Cambridge Assessment International Education

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CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER			

3088772224

COMPUTER SCIENCE **0478/13**

Paper 1 Theory **May/June 2021**

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 **16** pages. Any blank pages are indicated.

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1 Greta has a computer that she uses for schoolwork and leisure.

(a) The computer has the Media Access Control (MAC) address:

00:A0:C9:14:C8:29

(i) Tick (✓) to show whether the MAC address is initially assigned to the computer by the network, the manufacturer or the user.

	Tick (✓)
Network	☐
Manufacturer	☐
User	☐

[1]

(ii) The values in the MAC address are hexadecimal values.

Convert the **three** given hexadecimal values into 8-bit binary.

14 .....

A0 .....

C9 .....

[3]

Working space

.....

.....

.....

(iii) Convert the **two** given hexadecimal values into denary.

29 .....

C8 .....

[2]

Working space

.....

.....

.....

(b) Greta stores data on several off-line storage devices, including an external hard disk drive (HDD), a USB flash memory drive and a compact disc (CD).

(i) Identify the type of storage for each device.

External HDD .....

USB flash memory drive .....

CD .....

[3]

(ii) Describe the operation of a HDD and how it stores data.

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..... [4]

2 Jolene displays videos on her website. She uses lossy compression to reduce the file size of the videos.

(a) Describe how lossy compression reduces the file size of the videos.

.....

.....

.....

.....

.....

..... [3]

(b) State **two** reasons why Jolene would use lossy rather than lossless compression for the videos.

Reason 1 .....

.....

Reason 2 .....

.....

[2]

3 An optical mouse is a type of input device that can be used to input data into a computer system.

(a) Complete the paragraph about the operation of an optical mouse, using the most appropriate terms from the given list. **Not** all terms need to be used.

- Ball
- Battery
- LCD
- LED
- Lens
- Magnifies
- Matrix
- Microswitch
- Photoelectric
- Photographic
- Reduces
- USB

An optical mouse shines an ..... from the bottom of the mouse onto a surface. Light bounces straight back from the surface into a ..... cell. This has a ..... that ..... the reflected light to allow detection of smaller movements. When a button on the mouse is clicked, a ..... is pressed. A ..... connection is used to carry the data to the computer.

[6]

(b) Identify **two** other input devices that can be used to enter data into a computer.

1 .....

2 .....

[2]

4 Spencer finds out that his online music account has been accessed by an unauthorised person.

He believes his personal details for the account were obtained using phishing.

(a) Explain how the personal details could have been obtained using phishing.

.....

.....

.....

.....

.....

..... [3]

(b) Give **two** other Internet security risks that could have been used to obtain the personal details.

1 .....

2 .....
[2]

5 Six statements are given about programming languages.

Tick (✓) to show whether each statement applies to high-level language, assembly language or machine code. Some statements may apply to more than one type of programming language.

Statement	High-level language (✓)	Assembly language (✓)	Machine code (✓)
it requires a translator to be processed by a computer			
it is an example of low-level language			
it uses mnemonics			
it uses English-like statements			
it can be used to directly manipulate hardware in the computer			
it is portable			

[6]

6 Four 7-bit binary values are transmitted from one computer to another. A parity bit is added to each binary value creating 8-bit binary values. All the binary values are transmitted and received correctly.

(a) Identify whether each 8-bit binary value has been sent using odd or even parity by writing odd or even in the type of parity column.

8-bit binary value	Type of parity
01111100	
10010000	
10011001	
00101001	

[4]

(b) The 8-bit binary value 10110001 is transmitted and received as 10110010

A parity check does **not** identify any errors in the binary value received.

State why the parity check does **not** identify any errors.

.....

..... [1]

(c) The data is sent using serial duplex data transmission.

(i) Describe how data is sent using serial duplex data transmission.

.....

.....

.....

.....

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.....

.....

..... [4]

(ii) State **one** drawback of using serial data transmission, rather than parallel data transmission.

.....

..... [1]

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7 Marco uses his computer for work. The data he uses on a daily basis is valuable to his business.

Marco is concerned about his data being accidentally damaged. Human error, such as incorrectly removing external storage devices, is one way that the data can be accidentally damaged.

(a) Identify **two** other ways that data can be accidentally damaged.

1 .....

2 .....
[2]

(b) Removing storage devices correctly from the computer can help prevent data being accidentally damaged.

