Cambridge
O Level

Cambridge Assessment International Education
Cambridge Ordinary Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

6120402551

COMPUTER SCIENCE **2210/13**

Paper 1 Theory **October/November 2019**

1 hour 45 minutes

Candidates answer on the Question Paper.

No Additional Materials are required.

No calculators allowed.

READ THESE INSTRUCTIONS FIRST

Write your centre number, candidate number and name in the spaces at the top of this page.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams, graphs or rough working.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.
No marks will be awarded for using brand names of software packages or hardware.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.

The maximum number of marks is 75.

This document consists of **12** printed pages.

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Cambridge Assessment International Education

[Turn over

1 A library has a system that allows customers to check out the books that they want to borrow.

Each book has a barcode that can be used to identify the book.

(a) (i) Identify **two** input devices that may be used in the library's system.

Input device 1 .....

Input device 2 .....
[2]

(ii) Identify **two** storage devices that may be used in the library's system.

Storage device 1 .....

Storage device 2 .....
[2]

(iii) Identify **two** output devices that may be used in the library's system.

Output device 1 .....

Output device 2 .....
[2]

(b) The data stored by the library is archived at the end of each day. The archive is held on a server in the library office.

The data is encrypted with an 8-bit key. As some of the data is confidential, the library wants to make the encryption more secure.

(i) State how the library could make the encryption more secure.

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..... [1]

(ii) The term used to describe data before it is encrypted is plain text.

State the term used to describe encrypted data.

..... [1]

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(iii) The library's archive system uses an error detection and correction system that combines a parity check with an automatic repeat request (ARQ).

Describe how this system uses the parity check and ARQ.

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..... [6]

(c) The library has a website that customers can use to search for a book.

(i) The website has a background colour with the hexadecimal colour code #F92A10

The colour code is stored in two 12-bit binary registers.

Show how the colour code would be stored in the registers.

F92												
A10												

[6]

(ii) Videos on the library website show customers which books the library will soon have in stock.

The library wants the file size of a video to be as small as possible.

Identify **and** describe a method the library could use to reduce the file size of a video as much as possible.

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..... [4]

(d) The library often holds events that introduce new authors.

At the events, the library has a Liquid Crystal Display (LCD) screen that displays data, including an image and information about the author.

Describe how an LCD screen operates to display this data.

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..... [5]

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2 A programmer uses a high-level language to write a computer program.

(a) **Four** statements are given about high-level programming languages.

Tick (✓) to show if each statement is **True** or **False**.

Statement	True (✓)	False (✓)
High-level languages need to be translated into machine code to run on a computer		
High-level languages are written using mnemonic codes		
High-level languages are specific to the computer's hardware		
High-level languages are portable languages		

[4]

(b) **Tick (✓)** to show which of the following is an example of a high-level language program.

Example program	Tick (✓)
`1011100000110000` `0000011011100010`	

`INP`
`STA ONE`
`INP`
`STA TWO`
`ADD ONE`	

`a = input()`
`b = input()`
`if a == b:`
`  print("Correct")`
`else:`
`  print("Incorrect")`	

[1]

3 Blair writes a paragraph about data transmission in her Computer Science examination.

Use the list given to complete Blair's paragraph by inserting the correct **five** missing terms. Not all terms will be used. Terms can be used more than once.

- duplex
- half-duplex
- parallel
- serial
- simplex

..... data transmission is when data is transmitted a single bit at a time. ..... data transmission is when multiple bits of data are sent all at once. If a user wants to transmit data over a long distance, with the highest chance of accuracy, ... data transmission should be used. If data needs to be transmitted in one direction only, for example from a computer to a printer, ... data transmission should be used. If a user has a large amount of data to transmit and this needs to be done as quickly as possible ..... data transmission should be used.

[5]

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Question 4 starts on page 8.

4 A factory that manufactures cleaning products has a system that monitors conditions throughout the manufacturing process.

The inputs to the system are:

Input	Binary value	Condition
A	1	pH > 7
	0	pH < = 7
T	1	Temperature < 35 °C
	0	Temperature > = 35 °C
P	1	Pressure > = 80 %
	0	Pressure < 80 %

(a) The system will sound an alarm (**X**) when certain conditions are detected.

