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COMPUTER SCIENCE

0478/12

Paper 1 Theory

May/June 2022

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.

1 (a) Denary values are converted to binary values to be processed by a computer.

Draw **one** line from each denary value to the correctly converted 8-bit binary value.

Denary	8-bit binary
41	00100001
174	10100110
86	00101001
	10000110
	10101110
	01010110

[3]

Working space

.....

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.....

(b) Binary values can also be converted to denary values.

Give the correct denary value for the 12-bit binary value 000101010111
Show all your working.

.....

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.....

Denary value

[2]

3

- 2 Hexadecimal is used for Hypertext Markup Language (HTML) colour codes.

An HTML colour code is:

#2F15D6

Each pair of digits is stored as binary in an 8-bit register.

- (a) Give the 8-bit binary value that would be stored for each pair of hexadecimal digits.

2F								
15								
D6								

[6]

Working space

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- (b) HTML colour codes and Media Access Control (MAC) addresses are two examples of where hexadecimal is used in Computer Science.

Give **two** other examples of where hexadecimal can be used in Computer Science.

Example 1

Example 2

[2]

(c) Websites can be created using HTML structure and presentation.

State what is meant by HTML structure and presentation.

Give an example of each in your answer.

Structure

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Presentation

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[4]

(d) Explain why presentation is often separated from structure when creating a web page.

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[2]

3 Joelle is a student who uses the Internet.

(a) The table contains **five** terms or definitions that relate to the Internet.

Complete the table by writing each missing term or definition.

Term	Definition
browser	<p>.....</p> <p>.....</p> <p>.....</p>
.....	this is the company that provides a user with a connection to the Internet
.....	this is a protocol that is used to send data for web pages across the Internet
Uniform Resource Locator (URL)	<p>.....</p> <p>.....</p> <p>.....</p>
cookie	<p>.....</p> <p>.....</p> <p>.....</p>

[5]

6

(b) Joelle uses a firewall to keep her data safe when she uses the Internet.

Tick (✓) to show which statement about firewalls is true.

- | | Tick (✓) |
|---|--------------------------|
| Firewalls can only be hardware-based | <input type="checkbox"/> |
| Firewalls can only be software-based | <input type="checkbox"/> |
| Firewalls can be hardware-based or software-based | <input type="checkbox"/> |

[1]

(c) Joelle's parent also uses the firewall to limit the websites that Joelle can access.

Explain how the firewall is used to limit the websites that Joelle can access.

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..... [4]

4 Jason is a programmer who writes computer programs in a high-level language.

(a) Describe what is meant by a high-level language.

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.....
.....
.....
.....
..... [3]

(b) Jason wants to distribute a computer program he has written. He is considering distributing it to users as freeware or free software.

(i) Explain **one** drawback to a user if the program is distributed as freeware.

.....
.....
..... [2]

(ii) Explain **one** benefit to a user if the program is distributed as free software.

