Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

8003295621

COMPUTER SCIENCE **0478/12**

Paper 1 Theory **May/June 2018**

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.

Any businesses described in this paper are entirely fictitious.

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 syllabus is approved for use in England, Wales and Northern Ireland as a Cambridge International Level 1/Level 2 Certificate.

This document consists of **11** printed pages and **1** blank page.

CAMBRIDGE International Examinations

1 Different units of data can be used to represent the size of a file, as it changes in size.

Fill in the missing units of data, using the list given:

- byte
- gigabyte (GB)
- megabyte (MB)
- nibble

The units of data increase in size from smallest to largest.

Smallest	bit
	……..
	……..
	kilobyte (kB)
	……..
	……..
Largest	terabyte (TB)

[4]

2 **(a)** Nancy has captured images of her holiday with her camera. The captured images are stored as digital photo files on her camera.

Explain how the captured images are converted to digital photo files.

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..... [4]

(b) Nancy wants to email the photos to Nadia.

Many of the photos are very large files, so Nancy needs to reduce their file size as much as possible.

Identify which type of compression would be most suitable for Nancy to use. Explain your choice.

Compression type .....

Explanation .....

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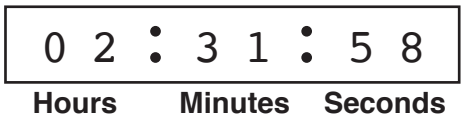
[4]

3 A stopwatch uses six digits to display hours, minutes and seconds.

The stopwatch is stopped at:



An 8-bit register is used to store each pair of digits.

(a) Write the 8-bit binary numbers that are currently stored for the **Hours**, **Minutes** and **Seconds**.

Hours								
Minutes								
Seconds								

[3]

(b) The stopwatch is started again and then stopped.

When the watch is stopped, the 8-bit binary registers show:

Hours	0	0	0	0	0	1	0	1
Minutes	0	0	0	1	1	0	1	0
Seconds	0	0	1	1	0	1	1	1

Write the denary values that will now be shown on the stopwatch.

[3]

4 Jafar is using the Internet when he gets the message:

"D03, page is not available"

Jafar remembers that hexadecimal is often used to represent binary values in error codes.

Convert the hexadecimal number in the error message into 12-bit binary.

[3]

5 The three binary numbers in the registers X, Y and Z have been transmitted from one computer to another.

								Parity bit
Register X	1	0	0	1	0	0	1	0
Register Y	1	1	1	0	0	1	1	1
Register Z	1	1	1	0	1	0	0	1

Only **one** binary number has been transmitted correctly. This is identified through the use of a parity bit.

Identify which register contains the binary number that has been transmitted **correctly**. Explain the reason for your choice.

The binary number that has been transmitted correctly is in **Register** .....

Explanation .....

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[4]

6 Kelvin correctly answers an examination question about the Von Neumann model.

Eight different terms have been removed from his answer.

Complete the sentences in Kelvin's answer, using the list given.

Not all items in the list need to be used.

- accumulator (ACC)
- address bus
- arithmetic logic unit (ALU)
- control unit (CU)
- data bus
- executed
- fetches
- immediate access store (IAS)
- memory address register (MAR)
- memory data register (MDR)
- program counter (PC)
- saved
- transmits

The central processing unit (CPU) .....

the data and instructions needed and stores them in the

..... to wait to be processed.

The ..... holds the address of the next

instruction. This address is sent to the ..... .

The data from this address is sent to the ..... .

The instruction can then be decoded and ..... .

Any calculations that are carried out on the data are done by the

..... . During calculations, the data is temporarily

held in a register called the ..... .

[8]

7 Consider the logic statement:

X = 1 if ((A is 1 AND B is NOT 1) NAND C is 1) XOR ((A is 1 AND C is 1) OR B is 1)

(a) Draw a logic circuit to represent the given logic statement.

[6]

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

A	B	C	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]

[Turn over

8 Dimitri is writing a computer program in a high-level language.

He needs to send just the machine code for the program to his friend, electronically.

It is important that the program is executed as quickly as possible.

Identify which translator will be most suitable for Dimitri to use. Explain your choice.

Type of translator .....

Explanation .....

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[4]

9 An advertisement in a magazine displays this barcode:

(a) Identify this type of barcode.

..... [1]

(b) Explain how the data stored in this barcode is read.

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..... [4]

10 Alexandra has a new mobile device.

It has a touch screen that uses capacitive technology.

(a) Describe how a capacitive touch screen registers Alexandra's touch.

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..... [4]

(b) Alexandra is wearing gloves because it is cold.

She presses an icon on her touch screen but her action is not registered.

(i) Explain why the touch screen will not register her touch.

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..... [2]

(ii) Alexandra does not want to remove her gloves.

Explain how Alexandra could use her mobile device whilst still wearing gloves.

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..... [2]

11 A factory uses a security system to control a security light. The system uses a sensor and a microprocessor.

Explain how the security system makes use of the sensor and the microprocessor to control the security light.

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..... [6]

12 **(a)** Selma has some important personal information that she needs to email to her employer.

She wants to make sure that if the personal information is intercepted, it cannot be understood.

(i) State how Selma could email her personal data more securely.

..... [1]

(ii) Describe how your chosen solution works.

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..... [5]

(b) Selma wants to make sure that the information received is correct.

A parity check can be used to detect errors.

Describe another error detection method that can be used to check the information received is correct.

Error detection method .....

Description .....

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[3]

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