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0478/12

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 Input and output devices are often connected to a personal computer.

(a) Identify **three** input devices that can be connected to a personal computer.

- 1
- 2
- 3 [3]

(b) Identify **three** output devices that can be connected to a personal computer.

- 1
- 2
- 3 [3]

2 A finance company uses off-line storage to archive their accounts.

(a) Explain what is meant by off-line storage.

-
-
-
- [2]

(b) The computers in the finance company use both primary and secondary storage.

(i) Give **one** example of primary storage.

- [1]

(ii) Give **two** examples of secondary storage.

- 1
- 2 [2]

- 3 Vanessa writes a paragraph as an answer to an examination question about the central processing unit (CPU).

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

- Components
- Data
- Decoded
- Executed
- Fetched
- Instructions
- RAM
- ROM
- Secondary storage

The CPU processes and

An instruction is from

into the CPU where it is then Once this has taken place the instruction is then

[6]

- 4 (a) Marley wants to store a video he has created for his school project.

He considers using a DVD or a Blu-ray to store the video.

Explain **two** differences between a DVD and a Blu-ray.

1

.....

.....

.....

2

.....

.....

.....

[2]

- (b) (i) Marley also needs to store ten 8-bit colour images in a file for his project.

Each image is 500 pixels wide and 300 pixels high.

Calculate the total file size in megabytes (MB) for all Marley's images.

Show all your working.

.....

.....

.....

.....

.....

.....

.....

File size **MB**

[3]

- (ii) Marley prints the images for his project using an inkjet printer.

Describe how the inkjet printer prints an image.

.....

.....

.....

.....

.....

.....

.....

..... [4]

- 5 A music company wants to send a new music file to many radio stations. It will send the music file the day before the release date so that the radio stations can store the file ready for release.

The music company does not want the radio stations to be able to open the music file until 09:00 on the release date.

Identify **two** security measures **and** describe how each measure can be used to make sure the music file cannot be opened until the release date.

Security measure 1

Description

.....

.....

Security measure 2

Description

.....

.....

[4]

6 Priya creates a website to sell her old comic books and superhero figures.

- (a) She uses HTML to create her website. The HTML she produces has both structure and presentation.

Explain what is meant by HTML **structure** and **presentation**. Include an **example** of each.

Structure

.....

.....

.....

Presentation

.....

.....

.....

[4]

- (b) Priya uses cookies in her website.

Five statements are given about cookies.

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

Statement	True (✓)	False (✓)
Cookies can be used to store a customer's credit card details		
Cookies can be used to track the items a customer has viewed on a website		
Cookies will corrupt the data on a customer's computer		
Cookies are downloaded onto a customer's computer		
Cookies can be deleted from a customer's computer		

[5]

- (c) Priya stores her website on a webserver.

To transmit the website data to the webserver she uses parallel duplex data transmission.

Describe how data is transmitted using parallel duplex data transmission.

.....

.....

.....

.....

.....

.....

.....

..... [4]

- (d) Priya has a URL for her website.

State what is meant by a URL.

.....

..... [1]

- (e) Priya is concerned about a denial of service attack (DoS) occurring on her webserver.

- (i) Explain what is meant by a denial of service attack.

.....

.....

.....

.....

.....

.....

.....

.....

..... [4]

- (ii) Give **one** security device that can be used to help prevent a denial of service attack.

..... [1]

- 7 (a) An office has an automated lighting system. When movement is detected in the office the lights are switched on. If movement is not detected for a period of 2 minutes the lights are switched off. The system uses a sensor and a microprocessor.

Describe how the automated lighting system uses a sensor and a microprocessor.

[6]

- (b)** A microprocessor uses ROM.

