Cambridge Assessment International Education

Cambridge O Level

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

0123456789

COMPUTER SCIENCE **2210/01**

Paper 1 Computer Systems **For examination from 2023**

SPECIMEN PAPER B **1 hour 45 minutes**

You must answer on the question paper.

No additional materials are needed.

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- Calculators must **not** be used in this paper.

INFORMATION

- The total mark for this paper is 75.
- The number of marks for each question or part question is shown in brackets [ ].
- No marks will be awarded for using brand names of software packages or hardware.

This document has **12** pages.

1 Binary is a number system used by computers.

(a) (i) Four 8-bit binary values are given.

Tick (✓) **one** box to show which 8-bit binary value is the correct conversion for the **denary** value **50**.

A 00101010 ☐

B 00110010 ☐

C 01001100 ☐

D 01010000 ☐

[1]

(ii) Four 8-bit binary values are given.

Tick (✓) **one** box to show which 8-bit binary value is the correct conversion for the **hexadecimal** value **90**.

A 00001001 ☐

B 01011010 ☐

C 10010000 ☐

D 01100100 ☐

[1]

(b) Explain why a computer system can only process data in binary form.

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..... [2]

(c) Two 8-bit binary values are given.

Add the two 8-bit binary values.

Give your answer in binary. Show all your working.

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  0 0 1 1 1 0 0 1
+ 0 1 0 0 1 0 1 0
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```

[3]

(d) Two 8-bit binary values are added.

The result of this calculation needs to be stored in an 8-bit register.

The denary result of this calculation is 301. This generates an error.

State the name of this type of error and explain why this error occurs.

Error name .....

Explanation .....

.....

.....

.....

[3]

2 The contents of three binary registers have been transmitted from one computer to another.

Even parity has been used as an error detection method.

The outcome after transmission is:

No errors have been detected in **Register A** and **Register C**.

An error has been detected in **Register B**.

Complete the parity bit for each register to show the given outcome.

	Parity bit							
Register A		0	1	0	0	1	0	1
Register B		1	0	0	0	0	0	1
Register C		1	0	0	0	0	1	1

[3]

3 A student uses a laptop and a calculator for schoolwork.

(a) The laptop has a central processing unit (CPU) that performs the fetch–decode–execute cycle.

The CPU has several components, including the memory data register (MDR) and the arithmetic logic unit (ALU).

Describe how the MDR and the ALU are used in the fetch–decode–execute cycle.

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..... [5]

(b) The calculator has an embedded system.

Describe what is meant by an embedded system.

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..... [2]

(c) Both the laptop and the calculator have read only memory (ROM).

State **one** reason why both devices have ROM.

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..... [1]

4 A student is concerned about the threats to their computer when using the internet.

The student wants to use some security solutions to help protect the computer from the threats.

(a) Identify a security solution that could be used to protect the computer from a computer virus, hacking and spyware.

Each security solution must be different.

Threat	Security solution
Computer virus	
Hacking	
Spyware	

[3]

(b) Describe how each security solution you identified in **(a)** will help protect the computer.

Computer virus security solution .....

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Hacking security solution .....

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Spyware security solution .....

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[6]

5 **(a)** Complete the statements about different types of programming language.

Use the terms from the list.

Some of the terms in the list will **not** be used. You should only use a term once.

assembly denary executable file instruction storage

hexadecimal high-level low-level machine code protocol

source code style syntax translator

The structure of language statements in a computer program is called the ..... .

A programming language that uses natural language statements is called a ..... language.

When programs are written in this type of language they need a .....

to convert them into ..... .

A programming language that is written using mnemonic codes is called an ..... language.

This is an example of a ..... language.

[6]

(b) A programmer often uses an integrated development environment (IDE) when writing a computer program.

Give **three** common functions of an IDE.

Function 1 .....

Function 2 .....

Function 3 .....

[3]

6 A finance company uses cloud storage to archive their accounts.

(a) Describe what is meant by cloud storage.

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..... [2]

(b) The computers in the finance company use both primary and secondary storage.

(i) One example of primary storage is ROM.

Give **one other** example of primary storage.

..... [1]

(ii) Give **two** examples of secondary storage.

1 .....

2 .....
[2]

(c) The computers also use virtual memory.

Describe how virtual memory is created and used.

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..... [4]

7 **(a)** In a computer system the operating system is run directly on the firmware.

Identify which type of software runs directly on the operating system.

..... [1]

(b) One function of an operating system is to manage interrupts.

Give **two** examples of when an interrupt would be generated.

Example 1 .....

Example 2 .....
[2]

8 Digital currency can be used to buy products from the world wide web.

(a) State what is meant by a digital currency.

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..... [1]

(b) Describe the process of blockchain in digital currency.

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..... [2]

9 The following data is stored as a text file:

red, green, yellow, green, purple, blue, red, purple, blue, yellow, grey, black, pink, red,

Explain how lossless compression would compress this file.

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..... [5]

10 An expert system is an example of artificial intelligence. One component of an expert system is a knowledge base.

(a) Explain why an expert system needs a knowledge base.

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..... [3]

(b) Identify **three** other components that are present in an expert system.

Component 1 .....

Component 2 .....

Component 3 .....
[3]

(c) An expert system can make use of machine learning.

State what is meant by machine learning.

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..... [1]

11 An office has an automated lighting system. When movement is detected in the office, the lights are switched on. If movement is **not** detected for a period of two minutes, the lights are switched off.

The system uses a sensor and a microprocessor.

(a) Identify the most appropriate sensor.

..... [1]

(b) Describe what is meant by a microprocessor.

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..... [2]

(c) Describe how the sensor and the microprocessor are used in this automated lighting system.

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..... [6]

