Cambridge Assessment International Education

Cambridge IGCSE™

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER			

6353612904

COMPUTER SCIENCE **0478/13**

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.

1 **Five** hardware devices are given.

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

Device	Input (✓)	Output (✓)	Storage (✓)
Solid state drive (SSD)			
Headphones			
2D cutter			
LCD projector			
Microphone			

[5]

2 Paige has a computer that has a central processing unit (CPU) based on the Von Neumann model for a computer system.

(a) Identify the component within the CPU that controls the flow of data.

..... [1]

(b) Identify the component within the CPU where calculations are carried out.

..... [1]

(c) Identify the component within the CPU that stores the address of the next instruction to be processed.

..... [1]

(d) Identify the register within the CPU that holds an instruction that has been fetched from memory.

..... [1]

(e) Identify the register within the CPU that holds data that has been fetched from memory.

..... [1]

3 **(a)** **Four** denary to 8-bit binary conversions are given.

Tick (✓) to show if each denary to 8-bit binary conversion is **Correct** or **Incorrect**.

Denary	Binary Conversion	Correct (✓)	Incorrect (✓)
145	10010001		
179	10110101		
11	00010011		
100	01100010		

[4]

(b) Convert the **12-bit** binary number into hexadecimal.

1	1	0	0	0	1	0	0	0	0	0	0

..... [3]

4 Eugene has a web server that stores his online shopping website.

Customers access the website using a browser.

(a) Describe how the webpages are requested and displayed on the customer's computer.

.....

.....

.....

.....

.....

.....

.....

..... [4]

(b) State **three** online security threats to Eugene's web server.

Threat 1 .....

Threat 2 .....

Threat 3 .....

[3]

5 Arjun uses a scanner to create digital versions of some printed documents.

The scanner is attached to his computer using a USB connection.

(a) Tick (✓) to show if the USB connection uses **Parallel** or **Serial** data transmission.

Describe your chosen method of data transmission.

Parallel ☐

Serial ☐

Description

.....

.....

.....

.....

[3]

(b) Give **three** benefits of a USB connection.

Benefit 1 .....

.....

Benefit 2 .....

.....

Benefit 3 .....

.....

[3]

(c) Arjun uses the Internet to send the digital documents to his friend. He wants to make sure the documents are sent securely.

Identify **two** protocols that can be used to transfer data securely.

Protocol 1 .....

Protocol 2 .....

[2]

6 Elsa writes a paragraph in an examination about encryption.

There are several terms missing from the paragraph.

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

Some terms may be used more than once.

- algorithm
- alphanumeric
- cookie
- cypher
- key
- padlock
- plain
- word processed

The data is encrypted using a ..... . This is an ..... that is used to scramble the data. The data before encryption is known as ..... text. When the data has been encrypted it is known as ..... text. To read the encrypted data it needs to be decrypted using a ..... .

[5]

7 **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 (✓)
10000001		
10000010		
00101001		
00101000		

[4]

(b) A parity check may not always detect errors that have occurred in data transmission.

State why a parity check may not detect data transmission errors.

..... [1]

(c) Give **one** other error checking method that could be used to check for errors in data transmission.

..... [1]

8 Edith is buying a new computer monitor that displays images using LCD technology.

(a) Explain what is meant by LCD technology.

.....

.....

.....

.....

.....

..... [3]

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

Benefit 1 .....

.....

Benefit 2 .....

.....

Benefit 3 .....

.....

[3]

9 Elle uses both CDs and DVDs to store her school projects.

(a) Give **three** similarities between a CD and a DVD.

1 .....

.....

2 .....

.....

3 .....

.....

[3]

(b) State **one** difference between a CD and a DVD.

.....

