Cambridge Assessment International Education

Cambridge O Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

7426797976

COMPUTER SCIENCE **2210/11**

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. Any blank pages are indicated.

DC (CJ) 312483

1 Jack has an MP3 file stored on his computer.

(a) **(i)** Tick (✓) to show which type of data is stored in an MP3 file.

	Tick (✓)
Video	
Sound	✓
Image	

[1]

(ii) Tick (✓) to show whether the MP3 file is a lossy compressed file or a lossless compressed file or **not** a compressed file.

	Tick (✓)
Lossy compressed file	✓
Lossless compressed file	
Not a compressed file	

[1]

2 A computer is designed using the Von Neumann model for a computer system.

The computer has a central processing unit (CPU).

(a) Data is fetched from primary storage into the CPU to be processed.

(i) State the name of the primary storage from where data is fetched.

Main Memory (RAM) [1]

(ii) The CPU performs a cycle to process data. Fetch is the first stage in this cycle.

State the names of the second and third stages in the cycle.

Second stage Decode

Third stage Execute

[2]

(iii) Identify **two** components within the CPU that are used in the fetch stage of the cycle.

Component 1 PC

Component 2 MAR

[2]

3 Three types of storage media are magnetic, optical and solid state.

(a) One example of solid-state storage is a Solid State Drive (SSD).

Identify **one** other example of solid-state storage.

USB flash drive ..... [1]

(b) Optical storage uses a laser to store and read data from a disk.

Explain how the laser is used to store and read data from the disk.

Storing Data: Laser creates pits & lands on the disc's surface to represent binary data.
Reading Data: Laser reads the differences in reflection between pits and lands to interpret data.

..... [3]

(c) A business is creating a new mobile device that has an SSD as secondary storage.

(i) Give **three** reasons why an SSD is the most suitable secondary storage for their mobile device.

Reason 1 Speed.

Reason 2 Durability

Reason 3 Energy efficient.

[3]

(ii) Identify **two** examples of software that can be stored on the SSD.

Example 1 OS

Example 2 WhatsApp, word processor.

[2]

4 All data needs to be converted to binary data so that it can be processed by a computer.

(a) Explain why a computer can only process binary data.

Logic Gates

Because they are built around digital circuits that operate using two states: on & off. These states are perfectly represented by the binary digits 0 & 1.

[2]

(b) The denary values 64, 101 and 242 are converted to 8-bit binary values.

$2^8 = 256$ — 0 … 255

Give the 8-bit binary value for each denary value.

64 01000000

101 01100101

242 11110010

[3]

Working space

128	64	32	16	8	4	2	1
0	1	0	0	0	0	0	0
0	1	1	0	0	1	0	1
1	1	1	1	0	0	1	0

(c) The hexadecimal values 42 and CE are converted to binary.

A	B	C	D	E	F
10	11	12	13	14	15

Give the binary value for each hexadecimal value.

✓ 42 01000010

CE 11001110

[4]

Working space

64	32	16	8	4	2	1
64		16			2	
64			8	4		
64	32		8	4	2	
1	0	0	0	0	1	0
1	1	0	0	0	0	0
1	1	1	0	1	1	0

 $2^{16} = 65536$ Colours

5 An image is stored on a computer. The image is 16-bit colour and is 100 pixels high and 150 pixels wide.

Calculate the file size of the image in bytes. Show all your working.

File size = Resolution x Color depth

150 x 100 x (16/8 = 2 B) *

15000 x 16 = 240000 / 8 =

30000 Bytes.

Answer 30000 bytes

[3]

6 A compiler and an interpreter are two different types of translator.

(a) One similarity between a compiler and an interpreter is that they both translate high-level language into machine code.

(i) Give **one** other similarity between a compiler and an interpreter.

Both are used for program execution.

[1]

(ii) Explain **two** differences between a compiler and an interpreter.

Method: Compiler translate the entire HLL Program into machine Language.

Interpreter reads, translates & executes the code line by line.

Speed: Runtime execution of compiled program is faster.

Interpreter is slow.

[4]

7 Adele chooses to set a biometric password for her mobile device, instead of a personal identification number (PIN).

(a) State what is meant by a biometric password.

.....

..... [1]

(b) Give **two** reasons why a biometric password is more secure than a PIN.

Reason 1 .....

.....

Reason 2 .....

.....

[2]

(c) Adele has a software-based firewall installed on her mobile device.

The firewall gathers data about the traffic coming into and going out of her mobile device.

Explain how the firewall uses the gathered data to keep the mobile device more secure.

.....

.....

.....

.....

.....

..... [3]

(d) Adele also encrypts the data on her mobile device to keep it more secure.

State how encryption will keep the data more secure.

By changing the data to a form, which can't be

understood until decryption key is used. [1]

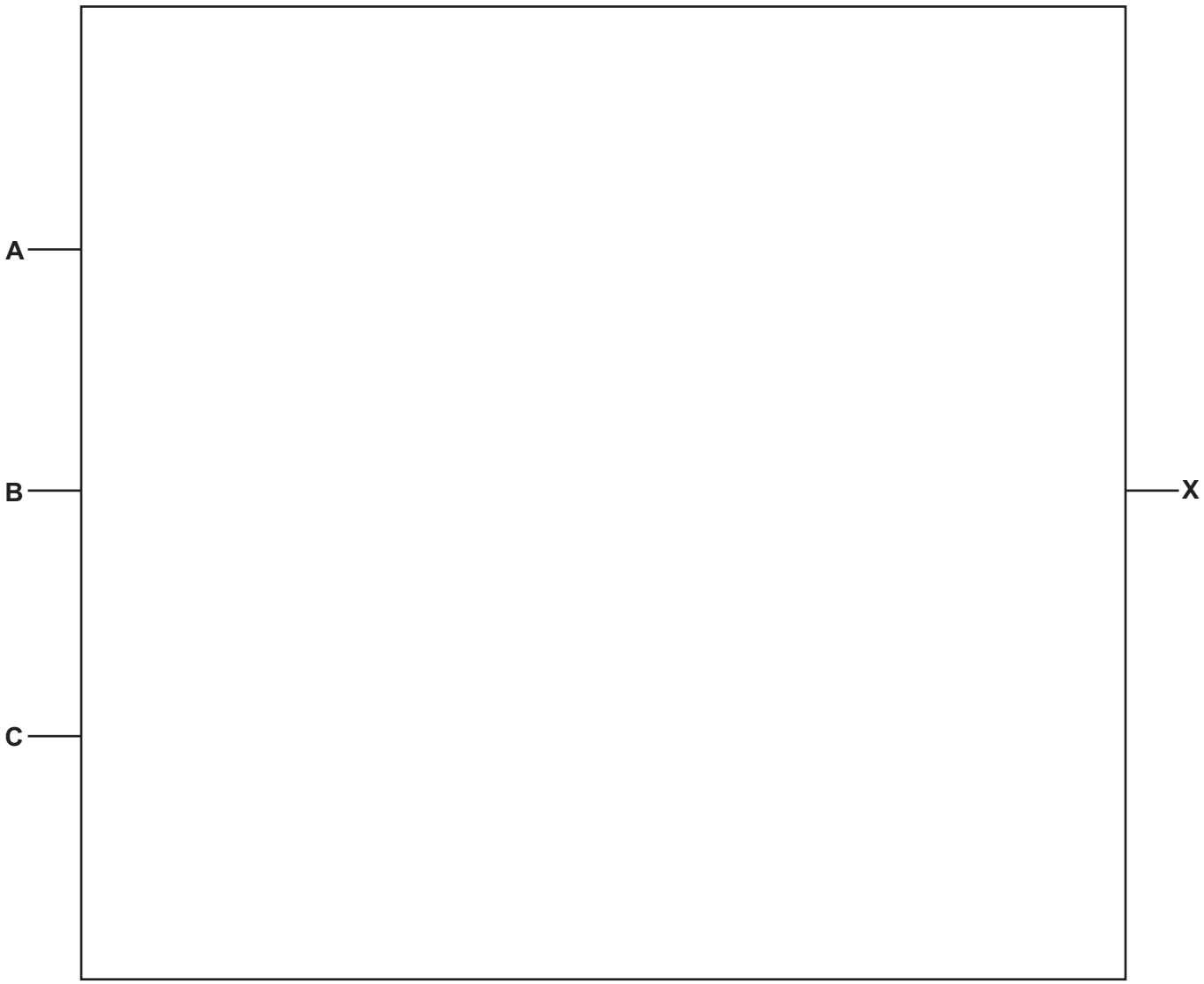
BLANK PAGE

8 Consider the following logic statement:

X = (((**A** AND NOT **B**) OR (NOT (**B** NOR **C**))) 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.



[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 Three Internet terms are browser, Internet Protocol (IP) address and Uniform Resource Locator (URL).

Five statements are given about the Internet terms.

Tick (✓) to show which statements apply to each Internet term. Some statements may apply to more than **one** Internet term.

Statement	Browser (✓)	IP address (✓)	URL (✓)
it contains the domain name	✓		✓
it is a type of software	✓		
it converts Hypertext Markup Language (HTML) to display web pages	✓		
it is a type of address		✓	✓
it stores cookies	✓		

[5]

10 Many devices have a Media Access Control (MAC) address.

Give **three** features of a MAC address.

Feature 1 Unique identifier assigned to NIC. It is physical address assigned by manufacturer.

Feature 2 Format & Structure. 48-bits HD number.

Feature 3 3 bytes on MSB side are manufacturer code 3 bytes on LSB side is the serial.

[3]

11 **(a)** The paragraph describes the process of printing a document using an inkjet printer.

Complete the paragraph using the most appropriate terms from the list. **Not** all of the terms in the list need to be used.

- binary
- buffer
- drum
- information
- interrupt
- laser
- liquid
- nozzles
- operating system
- powder
- thermal bubble
- toner

Data is sent from the computer to the printer. The data is held in a print

..... that is temporary storage until the data is

processed to be printed.

Inkjet printers operate by having a print head that moves

..... side to side across the page. These

spray ..... ink droplets onto the page. These ink

droplets can be created using piezoelectric or .....

technology.

If the paper jams in the printing process, the printing stops and an

..... is sent to the computer.

[5]

(b) A printer is one example of an output device.

Give **three** other examples of output devices.

Example 1 .....

Example 2 .....

Example 3 .....

[3]

(c) Give **three** examples of input devices.

Example 1 .....

Example 2 .....

Example 3 .....

[3]

Ethics is removed from the 23,24,25 syllabuses.

12 Computer ethics are a concern for any users of the Internet.

Identify and describe **three** ethical issues that could be a concern when using the Internet.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... [6]

Cambridge Assessment International Education

Cambridge O Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

5238662038

COMPUTER SCIENCE **2210/12**

Paper 1 Computer Systems **May/June 2023**

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.
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1 Output devices are used to output data from a computer.

