Cambridge IGCSE

Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME

CENTRE NUMBER | | | | | |

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3491654171

COMPUTER SCIENCE **0478/12**

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.

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

This document consists of **10** printed pages and **2** blank pages.

1 Computer memory size is measured in multiples of bytes.

Four statements about computer memory sizes are given in the table.

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

Statement	True (✓)	False (✓)
25 kB is larger than 100 MB		
999 MB is larger than 50 GB		
3500 kB is smaller than 2 GB		
2350 bytes is smaller than 2 kB		

[4]

2 The Von Neumann model for a computer system uses several components in the fetch-execute cycle. One component that is used is the Control Unit (CU).

Identify **four** other components that are used in the Von Neumann model for a computer system.

1 .....

2 .....

3 .....

4 .....

[4]

3 The data from a sensor must be converted from analogue to digital to be processed by a computer.

(a) State what is meant by analogue data.

.....

..... [1]

(b) State what is meant by digital data.

.....

..... [1]

4 An 8-bit binary register contains the value:

0	0	1	1	0	1	0	0

(a) Convert the binary value to denary.

.....

..... [1]

(b) The contents of the register shifted one place to the right would give the result:

0	0	0	1	1	0	1	0

The contents of the register shown at the start of question 4 are shifted two places to the left.

Show the contents of the register after this shift has taken place.

[1]

(c) State the effect this shift has on the denary value in **part (a)**.

.....

..... [1]

5 Audrey wants to send a sound file to Nico using email.

The file is too large to attach to an email so Audrey decides to compress the file.

She uses lossy compression to reduce the size of the sound file.

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

.....

.....

.....

.....

.....

.....

.....

..... [4]

(b) Nico asks Audrey why she used lossy compression rather than lossless.

(i) State **one** advantage Audrey could give of using lossy rather than lossless to compress the sound file.

.....

..... [1]

(ii) State **one** disadvantage Nico could give of using lossy rather than lossless to compress the sound file.

.....

..... [1]

(c) Audrey sometimes records MIDI files.

(i) Explain what is meant by a MIDI file.

.....

.....

.....

.....

.....

.....

.....

..... [4]

(ii) MIDI uses serial data transmission.

Explain **two** advantages of using serial transmission rather than parallel transmission.

Advantage 1 .....

.....

.....

.....

Advantage 2 .....

.....

.....

.....

[4]

6 Touch screen technologies can be described as resistive or capacitive.

Six statements are given about resistive and capacitive technology.

Tick (✓) to show if the statement applies to **Resistive** or **Capacitive** technology.

Statement	Resistive (✓)	Capacitive (✓)
This touch screen has multi-touch capabilities		
This touch screen cannot be used whilst wearing gloves		
This touch screen is made up of two layers with a small space in between		
This touch screen uses the electrical properties of the human body		
This touch screen is normally cheaper to manufacture		
This touch screen has a quicker response time		

[6]

7 Gerald uses a keyboard to enter a website address into the address bar of his browser.

(a) Describe how Gerald's key presses on his keyboard are processed by the computer.

.....

.....

.....

.....

.....

.....

.....

..... [4]

(b) State **three** functions of a browser.

1 .....

.....

2 .....

.....

3 .....

.....

[3]

(c) The website Gerald visits uses https.

Explain what is meant by https.

.....

.....

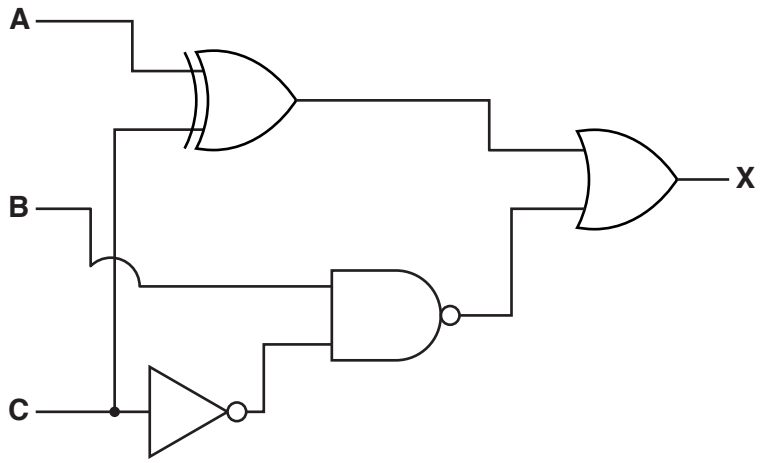
.....

