



CANDIDATE
NAME

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CENTRE
NUMBER

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CANDIDATE
NUMBER

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0478/11

October/November 2022

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.

- 1 A shopping mall has an information point. Visitors can use it to find out which shops are in the mall and where they are located.

(a) Identify **one** input device that could be built into the information point.

Give an example of how that device would be used.

Input device

Example [2]

(b) Identify **one** output device that could be built into the information point.

Give an example of how that device would be used.

Output device

Example [2]

(c) Identify **one** example of primary storage that could be built into the information point.

State what would be stored in your example of primary storage.

.....

 [2]

- 2 Phil has a computer that is designed using the Von Neumann model. The computer has a central processing unit (CPU).

(a) One type of component within the CPU is an address bus.

Identify **two** other types of bus and state what each is responsible for transmitting in the CPU.

Bus 1

.....

Bus 2

.....

[4]

(b) The CPU performs a cycle that has three stages. One of these stages is execute.

Identify **one** other stage of the cycle that is performed by the CPU.

..... [1]

(c) Identify the component within the CPU that the accumulator is built into and describe the purpose of the accumulator.

.....

.....

.....

.....

.....

.....

..... [3]

- 3** Error codes for a computer are often displayed as hexadecimal values. Each error code is stored in a 12-bit binary register.

(a) The error code 404 means 'file not found'.

Give the 12-bit binary value that would be stored for the hexadecimal error code 404

.....

Working space

.....

.....

.....

[2]

(b) The error code 12B means 'hardware fault'.

Give the 12-bit binary value that would be stored for the hexadecimal error code 12B

.....

Working space

.....

.....

.....

[2]

(c) Hexadecimal values can also be represented as denary values.

The hexadecimal error code 022 means 'file system error'. The hexadecimal error code 0AC means 'insufficient memory'.

Convert the hexadecimal error codes 022 and 0AC to denary values.

022

0AC

Working space

.....

.....

.....

.....

.....

[2]

- (d) The register stores the binary value 100111100000

Give the hexadecimal error code that would be displayed for the binary value 100111100000

.....

Working space

.....

.....

.....

[2]

- (e) Give **two** reasons why error codes are represented in hexadecimal, instead of binary.

Reason 1

.....

Reason 2

.....

[2]

- 4 Rebekah discovers that her bank details have been used fraudulently.

She thinks her bank details were stolen electronically, whilst she was using the Internet.

- (a) Identify and describe **two** methods that could have been used to steal Rebekah's bank details electronically.

Method 1

.....

.....

.....

.....

.....

Method 2

.....

.....

.....

.....

.....

[6]

(b) Rebekah decides to encrypt the data that she transmits whilst using the Internet. She does this to keep the data safe.

(i) State why encryption helps keep the data safe.

.....
 [1]

(ii) The data is encrypted using symmetric encryption.

Describe how the data is encrypted using symmetric encryption.

.....

 [4]

(iii) Identify **three** other methods Rebekah could use to help keep her data safe.

Method 1
 Method 2
 Method 3
 [3]

5 Consider the logic statement:

$$X = (((B \text{ OR } C) \text{ AND NOT } C) \text{ NAND } B) \text{ OR NOT } A$$

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

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



[6]

(b) State the name of **one** logic gate that is **not** included in the given logic statement.

..... [1]

(c) 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]

- 6 A computer sends the data for an image to the print buffer, to wait to be processed for printing, until the buffer is full.

When the buffer is no longer full, it sends a signal back to the computer to state it is ready for more data.

State the name of this signal and give **two** other examples of when this type of signal is used.

Signal name

Examples

.....

[3]

7 Cameron writes software for coffee machines. He uses assembly language to write his software.

- (a) Tick (✓) to show whether assembly language is an example of a high-level language, a low-level language or machine code.

Tick (✓)

High-level language

☐

Low-level language

☐

Machine code

☐

[1]

- (b) Identify the translator that is required for assembly language.

..... [1]

- (c) Give **two** reasons why Cameron chooses to write the software for the coffee machines in assembly language.

Reason 1

.....

Reason 2

.....

[2]

- (d) Give **two** drawbacks of using assembly language to write programs.

Drawback 1

.....

Drawback 2

.....

[2]

8 Eleanor has a website that she uses to advertise the cakes that she bakes.

(a) Hypertext Markup Language (HTML) is used to create the website. The HTML is separated into presentation and structure.

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

Example 1

Example 2 [2]

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

Example 1

Example 2 [2]

(b) Eleanor uses a secure connection to allow customers to buy the cakes from her website.

Describe how the secure connection is created.

[5]

- (c) Eleanor's website uses cookies.

