Cambridge Assessment International Education

Cambridge IGCSE™

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

COMPUTER SCIENCE **0478/12**

Paper 1 Theory **October/November 2020**

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 **12** pages. Blank pages are indicated.

DC (LK) 186556/2

[Turn over

1 Tina is creating a website for charity events. She uses HTML to create the website.

(a) State what is meant by HTML.

.....

..... [1]

(b) She uses the hexadecimal colour code #43B7F0 as the background colour for her website.

(i) State whether background colour is an example of **structure** or **presentation**, in the website.

..... [1]

(ii) The hexadecimal colour code **#43B7F0** is stored in three **8-bit** registers.

Give the **8-bit binary** values for each part of the hexadecimal code.

43								
B7								
F0								

[6]

(c) Tina uses a microphone to record a welcome message for her website.

(i) State whether the microphone is an **input** or **output** device.

..... [1]

(ii) She wants to compress the recording to make sure that the file is as small as possible for the website.

Identify which type of compression she should use and describe how this would compress the file for the website.

Type of compression .....

Description

.....

.....

.....

.....

.....

.....

.....

..... [4]

(iii) Give **two** benefits of compressing the file for the website.

Benefit 1 .....

.....

Benefit 2 .....

.....

[2]

(d) Tina will use the TLS protocol in her website when selling tickets to people for different charity events. This makes sure that their personal data is transmitted securely.

(i) Identify the **two** layers that are present in the TLS protocol.

Layer 1 .....

Layer 2 .....
[2]

(ii) Explain how data is sent securely using the TLS protocol.

.....

.....

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.....

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.....

.....

.....

.....

..... [6]

(e) Tina is concerned about security threats to her web server.

(i) Identify **three** security threats to her web server that Tina might be concerned about.

1 .....

2 .....

3 .....

[3]

(ii) Tina installs a proxy server to help protect her website from security threats.

Describe how the proxy server will help protect the website.

.....

.....

.....

.....

.....

.....

.....

..... [4]

2 **Four** 7-bit binary values are transmitted from one computer to another. A parity bit was added to each binary value creating 8-bit binary values. All the binary values have been transmitted correctly.

(a) Tick (✓) to show whether an **Even** or an **Odd** parity check has been used for each binary value.

8-bit binary value	Even (✓)	Odd (✓)
11111111		
01100110		
01111011		
10000000		

[4]

(b) The data will also be checked using a checksum.

Describe how a checksum can be used to check that the data has been transmitted correctly.

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... [5]

3 Alessandro has some important data stored on his computer.

He is concerned about accidental damage to his data.

(a) (i) Identify **three** ways that the data could be accidentally damaged.

1 .....

2 .....

3 .....

[3]

(ii) State what Alessandro could do to make sure that he can retrieve his data if it is accidentally damaged.

..... [1]

(b) Alessandro uses an SSD to store his data.

Describe what is meant by an SSD and how it operates to store data.

.....

.....

.....

.....

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.....

.....

..... [4]

(c) Alessandro also uses off-line storage to store his data.

Three examples of off-line storage are Blu-ray, CD and DVD.

Six statements are given about off-line storage.

Tick (✓) to show if each statement applies to **Blu-ray**, **CD**, or **DVD**.

Some statements apply to more than one example of off-line storage.

Statement	Blu-ray (✓)	CD (✓)	DVD (✓)
A type of optical storage			
Has the largest storage capacity			
Can be dual layer			
Read using a red laser			
Has the smallest storage capacity			
Stores data in a spiral track			