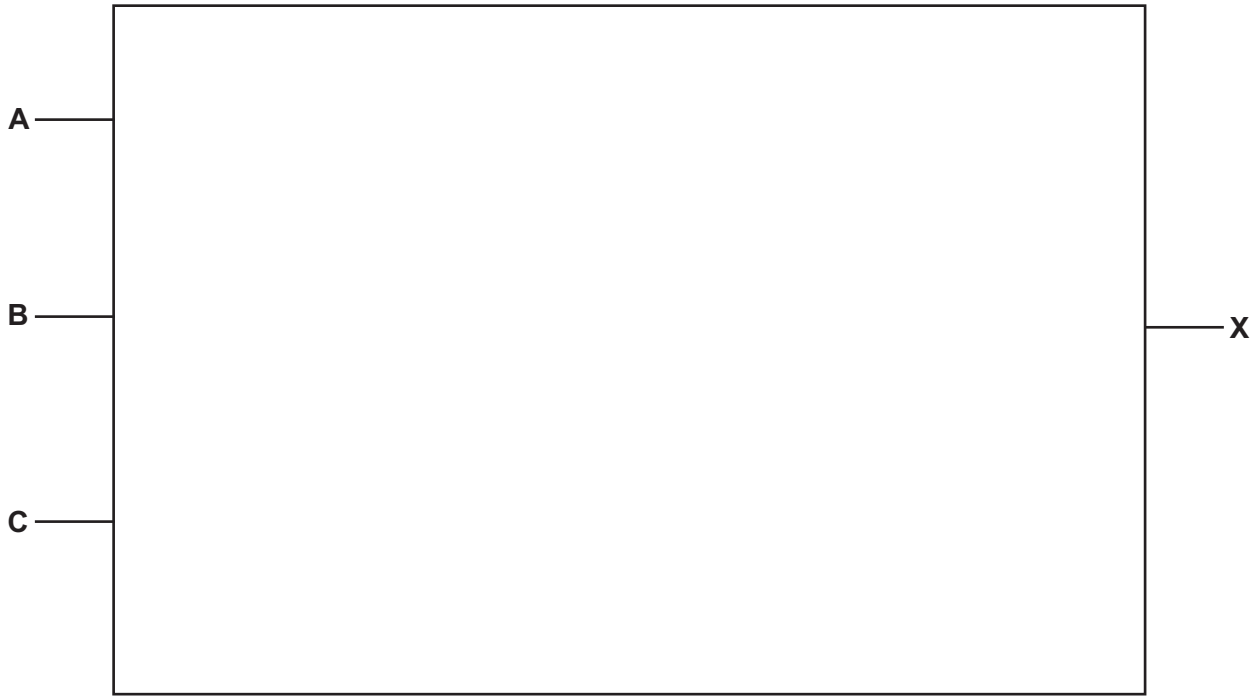
..... [1]

10 Consider the following logic statement:

X = ((**B** AND NOT **A**) XOR (**A** 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]

11 A theme park has a game where a player tries to run from the start to the finish without getting wet.

The system for the game uses sensors and a microprocessor to spray water at a player as they run past each sensor.

Describe how the sensors and the microprocessor are used in this system.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... [6]

12 Warner says that he has a very good Internet Service Provider (ISP) that provides several services.

Five statements about ISPs are given.

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

Statement	True (✓)	False (✓)
Provides access to the Internet for customers		
Can determine the maximum bandwidth available for customers		
Monitors the volume of data downloaded by customers		
Can provide an IP address for the customer		
Stores the content for all web pages available on the Internet		

[5]

13 Phishing and pharming are two security issues a user should be aware of when using the Internet.

(a) State **one** similarity between phishing and pharming.

.....

..... [1]

(b) Explain **two** differences between phishing and pharming.

Difference 1 .....

.....

.....

Difference 2 .....

.....

.....

[2]

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Cambridge Assessment International Education

Cambridge IGCSE™

COMPUTER SCIENCE **0478/13**

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.