Give **two** other ways that accidental damage to data can be prevented.

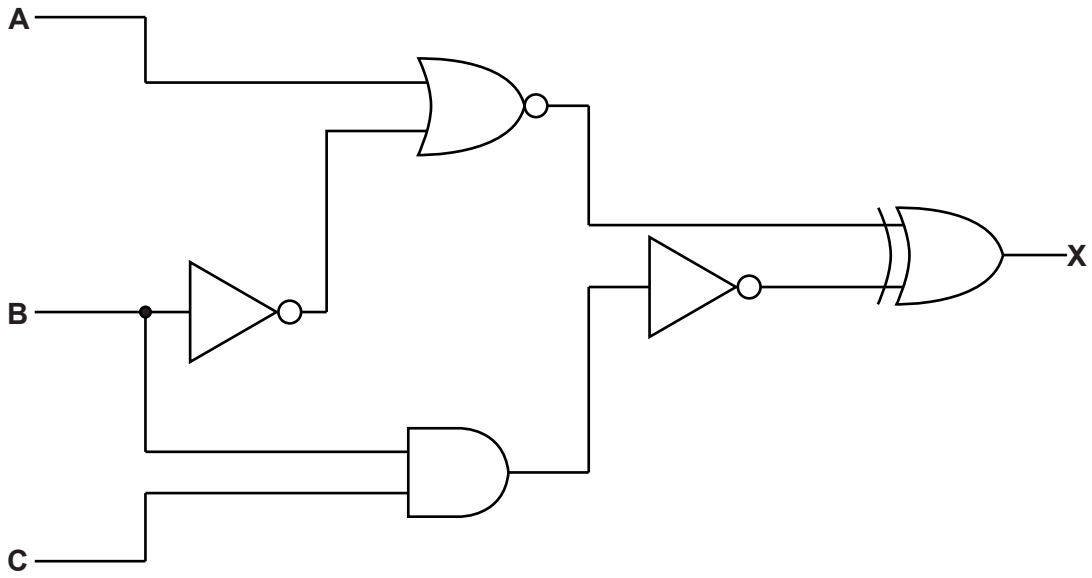
1 .....

.....

2 .....

.....
[2]

8 Consider the following logic circuit:



(a) Two **NOT** gates are used in the given logic circuit.

Identify **three** other logic gates that are used in the given logic circuit.

1 .....

2 .....

3 .....

[3]

(b) Consider the completed truth table for the given logic circuit.

Row number	A	B	C	Working space	X
1	0	0	0		**0**
2	0	0	1		**1**
3	0	1	0		**0**
4	0	1	1		**0**
5	1	0	0		**1**
6	1	0	1		**1**
7	1	1	0		**0**
8	1	1	1		**1**

There are four errors in the truth table in the output (X) column.

Identify the **four** incorrect outputs.

Write the row number to identify each incorrect output.

Row .....

Row .....

Row .....

Row .....

[4]

9 An underground car park has a system that checks the height of vehicles. A vehicle can be no higher than 1.8 metres to enter the car park.

The system also counts the number of vehicles that have entered the car park, so that it can display how many parking spaces are still available.

Each parking space has a red and a green light above it. If a car is parked in the parking space only the red light is on, otherwise only the green light is on.

Sensors and a microprocessor are used to control the system.

(a) Complete the table to identify a suitable sensor for each part of the system.

Task	Sensor
check if a vehicle is too high	
count the vehicles entering the car park	
check if a vehicle is parked in a parking space	

[3]

(b) Describe how the sensor and the microprocessor are used to display the red or green light above the parking space.

.....

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..... [6]

10 Several components are involved in processing an instruction in a Von Neumann model for a computer system.

Three of these components are the arithmetic logic unit (ALU), control unit (CU) and random access memory (RAM).

(a) Six statements are given about the components.

Tick (✓) to show if each statement applies to the ALU, CU or the RAM. Some statements may apply to more than one component.

Statement	ALU (✓)	CU (✓)	RAM (✓)
stores data and instructions before they enter the central processing unit (CPU)			
contains a register called the accumulator			
manages the transmission of data and instructions to the correct components			
contained within the CPU			
uses the data bus to send data into or out of the CPU			
carries out calculations on data			

[6]

(b) The accumulator is a register that is part of the Von Neumann model.

Give **two** other registers that are part of the Von Neumann model.

1 .....

2 .....

[2]

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