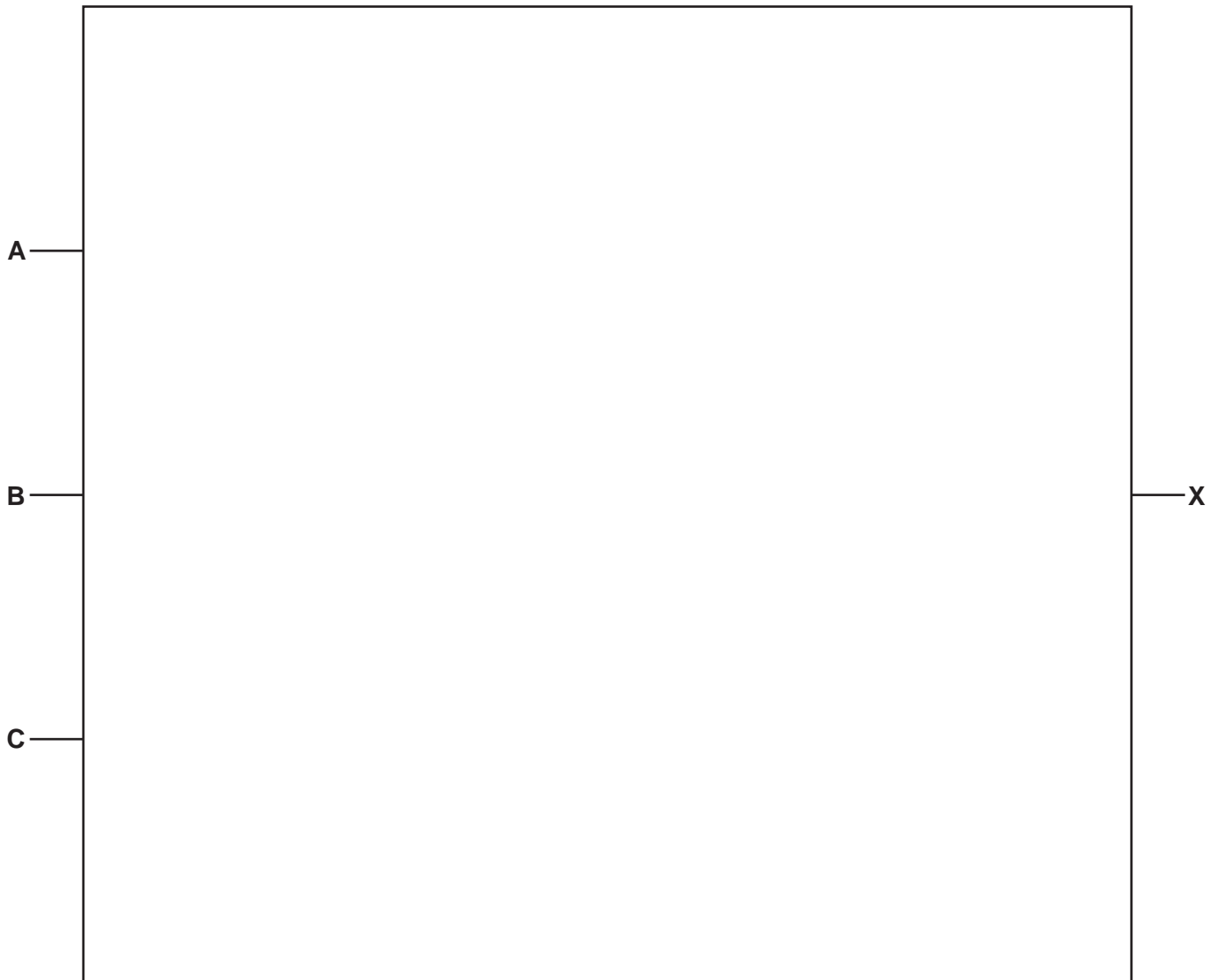
.....
.....
..... [2]

5 Consider the following logic statement:

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

(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.



[5]

(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]

6 Millions of emails are sent between users on a daily basis.

(a) Identify **two** online security attacks that can be carried out using email.

Describe how email is used to enable the attack.

Online security attack 1

Description

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.....

Online security attack 2

Description

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[6]

(b) Online security attacks can maliciously damage data.

One security method to keep data safe from online attacks is a firewall.

Identify **two** other security methods that keep data safe from online attacks.

Security method 1

Security method 2

[2]

(c) Data can also be damaged accidentally.

One example of how data can be damaged accidentally is by shutting down a computer before saving data. To prevent this from happening, a user should make sure they have saved all data before shutting down a computer.

Complete the table by giving **three** other examples of how data can be damaged accidentally.

Give a method of prevention for each example.

Example	Method of prevention
.....
.....
.....

[6]

7 Cassie stores data for her business every day. She stores the data using optical data storage.

(a) Identify **three** examples of optical data storage.

Example 1

Example 2

Example 3

[3]

(b) **Six** statements are given about the operation of three different types of storage.

Tick (✓) to show which statements apply to each type of storage. Some statements may apply to more than **one** type of storage.

Statement	Type of storage		
	Magnetic (✓)	Optical (✓)	Solid state (✓)
this storage has no moving parts			
this storage uses a laser to read and write data			
this storage uses a read/write head			
this storage burns pits onto a reflective surface			
this storage uses NAND and NOR technology			
this storage stores data in tracks and sectors			

[6]

8 Sam develops a software application. He distributes a version of the software as shareware.

(a) Describe what is meant by shareware.

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..... [4]

(b) Identify **three** ethical issues that may need to be considered when developing and distributing software.

Ethical issue 1

Ethical issue 2

Ethical issue 3 [3]

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