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## 0478/13

May/June 2019

**1 hour 45 minutes**

No Additional Materials are required.

No calculators allowed.

**READ THESE INSTRUCTIONS FIRST**

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 **11** printed pages and **1** blank page.

1 Victoria is building a website for her cake design business.

(a) She uses the hexadecimal colour code #D2E3F5 as the background colour for her website.

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

Show how the code would be stored in the registers.

**D2E**

--	--	--	--	--	--	--	--	--	--	--	--

**3F5**

--	--	--	--	--	--	--	--	--	--	--	--

[6]

(b) Victoria uses HTML to create her website.

State what is meant by HTML.

.....

..... [1]

(c) The HTML Victoria writes has both structure and presentation.

**Five** examples are given of structure and presentation.

**Tick (✓)** to show which example is **Structure** and which is **Presentation**.

Example	Structure (✓)	Presentation (✓)
The colour applied to a text heading on a web page		
The font style applied to a paragraph of text on a web page		
The placement of a paragraph of text on a web page		
The size that an image is set to be displayed at on a web page		
The placement of an image next to a paragraph of text on a web page		

[5]

(d) Customers will use a web browser to access Victoria's website.

Victoria writes a paragraph of text to explain how the website will be displayed on a customer's computer.

Use the list given to complete Victoria's paragraph by inserting the correct **six** missing terms. Not all terms will be used.

- browser
- domain name
- firewall
- hexadecimal
- HTML
- https
- MAC address
- search engine
- Uniform Resource Locator (URL)
- web server

The user enters the website ..... into the address bar.

The protocol that is used is ..... The URL contains

the ..... for the website. This is used to look up the

IP address of the company. A DNS server stores an index of IP addresses.

The browser sends a request to the ..... as this is

where the files for the website are stored. The files are sent back to the

..... as ..... files.

This is interpreted by the browser and the web page is displayed.

[6]

- (e) When customers access Victoria's website they will be given the message:

This website uses cookies. An explanation of their purpose can be found in our cookies policy.

- (i) Explain what is meant by cookies.

.....

.....

.....

..... [2]

- (ii) Explain why Victoria would use cookies as part of her website.

.....

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.....

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.....

.....

..... [4]

- 2 (a) A computer can have both a MAC address and an IP address.

**Four** statements are given about MAC addresses and IP addresses.

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

Statement	True (✓)	False (✓)
A MAC address is unique to a computer on a network		
Once an IP address has been set it cannot be changed		
A MAC address is made up of the computer's serial number and the IP address		
If a computer does not have an IP address it cannot communicate with another device using the Internet		

[4]

(b) A computer uses the Von Neumann model and the stored program concept.

(i) Explain what is meant by the stored program concept.

.....

.....

.....

..... [2]

(ii) The Von Neumann model has several components that are used in the fetch-execute cycle.

One component is the Arithmetic Logic Unit (ALU).

Describe the role of the ALU.

.....

.....

.....

.....

.....

.....

.....

..... [4]

(c) The computer has an operating system.

(i) A signal causes the operating system to stop and assess what to do next.

Identify the name of this signal.

..... [1]

(ii) State **two** functions of an operating system.

1 .....

2 .....

[2]

- 3** A finance company is concerned that its employees are being distracted by using gaming websites at work.

**(a)** Explain how a firewall could help prevent this distraction.

.....

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.....

.....

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..... [4]

**(b)** The finance company is also worried about the security of the data stored on its servers.

The company has decided to encrypt the data to improve the security.

Describe how the data are encrypted.

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..... [4]

