Centre Number	Candidate Number	Candidate Name

NAMIBIA SENIOR SECONDARY CERTIFICATE

COMPUTER SCIENCE ADVANCED SUBSIDIARY LEVEL 8231/1

PAPER 1 3 hours

Marks 100 **2022**

Additional Material: Non-programmable calculator

INSTRUCTIONS AND INFORMATION TO CANDIDATES

- Candidates answer on the Question Paper in the spaces provided.
- Write your Centre Number, Candidate Number and Name in the spaces at the top of this page and on all separate answer sheets used.
- Write in dark blue or black pen.
- You may use a soft pencil for any rough work, diagrams or graphs.
- Do not use correction fluid.
- Do not write in the margin *For Examiner's Use*.

- Answer **all** questions.
- Non-programmable calculators may be used.

- The number of marks is given in brackets [ ] at the end of each question or part question.
- The businesses mentioned in this question paper are entirely fictitious.

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Marker	
Checker	

This document consists of **13** printed pages and **3** blank pages.

Republic of Namibia

MINISTRY OF EDUCATION, ARTS AND CULTURE

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1 Device MAC addresses are represented using hexadecimal. The first six digits of a MAC address for a device are shown below:

CC:46:D6

(a) Each pair of digits is stored as an 8 bit byte. Give the binary representation of each pair of digits in the MAC address.

CC

46

D6

[3]

(b) Give **two** reasons why MAC addresses are represented using hexadecimal notation instead of binary.

1 .....

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2 .....

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[2]

(c) Describe **two** other uses of hexadecimal numbers.

1 .....

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2 .....

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[4]

(d) Three bytes have been transmitted from one computer to another.
Odd parity has been used as an error detection method.

After transmission, **Byte 1** and **Byte 2** have been transmitted **correctly but one of the bits in Byte 3** has been transmitted **incorrectly**.

Write the **Parity bit** for each message as it was received.

	Parity bit							
Byte 1		1	1	0	1	0	1	1
Byte 2		0	1	1	0	1	0	1
Byte 3		0	0	0	1	0	0	0

[3]

(e) Apart from parity checks, describe **two** other methods that can be used to check for errors that have occurred during the transmission of data.

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[4]

2 In today's world, users can stream movies over the internet.

(a) Explain the meaning of the term *bit streaming*.

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..... [2]

(b) Douglas is using his smartphone to watch a boxing match streamed from a website.

(i) Give **two** ways in which Douglas is benefiting from using bit streaming to watch the boxing match.

1.....

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2.....

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[2]

(ii) Mention **two** problems that Douglas might possibly experience while watching the match by bit streaming.

1.....

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[2]

(c) Bit streaming can either be on-demand or real-time. Distinguish between on-demand bit streaming and real-time bit streaming.

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3 Based on the Von Neumann architecture, the processor consists of registers and other components.

(a) With the aid of an example, explain the term register.

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(b) Describe the purpose of each of the following parts of the processor.

(i) Arithmetic logic unit

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..... [2]

(ii) Address bus

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..... [2]

(c) Some addressing modes are described below. Name each of the described addressing mode.

(i) The instruction contains the effective address of the operand.

..... [1]

(ii) The instruction contains the operand.

..... [1]

(iii) The instruction contains the address of the effective address of the operand.

..... [1]

4 Sound can be recorded and stored using a variety of digital formats.

(a) Describe how a computer encodes sound.

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..... [3]

(b) Explain how the sampling rate and sampling resolution affect the file size of sound files.

Sampling rate

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Sampling resolution

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[2]

For Examiner's Use

5 Since the phasing out of cheques in Namibia, most organizations now use online banking to do payments.

(a) Explain how **two step security** and **virtual tokens** are used to ensure safe online banking.

Two step security

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Virtual tokens

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[4]

(b) The accountant at a school wants to make an online payment to the supplier of school stationery. Data integrity needs to be preserved as the accountant is entering the supplier data into the online banking system.

(i) Define the term *data integrity*.

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..... [1]

(ii) Describe how data validation and data verification are used to ensure the integrity of data during data entry.

