Cambridge Assessment International Education

Cambridge IGCSE™

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

4401451422

COMPUTER SCIENCE **0478/11**

Paper 1 Theory **May/June 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 An image of a smartphone is shown.

(a) Identify **one** input device that is part of the smartphone.

..... [1]

(b) Identify **two** output devices that are part of the smartphone.

1 .....

2 .....
[2]

(c) All smartphones have a MAC address.

(i) State what is meant by the term MAC address.

.....

..... [1]

(ii) Describe the structure of a MAC address.

.....

.....

.....

.....

.....

..... [3]

(d) A smartphone needs both RAM and ROM.

State why a smartphone needs RAM and ROM.

RAM .....

.....

ROM .....

.....
[2]

(e) Modern smartphones can be secured with a biometric system that is built into the phone.

(i) Identify **two** biometric systems that would be suitable for securing a smartphone.

1 .....

2 .....
[2]

(ii) Explain why modern smartphones are secured with a biometric system.

.....

.....

.....

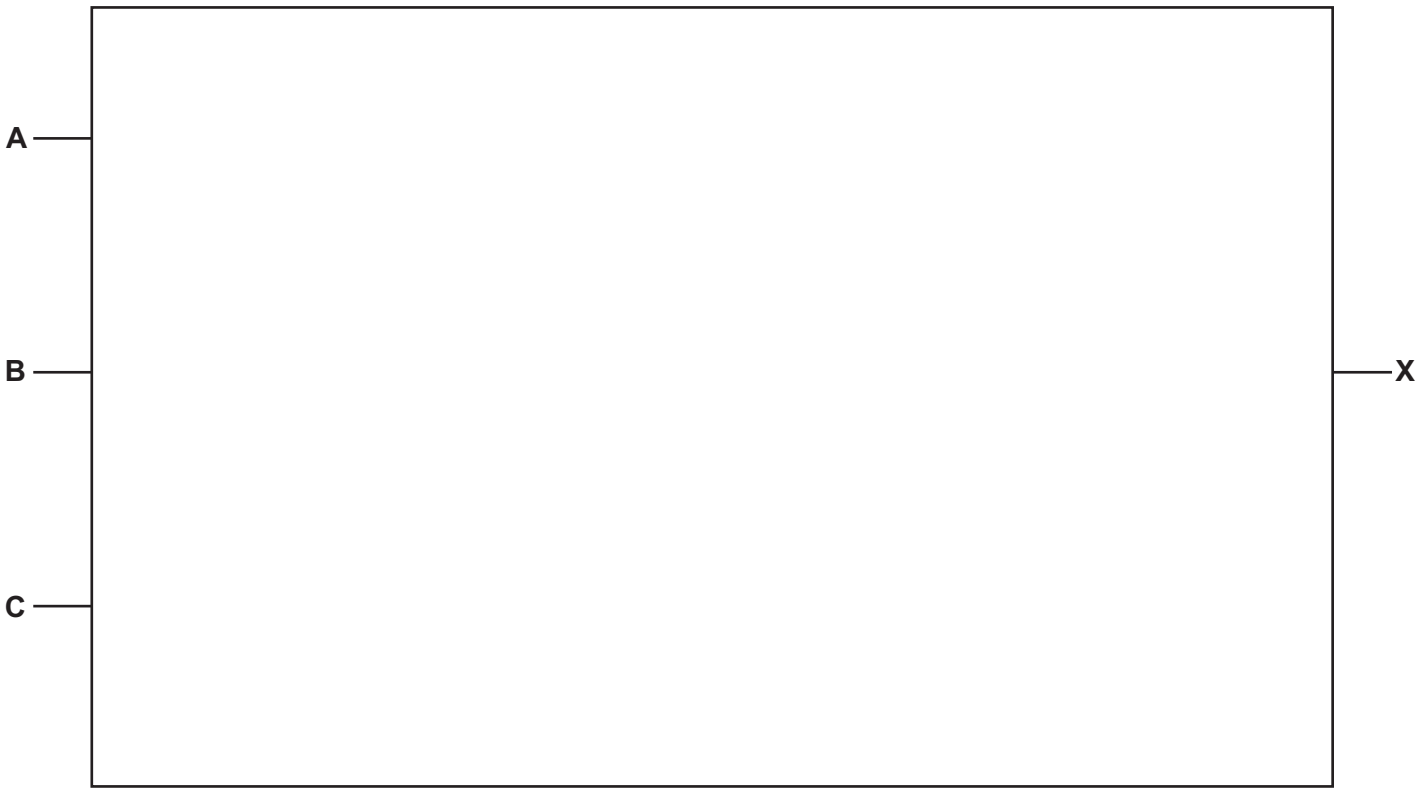
..... [2]

2 Consider the logic statement:

X = (((**A** NAND **B**) OR (**B** XOR **C**)) AND NOT **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.