.....

.....

..... [3]

8 Consider the logic circuit:



(a) Write a logic statement to match the given logic circuit.

..... [3]

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

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]

9 Maisey purchases a new router and attaches it to her computer. The connection she sets up uses duplex data transmission.

(a) **Five** statements are given about duplex data transmission.

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

Statement	True (✓)	False (✓)
Duplex data transmission can be either serial or parallel		
Duplex data transmission is when data is transmitted both ways, but only one way at a time		
Duplex data transmission is always used to connect a device to a computer		
Duplex data transmission is when data is transmitted both ways at the same time		
Duplex data transmission automatically detects any errors in data		

[5]

(b) Maisey's computer uses an integrated circuit (IC) for data transmission that sends multiple bits at the same time.

State whether the IC uses **serial** or **parallel** data transmission.

..... [1]

(c) Maisey purchases a new printer and connects it to her computer using the USB port.

Explain **two** benefits of using a USB connection.

Benefit 1 .....

.....

.....

.....

Benefit 2 .....

.....

.....

.....

[4]

10 Data is valuable to a company.

(a) Companies use error detection methods to make sure that data is accurate.

One error detection method is the use of a check digit.

Explain what is meant by a check digit and how it is used to detect errors.

.....

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.....

.....

.....

.....

.....

..... [4]

(b) Companies can use a range of security methods to keep their data secure.

Identify **two** security methods that a company can use to keep their data secure **and** explain how each method can keep the data secure.

Security method 1 .....

.....

.....

.....

.....

.....

Security method 2 .....

.....

.....

.....

.....

.....

[6]

11 Robert has a mobile device that uses RAM, ROM and an SSD.

(a) State what the RAM, ROM and SSD are used for.

RAM .....

.....

ROM .....

.....

SSD .....

.....

[3]

(b) Give **two** reasons why an SSD, rather than a HDD, is used in the mobile device.

Reason 1 .....

.....

Reason 2 .....

.....

[2]

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COMPUTER SCIENCE **0478/12**

Paper 1 **October/November 2019**

MARK SCHEME

Maximum Mark: 75

Published

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge International will not enter into discussions about these mark schemes.

Cambridge International is publishing the mark schemes for the October/November 2019 series for most Cambridge IGCSE™, Cambridge International A and AS Level components and some Cambridge O Level components.

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

Generic Marking Principles

These general marking principles must be applied by all examiners when marking candidate answers. They should be applied alongside the specific content of the mark scheme or generic level descriptors for a question. Each question paper and mark scheme will also comply with these marking principles.

GENERIC MARKING PRINCIPLE 1:

Marks must be awarded in line with:

- the specific content of the mark scheme or the generic level descriptors for the question
- the specific skills defined in the mark scheme or in the generic level descriptors for the question
- the standard of response required by a candidate as exemplified by the standardisation scripts.

GENERIC MARKING PRINCIPLE 2:

Marks awarded are always **whole marks** (not half marks, or other fractions).

GENERIC MARKING PRINCIPLE 3:

Marks must be awarded **positively**:

- marks are awarded for correct/valid answers, as defined in the mark scheme. However, credit is given for valid answers which go beyond the scope of the syllabus and mark scheme, referring to your Team Leader as appropriate
- marks are awarded when candidates clearly demonstrate what they know and can do
- marks are not deducted for errors
- marks are not deducted for omissions
- answers should only be judged on the quality of spelling, punctuation and grammar when these features are specifically assessed by the question as indicated by the mark scheme. The meaning, however, should be unambiguous.

GENERIC MARKING PRINCIPLE 4:

Rules must be applied consistently e.g. in situations where candidates have not followed instructions or in the application of generic level descriptors.

GENERIC MARKING PRINCIPLE 5: Marks should be awarded using the full range of marks defined in the mark scheme for the question (however; the use of the full mark range may be limited according to the quality of the candidate responses seen).
GENERIC MARKING PRINCIPLE 6: Marks awarded are based solely on the requirements as defined in the mark scheme. Marks should not be awarded with grade thresholds or grade descriptors in mind.