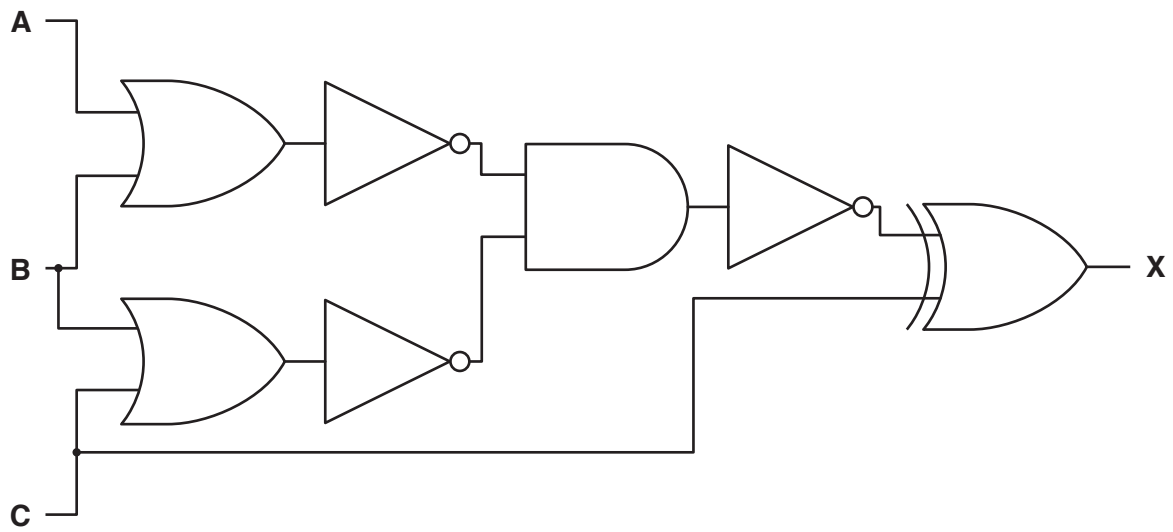
- (c)** The finance company realises that its computer systems have been hacked.

The company thinks that spyware was used to obtain a user's password.

Explain how spyware could have been used to obtain the user's password.

[6]

4 Consider the given logic circuit:



- (a) Redraw the logic circuit using only 4 logic gates. Each logic gate used must have a maximum of **two** inputs.



[4]



(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]

(c) Describe the purpose of a logic gate in a logic circuit.

.....

.....

.....

..... [2]

- 5 The three binary numbers in the registers given have been transmitted from one computer to another.

**One** binary number has been transmitted incorrectly. This can be identified by the use of a **Parity bit**.

Identify the binary number that has been transmitted **incorrectly**. Explain how you identified the incorrect binary number.

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

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

Explanation .....

.....

.....

.....

.....

.....

.....

..... [4]

**6** A museum has an information point.

Visitors to the museum can use the information point to plan their visit to the museum.

The information point allows visitors to access the information using a resistive touch screen.

Visitors can either listen to the information or read it on the screen. They can also select to output a paper copy of the information they require.

**(a)** Describe how the resistive touch screen registers the visitor's touch.

[4]

**(b)** The information point has a screen to allow visitors to read information.

Identify **two** other output devices that are present in the information point.

Output device 1 .....

Output device 2 ..... [2]

**(c)** The information point uses both primary and secondary storage.

Explain what is meant by primary and secondary storage.

Primary .....

.....

.....

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Secondary .....

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**COMPUTER SCIENCE**

**0478/13**

Paper 1 Theory

**May/June 2019**

MARK SCHEME

Maximum Mark: 75

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**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 May/June 2019 series for most Cambridge IGCSE™, Cambridge International A and AS Level and Cambridge Pre-U components, and some Cambridge O Level components.

**PUBLISHED****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.

Question	Answer	Marks																		
1(a)	<p>1 mark      1 mark      1 mark</p> <p>1 mark      1 mark      1 mark</p>	6																		
1(b)	<b>One</b> from: <ul style="list-style-type: none"> <li>– Hypertext Mark-up Language</li> <li>– A <u>mark-up</u> language used to create webpages</li> </ul>	1																		
1(c)	1 mark for each correct row: <table border="1"> <thead> <tr> <th>Example</th><th>Structure (✓)</th><th>Presentation (✓)</th></tr> </thead> <tbody> <tr> <td>The colour applied to a text heading on a web page</td><td></td><td>✓</td></tr> <tr> <td>The font style applied to a paragraph of text on a web page</td><td></td><td>✓</td></tr> <tr> <td>The placement of a paragraph of text on a web page</td><td>✓</td><td></td></tr> <tr> <td>The size that an image is set to be displayed at on a web page</td><td></td><td>✓</td></tr> <tr> <td>The placement of an image next to a paragraph of text of a web page</td><td>✓</td><td></td></tr> </tbody> </table>	Example	Structure (✓)	Presentation (✓)	The colour applied to a text heading on a web page		✓	The font style applied to a paragraph of text on a web page		✓	The placement of a paragraph of text on a web page	✓		The size that an image is set to be displayed at on a web page		✓	The placement of an image next to a paragraph of text of a web page	✓		5
Example	Structure (✓)	Presentation (✓)																		
The colour applied to a text heading on a web page		✓																		
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The placement of a paragraph of text on a web page	✓																			
The size that an image is set to be displayed at on a web page		✓																		
The placement of an image next to a paragraph of text of a web page	✓																			