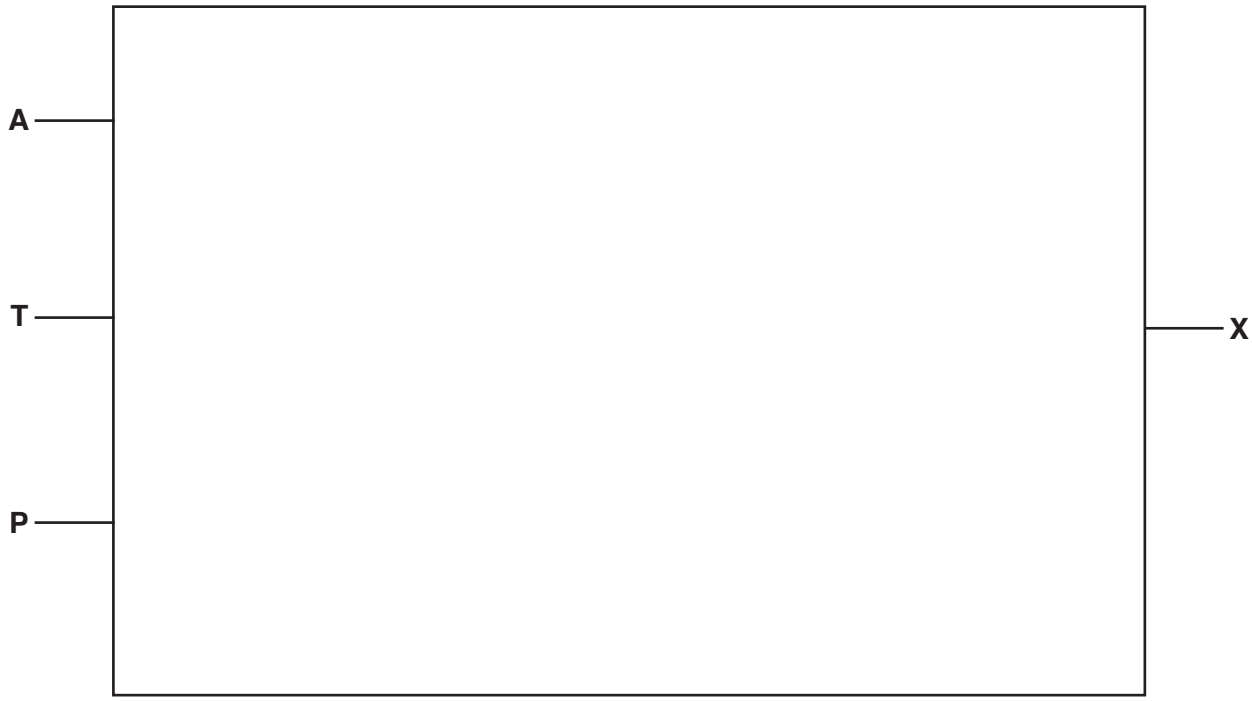
The alarm will sound when:

- The pressure > = 80 % and the temperature > = 35 °C

or

- The temperature < 35 °C and the pH > 7

Draw a logic circuit to represent the alarm system in the factory. Each logic gate must have a maximum of two inputs.



[4]

(b) Complete the truth table for the given logic problem.

A	T	P	Working space	X
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]

(c) A sensor and a microprocessor are used to monitor the pH of the cleaning products. The system records each reading that is taken. If the reading is greater than 7 a warning message is displayed on a monitor.

Explain how the sensor and microprocessor are used in the system.

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..... [6]

5 The contents of three binary registers have been transmitted from one computer to another. **Odd parity** has been used as an error detection method.

The outcome after transmission is:

- **Register A** and **Register B** have been transmitted **correctly**.
- **Register C** has been transmitted **incorrectly**.

Write the appropriate **Parity bit** for each register to show the given outcome.

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

[3]

6 Jesse is taking his Computer Science examination. He answers **five** questions about ethics.

(a) For the first question, he writes the answer:

"This type of software can be copied and shared without the permission of the owner."

State what Jesse is describing.

..... [1]

(b) For the second question, he writes the answer:

"With this type of software, the owner still retains the copyright for the software, but he gives away copies of it for free."

State what Jesse is describing.

..... [1]

(c) For the third question, he writes the answer:

"This type of software is often a trial version of the full software. To use the full version the user normally needs to pay a fee."

State what Jesse is describing.

..... [1]

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(d) For the fourth question, he writes the answer:

"This is when a person copies another person's computer program and tries to claim it as his own."

State what Jesse is describing.

..... [1]

(e) For the fifth question, he writes the answer:

"This is the legal protection that a person can obtain, to provide protection against his work being stolen."

State what Jesse is describing.

..... [1]

7 The Von Neumann model for a computer system has several components that are used in the fetch-execute cycle.

(a) One component is main memory.

(i) Describe what is meant by main memory and how it is used in the Von Neumann model for a computer system.

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..... [3]

(ii) State **two** other components in the Von Neumann model for a computer system.

1 .....

2 .....
[2]

(b) Computer systems often use interrupts.

Five statements are given about interrupts.

Tick (✓) to show if each statement is **True** or **False**.

Statement	True (✓)	False (✓)
Interrupts can be hardware based or software based		
Interrupts are handled by the operating system		
Interrupts allow a computer to multitask		
Interrupts work out which program to give priority to		
Interrupts are vital to a computer and it cannot function without them		

[5]

8 A company discovers malware on its network.

Explain **two** ways that the malware could have been introduced to the company's network.

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..... [4]

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