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>1</td><td>One mark for each correct tick

<table>
<tr><th>Statement</th><th>True (✓)</th><th>False (✓)</th></tr>
<tr><td>25 kB is larger than 100 MB</td><td></td><td>✓</td></tr>
<tr><td>999 MB is larger than 50 GB</td><td></td><td>✓</td></tr>
<tr><td>3500 kB is smaller than 2 GB</td><td>✓</td><td></td></tr>
<tr><td>2350 bytes is smaller than 2 kB</td><td></td><td>✓</td></tr>
</table></td><td>4</td></tr>
</table>

Question	Answer	Marks
2	**Four** from: • Arithmetic and logic unit (ALU) • Memory address register (MAR) • Memory data register (MDR) // Memory buffer register (MBR) • Accumulator (ACC) • Immediate Access Store (IAS) • Main memory // RAM • Program counter (PC) • Current instruction register (CIR) • Address bus • Data bus • Control bus • Input device • Output device • Secondary storage device	**4**

Question	Answer	Marks
3(a)	**One** from: • Continuous data // by description • Non-discrete data // by description • By example, e.g. data such as a sound wave	**1**
3(b)	**One** from: • Discrete data that has only two values • By example, e.g. binary data / 1's and 0's	**1**

Question	Answer	Marks
4(a)	• 52	**1**
4(b)	1 1 0 1 0 0 0 0	**1**
4(c)	• It is multiplied by 4	**1**

Question	Answer	Marks
5(a)	**Four** from: • A compression algorithm is used • Discards any unnecessary sounds … • … using perceptual musical shaping • … such as removing background noise / sounds humans can't hear // or other suitable example • Reduces sample size / resolution // by example • Reduces sample rate // by example • Sound is clipped • The data is permanently removed	**4**
5(b)(i)	**One** from: • The file size will be smaller than lossless • Requires less storage space • Requires less time to transmit	**1**
5(b)(ii)	**One** from: • The quality of the sound will be reduced • The original file cannot be restored	**1**

Question	Answer	Marks
5(c)(i)	**Four** from: • Musical Instrument Digital Interface file • Stores a set of commands / instructions for how the sound should be played • Does not store the actual sounds • Data in the file has been recorded using digital instruments • Specifies pitch of the note // specifies the note to be played • Specifies when each note plays and stops playing // Specifies key on/off • Specifies duration of the note • Specifies volume of the note • Specifies the tempo • Specifies the type of instrument	**4**
5(c)(ii)	**Four** from: • It uses a single wire … • … therefore, it is cheaper to manufacture / buy / install • … therefore, less likely to have interference // no crosstalk • … therefore, can be used over longer distances • Data is sent a bit at a time … • … therefore, less chance of data being skewed // data is received in order • Transmission can be synchronised … • … can reduce rate of errors	**4**

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>6</td><td>One mark for each correct tick
<table>
<tr><th>Statement</th><th>Resistive (✓)</th><th>Capacitive (✓)</th></tr>
<tr><td>This touch screen has multi-touch capabilities</td><td></td><td>✓</td></tr>
<tr><td>This touch screen cannot be used whilst wearing gloves</td><td></td><td>✓</td></tr>
<tr><td>This touch screen is made up of two layers with a small space in between</td><td>✓</td><td></td></tr>
<tr><td>This touch screen uses the electrical properties of the human body</td><td></td><td>✓</td></tr>
<tr><td>This touch screen is normally cheaper to manufacture</td><td>✓</td><td></td></tr>
<tr><td>This touch screen has a quicker response time</td><td></td><td>✓</td></tr>
</table></td><td>6</td></tr>
</table>

Question	Answer	Marks
7(a)	**Four** from: • Membrane / matrix / circuit board present at base of keys • A key is pressed that presses a switch • When a key is pressed it completes a circuit // changes the current in a circuit • The location of the keypress is calculated • An index of characters is searched to find the corresponding keypress • Each character has an ASCII / Unicode value • The ASCII / Unicode value has a binary value • Keypress generates an interrupt • Each character / keypress is added to a buffer to wait to be processed • The binary can then be processed by the CPU to action the key press	**4**
7(b)	**Three** from: • Display a web page • Sends a request to the web server • Receives data from web server • Translates HTML files • Processes client-side script, e.g. JavaScript • Store favourites • Store history • Navigation forward and backward • Check security • Store / access cookies • Find specific text within a web page • Downloading file from the web • Allows a homepage • Allows multiple tabs / web pages to be opened • Stores data in its cache	**3**