[Turn over

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</td><td>One mark for each correct row:

<table>
<tr><th>Device</th><th>Input (✓)</th><th>Output (✓)</th><th>Storage (✓)</th></tr>
<tr><td>Solid state drive (SSD)</td><td></td><td></td><td>✓</td></tr>
<tr><td>Headphones</td><td></td><td>✓</td><td></td></tr>
<tr><td>2D cutter</td><td></td><td>✓</td><td></td></tr>
<tr><td>LCD projector</td><td></td><td>✓</td><td></td></tr>
<tr><td>Microphone</td><td>✓</td><td></td><td></td></tr>
</table></td><td>5</td></tr>
</table>

Question	Answer	Marks
2(a)	– Control unit // CU	**1**
2(b)	– Arithmetic logic unit // ALU	**1**
2(c)	– Program counter // memory address register // PC // MAR	**1**
2(d)	– Memory data register // current instruction register // MDR // CIR	**1**
2(e)	– Memory data register // MDR	**1**

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>3(a)</td><td>One mark per each correct row:
<table><tr><th>Denary</th><th>Binary Conversion</th><th>Correct (✓)</th><th>Incorrect (✓)</th></tr><tr><td>145</td><td>10010001</td><td>✓</td><td></td></tr><tr><td>179</td><td>10110101</td><td></td><td>✓</td></tr><tr><td>11</td><td>00010011</td><td></td><td>✓</td></tr><tr><td>100</td><td>01100010</td><td></td><td>✓</td></tr></table></td><td>4</td></tr>
<tr><td>3(b)</td><td>One mark for each correct conversion in the correct order:
– C
– 4
– 0</td><td>3</td></tr>
</table>

Question	Answer	Marks
4(a)	Any **four** from: – Browsers sends URL to DNS – … using HTTP – DNS finds matching IP addresses for URL – … and sends IP address to web browser – Web browser sends request to IP address/web server for web pages – Web pages are sent from web server to browser – Browser renders HTML to display web pages – Any security certificates are exchanged/authenticated // SSL/HTTPS is used to secure the data – … encrypting any data sent	**4**

Question	Answer	Marks
4(b)	Any **three** from: – Hacking – Denial of service (DoS) – Malware – Virus NOTE: three suitable types of malware can be awarded	**3**

Question	Answer	Marks
5(a)	**One** mark for correct tick, **two** marks for description – Serial – Bits sent one at a time – Single wire If parallel given, no mark for parallel, but follow through for correct description of parallel: – Multiple bits sent at a time – Multiple wires	**3**
5(b)	Any **three** from: – Universal connection // industry standard – Can only be inserted one way – Backward compatible – Auto configures // automatically recognised devices – Can power devices – Fast data transfer speed – Inexpensive to purchase/manufacture	**3**

Question	Answer	Marks
5(c)	Any **two** from: – TLS – SSL – HTTPS	**2**

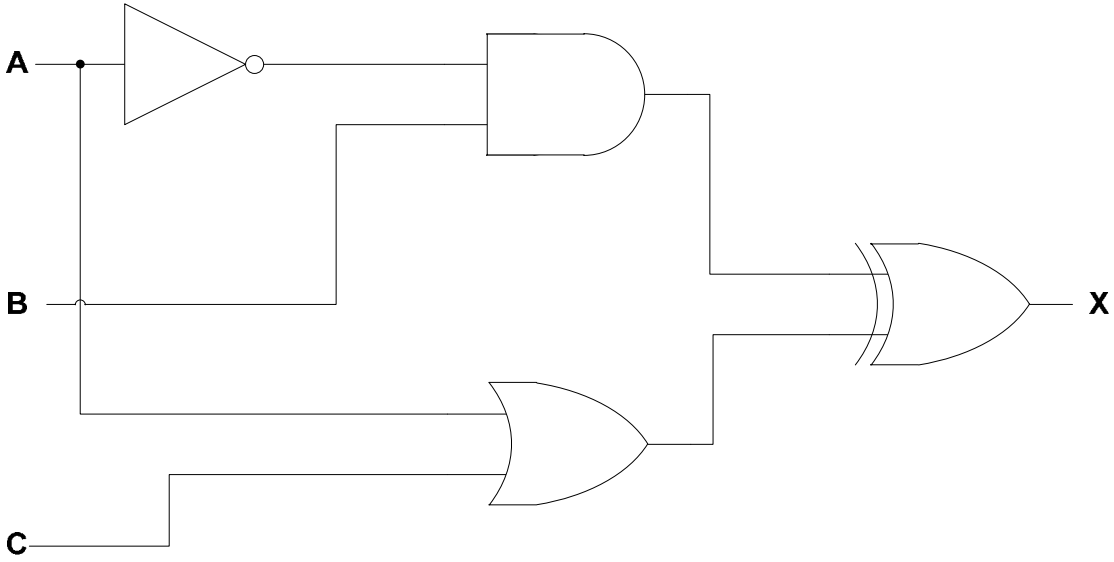
Question	Answer	Marks
6	– Key // Algorithm – Algorithm // Key (must be opposite of first one) – Plain – Cypher – Key // Algorithm	**5**