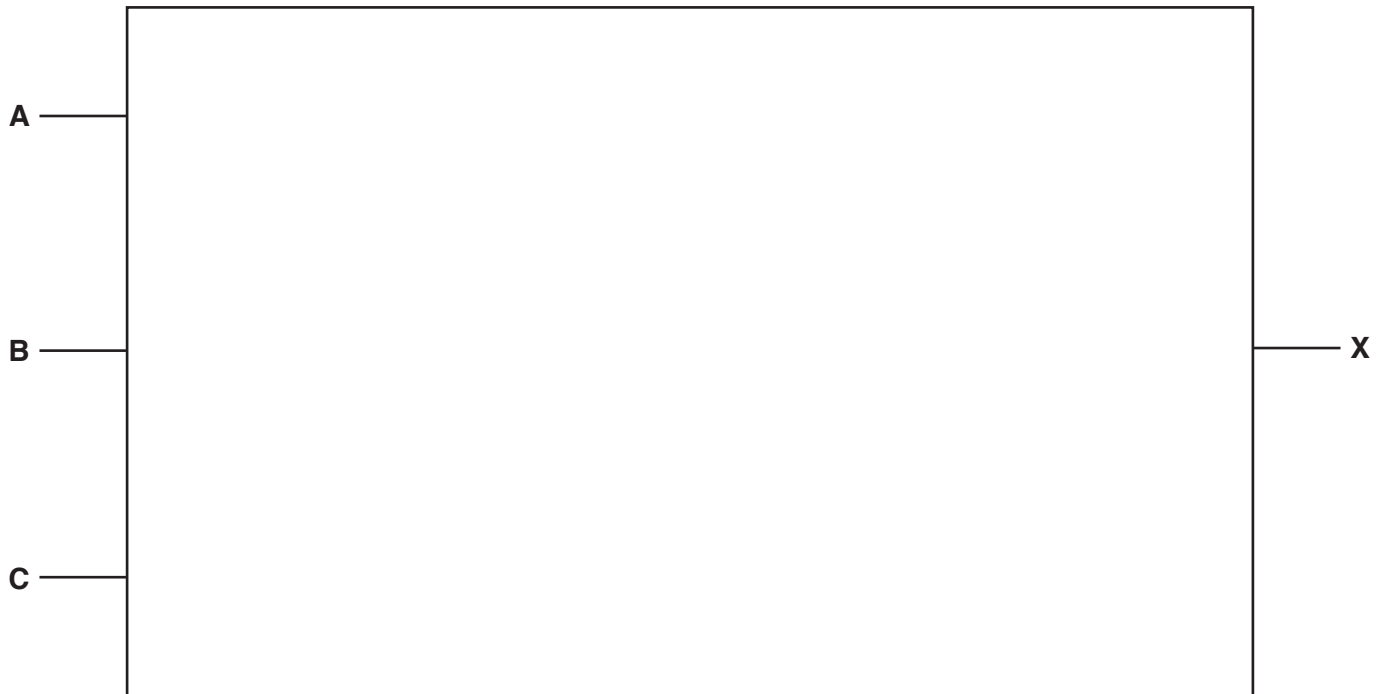
Explain what is meant by ROM.

[3]

8 Consider the logic statement:

$$X = 1 \text{ if } ((A \text{ is } 1 \text{ NOR } C \text{ is } 1) \text{ AND } (B \text{ is NOT } 1 \text{ NOR } C \text{ is } 1)) \text{ OR } (A \text{ is } 1 \text{ AND } B \text{ is } 1)$$

- (a) Draw a logic circuit to match the given logic statement. Each logic gate used must have a maximum of **two** inputs. Do **not** attempt to simplify the logic statement.



[6]

- (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]

- 9 The contents of three binary registers have been transmitted from one computer to another. **Even parity** has been used as an error detection method.

The outcome after transmission is:

Register A and **Register C** have been transmitted **correctly**.

Register B has been transmitted **incorrectly**.

Complete the **Parity bit** for each register to show the given outcome.

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

[3]

10 Remy has a mobile device that has a capacitive touch screen.

Describe how the capacitive touch screen registers Remy's touch.

.....

.....

.....

.....

.....

.....

.....

..... [4]

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COMPUTER SCIENCE

0478/12

Paper 1

May/June 2019

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 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)	Three from e.g.: <ul style="list-style-type: none">– Keyboard– Mouse– Microphone– 2D scanner– 3D scanner– Touchscreen– Webcam // digital camera– Joystick– Trackpad– Sensor– Interactive whiteboard	3
1(b)	Three from e.g.: <ul style="list-style-type: none">– Monitor // touchscreen– Inkjet printer– Laser printer– 3D printer– Speaker– Headphones– LED Projector– DLP– 2D cutter– 3D cutter– Actuator	3

Question	Answer	Marks
2(a)	Two from: <ul style="list-style-type: none"> – It is non-volatile – Can be easily disconnected from the computer – It is not directly accessed by the CPU – Suitable example e.g. CD, DVD, USB flash memory 	2
2(b)(i)	One from: <ul style="list-style-type: none"> – ROM – RAM 	1
2(b)(ii)	Two from: <ul style="list-style-type: none"> – HDD – SSD – Flash memory 	2

Question	Answer	Marks
3	1 mark for each correct term, in the correct place: <ul style="list-style-type: none"> – Data/instructions – Instructions/data (must be the alternative to MP1) – Fetched – RAM – Decoded – Executed 	6