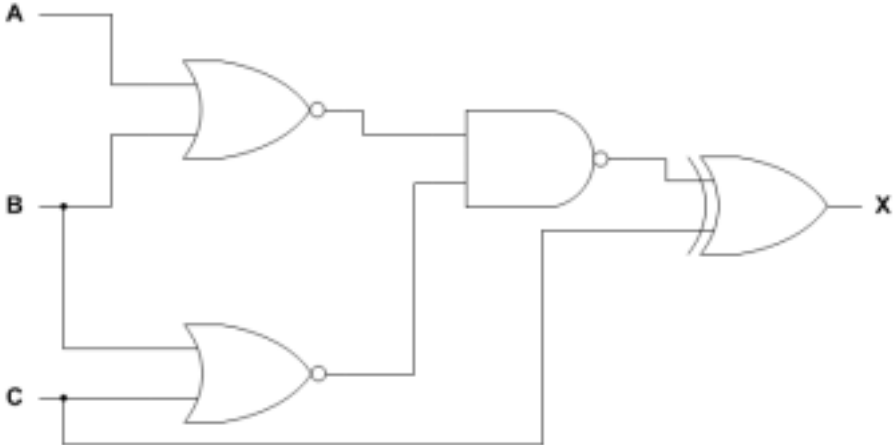


Question	Answer	Marks
1(d)	1 mark for each correct term, in the correct place: <ul style="list-style-type: none"><li>– URL</li><li>– https</li><li>– Domain name</li><li>– Web server</li><li>– Browser</li><li>– HTML</li></ul>	<b>6</b>
1(e)(i)	<ul style="list-style-type: none"><li>– Small packets of data</li><li>– ... that are stored by the web browser</li></ul>	<b>2</b>
1(e)(ii)	<b>Four</b> from: <ul style="list-style-type: none"><li>– To store a customer's password ...</li><li>– To store a customer's credit card details ...</li><li>– ... so they do not need to be re-entered in future</li><li>– To track what the customer has viewed on the website ...</li><li>– ... so she can send them adverts that match their preferences</li></ul>	<b>4</b>

Question	Answer	Marks															
2(a)	<p>1 mark for each correct row:</p> <table border="1"> <thead> <tr> <th>Statement</th><th>True (✓)</th><th>False (✓)</th></tr> </thead> <tbody> <tr> <td>A MAC address is unique to a computer on a network</td><td>✓</td><td></td></tr> <tr> <td>Once an IP address has been set it cannot be changed</td><td></td><td>✓</td></tr> <tr> <td>A MAC address is made up of the computer's serial number and the IP address</td><td></td><td>✓</td></tr> <tr> <td>If a computer does not have an IP address it cannot communicate with another device using the Internet</td><td>✓</td><td></td></tr> </tbody> </table>	Statement	True (✓)	False (✓)	A MAC address is unique to a computer on a network	✓		Once an IP address has been set it cannot be changed		✓	A MAC address is made up of the computer's serial number and the IP address		✓	If a computer does not have an IP address it cannot communicate with another device using the Internet	✓		4
Statement	True (✓)	False (✓)															
A MAC address is unique to a computer on a network	✓																
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A MAC address is made up of the computer's serial number and the IP address		✓															
If a computer does not have an IP address it cannot communicate with another device using the Internet	✓																
2(b)(i)	<p><b>Two</b> from:</p> <ul style="list-style-type: none"> <li>– Programs / instructions are stored in <b>memory</b></li> <li>– Data is stored in <b>memory</b></li> <li>– Instructions are fetched and executed <b>one after another</b></li> </ul>	2															
2(b)(ii)	<ul style="list-style-type: none"> <li>– Carries out calculations</li> <li>– Carries out logical operations</li> <li>– Holds temporary / interim values during calculations</li> <li>– ... in a register called the accumulator (ACC)</li> </ul>	4															

Question	Answer	Marks
2(c)(i)	– Interrupt	<b>1</b>
2(c)(ii)	<b>Two</b> from: <ul style="list-style-type: none"> <li>– Provides an interface</li> <li>– Loads / opens / installs / closes software</li> <li>– Manages the hardware // manages peripherals // spooling</li> <li>– Manages the transfer of programs into and out of memory</li> <li>– Divides processing time // processor management</li> <li>– Manages file handling</li> <li>– Manages error handling // interrupt handling</li> <li>– Manages security software</li> <li>– Manages utility software</li> <li>– Manages user accounts</li> <li>– Multitasking</li> <li>– Multiprogramming // time slicing</li> <li>– Batch processing</li> </ul>	<b>2</b>