Question	Answer	Marks
7(c)	**Three** from: • Hypertext Transfer Protocol Secure // It is a protocol … • … that is a set of rules/standards • Secure version of HTTP • Secure website // secures data • Uses TLS / SSL • Uses encryption	**3**

Question	Answer	Marks
8(a)	• X = 1 if (A is 1 XOR C is 1) OR (B is 1 NAND C is NOT 1) • X = (A XOR C) OR (B NAND NOTC) **One** mark for each bullet: • (A XOR C) • OR • (B NAND NOTC)	**3**

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>8(b)</td><td>
Four marks for 8 correct outputs
Three marks for 6 or 7 correct outputs
Two marks for 4 or 5 correct outputs
One mark for 2 or 3 correct outputs

<table>
<tr><th>A</th><th>B</th><th>C</th><th>Working space</th><th>X</th></tr>
<tr><td>0</td><td>0</td><td>0</td><td></td><td>1</td></tr>
<tr><td>0</td><td>0</td><td>1</td><td></td><td>1</td></tr>
<tr><td>0</td><td>1</td><td>0</td><td></td><td>0</td></tr>
<tr><td>0</td><td>1</td><td>1</td><td></td><td>1</td></tr>
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<tr><td>1</td><td>1</td><td>1</td><td></td><td>1</td></tr>
</table>
</td><td>4</td></tr>
</table>

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>9(a)</td><td>One mark per each correct tick

<table>
<tr><th>Statement</th><th>True (✓)</th><th>False (✓)</th></tr>
<tr><td>Duplex data transmission can be either serial or parallel</td><td>✓</td><td></td></tr>
<tr><td>Duplex data transmission is when data is transmitted both ways, but only one way at a time</td><td></td><td>✓</td></tr>
<tr><td>Duplex data transmission is always used to connect a device to a computer</td><td></td><td>✓</td></tr>
<tr><td>Duplex data transmission is when data is transmitted both ways at the same time</td><td>✓</td><td></td></tr>
<tr><td>Duplex data transmission automatically detects any errors in data</td><td></td><td>✓</td></tr>
</table></td><td>5</td></tr>
<tr><td>9(b)</td><td>• Parallel data transmission</td><td>1</td></tr>
</table>

Question	Answer	Marks
9(c)	**Four** from (maximum two marks per benefit): • It is a universal standard … • … so it is likely to be compatible with the computer • It can only be inserted one way … • … so there is less chance of connecting a device incorrectly • It is a high-speed connection … • … so data will be transmitted quicker • It uses serial transmission … • … so it is cheaper to manufacture/buy • … less chance of skewing / errors • It doesn't require a (wireless) network … • … therefore, can be used if a network is down • It is backwards compatible … • … so no additional technology is needed • It can power the device … • … therefore no separate source of power is needed • Drivers are automatically downloaded // device is automatically identified … • … so no need to find them online / install them manually	**4**

Question	Answer	Marks
10(a)	**Four** from: • Validation method • Used to check data entry • Digit is calculated from data // by example • Digit is appended / added to data • Digit is recalculated when data has been input • Digits are compared • If digits are different, error is detected // If digits match, no error is detected	**4**
10(b)	**Six** from (maximum three marks per security method): • Firewall … • … Monitors the traffic • … **Blocks** any traffic that doesn't meet the **criteria** / **rules** • (Strong) password // biometric … • … Data cannot be accessed without the use of the password / bio data • … Prevent brute force attacks • Encryption … • … Data will be scrambled • … **Key** is required to decrypt the data • … If data is stolen it will be meaningless • Physical security methods … • … The physical security will need to be overcome • … This can help deter theft of the data • Antispyware … • … will remove any spyware from system • … will prevent data being relayed to a third party	**6**

Question	Answer	Marks
11(a)	**RAM** • To store the data / instructions / parts of OS that are currently in use **ROM** • To store the firmware / bootup instructions / BIOS **SSD** • To store files / software // by example	**3**
11(b)	**Two** from: • It is more durable // it has no moving parts • It has a faster read / write / access speed • It is more compact / light weight / smaller / portable • It uses less energy // battery will last longer • It is quieter • Not affected by magnetic forces • It runs at a cooler temperature • Less latency // takes less time to warm up	**2**