[5]

(b) Complete the truth table to represent 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]

3 Carla's computer has a USB port.

Carla uses the USB port to connect her mobile device to her computer, to transfer her photos.

(a) Give **three** benefits of using a USB port to connect the mobile device to the computer.

Benefit 1 .....

.....

Benefit 2 .....

.....

Benefit 3 .....

.....

[3]

(b) State the type of data transmission used when transferring data using a USB port.

..... [1]

(c) Carla wants to reduce the file size of the photos she has transferred to her computer. She does not want the quality of the photos to be reduced, so she uses lossless compression.

Describe how lossless compression reduces the file size of the photos.

.....

.....

.....

.....

.....

.....

.....

..... [4]

4 Two error detection methods that Allison's computer uses are check digit and checksum.

(a) Give **two** similarities between the check digit and checksum methods.

1 .....

.....

2 .....

.....

[2]

(b) Identify **one other** error detection method that Allison's computer could use.

Describe how the method checks for errors.

Method .....

Description .....

.....

.....

.....

.....

.....

[4]

5 **Six** components of a computer are given.

Some are part of the central processing unit (CPU) of the Von Neumann model for a computer system.

Tick (✓) to show if each component is a **CPU component** or is **Not a CPU component**.

Component	CPU component (✓)	Not a CPU component (✓)
Arithmetic logic unit (ALU)		
Hard disk drive (HDD)		
Memory address register (MAR)		
Random access memory (RAM)		
Solid state drive (SSD)		
Control unit (CU)		

[6]

6 **Four** scenarios are given.

Identify the most suitable sensor for each scenario.

A **different** sensor must be used for each scenario.

Sensor	Scenario
	Detecting when a person is approaching an automatic door system
	Monitoring the pollution level in a river
	Checking if a tropical aquarium is 25 degrees Celsius
	Counting the number of cars that cross a bridge

[4]

[Turn over

7 Hans has a website selling comic books. Customers can create an account to buy the comic books.

Customers enter a username and password to log in to their account.

(a) Customers may worry about keylogging software being used to gain unauthorised access to their account.

(i) Describe how keylogging software can be used to gain unauthorised access to a customer's account.

.....

.....

.....

.....

.....

.....

.....

..... [4]

(ii) Identify a feature that Hans can add to the website to limit the threat of keylogging software.

..... [1]

(b) Hans makes sure data transmission for his website is secure.

(i) State how customers can check that the personal details they enter into the website will be transmitted securely.

.....

..... [1]

(ii) Explain how a customer's browser checks that the website is secure.

.....

.....

.....

.....

.....

.....

.....

..... [4]

8 Benny is a photographer and prints his photos using an inkjet printer.

(a) Benny is printing some photos and the paper gets jammed in the printer.

A signal is sent to alert the computer about the paper jam.

State the name of this type of signal.

..... [1]

(b) Identify **one** benefit and **two** drawbacks of Benny using an inkjet printer, instead of a laser printer, to print his photos.

Benefit .....

.....

Drawback 1 .....

.....

Drawback 2 .....

.....

[3]

(c) **Four** statements are given about printers.

Tick (✓) to show whether the statement applies to an **Inkjet** printer or a **Laser** printer.

Statement	Inkjet (✓)	Laser (✓)
Uses a rotating drum to transfer the image to the paper		
Uses powdered toner		
Uses nozzles to spray droplets on to the paper		
Uses a print head mechanism that moves side to side		

[4]

9 Programs can be written in a low-level language.

(a) Identify **three** features of a low-level language.

Feature 1 .....

Feature 2 .....

Feature 3 .....

[3]

(b) Give **two** examples of a low-level language.

Example 1 .....

Example 2 .....

[2]

(c) Give **one** drawback of writing programs in a low-level language, instead of a high-level language.

.....

..... [1]

(d) A low-level language needs to be converted to binary before it can be processed by a computer.

(i) Give the **8-bit binary** value of the two denary values:

180 .....

201 .....

[2]

Working space

.....

.....

.....

.....

(ii) Give the **12-bit binary** value of the denary value **250**.

..... [1]

Working space

.....