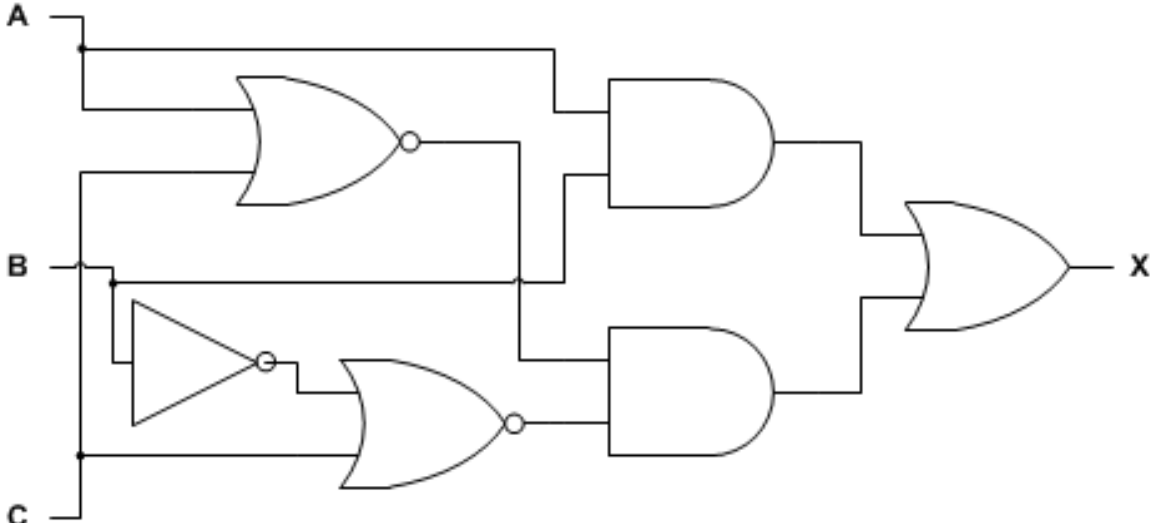
Question	Answer	Marks
4(a)	<p>Two from e.g.:</p> <ul style="list-style-type: none"> – <u>DVD</u> uses red laser/light whereas <u>blu-ray</u> uses blue/violet laser/light – <u>DVD</u> has a smaller (storage) capacity // <u>Blu-ray</u> has a larger (storage) capacity – <u>DVD</u> has two layers (of polycarbonate) whereas <u>Blu-ray</u> disks have a single layer (of polycarbonate) – <u>DVD</u> has a slower transfer rate (of approximately 10 mbps) // <u>Blu-ray</u> has a faster transfer rate (of approximately 36 mbps) 	2
4(b)(i)	<p>2 marks for any two correct stages of working, 1 mark for correct answer.</p> <ul style="list-style-type: none"> – $500 * 300 * 10 // 150\ 000 * 10$ – $* 8$ then $\div 8$ (anywhere in the process) – $1\ 500\ 000 \div 1024 \div 1024 // 1\ 500\ 000 \div 1\ 048\ 576$ – $= 1.43\ MB$ 	3
4(b)(ii)	<p>Four from:</p> <ul style="list-style-type: none"> – Rollers are used to move the paper through the printer – Nozzles spray/drop/jet ink onto the paper – Ink jets/print head/nozzles are moved across the paper (to distribute the ink) – Different colour inks are mixed to create required colours – Technology could be piezoelectric – Technology could be thermal bubble – Ink is heated – ... and expands/evaporates into a bubble – Bubble is pushed through the nozzle on to the paper – ... then the bubble collapses – Electrical current is applied to a crystal – ... which makes it vibrate – ... which forces a droplet of ink through the nozzle 	4

Question	Answer	Marks
5	<ul style="list-style-type: none"> – Password protection – Password is released on the release date – Encryption – Encryption key is released on the release date 	4