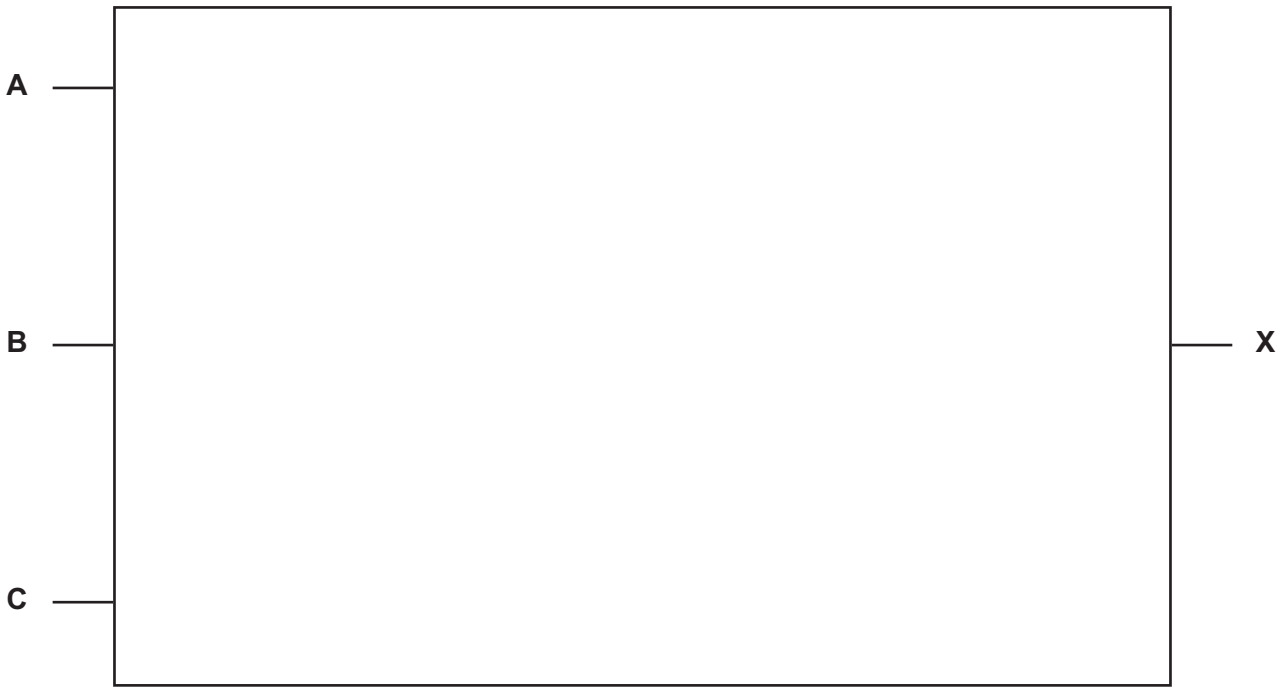
[6]

4 Consider the logic statement:

X = (((**A** NAND **B**) NOR (**B** AND **C**)) OR **C**)

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

All logic gates must have a maximum of **two** inputs. Do **not** attempt to simplify the logic statement.



[4]

(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]

5 Tammy is buying a new computer that has an LED display.

(a) **Five** statements about LED displays are given.

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

Statement	True (✓)	False (✓)
It is a flat panel display		
It creates images using red, green and blue diodes		
It is not very energy efficient and gives off heat		
It can be used in mobile devices such as smartphones and tablets		
It is a front-lit display		

[5]

(b) Tammy connects the computer to her home network. The computer has a MAC address and an IP address.

A paragraph is given about MAC addresses and IP addresses.

Complete the paragraph using the list of terms given. Not all terms need to be used.

- compiled
- computer
- control
- dynamic
- identify
- packet
- principal
- protocol
- similar
- unique

A MAC address is a media access …….. address. A network device has a …… MAC address that can help …….. the device in the network. An IP address is an Internet …… address. An IP address can be static or …… .

[5]

(c) Tammy uses a browser when accessing the Internet.

Describe the role of the browser.

.....

.....

.....

.....

.....

.....

.....

..... [4]

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COMPUTER SCIENCE **0478/12**

Paper 1 **October/November 2020**

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 2020 series for most Cambridge IGCSE™, Cambridge International A and AS Level and Cambridge Pre-U components, and some Cambridge O Level components.

This document consists of **13** printed pages.

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.