Explain what is meant by the term cookies and give **two** examples of how cookies can be used.

.....

.....

.....

.....

.....

.....

.....

..... [4]

- (d) Eleanor is worried about a denial of service (DoS) attack on her web server.

She wants to help prevent a DoS attack reaching the web server.

Identify a security method that she could use to help prevent a DoS attack.

Explain how the method you identify helps to prevent the attack.

Security method

Explanation

.....

.....

.....

.....

.....

.....

.....

.....

[4]

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Cambridge IGCSE™

COMPUTER SCIENCE

0478/11

Paper 1 Theory

October/November 2022

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 2022 series for most Cambridge IGCSE™, Cambridge International A and AS Level components and some Cambridge O Level components.

This document consists of **15** 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.

Please note the following further points:

The words in **bold** in the mark scheme are important text that needs to be present, or some notion of it needs to be present. It does not have to be the exact word, but something close to the meaning.

If a word is underlined, this **exact** word must be present.

A single forward slash means this is an alternative word. A double forward slash means that this is an alternative mark point.

Ellipsis (...) on the end of one-mark point and the start of the next means that the candidate **cannot** get the second mark point without being awarded the first one. If a mark point has an ellipsis at the beginning, but there is no ellipsis on the mark point before it, then this is just a follow-on sentence and **can** be awarded **without** the previous mark point.

Question	Answer	Marks
1(a)	<p>One mark for a correct device and one mark for a corresponding example</p> <ul style="list-style-type: none">• Keyboard• ... e.g. to type in a shop name• Mouse• ... e.g. to click on a shop• Microphone• ... e.g. to speak the shop name as a voice command• Touchscreen• ... e.g. to select a shop• Barcode scanner• ... e.g. to scan a barcode for a voucher• Sensor• ... e.g. to detect when a person walks past• Digital camera // webcam• ... e.g. to video call for assistance	2

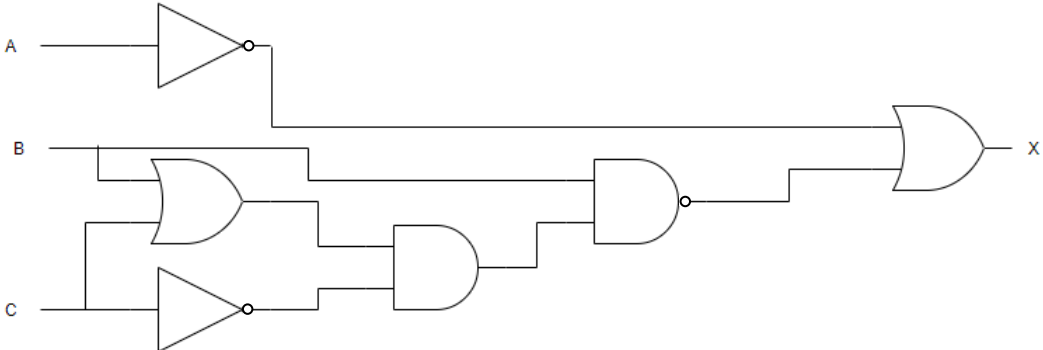
Question	Answer	Marks
1(b)	<p>One mark for a correct device and one mark for a corresponding example</p> <ul style="list-style-type: none"> • Display screen / monitor / touchscreen • ... e.g. to see a shops location • Speaker // headphones • e.g. to hear where a shop is located • Printer • e.g. to get a hard copy of shop information • LED/Light • ... e.g. to indicate where a shop is on the map 	2
1(c)	<p>One mark for a correct storage and one mark for a corresponding example</p> <ul style="list-style-type: none"> • Random access memory // RAM • ... to store data the is currently being processed • ... to store the OS/programs/applications whilst in use • Read only memory // ROM • ... to store the start-up instructions • ... to store the BIOS 	2

Question	Answer	Marks
2(a)	<p>One mark for each correct bus (max 2) and one mark for corresponding description of transmission</p> <ul style="list-style-type: none"> • Data bus • responsible for transmitting data/instructions • Control bus • ... responsible for transmitting control <u>signals</u> 	4
2(b)	<p>Any one from:</p> <ul style="list-style-type: none"> • Fetch • Decode 	1
2(c)	<p>Any two from:</p> <ul style="list-style-type: none"> • To temporarily store data • It stores the result of interim calculations <p>One from:</p> <ul style="list-style-type: none"> • Arithmetic logic unit / ALU 	3