Question	Answer	Marks																		
6(a)	<p>Structure</p> <ul style="list-style-type: none"> – This is the layout of the web page – e.g. placing an image alongside some text // example of tag, such as <div> <p>Presentation</p> <ul style="list-style-type: none"> – This is the formatting/style of the web page – e.g. the colour that is applied to some text // example of tag, such as <font-color> 	4																		
6(b)	<p>1 mark per each correct row.</p> <table border="1"> <thead> <tr> <th>Statement</th><th>True (✓)</th><th>False (✓)</th></tr> </thead> <tbody> <tr> <td>Cookies can be used to store a customer's credit card details</td><td>✓</td><td></td></tr> <tr> <td>Cookies can be used to track the items a customer has viewed on a website</td><td>✓</td><td></td></tr> <tr> <td>Cookies will corrupt the data on a customer's computer</td><td></td><td>✓</td></tr> <tr> <td>Cookies are downloaded onto a customer's computer</td><td>✓</td><td></td></tr> <tr> <td>Cookies can be deleted from a customer's computer</td><td>✓</td><td></td></tr> </tbody> </table>	Statement	True (✓)	False (✓)	Cookies can be used to store a customer's credit card details	✓		Cookies can be used to track the items a customer has viewed on a website	✓		Cookies will corrupt the data on a customer's computer		✓	Cookies are downloaded onto a customer's computer	✓		Cookies can be deleted from a customer's computer	✓		5
Statement	True (✓)	False (✓)																		
Cookies can be used to store a customer's credit card details	✓																			
Cookies can be used to track the items a customer has viewed on a website	✓																			
Cookies will corrupt the data on a customer's computer		✓																		
Cookies are downloaded onto a customer's computer	✓																			
Cookies can be deleted from a customer's computer	✓																			

Question	Answer	Marks
6(c)	<ul style="list-style-type: none"> – Several/multiple bits are transmitted at a time/simultaneously – Several/multiple wires are used – Data is transmitted in both directions ... – ... at the same time/simultaneously 	4
6(d)	One from: <ul style="list-style-type: none"> – Uniform resource locator – The website's address – User friendly version of the IP address 	1
6(e)(i)	Four from: <ul style="list-style-type: none"> – Designed to deny people access to a website – A large number/numerous requests are sent (to a server) ... – ... all at the same time – The server is unable to respond/struggles to respond to all the requests – The server fails/times out as a result 	4
6(e)(ii)	One from: <ul style="list-style-type: none"> – Proxy server – Firewall 	1

Question	Answer	Marks
7(a)	Six from: <ul style="list-style-type: none"> – Motion sensor is used – Sensor sends data/signal to microprocessor – Data/Signal is converted from analogue data to digital data (using ADC) – Value is compared to stored value(s) // – If value is outside range/matches ... – ... microprocessor sends signal to switch lights on – ... actuator used to switch light on/off – ... timer is set for 2 minutes – Every time movement is detected the timer is reset – When timer reaches 0/120/times out microprocessor sends signal to switch lights off – Process is continuous 	6
7(b)	Three from: <ul style="list-style-type: none"> – Read only memory – Non-volatile memory // Contents of memory are retained when power is turned off//permanent storage – Primary storage // directly accessed by the CPU – Holds firmware/boot-up instructions/start-up instructions/BIOS – Cannot be written to 	3

Question	Answer	Marks
8(a)	<p>1 mark per each correct logic gate, with correct input(s)</p>  <pre>graph LR A --- OR1[OR Gate] A --- AND1[AND Gate] B --- OR1 B --- AND2[AND Gate] B --- NOT1[NOT Gate] C --- OR2[OR Gate] C --- AND2 OR1 --> AND1 NOT1 --> OR2 OR2 --> AND2 AND1 --> OR3[OR Gate] AND2 --> OR3 OR3 --> X</pre>	6

Question	Answer	Marks																																													
8(b)	<div>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</div> <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>0</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		0	0	0	1		0	0	1	0		1	0	1	1		0	1	0	0		0	1	0	1		0	1	1	0		1	1	1	1		1	4
A	B	C	Working space	X																																											
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Question	Answer	Marks																								
9	<p>1 mark per each correct parity bit:</p> <p>Parity bit</p> <p>Register A</p> <table><tr><td>1</td><td>0</td><td>1</td><td>0</td><td>0</td><td>1</td><td>0</td><td>1</td></tr></table> <p>Register B</p> <table><tr><td>1</td><td>1</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td></tr></table> <p>Register C</p> <table><tr><td>1</td><td>1</td><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td><td>1</td></tr></table>	1	0	1	0	0	1	0	1	1	1	0	0	0	0	0	1	1	1	0	0	0	0	1	1	3
1	0	1	0	0	1	0	1																			
1	1	0	0	0	0	0	1																			
1	1	0	0	0	0	1	1																			

Question	Answer	Marks
10	<p>Four from:</p> <ul style="list-style-type: none"> – Electrical field/charge is spread across the screen – Sensors are located around the screen // sensors are used to read the electric field – When finger touches screen, the charge/ is transferred to the user – ... as it is affected by the conductivity of another object – Coordinates of touch determined/calculated/measured 	4