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>1(a)</td><td>Any one from:
– Hypertext Mark-up Language
– Web authoring language // language used to write/create websites/web pages</td><td>1</td></tr>
<tr><td>1(b)(i)</td><td>– Presentation</td><td>1</td></tr>
<tr><td>1(b)(ii)</td><td>One mark per each nibble:
<table><tr><td>43</td><td>0</td><td>1</td><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td><td>1</td></tr><tr><td>B7</td><td>1</td><td>0</td><td>1</td><td>1</td><td>0</td><td>1</td><td>1</td><td>1</td></tr><tr><td>F0</td><td>1</td><td>1</td><td>1</td><td>1</td><td>0</td><td>0</td><td>0</td><td>0</td></tr></table></td><td>6</td></tr>
<tr><td>1(c)(i)</td><td>– Input</td><td>1</td></tr>
</table>

Question	Answer	Marks
1(c)(ii)	**One** from: – Lossy (compression) Any **three** from: – A (compression) algorithm is used – Removes redundant/unnecessary data from the file – Removes sounds that cannot be heard by the human ear/background noise – Reduces sample rate – Reduces sample resolution – Data is **permanently** removed // original file cannot be re-instated – Perceptual music shaping is used NOTE: If lossless given, marks can be awarded for a correct description of lossless as follow through. Any **three** from (lossless): – A (compression) algorithm is used – Repeating patterns are identified – … are replaced with a value – … and indexed – No data is permanently removed // original file can be re-instated – Suitable example of a lossless algorithm	**4**
1(c)(iii)	Any **two** from: – Quicker for her to upload – Quicker for users to download – Won't slow website down as much when loading – Takes up less **storage** space	**2**
1(d)(i)	– Handshake (layer) – Record (layer)	**2**

Question	Answer	Marks
1(d)(ii)	Any **six** from: – **Client**/**browser** requests secure **connection** to server – **Client**/**browser** requests the **server** to identify itself – **Server** provides a digital certificate – **Client**/**browser** validates the certificate – **Client**/**browser** send signal **back to server** (to begin transmission) – Session caching can be used – A session key is generated – Encryption method is agreed // data is encrypted	**6**
1(e)(i)	Any **three** from: – Hacking – Denial of service (DoS) attack – Virus – Malware NOTE: Three different type of malware can be awarded	**3**
1(e)(ii)	Any **four** from: – Acts as a firewall – Monitor/filters/examines incoming **and** outgoing traffic – Rules/criteria for traffic can be **set** // blacklist/whitelist **set** – Blocks any traffic that does not meet criteria … – … and can send a warning message **to the user** – Stop the website failing in a DoS attack // DoS attack hits the proxy server and not the webserver	**4**

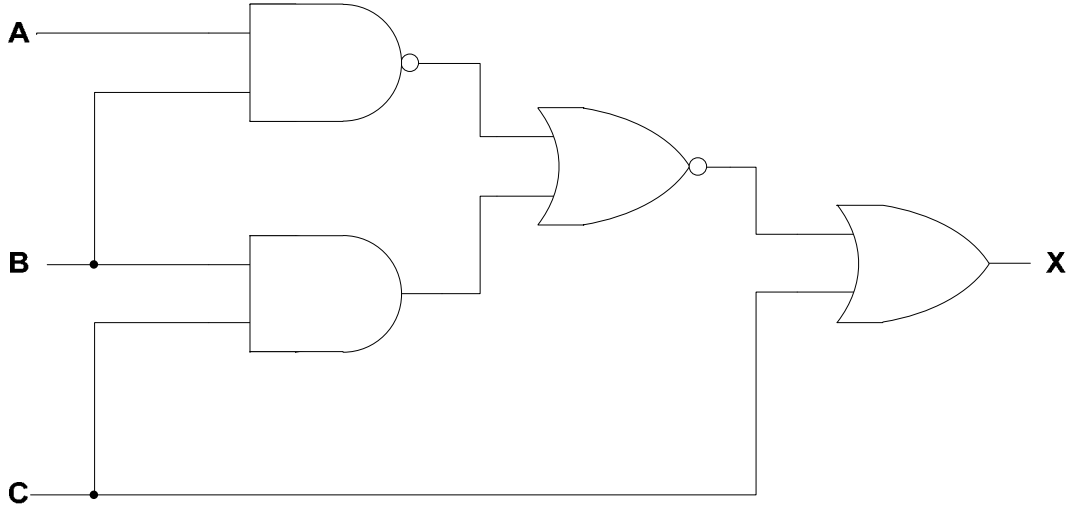
<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>2(a)</td><td>One mark for each correct row:

