) Explain **two** possible effects if the doctor does not obey the data protection principles. [4]

(b) Define the term data *integrity*. [1]

(c) Find any biometric technique to protect data in **(a)**, showing how it works. [2]

8 **(a)** The empty flowchart below gives steps followed when seeking admission to a new school. The phrases to be filled in the boxes are also given. Complete the flow chart by filling in the number of the corresponding phrase in each empty box. For example, the number corresponding to the first box in the flowchart is 7. [4]



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1. Search for a school.
2. Prepare for the admission.
3. Did you pass the exam?
4. Submit necessary documents and get admission.
5. End
6. Are places available
7. Start
8. Is there an admission test?

(b) The following is a recursive procedure that is called from the main module

```
Module Main (    )
        Call Array × (0,5)
End module

Procedure Array × (Low, high)
    If low < = high Then
        Print (Array × (Low) * Array × (high))
        Array×(Low +1, high)
    End if
End procedure
```

Using a trace table, dry run the above algorithm using the following Array *X* data.

Array elements	3	5	2	7	4	1
Index	0	1	2	3	4	5

[6]

(c) The following is a list of elements that need to be sorted.

3 5 2 7 4 1

Demonstrate how the elements can be sorted using a bubble sort algorithm. Just show output for each pass. [5]

9 **(a)** Explain the term *data redundancy* giving a suitable characteristic which leads to it. [2]

(b) Given the following structure of SQL command, explain its 4 parts. Give examples on each part. [8]

Create table <table name>

(Column name, Datatype, Optional column constraints
Optional table constraints);

10 **(a)** Define the term *financial literacy.* [1]

(b) You are the owner of an online shop, you can decide whether your customers have to pay after delivery by a money transfer from their bank account to your bank with a credit card, ZIPIT or using mobile wallet payment (Ecocash, Telecash, Netcash). All these variants have advantages and disadvantages for your online shop.

Assume that you can select only one of these methods. Which one would you select?
Give four reasons to justify your choice. [4]

(c) Computer Science plays a very important role in the field of engineering.

Explain **five** ways how Computer Science can help engineers in the simulation of prototype designing. [5]

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