Circle **three** devices that are output devices.

actuator	digital versatile disk (DVD)	keyboard
microphone	mouse	printer
scanner		
sensor	solid-state drive (SSD)	speaker

[3]

2 Binary numbers can be converted to hexadecimal.

A B C D E F
10 11 12 13 14 15

(a) Convert the **two** binary numbers to hexadecimal.

9 3
10010011 93

8421
00001101 ..... 0D

[4]

Working space

.....

.....

.....

.....

(b) A value is stored as a binary number in a register.

0	1	1	1	1	~~0~~	~~1~~	~~0~~

→ discarded

A logical right shift of **three** places is performed on the binary number.

(i) Complete the binary register to show its contents after this logical right shift.

0	0	0	0	1	1	1	1

[1]

(ii) State **one** effect this logical shift has on the binary number.

Each right shift effectively divides the binary number by 2, ignoring any remainder. [1]

(c) Give **two** reasons why a programmer may use hexadecimal to represent binary numbers.

1 Compact representation, that is, how takes less space on screen and paper.

2 Memory addressing, Large memory addresses in low level languages are hard to handle.

[2]

(d) Denary numbers can also be converted to hexadecimal.

Convert the denary number to hexadecimal.

301 (012D)$_{16}$ [2]

A B C D E F
10 11 12 13 14 15

Working space

256 128 64 32 16 8 4 2 1

0 0 0 1 | 0 0 1 0 | 1 1 0 1

0 1 2 D

301
- 256
45
- 32
13
- 8
5
- 4
1
- 1
0

3 When keys are pressed on a keyboard, the text is converted to binary to be processed by the computer.

(a) Describe how the text is converted to binary to be processed by the computer.

.....

.....

.....

.....

.....

..... [3]

(b) Text that is input into a computer can be stored in a text file.

A text file can be compressed using lossless compression.

(i) State what effect this has on the file size.

.....

..... [1]

(ii) Describe how lossless compression compresses the text file.

.....

.....

.....

.....

.....

.....

.....

..... [4]

(iii) Give **two** reasons why the text file may have been compressed.

1 .....

.....

2 .....

.....
[2]

4 A student uses a mobile phone to take photographs for a school project.

The student needs to transmit the photographs to their computer. They could use serial data transmission or parallel data transmission to transmit the photographs.

(a) (i) Describe how the photographs would be transmitted using serial data transmission.

.....

.....

.....

..... [2]

(ii) Give **two** benefits of transmitting the photographs using serial data transmission.

1 .....

.....

2 .....

.....

[2]

(iii) State **one** benefit of the student using parallel data transmission instead of serial data transmission.

.....

..... [1]

(b) The photographs are also transmitted across a network to cloud storage. A device on the network forwards the data towards its correct destination.

(i) State the name of this device.

Router

..... [1]

(ii) Describe what is meant by cloud storage.

It refers to a service in which data is maintained, managed, backed up, and made available to users over a network, typically the Internet.

..... [2]

(iii) Give **one** disadvantage of storing the photographs in cloud storage instead of storing them locally.

dependency on Internet connectivity.

..... [1]

5 A programmer writes a computer program using a high-level language.

(a) Tick (✓) **one** box to show which statement is correct about writing computer programs in a high-level language.

A Mnemonics are used to create instructions. ☐

B The computer program is harder to debug than a low-level language program. ☐

C The computer program is machine independent. ☑

D The hardware of the computer can be directly manipulated. ☐

[1]

(b) The programmer uses a compiler to translate the computer program.

(i) Describe how the compiler translates the computer program.

- It reads the whole program
- generates machine code file
- gives all errors (if any) at the end of the Compilation.
- Programs generated are machine dependent.

[3]

(ii) Describe how the compiler reports errors.

If errors detected the compiler goes-on and generates a very detailed error report towards the end of Compilation process.

[2]

(c) The programmer uses an integrated development environment (IDE) to create the computer program.

One function of the IDE is that it has the built-in compiler.

Give **three** other common functions of an IDE.

1 Source code editor.

2 Debugging tools.

3 Auto-completion.

[3]

6 **(a)** Complete the statements about cookies.

Use the terms from the list.

Some of the terms in the list will **not** be used. Some terms may be used more than once.

compression	executable	hypertext markup language (HTML)
hypertext transfer protocol (HTTP)	image	internet protocol (IP) address
persistent	session	sound
text	uniform resource locater (URL)	web browser
web server		

Cookies are small ..... text ..... files that are sent between a ..... web browser ..... and a ..... web server ..... .

..... Session ..... cookies are stored in memory and **not** in the user's secondary storage.

When the web browser is closed a ..... session ..... cookie is lost, whereas a ..... persistent ..... cookie is **not** lost.

[6]

(b) Give **three** functions of a cookie.

1 ..... Tracking .....

2 ..... Session Management .....

3 ..... Personalisation .....

[3]

7 A distributed denial of service attack (DDoS) is a cyber security threat.

(a) Draw and annotate a diagram to represent the process of a DDoS.

[6]

(b) State **two** aims of carrying out a DDoS attack.

1 .....

.....

2 .....

.....

[2]

(c) Give **two** security solutions that can be used to help prevent a DDoS attack being successful.

1 .....

.....

2 .....

.....

[2]

8 A computer is connected to a network and assigned an IPv4 address.

(a) Tick (✓) **one** box to show which device would assign the IPv4 address to the computer.

A Domain name server (DNS) ☐

B Network interface card (NIC) ☐

C Router ☑

D Web server ☐

[1]

(b) Describe the characteristics of an IPv4 address.

0 – 255

192.168.2.5

1. 32 bit denary number
2. Dotted decimal notation
3. Private & Public — provided by ISP
   - Private: Provided by the router
   - Public
4. Static & Dynamic
   - Static: remains same all the time
   - Dynamic: change every time we connect to internet.

[4]

9 One component of an expert system is the inference engine.

(a) Identify the **three** other components in an expert system.

1 .....

2 .....

3 .....

[3]

(b) Describe the role of the inference engine in an expert system.

.....

.....

.....

..... [2]

10 A user has both system software and application software installed on their computer.

(a) Describe the difference between system software and application software.

Give an example of each software in your answer.

.....

.....

.....

.....

.....

.....

..... [4]

(b) State which component in the computer would store both types of software when the power is turned off.

..... [1]

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Cambridge
O Level

Cambridge Assessment International Education
Cambridge Ordinary Level

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER			

0298762377

COMPUTER SCIENCE **2210/12**

Paper 1 Theory **October/November 2019**

1 hour 45 minutes

Candidates answer on the Question Paper.

No Additional Materials are required.

No calculators allowed.

READ THESE INSTRUCTIONS FIRST

Write your centre number, candidate number and name in the spaces at the top of this page.
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 document consists of **10** printed pages and **2** blank pages.

Cambridge Assessment International Education

1 Computer memory size is measured in multiples of bytes.

Four statements about computer memory sizes are given in the table.

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

Statement	True (✓)	False (✓)
25 kB is larger than 100 MB		
999 MB is larger than 50 GB		
3500 kB is smaller than 2 GB		
2350 bytes is smaller than 2 kB		

[4]

2 The Von Neumann model for a computer system uses several components in the fetch-execute cycle. One component that is used is the Control Unit (CU).

Identify **four** other components that are used in the Von Neumann model for a computer system.

1 ALU • Buses

2 MAR • Clock

3 MDR -

4 PC

[4]

3 The data from a sensor must be converted from analogue to digital to be processed by a computer.

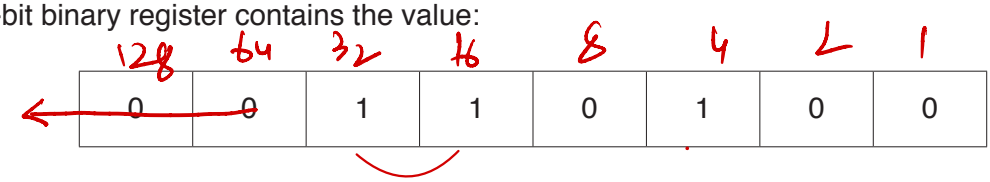
(a) State what is meant by analogue data.

It is natural data based on real-world phenomena like sound, temperature or light. It is continuous in nature [1]

(b) State what is meant by digital data.

It is data represented in discrete or levels. As in, binary. It is understood by computers & CPUs. [1]

4 An 8-bit binary register contains the value:



(a) Convert the binary value to denary.

52 x 2 x 2

[1]

(b) The contents of the register shifted one place to the right would give the result:

0	0	0	1	1	0	1	0

The contents of the register shown at the start of question 4 are shifted two places to the left.

Show the contents of the register after this shift has taken place.

128	64	32	16	8	4	2	1
1	1	0	1	0	0	0	0

128 + 64 = 192 + 16 = 208

[1]

(c) State the effect this shift has on the denary value in **part (a)**.

52 x 4 = 208

The number shifted twice left, so 52 x 2 = 104 & 104 x 2 = 208.

[1]

5 Audrey wants to send a sound file to Nico using email.

The file is too large to attach to an email so Audrey decides to compress the file.

She uses lossy compression to reduce the size of the sound file.

(a) Describe how lossy compression reduces the size of the sound file.

1. Data Elimination.
2. Sample rate reduction.
3. Low notes.
4. Encoding efficiency: Any frequent sound patterns will only be saved once.

[4]

(b) Nico asks Audrey why she used lossy compression rather than lossless.

(i) State **one** advantage Audrey could give of using lossy rather than lossless to compress the sound file.

Greater reduction in file size saves time in file transfer with email and takes less space on storage when downloaded. [1]

(ii) State **one** disadvantage Nico could give of using lossy rather than lossless to compress the sound file.

Quality loss: lossy compression results in a loss of audio quality. [1]

(c) Audrey sometimes records MIDI files.

(i) Explain what is meant by a MIDI file. — Not in syllabus.

[4]

(ii) MIDI uses serial data transmission.

Explain **two** advantages of using serial transmission rather than parallel transmission.

Advantage 1

Advantage 2

[4]

6 Touch screen technologies can be described as resistive or capacitive.

Six statements are given about resistive and capacitive technology.

Tick (✓) to show if the statement applies to **Resistive** or **Capacitive** technology.

Statement	Resistive (✓)	Capacitive (✓)
This touch screen has multi-touch capabilities		
This touch screen cannot be used whilst wearing gloves		
This touch screen is made up of two layers with a small space in between		
This touch screen uses the electrical properties of the human body		
This touch screen is normally cheaper to manufacture		
This touch screen has a quicker response time		

[6]

7 Gerald uses a keyboard to enter a website address into the address bar of his browser.

(a) Describe how Gerald's key presses on his keyboard are processed by the computer.

.....

.....

.....

.....

.....

.....

.....

..... [4]

(b) State **three** functions of a browser.

1 .....

.....

2 .....

.....

3 .....

.....

[3]

(c) The website Gerald visits uses https.

Explain what is meant by https.

.....

.....