.....

.....

.....

(iii) Binary can be represented as hexadecimal to make it easier to read.

Give the **hexadecimal** values of the 8-bit binary values:

10010011 .....

00011101 .....
[2]

BLANK PAGE

Cambridge Assessment International Education

Cambridge IGCSE™

COMPUTER SCIENCE **0478/11**

Paper 1 **May/June 2020**

MARK SCHEME

Maximum Mark: 75

Published

Students did not sit exam papers in the June 2020 series due to the Covid-19 global pandemic.

This mark scheme is published to support teachers and students and should be read together with the question paper. It shows the requirements of the exam. The answer column of the mark scheme shows the proposed basis on which Examiners would award marks for this exam. Where appropriate, this column also provides the most likely acceptable alternative responses expected from students. Examiners usually review the mark scheme after they have seen student responses and update the mark scheme if appropriate. In the June series, Examiners were unable to consider the acceptability of alternative responses, as there were no student responses to consider.

Mark schemes should usually be read together with the Principal Examiner Report for Teachers. However, because students did not sit exam papers, there is no Principal Examiner Report for Teachers for the June 2020 series.

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

Cambridge International is publishing the mark schemes for the June 2020 series for most Cambridge IGCSE™ and Cambridge International A & AS Level components, and some Cambridge O Level components.

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**:

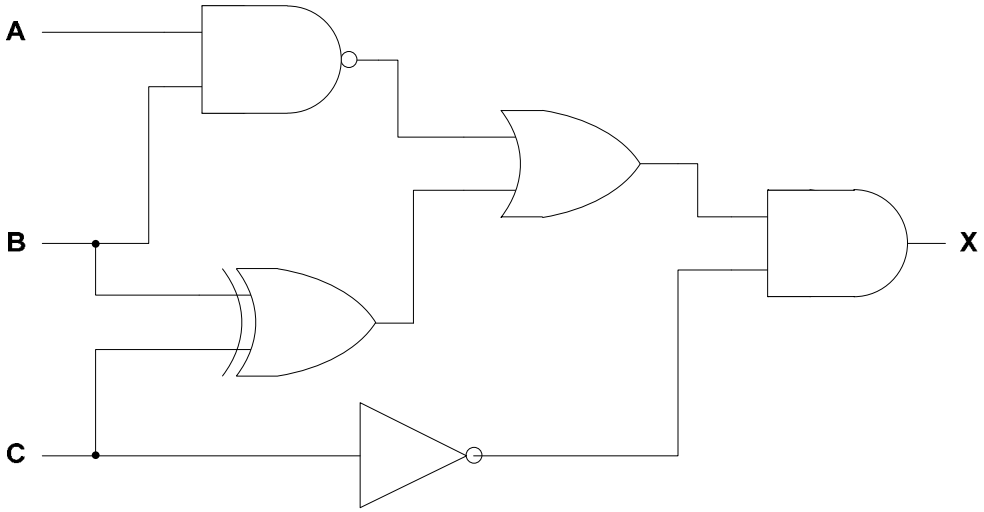
- marks are awarded for correct/valid answers, as defined in the mark scheme. However, credit is given for valid answers which go beyond the scope of the syllabus and mark scheme, referring to your Team Leader as appropriate
- marks are awarded when candidates clearly demonstrate what they know and can 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)	Any **one** from: – Microphone – Touchscreen – Camera – Button	**1**
1(b)	Any **two** from: – Speaker – Touchscreen – Light/flash	**2**
1(c)(i)	Any **one** from: – Media access control – Unique address given to each device	**1**
1(c)(ii)	Any **three** from: – Uses hexadecimal values – Normally 48/64 bits in length (accept any other reasonable value) – First half is manufacturer number/code/ID – Second half is serial number	**3**
1(d)	– It needs RAM to store the data and programs currently in use – It needs ROM to permanently store the boot up instructions	**2**
1(e)(i)	Any **two** from: – Fingerprint scanner – Voice recognition – Retina/iris recognition – Facial recognition	**2**
1(e)(ii)	Any **two** from: – Adds extra level of security – Biometric device requires properties unique to individual – Allows quicker access as no need to input password // don't need to remember password	**2**

Question	Answer	Marks
2(a)	 1 mark for each correct gate.	5

Question	Answer	Marks
2(b)		4

A	B	C	Working space	X
0	0	0		**1**
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 marks for 8 correct outputs
3 marks for 6 or 7 correct outputs
2 marks for 4 or 5 correct outputs
1 mark for 2 or 3 correct outputs