Question	Answer	Marks
7(a)	**One** mark for each correct row: **8-bit binary value** / **Even (✓)** / **Odd (✓)** 10000001 / ✓ / 10000010 / ✓ / 00101001 / / ✓ 00101000 / ✓ /	**4**
7(b)	Any **one** from: – Transposition error – When bits still add up to odd/even number – **Even** number of incorrect bits	**1**

Question	Answer	Marks
7(c)	Any **one** from: – ARQ – Checksum	**1**

Question	Answer	Marks
8(a)	Any **three** from: – Liquid crystal display – The **display** is made of pixels – … arranged in a matrix – Uses a flat panel display – Backlit display – … with CCFLs/LEDs – Uses light-modulating properties of liquid crystals – Crystals can be turned between opaque and transparent (to allow light to pass) – Colours created using RGB	**3**
8(b)	Any **three** from: – Low power consumption – Runs at cool temperature – Do not suffer image burn – Do not suffer flicker issues – Bright image/colours – High resolution image – Cheaper to purchase than e.g. LED screen	**3**

Question	Answer	Marks
9(a)	Any **three** from: – Both need a **red** laser to read/write data – Both are spun to be read – Both use spiral tracks for data – Both are optical storage – Both are off-line storage // both non-volatile – Both use pits and lands to store data	**3**
9(b)	Any **one** from: – DVD can be dual layer, but CD can only be single – DVD has higher storage capacity – DVD has a shorter wavelength laser – DVD are spun faster – DVDs have a higher data transfer rate	**1**

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

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>10(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>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>
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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>
<tr><td>11</td><td>
Six from:
– Suitable sensor used e.g. motion sensor/pressure sensor
– (Analogue) data is converted to digital (using ADC)
– Sensor sends data to microprocessor
– Data compared to stored data …
– … if value outside range/within range water is sprayed
– … signal sent to actuator to spray water
– … if value within range/outside range no action taken
– Continuous loop
</td><td>6</td></tr>
</table>

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>12</td><td>One mark for each correct row:

<table>
<tr><th>Statement</th><th>True (✓)</th><th>False (✓)</th></tr>
<tr><td>Provides access to the Internet for customers</td><td>✓</td><td></td></tr>
<tr><td>Can determine the maximum bandwidth available for customers</td><td>✓</td><td></td></tr>
<tr><td>Monitors the volume of data downloaded by customers</td><td>✓</td><td></td></tr>
<tr><td>Can provide an IP address for the customer</td><td>✓</td><td></td></tr>
<tr><td>Stores the content for all web pages available on the Internet</td><td></td><td>✓</td></tr>
</table></td><td>5</td></tr>
</table>

Question	Answer	Marks
13(a)	Any **one** from: – Both are designed to steal/collect personal data – Both pretend to be a real company – Both use fake websites	**1**
13(b)	– Phishing involves use of an email whereas pharming involves installing malicious code – Phishing involves clicking a link or an attachment whereas pharming creates a redirection	**2**