<table>
<tr><th>8-bit binary value</th><th>Even (✓)</th><th>Odd (✓)</th></tr>
<tr><td>11111111</td><td>✓</td><td></td></tr>
<tr><td>01100110</td><td>✓</td><td></td></tr>
<tr><td>01111011</td><td>✓</td><td></td></tr>
<tr><td>10000000</td><td></td><td>✓</td></tr>
</table></td><td>4</td></tr>
<tr><td>2(b)</td><td>Any five from:
– A value is calculated from the data
– The value is calculated using an algorithm // by example
– The value is appended to the data to be transmitted
– Value is recalculated after transmission
– Values are compared
– If the values match the data is correct // if the values do not match the data is incorrect</td><td>5</td></tr>
</table>

Question	Answer	Marks
3(a)(i)	Any **three** from: – Loss of power/electricity – Spillage of liquids – Flood – Fire – Human error – Hardware failure – Software failure NOTE: Three different types of human error can be awarded e.g. accidental deletion, not saving data, incorrect shutdown procedure	**3**
3(a)(ii)	– Create a backup	**1**
3(b)	Max **three** from: – Solid state drive – Non-volatile – Secondary storage – Flash memory – Has no mechanical/moving parts – Uses transistors – … and cells that are laid out in a grid – Uses control gates and floating gates – Can be NAND/NOR (technology) – Use EEPROM technology Max **two** from: – Stores data by flashing it onto the chips – Data stored by controlling the flow of electrons **through/using transistors/chips/gates** – The electric current reaches the control gate and flows through to the floating gate to be stored – When data is stored the transistor is converted from 1 to 0	**4**

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>3(c)</td><td>One mark for each correct row:

<table>
<tr><th>Statement</th><th>Blu-ray (✓)</th><th>CD (✓)</th><th>DVD (✓)</th></tr>
<tr><td>A type of optical storage</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>Has the largest storage capacity</td><td>✓</td><td></td><td></td></tr>
<tr><td>Can be dual layer</td><td>✓</td><td></td><td>✓</td></tr>
<tr><td>Read using a red laser</td><td></td><td>✓</td><td>✓</td></tr>
<tr><td>Has the smallest storage capacity</td><td></td><td>✓</td><td></td></tr>
<tr><td>Stores data in a spiral track</td><td>✓</td><td>✓</td><td>✓</td></tr>
</table></td><td>6</td></tr>
</table>

Question	Answer	Marks
4(a)	**One** mark for each correct logic gate with correct input:  	**4**

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>4(b)</td><td>
Four marks for 8 correct outputs
Three marks for 6/7 correct outputs
Two marks for 4/5 correct outputs
One mark for 2/3 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>0</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>5(a)</td><td>One mark for each correct row:

<table>
<tr><th>Statement</th><th>True (✓)</th><th>False (✓)</th></tr>
<tr><td>It is a flat panel display</td><td>✓</td><td></td></tr>
<tr><td>It creates images using red, green and blue diodes</td><td>✓</td><td></td></tr>
<tr><td>It is not very energy efficient and gives off heat</td><td></td><td>✓</td></tr>
<tr><td>It is also used in mobile devices such as smartphones and tablets</td><td>✓</td><td></td></tr>
<tr><td>It is a front-lit display</td><td></td><td>✓</td></tr>
</table></td><td>5</td></tr>
<tr><td>5(b)</td><td>One mark for each correct term in the correct place:
– Control
– Unique
– Identify
– Protocol
– Dynamic</td><td>5</td></tr>
</table>

Question	Answer	Marks
5(c)	Any **four** from**:** – Allows user to view web pages – Renders HTML – Allows user to bookmark/favourite web pages – Provides navigation features – Allows (multiple) tabs – **Stores** cookies – Records history of pages visited – Has a homepage – Runs active script – Allows **files** to be downloaded from **website/internet** – Sends a request to the **IP address/web server** (to obtain the contents of a web page) – Sends URL to DNS – **Manages** HTTP/HTTPS protocol	**4**