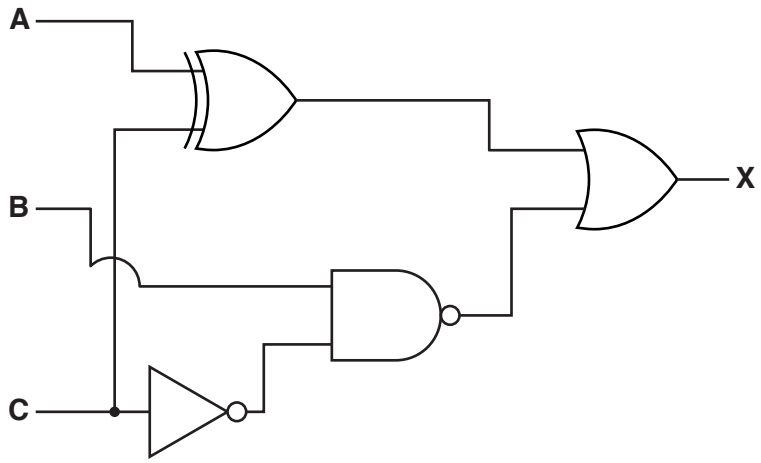
.....

.....

.....

..... [3]

8 Consider the logic circuit:



(a) Write a logic statement to match the given logic circuit.

..... [3]

(b) Complete the truth table for the given logic circuit.

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 Maisey purchases a new router and attaches it to her computer. The connection she sets up uses duplex data transmission.

(a) **Five** statements are given about duplex data transmission.

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

Statement	True (✓)	False (✓)
Duplex data transmission can be either serial or parallel	✓	
Duplex data transmission is when data is transmitted both ways, but only one way at a time		✓
Duplex data transmission is always used to connect a device to a computer		✓
Duplex data transmission is when data is transmitted both ways at the same time	✓	
Duplex data transmission automatically detects any errors in data		✓

[5]

(b) Maisey's computer uses an integrated circuit (IC) for data transmission that sends multiple bits at the same time.

State whether the IC uses **serial** or **parallel** data transmission.

Parallel.

..... [1]

(c) Maisey purchases a new printer and connects it to her computer using the USB port.

Explain **two** benefits of using a USB connection.

Benefit 1 .....

.....

.....

.....

Benefit 2 .....

.....

.....

.....

[4]

10 Data is valuable to a company.

(a) Companies use error detection methods to make sure that data is accurate.

One error detection method is the use of a check digit.

Explain what is meant by a check digit and how it is used to detect errors.

- A check digit is an additional digit added to a number sequence (like barcode, ISBN) that is calculated from the other digits
- It is used to verify the accuracy of the primary data when it is entered.
- When the number sequence is entered or scanned, the check digit is recalculated and matched.
- If differs an error is flagged indicating potential entry mistake.

[4]

(b) Companies can use a range of security methods to keep their data secure.

Identify **two** security methods that a company can use to keep their data secure **and** explain how each method can keep the data secure.

Security method 1 Encryption: Data protection
Privacy Assurance

Security method 2 Firewall: -Network traffic control
-Threat prevention

[6]

11 Robert has a mobile device that uses RAM, ROM and an SSD.

(a) State what the RAM, ROM and SSD are used for.

RAM .....

.....

ROM .....

.....

SSD .....

.....

[3]

(b) Give **two** reasons why an SSD, rather than a HDD, is used in the mobile device.

Reason 1 .....

.....

Reason 2 .....

.....

[2]

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Cambridge Assessment International Education

Cambridge O Level

CANDIDATE NAME

CENTRE NUMBER

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COMPUTER SCIENCE **2210/12**

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.
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[Turn over

1 Tina is creating a website for charity events. She uses HTML to create the website.

(a) State what is meant by HTML.

.....

..... [1]

(b) She uses the hexadecimal colour code #43B7F0 as the background colour for her website.

(i) State whether background colour is an example of **structure** or **presentation**, in the website.

..... [1]

(ii) The hexadecimal colour code **#43B7F0** is stored in three **8-bit** registers.

Give the **8-bit binary** values for each part of the hexadecimal code.

43								
B7								
F0								

[6]

(c) Tina uses a microphone to record a welcome message for her website.

(i) State whether the microphone is an **input** or **output** device.

..... [1]

(ii) She wants to compress the recording to make sure that the file is as small as possible for the website.

Identify which type of compression she should use and describe how this would compress the file for the website.

Type of compression .....

Description

.....

.....

.....

.....

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..... [4]

(iii) Give **two** benefits of compressing the file for the website.

Benefit 1 .....

.....

Benefit 2 .....

.....

[2]

(d) Tina will use the TLS protocol in her website when selling tickets to people for different charity events. This makes sure that their personal data is transmitted securely.

(i) Identify the **two** layers that are present in the TLS protocol.

Layer 1 .....

Layer 2 .....
[2]

(ii) Explain how data is sent securely using the TLS protocol.

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..... [6]

(e) Tina is concerned about security threats to her web server.

(i) Identify **three** security threats to her web server that Tina might be concerned about.

1 .....

2 .....

3 .....

[3]

(ii) Tina installs a proxy server to help protect her website from security threats.

Describe how the proxy server will help protect the website.

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..... [4]

2 **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 (✓)
11111111		
01100110		
01111011		
10000000		

[4]

(b) The data will also be checked using a checksum.

Describe how a checksum can be used to check that the data has been transmitted correctly.

A checksum is a method used to verify the integrity of the transferred data.
- Sum calculation
- Transmission of the checksum.
- Checksum verification
- Comparison
- Error indication

..... [5]

3 Alessandro has some important data stored on his computer.

He is concerned about accidental damage to his data.

(a) **(i)** Identify **three** ways that the data could be accidentally damaged.

1 .....

2 .....

3 .....
[3]

(ii) State what Alessandro could do to make sure that he can retrieve his data if it is accidentally damaged.

..... [1]

(b) Alessandro uses an SSD to store his data.

Describe what is meant by an SSD and how it operates to store data.

.....

.....

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..... [4]

(c) Alessandro also uses off-line storage to store his data.

Three examples of off-line storage are Blu-ray, CD and DVD.

Six statements are given about off-line storage.

Tick (✓) to show if each statement applies to **Blu-ray**, **CD**, or **DVD**.

Some statements apply to more than one example of off-line storage.

Statement	Blu-ray (✓)	CD (✓)	DVD (✓)
A type of optical storage	✓		
Has the largest storage capacity	✓		
Can be dual layer	✓		✓
Read using a red laser		✓	✓
Has the smallest storage capacity		✓	
Stores data in a spiral track	✓	✓	✓

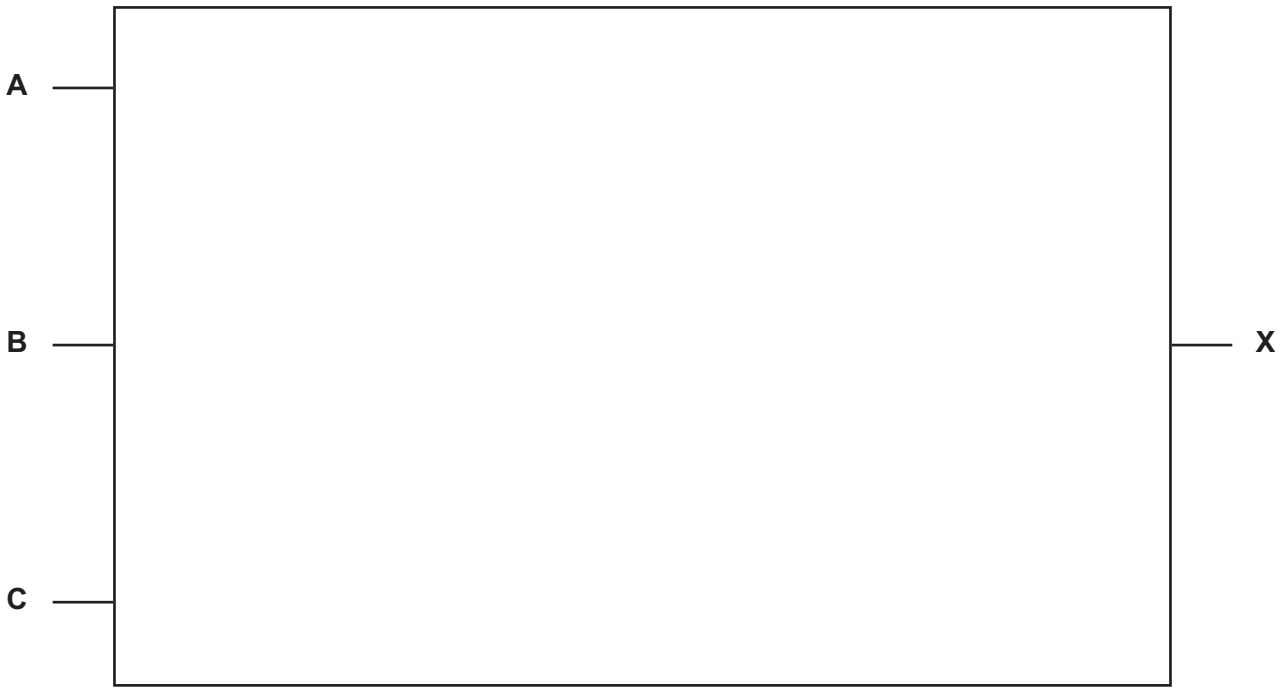
[6]

4 Consider the logic statement:

X = (((**A** NAND **B**) NOR (**B** AND **C**)) 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]

5 Tammy is buying a new computer that has an LED display.

(a) **Five** statements about LED displays are given.

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

Statement	True (✓)	False (✓)
It is a flat panel display		
It creates images using red, green and blue diodes		
It is not very energy efficient and gives off heat		
It can be used in mobile devices such as smartphones and tablets		
It is a front-lit display		

[5]

(b) Tammy connects the computer to her home network. The computer has a MAC address and an IP address.

A paragraph is given about MAC addresses and IP addresses.

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

- compiled
- computer
- control
- dynamic
- identify
- packet
- principal
- protocol
- similar
- unique

A MAC address is a media access Control address. A network device has a Unique MAC address that can help identify the device in the network. An IP address is an Internet protocol address. An IP address can be static or dynamic .

[5]

(c) Tammy uses a browser when accessing the Internet.

Describe the role of the browser.

.....

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..... [4]

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Cambridge Assessment International Education

Cambridge O Level

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER			

2699981726

COMPUTER SCIENCE **2210/11**

Paper 1 Computer Systems **May/June 2023**

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. Any blank pages are indicated.

1 Binary is a number system used by computers.

(a) Tick (✓) **one** box to show which statement about the binary number system is correct.

A It is a base 1 system ☐

B It is a base 2 system ☐

C It is a base 10 system ☐

D It is a base 16 system ☐

[1]

(b) Denary numbers are converted to binary numbers to be processed by a computer.

Convert these **three** denary numbers to 8-bit binary numbers.

50 .....

