For Performance Measurement

ZIMBABWE SCHOOL EXAMINATIONS COUNCIL

General Certificate of Education Advanced Level

COMPUTER SCIENCE **6023/1**
PAPER 1 3 hours

NOVEMBER 2024 SESSION

Additional materials:
Answer booklet

Calculators must not be used

INSTRUCTIONS TO CANDIDATES

Write your name, Centre number and candidate number in the spaces provided on the answer booklet.

Answer **all** questions.

Write your answers on the separate answer booklet provided.

If you use more than one booklet, fasten them together.

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.

[Turn over]

1 **(a)** Define a *character set* giving examples. [2]

(b) Represent the denary value 187 in:

(i) Octal, [1]

(ii) Hexadecimal. [1]

(c) Explain why 187 can not be represented as an 8 bit, 2's compliment binary number. [2]

2 **(a)** Convert the denary value –6.3125 to a normalised floating point number, 8 bits for mantissa and 4 bits for the exponent. Show your working. [3]

(b)

0 •	0	0	0	0	1	0	1

Mantissa

0	0	1	1

exponent

The floating point value above is **not** normalised, normalise the number. Show your working. [3]

(c) Study the pseudocode below.

```
Procedure Add
        Declare MyNum:  FLOAT = 1.3
           For i = 1 to 5
              MyNum = MyNum + 0.3
              print (MyNum)
           Next i
End procedure
```

Dry run the pseudocode and show the output. [3]

3 **(a)** Explain the role of the *Domain name system*. [2]

(b) **(i)** Describe the Routing Information Protocol. [5]

(ii) State **three** advantages of Open Shortest Path First LINK (OSPFL). [3]

4 **(a)** Define the term *cloud computing*. [1]

(b) Give **three** advantages of cloud computing. [3]

(c) Explain **three** cloud service models. [6]

5 **(a)** Explain the following types of memory address:

(i) Direct addressing, [2]

(iii) Indirect addressing, [2]

(iii) Indexed addressing. [2]

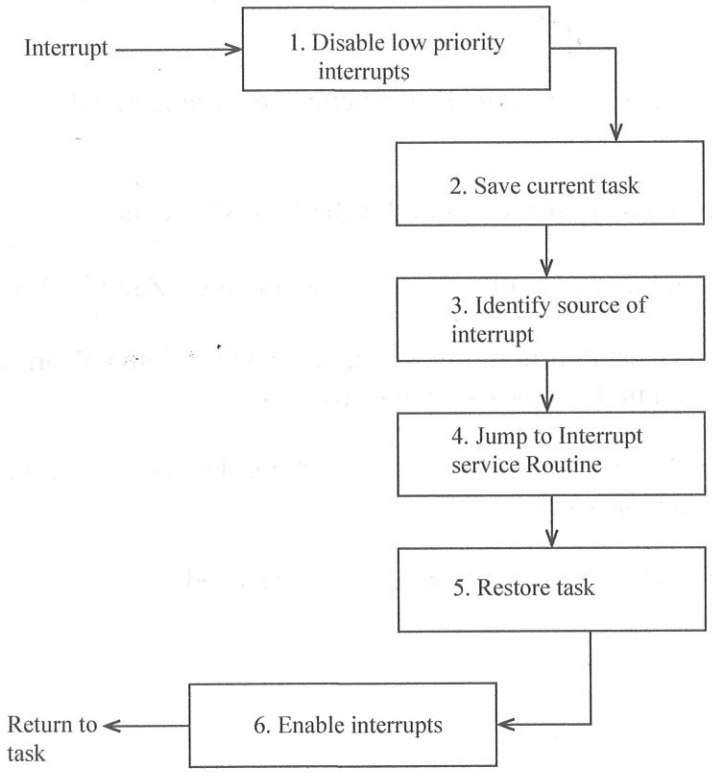
(b) Explain the circumstances for which the following addressing modes are useful

(i) indirect addressing, [2]

(ii) indexed addressing. [2]

6 **(a)** A method of reading and processing sensor data is to use interrupts. Each sensor is connected so that it can send an interrupt signal to the processor if its value changes.

On receipt of an interrupt signal, the processor carries out a number of steps as shown in the following diagram.



(i) State the purpose of the following:

1. step 1,

2. step 6.

[2]

(ii) Explain how the current task is saved in step 2. [2]

(iii) State **two** benefits of using interrupts to read and process the sensor data. [2]

(b) Explain how a parallel processor system works. [2]

(c) Give an example of an application for which it would be sensible to use parallel processing. Justify your choice. [2]

7 **(a)** Explain the following terms:

(i) *Data Integrity*, [1]

(ii) *Data security*. [1]

(b) Describe **three** potential computer system risks in an organisation. [6]

(c) Suggest **two** tools used to eliminate vulnerability in an organisation. [2]

8 **(a)** Explain the difference between *static* and *dynamic implementation of data structures*. [2]

(b) Give **two** advantages of static data structures over dynamic data structures. [2]

(c) (i) Draw a binary tree diagram for the following data.

Mozambique, Angola, Botswana, Zimbabwe, Zambia, Namibia. [3]

(ii) Produce an algorithm to insert a new country into its correct position in the binary tree in **(c)(i)**. [5]

(d) (i) State the problem that arises when a non-leaf node is removed from a binary tree. [1]

(ii) Explain how this problem can be overcomed. [2]

9 A school enrols learners into form 1 and lower 6. Each form has several classes. All class names are different. Each form has a number of class teachers. The teachers always teach the same class. Each teacher has a unique Teacher ID of STRING data type.

(a) Describe the relationship shown in the diagram. [1]

(b) A relational database is created to store the class and teacher data. The two table designs for form 1 are:

B CLASS (ClassCode, Number of Desks)
A TEACHER(TeacherID, FirstName, FamilyName,…)

(i) Add one more field to the TEACHER table. [1]

(ii) Explain how the relationship in part **(a)** is implemented. [2]

(c) In lower 6 of the school, there are a number of classes and a number of teachers.

The relationship for lower 6 of the school is as follows:

(i) Explain the degree of relationship shown. [1]

(ii) The design for the Lower 6 is as follows:

B – TEACHER(TeacherID, FirstName, FamilyName,Specialism)
B – CLASS(ClassName, NumberOfDesks, Specialism)
B – TEACHER: B – CLASS (…)

Complete the attributes for the third table.
Underline its primary key. [2]

(iii) Draw the relationships on an entity relationship (E-R) diagram. [3]

10 (a) (i) Define *Intellectual Property* giving an example. [2]

(ii) Compare the terms *copyright* and *Patent*. [4]

(b) Describe **two** offences that are found in each of the following computer laws in Zimbabwe:

(i) The computer Misuse Act 1990. [2]

(ii) The Copyright Design and Patents Act 1988. [2]