Question	Answer	Marks
3(a)	One mark for two correct characters, two marks for three, in the correct place <ul style="list-style-type: none"> 0100 0000 0100 	2
3(b)	One mark for two correct characters, two marks for three <ul style="list-style-type: none"> 0001 0010 1011 	2
3(c)	One mark for each correct denary conversion <ul style="list-style-type: none"> 34 172 	2
3(d)	One mark for two correct characters, two marks for three, in the correct place <ul style="list-style-type: none"> 9E0 	2
3(e)	Any two from: <ul style="list-style-type: none"> It is easier for user to read/recognise/understand It takes up less space on a display 	2

Question	Answer	Marks
4(a)	<p>One mark for identification of the method (max 2), two marks for describing how the method could be used</p> <ul style="list-style-type: none"> • Phishing • A legitimate looking email is sent to her, asking her to click a link • ... this takes her to a fake website where she enters her bank details • Pharming • She accidentally downloads malicious software onto her computer • ... this redirects her legitimate website requests to a fake website where she enters her bank details • Hacking • A person gains unauthorised access to her computer • .. they steal/view a data file that contains her bank details • Spyware • Records the key presses on her computer • ... this data is analysed for patterns and her bank details are identified 	6
4(b)(i)	<ul style="list-style-type: none"> • The data will be meaningless if it is stolen 	1
4(b)(ii)	<p>One from:</p> <ul style="list-style-type: none"> • Data is encrypted and decrypted using the same key/algorithm <p>Any three from:</p> <ul style="list-style-type: none"> • Data before encryption is known as plain text • Data after encryption is known as cypher text • Key is sent to receiver (to allow data to be decrypted) // Values are sent to receiver that are used to generate key 	4

Question	Answer	Marks
4(b)(iii)	<p>Any three from:</p> <ul style="list-style-type: none">• Firewall // proxy server• Password• Biometric device• Virtual measure e.g. onscreen keyboard• Two-step verification // two factor authentication• Physical methods• Antimalware // Antispyware // Antivirus	3

Question	Answer	Marks
5(a)	<p>One mark for each correct logic gate with correct input(s)</p> 	6
5(b)	<p>Any one from:</p> <ul style="list-style-type: none"> • NOR • XOR // EOR 	1

Question	Answer	Marks																																													
5(c)	<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>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>1</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>1</td></tr><tr><td>1</td><td>1</td><td>0</td><td></td><td>0</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		1	0	1	0		1	0	1	1		1	1	0	0		1	1	0	1		1	1	1	0		0	1	1	1		1	4
A	B	C	Working space	X																																											
0	0	0		1																																											
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1	1	1		1																																											

Question	Answer	Marks
6	<p>One from:</p> <ul style="list-style-type: none">• Interrupt <p>Any two from e.g.:</p> <ul style="list-style-type: none">• Paper jam• Paper tray empty• Any change of task example• Any error occurrence example	3

Question	Answer	Marks
7(a)	<ul style="list-style-type: none">• Low-level language	1
7(b)	<ul style="list-style-type: none">• Assembler	1
7(c)	Any two from: <ul style="list-style-type: none">• He can directly access the hardware• He can use special machine-dependent instructions• There is no need for the program to be portable• Smaller file size // takes up less storage space• More efficient use of memory• Programs will be more time efficient when running	2
7(d)	Any two from: <ul style="list-style-type: none">• Programs are not portable• It is complex to learn• Difficult to debug	2

Question	Answer	Marks
8(a)(i)	Any two from e.g.: <ul style="list-style-type: none"> • Background colour • Font colour • Font size • Font style 	2
8(a)(ii)	Any two from e.g.: <ul style="list-style-type: none"> • Placement of text • Placement of image 	2
8(b)	Any five from: <ul style="list-style-type: none"> • Web browser sends request to web server • ... to view the digital certificate • Web server sends the digital certificate to the web browser • Web browser checks the certificate for authenticity • If certificate is authentic a secure connection is created • Any data sent is encrypted • If certificate is not authentic the connection is rejected • Uses a protocol such as SSL/TLS 	5

Question	Answer	Marks
8(c)	<p>Any two from:</p> <ul style="list-style-type: none"> • A (small) text files • ... that is stored by the browser • ... sent between web server and browser when user visits the website <p>Any two from e.g.:</p> <ul style="list-style-type: none"> • To track users browsing habits • To store personal details • To tailor web page to user's presentation requirements • To store items in a virtual shopping cart • To tailor adverts to a user 	4
8(d)	<p>One from:</p> <ul style="list-style-type: none"> • Proxy server <p>Any three from:</p> <ul style="list-style-type: none"> • It examines the incoming traffic to server • It limits the number of requests to the website • ... preventing too many requests that could overwhelm the server • Block multiple requests from the same IP within a timeframe 	4