102 .....

221 .....

[3]

Working space

.....

.....

.....

.....

(c) Binary numbers are stored in registers.

Negative denary numbers can be represented as binary using two's complement.

Complete the binary register for the denary number –78

You must show all your working.

Working space

01001110 +78

10110010 −78

Register:	1	0	1	1	0	0	1	0

✓

[2]

(d) Two 8-bit binary numbers are given.

Add the **two** 8-bit binary numbers using binary addition.

Give your answer in binary. Show all your working.

```
  1 1     1 1
  0 0 1 1 0 0 1 1
+ 0 1 1 0 0 0 0 1
  1 0 0 1 0 1 0 0
```

51
97
148

just to check

[3]

(e) Two binary numbers are added by a computer and an overflow error occurs.

Explain why the overflow error occurred.

When two +ve numbers are added in binary the result is saved in a register. If the register size in binary is smaller than the bits in answer of addition then an overflow occurs as all the additional bits from msb side are dropped.

[2]

2 A student has a sound file that is too large to be stored on their external secondary storage device. The student compresses the sound file to make the file size smaller.

The compression method used reduces the sample rate and the sample resolution of the sound file.

(a) State what is meant by the sample rate and sample resolution.

Sample rate .....

.....

Sample resolution .....

.....

[2]

(b) Identify which type of compression has been used to compress the sound file.

.....

..... [1]

(c) The student sends the sound file to a friend. The file is transmitted across a network that uses packet switching.

(i) Identify **two** pieces of data that would be included in the header of each packet.

1 Destination Address

2 Packet Number.

[2]

(ii) Explain how the file is transmitted using packet switching.

- The sound file is broken down into packets.
- Each packet travels independently across the network.
- Potentially taking different routes.
- Routers are deciding for the packets' routes as per the conditions like congestion etc.
- At the destination, packets are re-assembled into the correct sequence based on their packet Nos.
- The original file is reconstructed and delivered.

.....

..... [5]

3 Secondary storage devices are used to store data in a computer.

(a) Circle **three** components that are secondary storage devices.

central processing unit (CPU) compact disk (CD)

hard disk drive (HDD) random access memory (RAM) read only memory (ROM)

register sensor solid-state drive (SSD)

[3]

(b) Tick (✓) **one** box to show which statement about secondary storage is correct.

A It is directly accessed by the CPU. ☐

B It is magnetic storage only. ☐

C It is used to permanently store software and data files. ☐

D It is volatile. ☐

[1]

4 Complete the statements about different types of software.

Use the terms from the list.

Some of the terms in the list will **not** be used. You should only use a term once.

application assembly language bootloader central processing unit (CPU)

firmware hardware operating output system user

System ..... software provides the services that the computer requires; an example is utility software.

Application ..... software is run on the operating system.

The operating ..... system is run on the firmware, which is run on the hardware ..... .

[4]

5 A farm has an automated drinking system for its animals. The drinking system has a water bowl that contains the water. When the water bowl is empty, it is automatically refilled.

The system uses a sensor and a microprocessor.

(a) Identify the most appropriate sensor for this system.

..... [1]

(b) Describe how the sensor and the microprocessor are used to automatically refill the water bowl.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... [6]

6 A user wants to connect their computer to a network.

(a) **(i)** Identify the component in the computer that is needed to access a network.

Network Interface card (NIC) [1]

(ii) Identify the type of address that is allocated to the component by the manufacturer, which is used to uniquely identify the device.

MAC address [1]

(b) A dynamic internet protocol (IP) address is allocated to the computer when it is connected to the network.

(i) Identify the device on the network that can connect multiple devices and automatically assign them an IP address.

– Router – [1]

(ii) Describe what is meant by a dynamic IP address.

– IP add. that is automatically assigned to a device when it connects to a network
– It is assigned out of the available pool of ISP's owned IP addresses. [3]

7 A programmer uses a low-level language to write a computer program for a vending machine.

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

[2]

(b) Give **two** reasons why the programmer would choose to write the computer program in a low-level language instead of a high-level language.

1

2

[2]

8 A manager at a company is concerned about a brute-force attack on its employee user accounts.

(a) Describe how a brute-force attack can be used to gain access to the employee user accounts.

.....

.....

.....

.....

.....

..... [3]

(b) One possible aim for carrying out a brute-force attack is to install malware onto the company network.

(i) State **two** other aims for carrying out a brute-force attack to gain access to the employee user accounts.

1 .....

.....

2 .....

.....

[2]

(ii) Identify **three** types of malware that could be installed.

1 .....

2 .....

3 .....

[3]

(c) Give **two** security solutions that could be used to help prevent a brute-force attack being successful.

1 .....

.....

2 .....

.....

[2]

9 A company uses robots in its factory to manufacture large pieces of furniture.

(a) One characteristic of a robot is that it is programmable.

State **two** other characteristics of a robot.

1 .....

.....

2 .....

.....

[2]

(b) Give **two** advantages to company employees of using robots to manufacture large pieces of furniture.

1 .....

.....

2 .....

.....

[2]

(c) Give **one** disadvantage to the company's owners of using robots to manufacture large pieces of furniture.

.....

..... [1]

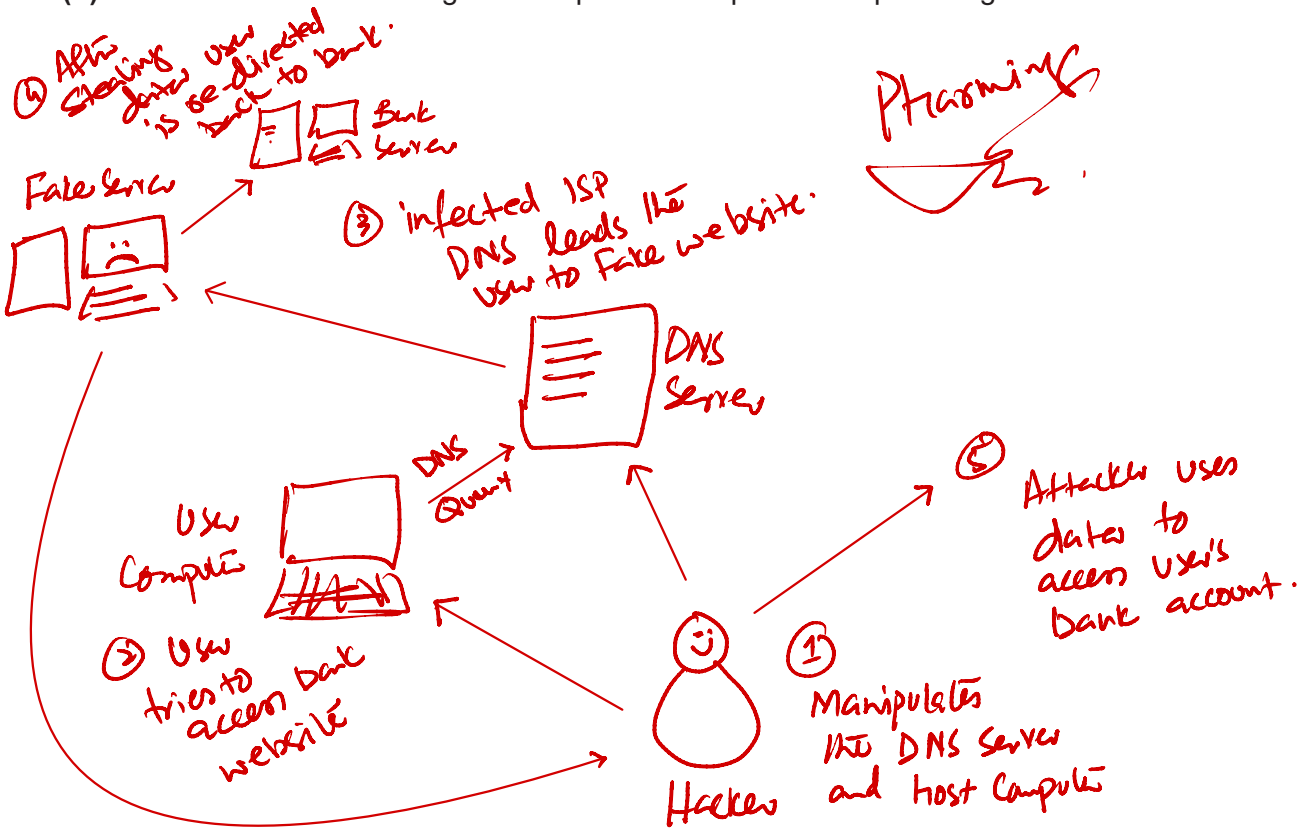
10 A student uses the internet for their schoolwork to research what is meant by pharming.

(a) State the aim of pharming.

.....

..... [1]

(b) Draw and annotate a diagram to represent the process of pharming.



[4]

(c) The student uses a web browser to access data on the internet.

Explain the purpose of the web browser.

.....

.....

.....

..... [2]

(d) Storing cookies is one function of the web browser.

Give **three** other functions of the web browser.

1 .....

.....

2 .....

.....

3 .....

.....

[3]

(e) A student visits a website that uses session cookies, instead of persistent cookies.

Explain the difference between session cookies and persistent cookies.

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..... [4]

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Cambridge
O Level

Cambridge Assessment International Education
Cambridge Ordinary Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

1577308739

COMPUTER SCIENCE **2210/12**

Paper 1 Theory **May/June 2019**

1 hour 45 minutes

Candidates answer on the Question Paper.

No Additional Materials are required.

No calculators allowed.

READ THESE INSTRUCTIONS FIRST

Write your centre number, candidate number and name in the spaces at the top of this page.
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 document consists of **11** printed pages and **1** blank page.

Cambridge Assessment International Education

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.

.....

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.....

..... [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.

.....

.....

.....

.....

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.....

..... [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.

.....

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..... [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.

.....

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..... [6]

(b) A microprocessor uses ROM.

Explain what is meant by ROM.

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.....