Data verification

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Data validation

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[4]

6 Atushe is designing a website for a tourism company that is based in Kamanjab.

(a) The following text is stored as a text file.

You think of riding through the desert and imagine it will be all sand - but every day the scenery is so diverse.

Explain how lossless compression could compress this file.

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(b) In terms of both sampling rate and sampling resolution, which audio file will give the best audio experience for the bird song?

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..... [5]

For Examiner's Use

7 A car rental company uses a database management system (DBMS) to manage the business. The designs of the tables in the database are shown below.

CLIENT (ClientID, ClientName, ClientSurname, ClientCellNumber, ClientAddress)

CARS (CarID, CarMake, CarModel, Year, OdometerReading, DateBought, PricePerDay)

RENTING (RentID, ClientID, CarID, RentDate, Duration)

(a) Underline the primary key for each table in the above table designs. [3]

(b) Explain how primary keys and foreign keys are used to link the tables in the car rental database.

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(c) Write an SQL script to display the ClientName, ClientSurname and ClientCellNumber of all the clients who rented cars on 21/06/2020.

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(d) The DBMS includes a query processor. Describe how this feature could be used.

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8 A shop owner has a stock control system which uses a sequential master file of his stock, ordered by item number. During the week, as an item is sold, it is recorded in a transaction file. At the end of the week, the master file is updated using records from the transaction file.

(a) Distinguish between a sequential file and a serial file.

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(b) Explain how the master file is updated at the end of each week in this stock control system.

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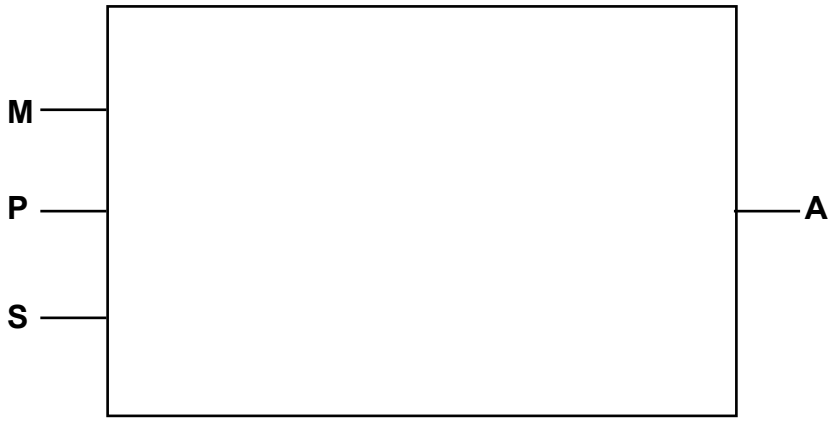
9 A burglar detection system for a factory has a door pressure sensor (P), a sound sensor (S) and a motion sensor (M). The output from the burglar detection system is a loud alarm, (A=1). Consider the following logic expression for this burglar detection system.

$$A = M.((P.\overline{S}) + (\overline{P}.S))$$

(a) Draw a logic circuit for this logic expression.



[5]

(b) Complete the following truth table for the above logic expression.

M	P	S	Working space	A
0	0	0		
0	0	1		
0	1	0		
0	1	1		
1	0	0		
1	0	1		
1	1	0		
1	1	1		

[4]

10 Programmers can either use procedural programming paradigms or object-oriented programming paradigms to develop programs.

(a) Distinguish between procedural programming and object-oriented programming paradigms.

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(b) Describe the relationship between a class and an object as used in object-oriented programming.

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..... [2]

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11 Mrs. Hausiku buys three houses as an investment. All houses will be sold after 5 years. The value of each house increases by 10% each year. Mrs. Hausiku will pay 3% tax on the value of the house when it is sold.

Write an algorithm, using pseudocode or a programming language, to do the following:

- Enter the cost at which Mrs. Hausiku bought each of the houses.
- Calculate and output the net profit that Mrs. Hausiku will get after selling each house at the end of five years.
- Calculate and output the total net profit that Mrs. Hausiku will get after selling all the houses at the end of five years.

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