Question	Answer	Marks
3(a)	Any **three** from: – It is a universal standard – It can't be inserted the wrong way around – Supports different transmission speeds – Automatically detects if correct driver installed – It will charge the mobile device at the same time	**3**

Question	Answer	Marks
3(b)	– Serial	1
3(c)	– A compression algorithm is used – No data is removed in the compression process – An index/dictionary of pixels is created – The number of times a pixel is repeated in a row is stored	4

Question	Answer	Marks
4(a)	Any **two** from: – They both calculate a value from the data – They both append the calculated value to the data – They both recalculate the value – … They both report an error if they don't match	2
4(b)	**One** mark for method, **three** marks for description: **Automatic Repeat reQuest** – Uses acknowledgement / request and time-out – Error control protocol – Check performed on receiving data // error is detected by e.g. parity check, check sum – If error detected, request is sent to resend data // negative acknowledgement is used – Resend request is repeated till data is sent correctly / requests timeout / limit is reached – Send acknowledgement that data is received // positive acknowledgement is used – If acknowledgement not received in set time data is resent **Parity Check** – A parity bit is added (to the parity byte) – Counts / checks number of 1's – Can be even or odd – If parity is incorrect, error is detected	4

Question	Answer	Marks
5		6

Component	CPU component (✓)	Not a CPU component (✓)
Arithmetic logic unit (ALU)	✓	
Hard disk drive (HDD)		✓
Memory address register (MAR)	✓	
Random access memory (RAM)		✓
Solid state drive (SSD)		✓
Control unit (CU)	✓	

One mark per each correct row

Question	Answer	Marks
6		4

Sensor	Scenario
Pressure / motion / infra-red	Detecting when a person is approaching an automatic door system
pH / light	Monitoring the pollution level in a river
Temperature	Checking if a tropical aquarium is 25 degrees Celsius
Magnetic field / pressure / motion / infra-red	Counting the number of cars that cross a bridge

One mark per each correct sensor (each sensor **must** be different)

Question	Answer	Marks
7(a)(i)	Any **four** from: – Keylogger is downloaded without knowledge (by example) – Keylogger records key presses – Data is relayed back to third party – Data is analysed // Patterns in data could reveal log-in details … – … details can then be used to log into the account	**4**
7(a)(ii)	Any **one** from: – Use drop-down boxes for password – Two-step verification (by example) – Partial password requests – Onscreen / virtual keyboard	**1**
7(b)(i)	Any **one** from: – Look for locked padlock / green padlock – Check for https	**1**
7(b)(ii)	Any **four** from: – requests web server to identify itself // request to view the (SSL) certificate – receives a copy of the (SSL) certificate, sent from the webserver – checks if (SSL) certificate is authentic/trustworthy – sends signal back to webserver that the certificate is authentic/trustworthy	**4**

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>8(a)</td><td>– Interrupt</td><td>1</td></tr>
<tr><td>8(b)</td><td>One mark for benefit, two marks for drawbacks
Benefit:
– Printing may be higher quality
– Can use larger paper sizes
– Can print onto different media
– No warm-up time

Drawbacks:
– Printing will be slower
– Ink is more expensive per page
– Ink can be smeared // ink is not smudge proof</td><td>3</td></tr>
<tr><td>8(c)</td><td>
<table>
<tr><th>Statement</th><th>Inkjet (✓)</th><th>Laser (✓)</th></tr>
<tr><td>Uses a rotating drum to transfer the image to the paper</td><td></td><td>✓</td></tr>
<tr><td>Uses powdered toner</td><td></td><td>✓</td></tr>
<tr><td>Uses nozzles to spray droplets on to the paper</td><td>✓</td><td></td></tr>
<tr><td>Uses a print head mechanism that moves side to side</td><td>✓</td><td></td></tr>
</table>
One mark per each correct row</td><td>4</td></tr>
</table>

Question	Answer	Marks
9(a)	Any **three** from: – Closer to/is machine code – May use mnemonics – May need an assembler to be translated – One line of code represents a single instruction – Machine dependent – Have direct access to memory locations/registers	**3**
9(b)	– Assembly code – Machine code	**2**
9(c)	Any **one** from: – It is more difficult to understand – Error prone – Have to manipulate memory locations – Machine dependent	**1**
9(d)(i)	– 10110100 – 11001001	**2**
9(d)(ii)	– 000011111010 (must have leading zeros)	**1**
9(d)(iii)	– 93 – 1D	**2**