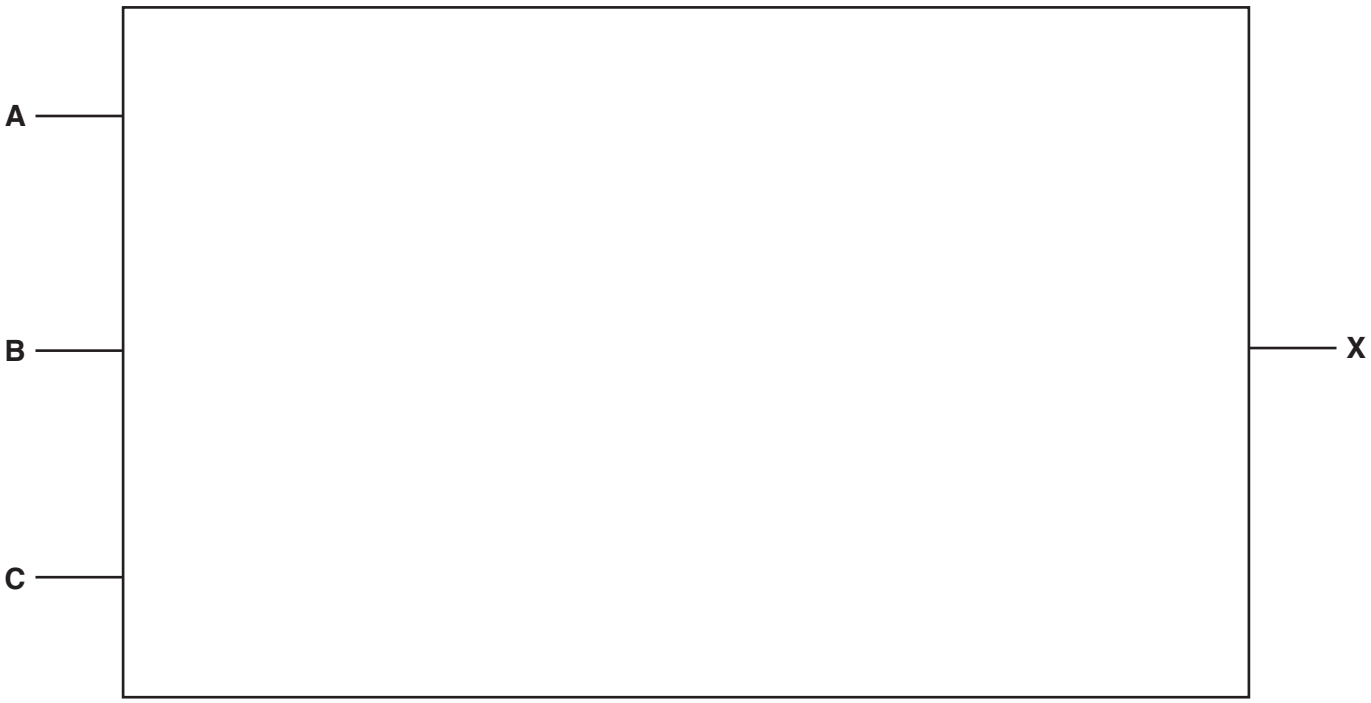
.....

..... [3]

8 Consider the logic statement:

X = 1 if ((A is 1 NOR C is 1) AND (B is NOT 1 NOR C is 1)) OR (A is 1 AND B 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]

[Turn over

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	1	0	1	0	0	1	0	1
Register B	1	1	0	0	0	0	0	1
Register C	1	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.

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..... [4]

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Cambridge
O Level

Cambridge Assessment International Education
Cambridge Ordinary Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

8893936026

COMPUTER SCIENCE **2210/11**

Paper 1 Theory **May/June 2019**

1 hour 45 minutes

Candidates answer on the Question Paper.

No Additional Materials are required.

No calculators allowed.

READ THESE INSTRUCTIONS FIRST

Write your centre number, candidate number and name in the spaces at the top of this page.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams, graphs or rough working.
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Answer **all** questions.

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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 document consists of **11** printed pages and **1** blank page.

Cambridge Assessment International Education

1 Hexadecimal is used for MAC addresses.

Part of a MAC address is given:

97 – 5C – E1

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

(a) Show what the binary register stores for each pair of the given digits.

97								
5C								
E1								

[6]

(b) Explain what is meant by a MAC address.

.....

.....

.....

.....

.....

.....

.....

..... [4]

(c) Give **two** other examples where hexadecimal can be used.

Example 1 .....

.....

Example 2 .....

.....

[2]

2 Rajesh creates a logic circuit.

He uses three different logic gates in his circuit. Each logic gate has a maximum of **two** inputs.

He describes the logic of each gate.

(a) "The only time the output will be 1 is when both inputs are 1."

State the single logic gate .....

Draw the single logic gate:

[2]

(b) "The only time the output will be 1 is when both inputs are 0."

State the single logic gate .....

Draw the single logic gate:

[2]

(c) "The only time the output will be 0 is when both inputs are 1."

State the single logic gate .....

Draw the single logic gate:

[2]

[Turn over

3 **Five** descriptions of different input or output devices are given in the table.

Complete the table by stating the **name** of each input or output device.

Description	Name of device
This is an input device that works by shining a light onto the surface of a document. The light source is automatically moved across the document and the reflected light is captured by mirrors and lenses.	.....
This is an input device where a laser or a light source is moved across an object. The width, height and depth of the object are measured to allow a model to be created.	.....
This is a large input device that is usually fixed to a wall. A user can calibrate the device to make sure the sensors align with a projected image. The user can use either their finger or a special pen to make selections.	.....
This is an output device that uses many small mirrors to reflect light towards a lens. This will display an image.	.....
This is an output device that creates an object by building layer upon layer of material.	.....

[5]

4 **(a)** Lola is concerned about the risks to her computer when using the Internet.

She wants to use some security methods to help protect her computer from the risks.

Identify a security method she could use for each of the following risks. Each security method must be different.

Describe how each security method will help protect Lola's computer.

(i) Computer virus

Security method .....

Description .....

.....

.....

.....

[3]

(ii) Hacking

Security method .....

Description .....

.....

.....

.....

[3]

(iii) Spyware

Security method .....

Description .....

.....

.....

.....

[3]

[Turn over

(b) Lola is also concerned that the data she stores could be subject to accidental damage or accidental loss.

(i) State **three** ways that the data Lola stores could be accidentally damaged or accidentally lost.

1 .....

.....

2 .....

.....

3 .....

.....

[3]

(ii) Give **two** methods that Lola could use to help keep her data safe from accidental damage or accidental loss.

1 .....

.....

2 .....

.....

[2]

5 The following text is stored as a text file:

She sells sea shells on the seashore. The shells that she sells are sea shells I am sure.

Explain how lossless compression would compress this file.

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... [5]

6 A law company holds a lot of sensitive data about its clients.

(a) It currently requires employees to enter a username and a password to log-in to an account. Each password must be 8 letters.

The company wants to increase the security of the log-in system.
Identify **two** improvements the company could use to make the log-in system more secure.

Explain how each improvement increases security.

Improvement 1 .....

.....

Explanation .....

.....

.....

Improvement 2 .....

.....

Explanation .....

.....

.....
[4]

(b) The law company wants to purchase a new file server.

The company can purchase a server with either solid state storage or magnetic storage. After discussion, it decides to purchase a file server with magnetic storage.

Explain why the company chose magnetic storage rather than solid state storage.

.....

.....

.....

.....

.....

.....

.....

..... [4]

(c) The law company also uses optical storage.

Give **three** different examples of optical storage.

1 .....

2 .....

3 .....

[3]

7 Annie writes a paragraph of text as an answer to an examination question about programming languages.

Using the list given, complete Annie's answer by inserting the correct **six** missing terms. Not all terms will be used.

- Assembly
- Converter
- Denary
- Hexadecimal
- High-level language
- Low-level language
- Machine Code
- Source Code
- Syntax
- Translator

The structure of language statements in a computer program is called the

..... . A programming language that uses natural

language statements is called a ..... . When programs

are written in this type of language they need a ..... to

convert them into ..... .

A programming language that is written using mnemonic codes is called

..... language. This is an example of a

..... .

[6]

8 An art gallery has a website that is used to display and sell art.

(a) The gallery uses Secure Socket Layer (SSL) to provide a secure connection when selling art.

Describe the process of SSL and how it provides a secure connection.

1. Connection establishment -
2. Authentication - Certificate validation from CA.
3. Session key creation.
4. Secure connection is established.
5. Data Transfer
6. Session closes

[6]

(b) The art gallery also uses a firewall.

Six statements are given about firewalls.

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

Statement	True (✓)	False (✓)
Firewalls are only available as hardware devices		
Firewalls allow a user to set rules for network traffic		
Firewalls will automatically stop all malicious traffic		
Firewalls only examine traffic entering a network		
Firewalls encrypt all data that is transmitted around a network		
Firewalls can be used to block access to certain websites		

[6]

(c) The art gallery is concerned about computer ethics relating to its website.

Explain what is meant by computer ethics **and** why the art gallery is concerned about computer ethics.

.....

.....

.....

.....

.....

.....

.....

..... [4]

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Cambridge Assessment International Education

Cambridge O Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

9517397878

COMPUTER SCIENCE **2210/12**

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.
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- Do **not** write on any bar codes.
- Calculators must **not** be used in this paper.

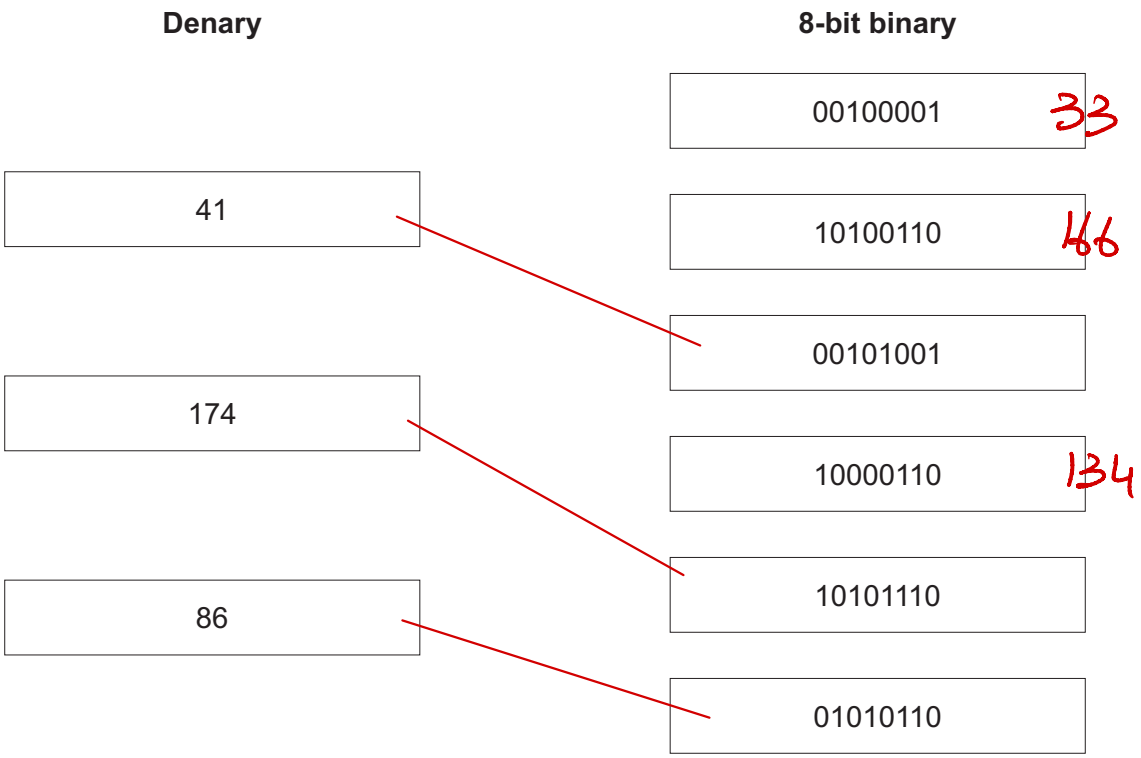
INFORMATION

- 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.



[3]

Working space

.....

.....

.....

.....

.....

(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.

2048 1024 512 256 128 64 32 16 8 4 2 1
0 0 0 1 0 1 0 1 0 1 1 1

256
64
16
7

.....

.....

Denary value 343

[2]

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

.....

.....

.....

.....

.....

(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 .....

.....

.....

.....

Presentation .....

.....

.....

.....

[4]

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

.....

.....

.....

..... [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	....
.....	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)	....
cookie	....

[5]

(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	☐
Firewalls can only be software-based	☐
Firewalls can be hardware-based or software-based	☐

[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.

.....

.....

.....

.....

.....

.....

.....

..... [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.

.....

.....

.....

.....

.....

..... [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.

.....

.....

.....

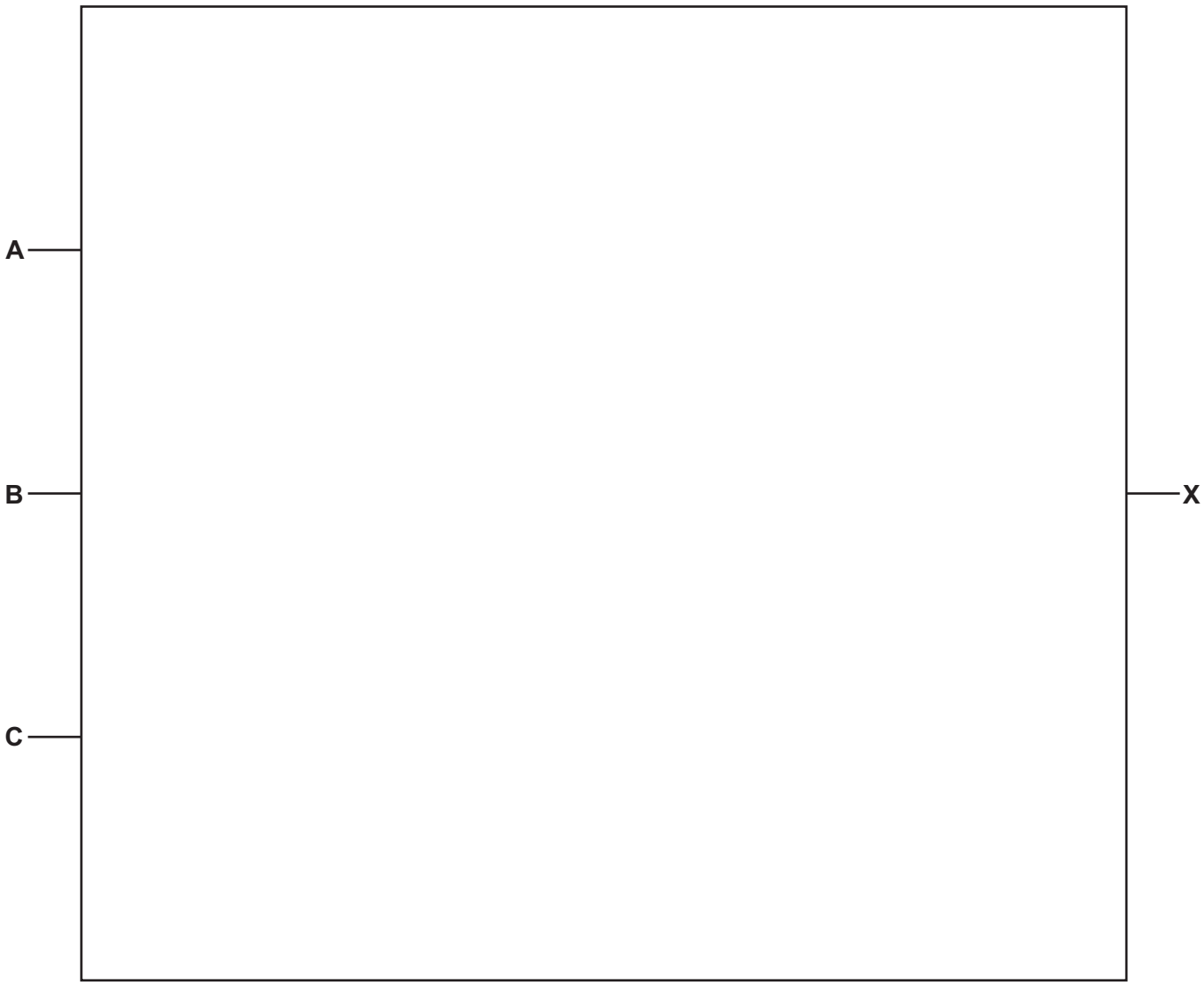
..... [2]

5 Consider the following logic statement:

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

.....

.....

.....

.....

Online security attack 2 .....

Description .....

.....

.....

.....

.....

[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.

	Type of storage		
Statement	**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]

[Turn over

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

(a) Describe what is meant by shareware.

.....

.....

.....

.....

.....

.....

.....

..... [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]

Cambridge Assessment International Education

Cambridge O Level

CANDIDATE NAME

CENTRE NUMBER | | | | | |

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0622156169

COMPUTER SCIENCE **2210/12**

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.
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INFORMATION

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This document has **12** pages. Blank pages are indicated.

DC (CE/SW) 198767

[Turn over

1 A Von Neumann model for a computer system has a central processing unit (CPU) that makes use of registers.

(a) Identify **three** registers that may be used.

Register 1 ..... PC .....

Register 2 ..... ACC .....

Register 3 ..... CIR .....

[3]

(b) The CPU is responsible for processing instructions.

One stage of processing instructions is the decode stage.

(i) Identify the **two other** stages of processing instructions.

Stage 1 ..... Fetch .....

Stage 2 ..... Execute .....

[2]

(ii) Identify the component of the CPU that is responsible for decoding instructions.

..... CU ..... [1]

2 Both an interpreter and a compiler can be used when writing a program in a high-level language.

(a) Explain why a programmer would make use of both an interpreter **and** a compiler.

.....

.....

.....

.....

.....

.....

.....

..... [4]

(b) Give **three** reasons why a programmer would choose to write a program in a high-level language, instead of a low-level language.

Reason 1 .....

.....

Reason 2 .....

.....

Reason 3 .....

.....

[3]

3 A company collects and stores data about its customers. The data is stored on a server in the company's office.

The data is transmitted to cloud storage to create a back-up.

The data is encrypted using symmetric encryption before it is sent to the cloud storage.

(a) Describe how the data is encrypted.

.....

.....

.....

.....

.....

.....

.....

..... [4]

(b) Give **three other** methods that can be used to secure the data in the office.

Method 1 .....

.....

Method 2 .....

.....

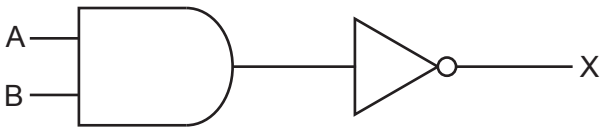
Method 3 .....

.....

[3]

4 **(a)** Identify the name **and** draw the **single** logic gate that can replace the given logic circuits.

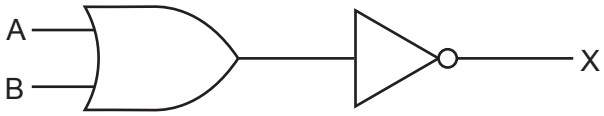
(i)



Name of gate: …… Drawing of gate:

[2]

(ii)



Name of gate: …… Drawing of gate:

[2]

(b) Complete the truth table for the given logic statement:

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

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]

5 Meena uses a browser to research information for her business.

(a) Give **three** functions of a browser.

1 .....

2 .....

3 .....

[3]

(b) Meena buys products for her business using the Internet.

The Transport Layer Security (TLS) protocol is used for transferring data when she buys products.

One layer of the TLS protocol is the handshake layer.

(i) Describe the purpose of the handshake layer.

.....

.....

.....

..... [2]

(ii) Identify the other layer of the TLS protocol.

..... [1]

(iii) Identify another protocol that can be used to transfer data securely.

..... [1]

(c) Meena visits a website to buy products for her business.

The browser uses a small file to store the details of the products she views. This allows the website to display advertisements for other products she may like.

The small file also stores her log-in details.

Give the name of this type of file.

..... [1]

6 **Six** statements are given about touch screen technology.

Tick (✓) to show if the statement applies to **Capacitive** or **Resistive** touch screen technology.

Statement	Capacitive (✓)	Resistive (✓)
Needs pressure to be applied to create a circuit		
May not register a touch if the user is wearing gloves		
More commonly used in smartphones		
More responsive to a touch		
Needs an electrical field to be changed to register a touch		
Cheaper to manufacture		

[6]

7 **(a)** Give the **denary** value of each of the three 12-bit binary values.

(i) 000000001100

..... [1]

(ii) 000011000110

..... [1]

(iii) 010011000001

..... [1]

Working space

.....

.....

.....

.....

.....

.....

.....

(b) 12-bit binary values can also be represented as hexadecimal values.

Give the **hexadecimal** value of the 12-bit binary value.

000011101001

..... [3]

8 Leonard has a new laser printer to print letters for his business.

Leonard connects his printer to his computer using the USB port.

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

Benefit 1 .....

.....

Benefit 2 .....

.....

Benefit 3 .....

.....

[3]

(b) State **two** benefits and **one** drawback of Leonard using a laser printer, instead of an inkjet printer, to print the letters.

Benefit 1 .....

.....

Benefit 2 .....

.....

Drawback .....

.....

[3]

(c) An interrupt signal is sent from the printer to the computer.

(i) Give **two** examples of when a printer would generate an interrupt signal.

Example 1 .....

Example 2 .....

[2]

(ii) Many devices send interrupt signals.

Identify the software in the computer that will receive and manage all interrupt signals.

..... [1]

9 **(a)** **Six** statements are given about storage devices.

Tick (✓) to show if the statement applies to hard disk drive (**HDD**) storage or solid state drive (**SSD**) storage.

Some statements can apply to both.

Statement	HDD (✓)	SSD (✓)
It has a limited number of read/write cycles		
It uses magnetic properties to store data		
It has moving parts		
It is non-volatile storage		
It can be used as an external storage device to back up data		
It uses flash memory to store data		

[6]

(b) Optical storage is another type of storage.

Give **two** examples of optical storage.

Example 1 .....

Example 2 .....

[2]

[Turn over

10 Uma is concerned about risks that she may encounter when using the Internet.

Two of the risks she is concerned about are phishing and pharming.

(a) Give **one** similarity and **two** differences between phishing and pharming.

Similarity .....

.....

.....

Difference 1 .....

.....

.....

Difference 2 .....

.....

.....

[3]

(b) Identify **two** other risks that Uma could encounter when using the Internet.

Risk 1 .....

Risk 2 .....

[2]

(c) Uma uses a firewall to secure the data on her computer.

(i) Uma tells her friend that a firewall can only be software-based.

Tick (✓) to show whether Uma is **Correct** or **Incorrect**.

☐ **Correct**

☐ **Incorrect**

[1]

(ii) Describe how the firewall helps to keep Uma's data secure.

.....

.....

.....

.....

.....

.....

.....

..... [4]

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Cambridge Assessment International Education

Cambridge O Level

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

0190384781

COMPUTER SCIENCE **2210/12**

Paper 1 Theory **October/November 2021**

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.
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1 **(a)** Denary is a number system that is used by programmers.

Tick (✓) **one** box to show whether denary is a base-2, base-10 or base-16 number system.

Tick (✓)	
☐	Base-2
☑	Base-10
☐	Base-16

[1]

(b) Hexadecimal values can be used to represent denary values.

Convert these **four** hexadecimal values into denary values.

8421 4421

05 0000 0101

0010 0000

20

0001 1010

1A

1010 1011

AB

[4]

Working space

.....

.....

.....

.....

.....

(c) Hexadecimal values can also be converted to binary values.

Tick (✓) **one** box to show the correct 8-bit binary value for each hexadecimal value.

(i) Hexadecimal value 25

Tick (✓)	
☐	00011001
☑	00100101
☐	10100001

[1]

(ii) Hexadecimal value 1B

Tick (✓)	
☑	00011011
☐	10110001
☐	00011010

[1]

(d) **(i)** Give **one** way that hexadecimal is used in website development.

HTML Colors.

..... [1]

(ii) Give **one** way that hexadecimal is used in low-level programming.

Memory addressing.

..... [1]

2 A train company wants to install a self-service ticket machine system for its train stations. When the customer has purchased their tickets, the machine will provide a paper ticket.

(a) **One** output device that is used in the ticket machine is a display screen.

Identify **one** other output device that is used in the ticket machine system.

..... [1]

(b) The train company does **not** want users to use a keyboard or a mouse to enter their data, when buying a ticket. The company is worried that they may be stolen or get too dirty.

Identify **one** other input device that would be suitable for use in the ticket machine system, to allow users to enter their data.

..... [1]

3 **(a)** **Six** statements are given about methods of data transmission.

Tick (✓) to show if each statement applies to serial simplex, parallel simplex, parallel half-duplex or serial duplex data transmission. Some statements may apply to more than **one** data transmission method.

Statement	Serial simplex (✓)	Parallel simplex (✓)	Parallel half-duplex (✓)	Serial duplex (✓)
bits are transmitted along a single wire				
data is transmitted in both directions				
it is only suitable for distances less than 5 metres				
bits from the same byte are transmitted one after the other				
data may **not** arrive in the correct sequence				
data is transmitted in both directions, but only **one** direction at a time				

[6]

(b) A Universal Serial Bus (USB) connection can be used to transmit data from a mobile device to a computer.

Give **three** benefits of using a USB connection for this purpose.

Benefit 1 .....

.....

Benefit 2 .....

.....

Benefit 3 .....

.....

[3]

4 The paragraph explains the operation of different touch screen technologies.

Complete the paragraph using the list of terms. **Not** all terms in the list need to be used.

- capacitive
- change
- circuit
- conductive
- coordinates
- grid
- heat
- infra-red
- insulating
- light
- manufacture
- pressure
- resistive

In ..... touch screen technology, an electrostatic field is present on the surface of the touch screen. The ..... properties of a user cause a ..... in the field. The ..... of the user's touch can be calculated.

In ..... touch screen technology, a user pushes the top layer of the screen and makes it connect with the bottom layer to complete a ..... .

This type of touch screen is cheaper to ..... .

[7]

5 Sammi works for a finance company and has a laptop that he uses for his work. He has confidential data about his customers stored on his laptop.

Sammi does **not** connect the laptop to any networks.

(a) Sammi is concerned about his customers' confidential data being viewed by other people in his office.

One method he uses to prevent others viewing the data is encryption.

Identify **three** other methods Sammi could use to prevent his customers' confidential data being viewed.

1 .....

2 .....

3 .....
[3]

(b) Sammi creates videos for the finance company website that give customers advice about their finances.

He uses lossy compression to reduce the file size of the videos for the website.

(i) Give **three** ways that lossy compression can reduce the file size of the videos.

1 .....

.....

2 .....

.....

3 .....

.....
[3]

(ii) Give **one** drawback of using lossy compression to reduce the file size of the videos.

.....

..... [1]

(c) Sammi could have used lossless compression to compress the videos for the website.

(i) Give **one** reason why he would use lossless compression, rather than lossy compression, for the videos.

.....

..... [1]

(ii) Give **two** disadvantages of Sammi using lossless compression, rather than lossy compression, for the videos.

Disadvantage 1 .....

.....

Disadvantage 2 .....

.....

[2]

6 A programmer can use translators, such as an interpreter and a compiler, when developing a computer program.

(a) Give **one** similarity between a compiler and an interpreter.

.....

..... [1]

(b) Describe **two** differences between a compiler and an interpreter.

Difference 1 .....

.....

.....

.....

Difference 2 .....

.....

.....

.....

[4]

(c) Identify **one** other type of translator.

..... [1]

7 **Five** statements are given about devices.

Tick (✓) to show if each statement applies to a 3D scanner, barcode reader or a Quick Response (QR) code reader. Some statements may apply to more than **one** type of device.

Statement	3D scanner (✓)	Barcode reader (✓)	QR code reader (✓)
uses position and alignment markers for orientation when scanning			
scans the shape and appearance of an object			
uses reflected light from a laser to convert a black-and-white pattern into binary			
can often be built into an Electronic Point Of Sale (EPOS) terminal, for example, a supermarket checkout			
it is an example of an input device			

[5]

8 An electronic game has **three** square mats that are coloured red, green and blue.

The player will see a colour displayed on a screen and has 1 second to hit the mat that matches the colour. If the player hits the correct mat, within 1 second, a counter is incremented. When a player hits an incorrect mat, the game ends.

The game uses sensors and a microprocessor to determine if the player hits the correct mat within 1 second.

Explain how the game uses sensors and a microprocessor to count the number of times a player hits a correct mat within 1 second.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... [7]

9 Padma opens an application on her computer.

An interrupt is generated to inform the Central Processing Unit (CPU) that the application has been opened.

(a) Give **three** other examples of when an interrupt signal could be generated.

1 .....

2 .....

3 .....

[3]

(b) State what would happen if interrupt signals were **not** used in a computer.

.....

..... [1]

10 Jermain uses the Secure Socket Layer (SSL) protocol for secure transmission when sending data using the internet.

(a) Explain how the SSL protocol secures the data for transmission.

.....

.....

.....

..... [2]

(b) Identify an alternative protocol that could be used for secure transmission of data using the internet.

..... [1]

(c) Give **two** ways that a user can identify if a website uses secure data transmission.

1 .....

.....

2 .....

.....

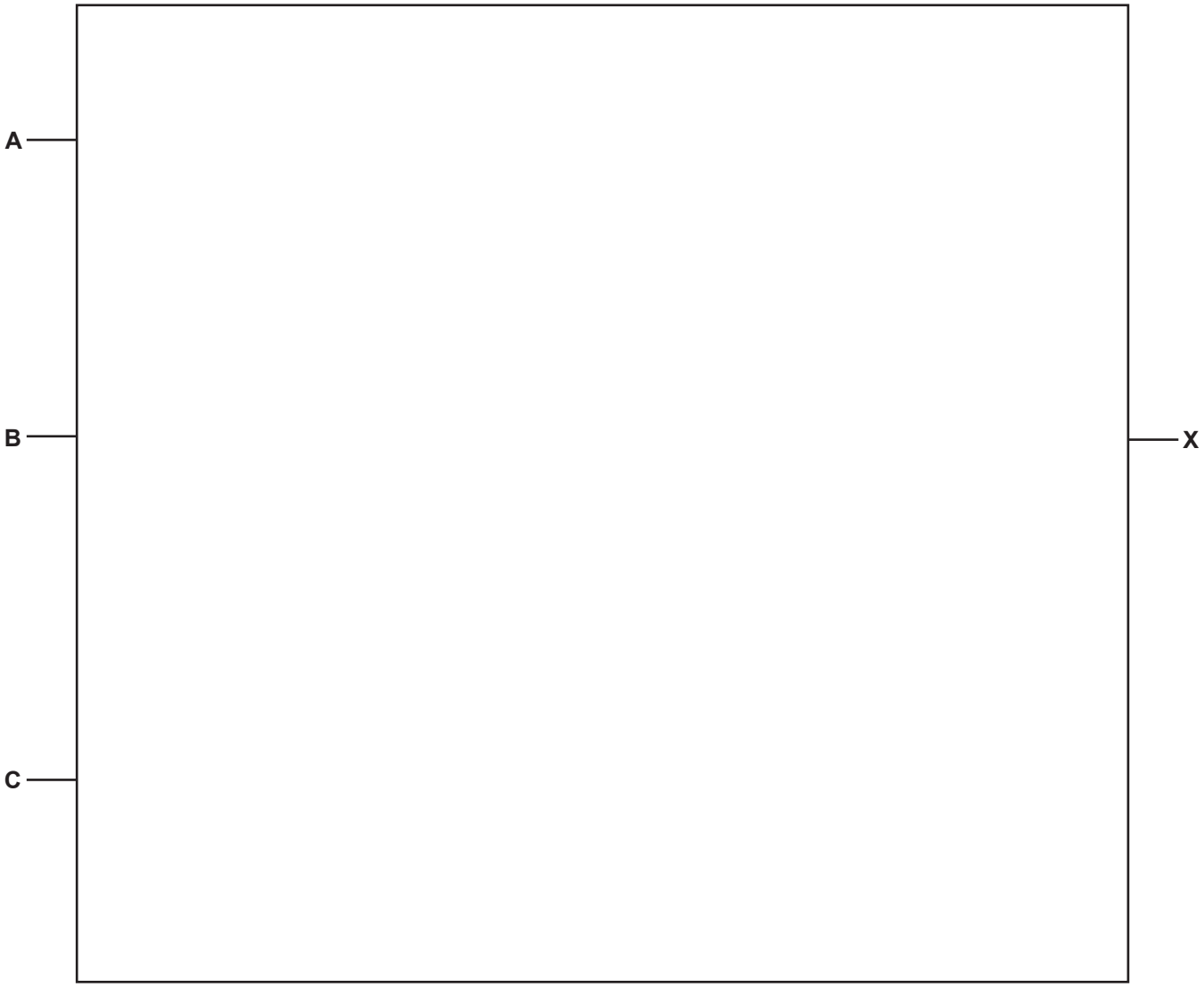
[2]

11 Consider the following logic statement:

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

(c) Identify **two** logic gates that are **not** included in the given logic statement.

Logic gate 1 .....

Logic gate 2 .....

[2]

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Cambridge Assessment International Education

Cambridge O Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

3436358301

COMPUTER SCIENCE **2210/12**

Paper 1 Theory **October/November 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.
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This document has **12** pages.

1 A bus station has a ticket machine.

A customer can use the ticket machine to select and pay for their ticket.

One input device built into the ticket machine is a touch screen.

(a) Identify **two** other input devices that could be built into the ticket machine.

Input device 1 .....

Input device 2 .....
[2]

(b) The ticket machine has a help icon that a user can touch to contact customer support.

The ticket machine has an output device that allows the user to hear the customer support person.

Identify an output device that would be used for this purpose.

..... [1]

(c) The touch screen for the ticket machine uses resistive technology.

(i) Describe how resistive touch screen technology operates to recognise a user's touch.

.....

.....

.....

.....

.....

.....

.....

..... [4]

(ii) Give **two** benefits of using resistive touch screen technology for the ticket machine.

Benefit 1 .....

.....

Benefit 2 .....

.....

[2]

(iii) Give **two** drawbacks of using resistive touch screen technology for the ticket machine.

Drawback 1 .....

.....

Drawback 2 .....

.....

[2]

(iv) Identify **one** other touch screen technology that could have been used.

..... [1]

(d) The computer in the ticket machine uses the stored program concept.

Describe the stored program concept.

.....

.....

.....

..... [2]

(e) The computer in the ticket machine has an operating system.

One function of the operating system is to provide an interface for the user.

State **three** other functions of the operating system.

Function 1 Interrupts handling

Function 2 managing files

Function 3 managing memory

[3]

(f) The computer uses 12-bit binary registers to store data whilst it is being processed.

Customers are given a denary ticket number.

(i) Give the 12-bit binary value that is stored in the register for each denary ticket number.

100 .....

235 .....

301 .....

Working space

.....

.....

.....

.....

.....

[3]

(ii) Show the denary ticket number that would be given to the customer for each 12-bit binary value.

000000010110 .....

000001110111 .....

001101011001 .....

Working space

.....

.....

.....

.....

.....

[3]

(iii) Binary values can also be represented as hexadecimal values.

Show the hexadecimal value that represents each of the **two** 12-bit binary values.

000010010101 .....

101011010001 .....

Working space

.....

.....

.....

[4]

2 An automated water tap system uses a sensor and a microprocessor to operate. Water flows from the tap when a person's hands are placed underneath the tap. Water stops flowing when the person's hands are removed from underneath the tap.

(a) Explain how the water tap system uses a sensor and a microprocessor to operate.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... [6]

(b) **Three** descriptions are shown of different systems.

Identify the most suitable sensor that could be used in each system.

Description of system	Sensor
it checks the air is dry enough in a garage that spray paints cars	Humidity
it automatically switches on the headlights on a car when it is dark	Light
it checks that the soil in a greenhouse has the correct level of acidity	PH.

[3]

3 **Five** statements are shown about Random Access Memory (RAM), an internal Solid State Drive (SSD) and a USB flash memory drive.

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

	Component		
Statement	**RAM (✓)**	**Internal SSD (✓)**	**USB flash memory drive (✓)**
it is a type of primary storage	✓		
it is volatile	✓		
it uses NAND and NOR technology		✓	✓
it does **not** have any moving parts		✓	✓
it is **not** directly connected to the central processing unit (CPU)			✓

[5]

4 Doris has data stored on her computer.

She accidentally loses some data by deleting a file.

State **two** methods she could use to help prevent accidental loss of data in this way.

Describe how each method would help prevent accidental loss of the data.

Method 1 .....

.....

.....

.....

Method 2 .....

.....

.....

.....

[4]

5 8 bytes of data are transmitted from one computer to another. Each byte of data has a parity bit.

The data is also sent with a parity byte. Each bit in the parity byte allows a check to be performed on each column of bits.

A parity check is performed on the data and an error is found in one bit. The table shows the data that was received.

Even parity

	Parity bit	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7	Bit 8
Byte 1	0	1	0	1	0	0	1	1
Byte 2	1	0	0	1	1	1	1	1
Byte 3	1	1	1	1	1	1	0	0
Byte 4	1	1	0	1	01	1	0	1
Byte 5	1	0	0	0	1	1	1	0
Byte 6	1	1	1	0	1	0	1	1
Byte 7	1	1	0	0	1	1	0	0
Byte 8	1	1	1	1	0	0	1	1
Parity byte	1	0	1	1	0	1	1	1

Identify which bit has an error by giving the Byte number and Bit number.

Explain how you found the error.

Byte number 4

Bit number 5

Explanation Bit 5 and Byte 4 has odd parities, where as rest of the bits were all even. So I found out odd column & row and at their intersection I flipped the bit.

[4]

6 Jian has a website that uses the Secure Socket Layer (SSL) protocol to make sure that data is kept secure during transmission.

(a) Give **two** ways that a user could check that a website uses the SSL protocol.

1 .....

.....

2 .....

.....
[2]

(b) State the name of the updated version of the SSL protocol.

..... [1]

(c) Jian's system for his website has a proxy server.

Explain why Jian uses a proxy server as part of the system for his website.

.....

.....

.....

.....

.....

.....

.....

..... [4]

(d) Jian sells products using his website. He wants to create a secure login system for user accounts.

He is worried that a user's login details may be gathered by malware when they are logging into their account.

(i) State the type of malware that could be used to gather a user's login details.

..... [1]

(ii) Give **three** methods that could be used to help prevent a user's login details being gathered by malware, when they are logging into their account.

Describe how each method can help prevent this happening.

Method 1 .....

.....

.....

.....

Method 2 .....

.....

.....

.....

Method 3 .....

.....

.....

.....

[6]

(e) The paragraph describes how the web pages are obtained and displayed for the user.

Complete the paragraph using the list of terms. **Not** all terms in the list need to be used.

- browser
- Hypertext Markup Language (HTML)
- Internet Protocol (IP) address
- Internet Service Provider (ISP)
- Media Access Control (MAC) address
- presentation
- protocols
- structure
- Uniform Resource Locator (URL)
- web pages
- web server

The browser sends the ..... to the

Domain Name Server (DNS) that looks up the corresponding

..... . This is returned to the browser, which

then sends a request to the ..... where the

..... are stored. The website is written in

..... that is rendered by the

..... .

[6]

7 NAND, OR and XOR are three types of logic gate.

(a) **Four** statements are shown about the logic gates.

Tick (✓) to show which statements apply to each logic gate. Some statements may apply to more than one logic gate.

Statement	NAND (✓)	OR (✓)	XOR (✓)
if both inputs are 1, the output is 1			
if both inputs are different from each other, the output is 1			
if both inputs are 0, the output is 0			
if both inputs are the same as each other, the output is always 0			

[4]

(b) NAND, OR, XOR, NOR and NOT are all examples of logic gates.

State the name of **one** other logic gate and complete its truth table.

Logic gate .....

Truth table:

A	B	Output
0	0	
0	1	
1	0	
1	1	

[2]

Cambridge Assessment International Education

Cambridge O Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

2317258264

COMPUTER SCIENCE **2210/11**

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.

.....

.....

.....

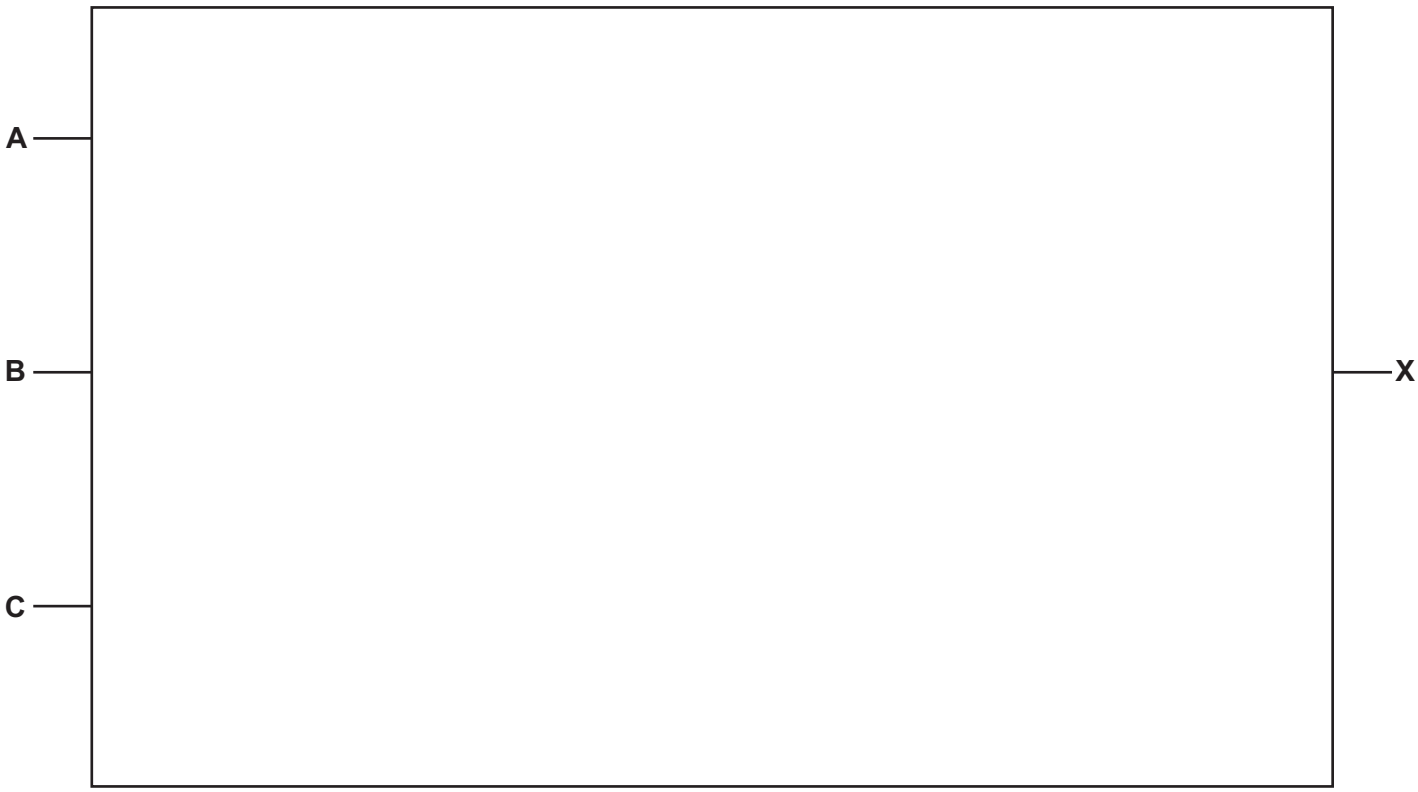
..... [2]

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.

Serial ..... [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 Purpose: - Both are used to verify data integrity

2. