



CANDIDATE
NAME

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CENTRE
NUMBER

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CANDIDATE
NUMBER

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0478/11

October/November 2020

1 hour 45 minutes

No additional materials are needed.

- 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.

- 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.

- 1 Six devices are shown.

Tick (✓) to show if each device is an **Input**, **Output** or **Storage** device.

Device	Input (✓)	Output (✓)	Storage (✓)
Keyboard			
Sensor			
3D cutter			
2D scanner			
Microphone			
Hard disk drive (HDD)			

[6]

- 2 Ron is attending a music concert. He has bought three tickets.

Each ticket number is displayed as a hexadecimal number.

- (a) Complete the table to show the **12-bit binary** values and the **Denary** values for each Hexadecimal ticket number.

Hexadecimal ticket number	12-bit binary value	Denary value
028		
1A9		
20C		

[6]

Working space

.....

.....

.....

.....

.....

When a person enters, a count is incremented to show how many people have entered the venue.

Explain how the system scans the QR code, checks if a person can enter and counts how many people have entered.

[7]

3 Transport Layer Security (TLS) protocol is used to secure the transmission of data over the Internet.

(a) Identify the **two** layers in the TLS protocol.

Layer 1

Layer 2

[2]

(b) The following paragraph explains how data is sent securely using the TLS protocol.

Use the terms to complete the paragraph. Not all terms may need to be used.

- authentic
- binary
- browser
- certificate
- internet service provider
- signal
- web page
- web server
- website

The browser requests the to identify itself
by providing its This is sent and a check
is performed to see if it is If it is, the
..... sends a
back to the web server and data transmission begins.

[5]

(c) Identify **one** other protocol that can be used to secure data transmission over the Internet.

..... [1]

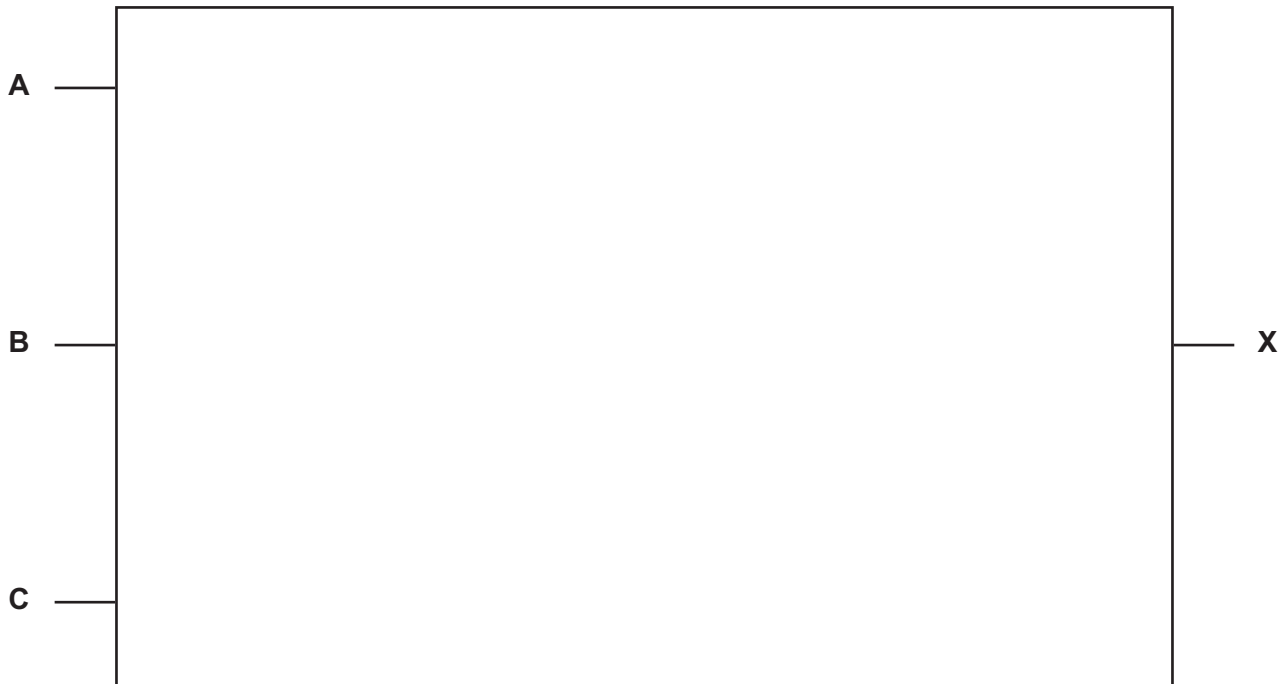
Question 4 starts on page 6.

4 Consider the given logic statement:

$$X = ((\text{NOT } (A \text{ NAND } B)) \text{ OR } (B \text{ NOR } C))$$

(a) Draw a logic circuit to represent 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]

(c) The logic statement given has **four** different logic gates.

Identify **two other** logic gates and complete a truth table for each.

Logic gate

.....

Truth table

A	B	X
0	0	
0	1	
1	0	
1	1	

Logic gate

.....

Truth table

A	B	X
0	0	
0	1	
1	0	
1	1	

[4]

5 Luke is creating a website for his t-shirt design business.

(a) He is using HTML to create the website. HTML can be separated into structure and presentation.

(i) Give **two** examples of HTML structure.

Example 1

Example 2

[2]

(ii) Give **two** examples of HTML presentation.

Example 1

Example 2

[2]

- (b) Luke is concerned that his web server may be hacked or subjected to a denial of service (DoS) attack.

State **two** security methods that Luke could use to help protect the web server from hacking or a DoS attack.

Method 1

Method 2

[2]

- 6 A Von Neumann model for a computer system contains several integrated circuits (IC).

- (a) Parallel data transmission is used in an IC.

- (i) Describe how data is transmitted using parallel data transmission.

.....

 [2]

- (ii) Give **one** benefit of using parallel, rather than serial, data transmission.

.....
 [1]

- (b) The computer has a central processing unit (CPU).

- (i) Identify the bus that carries signals around the CPU to control the components.

..... [1]

- (ii) Identify the register built into the arithmetic logic unit (ALU).

..... [1]

(iii) Four statements about a Von Neumann model for a computer system are shown.

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

Statement	True (✓)	False (✓)
Data and instructions are stored in the same memory unit		
The control unit manages operations within the CPU		
Data and instructions can be fetched into the CPU at the same time		
The control unit is responsible for decoding an instruction		

[4]

- 7 Nina is recording some music tracks that she has written. She is researching whether she should record them in MIDI or MP3 format.

Explain what is meant by MIDI and MP3 format.

MIDI

.....

.....

.....

MP3

.....

.....

.....

[4]

8 Matthew is buying a new television with a display that uses LED technology.

(a) Explain what is meant by LED technology.

.....

.....

.....

.....

.....

..... [3]

(b) State **three** benefits of LED technology.

Benefit 1

.....

Benefit 2

.....

Benefit 3

..... [3]

(c) Identify **one other** technology that could have been used for the display.

..... [1]

9 Victoria is entering data into a computer system. The data will be transmitted to cloud storage.

(a) An even parity check is used to check for errors in the binary values after transmission.

For each of the **7-bit binary values**, write the **Parity bit** that makes sure **even** parity is met.

7-bit binary value	Parity bit
1100010
1001011
0100010
0010111

[4]

- (b) Identify **two** other error checking methods that could be used to check the binary values are correct after transmission.

Method 1

Method 2

[2]

- (c) A check digit is used to check whether data is correct when entered into the system.

Describe how a check digit can be used to make sure the data entered is correct.

.....

.....

.....

.....

.....

.....

.....

.....

..... [4]

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Cambridge IGCSE™

COMPUTER SCIENCE

0478/11

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 **11** 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:

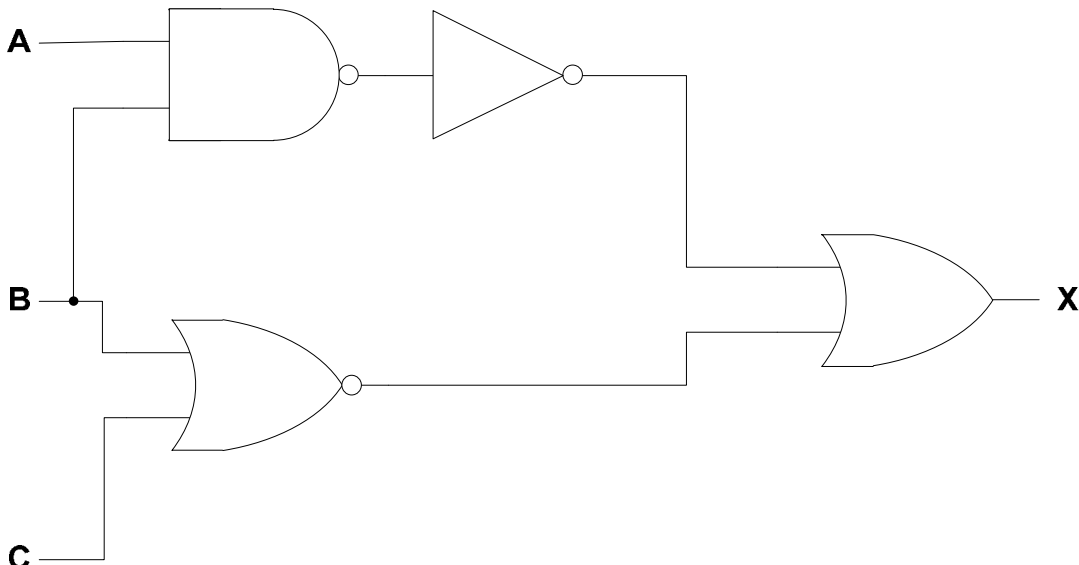
Marks awarded are based solely on the requirements as defined in the mark scheme. Marks should not be awarded with grade thresholds or grade descriptors in mind.

Question	Answer	Marks																												
1	<p>One mark per each correct row:</p> <table><tr><th>Device</th><th>Input (✓)</th><th>Output (✓)</th><th>Storage (✓)</th></tr><tr><td>Keyboard</td><td>✓</td><td></td><td></td></tr><tr><td>Sensor</td><td>✓</td><td></td><td></td></tr><tr><td>3D Cutter</td><td></td><td>✓</td><td></td></tr><tr><td>2D Scanner</td><td>✓</td><td></td><td></td></tr><tr><td>Microphone</td><td>✓</td><td></td><td></td></tr><tr><td>Hard disk drive (HDD)</td><td></td><td></td><td>✓</td></tr></table>	Device	Input (✓)	Output (✓)	Storage (✓)	Keyboard	✓			Sensor	✓			3D Cutter		✓		2D Scanner	✓			Microphone	✓			Hard disk drive (HDD)			✓	6
Device	Input (✓)	Output (✓)	Storage (✓)																											
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Hard disk drive (HDD)			✓																											

Question	Answer	Marks												
2(a)	<p>One mark for each correct binary conversion One mark for each correct denary conversion</p> <table border="1"> <thead> <tr> <th>Hexadecimal ticket number</th><th>12-bit binary value</th><th>Denary value</th></tr> </thead> <tbody> <tr> <td>028</td><td>0000 0010 1000</td><td>40</td></tr> <tr> <td>1A9</td><td>0001 1010 1001</td><td>425</td></tr> <tr> <td>20C</td><td>0010 0000 1100</td><td>524</td></tr> </tbody> </table>	Hexadecimal ticket number	12-bit binary value	Denary value	028	0000 0010 1000	40	1A9	0001 1010 1001	425	20C	0010 0000 1100	524	6
Hexadecimal ticket number	12-bit binary value	Denary value												
028	0000 0010 1000	40												
1A9	0001 1010 1001	425												
20C	0010 0000 1100	524												

Question	Answer	Marks
2(b)	Seven from: <ul style="list-style-type: none"> – Camera captures code // Laser/light shone on code – Black squares reflect different light to white – Corner squares are used for alignment – Pattern converted to digital data // by example – (Digital) data sent to microprocessor – There is a database of valid QR codes – Data compared to stored values/valid QR codes ... – ... If data matches entry is granted is raised – ... If data matches count is incremented – ... If data does not match, entry is denied 	7

Question	Answer	Marks
3(a)	<ul style="list-style-type: none"> – Handshake – Record 	2
3(b)	<ul style="list-style-type: none"> – Web server – Certificate – Authentic – Browser – Signal 	5
3(c)	Any one from: <ul style="list-style-type: none"> – SSL – HTTPS 	1

Question	Answer	Marks
4(a)	 <p data-bbox="336 861 974 893">One mark for each correct gate with correct input</p>	4

Question	Answer	Marks																																													
4(b)	<p>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</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>1</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>0</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>1</td></tr></table>	A	B	C	Working space	X	0	0	0		1	0	0	1		0	0	1	0		0	0	1	1		0	1	0	0		1	1	0	1		0	1	1	0		1	1	1	1		1	4
A	B	C	Working space	X																																											
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1	1	1		1																																											

Question	Answer	Marks																														
4(c)	<p>One mark for the correct gate and one mark for the correct truth table</p> <p>– AND</p> <table border="1"> <tr><td>A</td><td>B</td><td>X</td></tr> <tr><td>0</td><td>0</td><td>0</td></tr> <tr><td>0</td><td>1</td><td>0</td></tr> <tr><td>1</td><td>0</td><td>0</td></tr> <tr><td>1</td><td>1</td><td>1</td></tr> </table> <p>– XOR</p> <table border="1"> <tr><td>A</td><td>B</td><td>X</td></tr> <tr><td>0</td><td>0</td><td>0</td></tr> <tr><td>0</td><td>1</td><td>1</td></tr> <tr><td>1</td><td>0</td><td>1</td></tr> <tr><td>1</td><td>1</td><td>0</td></tr> </table>	A	B	X	0	0	0	0	1	0	1	0	0	1	1	1	A	B	X	0	0	0	0	1	1	1	0	1	1	1	0	4
A	B	X																														
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0	0	0																														
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Question	Answer	Marks
5(a)(i)	– Two valid examples of Structure e.g. where text is placed, margins of page	2
5(a)(ii)	– Two valid examples of Presentation e.g. font size, font colour	2
5(b)	– Firewall – Proxy server	2

Question	Answer	Marks															
6(a)(i)	<ul style="list-style-type: none"> – Uses multiple wires – Sends multiple bits of data at a time 	2															
6(a)(ii)	<ul style="list-style-type: none"> – Faster transmission speed 	1															
6(b)(i)	<ul style="list-style-type: none"> – Control (bus) 	1															
6(b)(ii)	<ul style="list-style-type: none"> – Accumulator (ACC) 	1															
6(b)(iii)	<table> <tr> <th>Statement</th><th>True (✓)</th><th>False (✓)</th></tr> <tr> <td>Data and instructions are stored in the same memory unit</td><td>✓</td><td></td></tr> <tr> <td>The control unit manages operations within the CPU</td><td>✓</td><td></td></tr> <tr> <td>Data and instructions can be fetched into the CPU at the same time</td><td></td><td>✓</td></tr> <tr> <td>The control unit is responsible for decoding an instruction</td><td>✓</td><td></td></tr> </table>	Statement	True (✓)	False (✓)	Data and instructions are stored in the same memory unit	✓		The control unit manages operations within the CPU	✓		Data and instructions can be fetched into the CPU at the same time		✓	The control unit is responsible for decoding an instruction	✓		4
Statement	True (✓)	False (✓)															
Data and instructions are stored in the same memory unit	✓																
The control unit manages operations within the CPU	✓																
Data and instructions can be fetched into the CPU at the same time		✓															
The control unit is responsible for decoding an instruction	✓																

Question	Answer	Marks
7	<p>Four from (Max two per format):</p> <p>MIDI</p> <ul style="list-style-type: none"> – 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 // produced by synthesizer – 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 – Individual notes can be edited <p>MP3</p> <ul style="list-style-type: none"> – MP3 is a format for digital audio – MP3 is an actual recording of the sound – MP3 is a (lossy) compression format – Recorded using a microphone 	4

Question	Answer	Marks
8(a)	<p>Any three from:</p> <ul style="list-style-type: none"> – Light emitting diodes (technology) – The display is made up of pixels – ... that are arranged together as a matrix – ... each is formed of three LEDs/filters – Shades of colour are achieved by mixing red, blue and green – The screen can be back-lit/edge-lit <p>NOTE: Use of liquid crystals with LED technology can also be awarded</p>	3

Question	Answer	Marks
8(b)	Any three from: <ul style="list-style-type: none"> – Energy efficient // low power consumption – Long lasting // longevity – Focussed beam // less light strays from beam – Brighter/vivid colours – High resolution – No flicker – Display is thinner – Mercury free technology // environmentally friendly – Fewer pixel failure – Increased viewing in sunlight 	3
8(c)	– LCD	1

Question	Answer	Marks
9(a)	<ul style="list-style-type: none"> – 1 – 0 – 0 – 0 	4
9(b)	Two from: <ul style="list-style-type: none"> – Checksum – Automatic repeat request // ARQ 	2
9(c)	Any four from: <ul style="list-style-type: none"> – Data is input with check digit – A calculation is performed on the (inputted) data // by example – The calculated digit is compared to a stored value – If it matches, the data entered is correct – If it does not match, the data entered is incorrect 	4