Question	Answer	Marks
3(a)	<b>Four</b> from: <ul style="list-style-type: none"> <li>– The company could use the firewall to set criteria</li> <li>– Gaming websites can be listed as blocked websites // ports can be blocked</li> <li>– The firewall would examine any traffic leaving the network</li> <li>– If it detected traffic requesting a listed website, it will block access to it</li> <li>– Keeps a log of all attempts to access blocked websites</li> </ul>	<b>4</b>
3(b)	<b>Four</b> from: <ul style="list-style-type: none"> <li>– An encryption algorithm is used</li> <li>– ... to scramble data</li> <li>– The original data is called the plain text</li> <li>– A key is used to encrypt the data</li> <li>– The key is applied to the plain text</li> <li>– Plain text is encrypted into cypher text</li> </ul>	<b>4</b>
3(c)	<b>Six</b> from: <ul style="list-style-type: none"> <li>– The user could have been sent an email with an attachment / link containing the spyware</li> <li>– The user could have clicked a link on an untrusted website</li> <li>– When the attachment / link was clicked the spyware was downloaded onto the user's computer</li> <li>– The spyware recorded all the key logs from the user's keyboard</li> <li>– The recorded key logs were sent back to the creator of the spyware</li> <li>– The key logs were analysed</li> <li>– A common pattern / word in the key logs could have allowed a password to be identified</li> </ul>	<b>6</b>

Question	Answer	Marks
4(a)	<p data-bbox="349 215 1048 247">1 mark for each correct logic gate, with correct inputs:</p> 	<b>4</b>

Question	Answer	Marks																																													
4(b)	<p>4 marks for 8 correct outputs 3 marks for 6/7 correct outputs 2 marks for 4/5 correct outputs 1 mark for 2/3 correct outputs</p> <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>0</td></tr><tr><td>0</td><td>0</td><td>1</td><td></td><td>0</td></tr><tr><td>0</td><td>1</td><td>0</td><td></td><td>1</td></tr><tr><td>0</td><td>1</td><td>1</td><td></td><td>0</td></tr><tr><td>1</td><td>0</td><td>0</td><td></td><td>1</td></tr><tr><td>1</td><td>0</td><td>1</td><td></td><td>0</td></tr><tr><td>1</td><td>1</td><td>0</td><td></td><td>1</td></tr><tr><td>1</td><td>1</td><td>1</td><td></td><td>0</td></tr></table>	A	B	C	Working space	X	0	0	0		0	0	0	1		0	0	1	0		1	0	1	1		0	1	0	0		1	1	0	1		0	1	1	0		1	1	1	1		0	4
A	B	C	Working space	X																																											
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1	1	0		1																																											
1	1	1		0																																											
4(c)	<p><b>Two</b> from:</p> <ul style="list-style-type: none"><li>– To carry out a logical operation</li><li>– To control the flow of electricity through a logic circuit</li><li>– An input is given and the logic of the gate is applied to give an output // to alter the output from given inputs</li></ul>	2																																													

Question	Answer	Marks
5	<p>– B</p> <p><b>Three</b> from:</p> <ul style="list-style-type: none"> <li>– Added up the number of 1's / 0's in each register</li> <li>– With the parity bit, two registers have an odd number of 1's / 0's</li> <li>– One register has an even number of 1's / 0's</li> <li>– Odd parity must be the parity used</li> </ul>	4

Question	Answer	Marks
6(a)	<p><b>Four</b> from:</p> <ul style="list-style-type: none"> <li>– Screen has two / multiple layers</li> <li>– Visitor presses on top layer</li> <li>– Top layer connects to bottom layer</li> <li>– ... creating a circuit</li> <li>– Calculation is carried out on where layers are connected</li> </ul>	4
6(b)	<p><b>Two</b> from:</p> <ul style="list-style-type: none"> <li>– Speaker</li> <li>– Headphones</li> <li>– Printer</li> </ul>	2

Question	Answer	Marks
6(c)	<p><b>Four</b> from (max. 2 marks per type):</p> <p><b>Primary</b></p> <ul style="list-style-type: none"><li>– Memory that is directly accessed by the CPU</li><li>– An example is RAM / ROM</li><li>– RAM stores programs and data that are currently in use and ROM stores boot-up instructions</li><li>– RAM is volatile and ROM is non volatile</li></ul> <p><b>Secondary</b></p> <ul style="list-style-type: none"><li>– Storage that is not directly accessed by the CPU</li><li>– An example is HDD / SSD</li><li>– Stores data / files that can be accessed at a later stage</li><li>– Non volatile</li></ul>	<b>4</b>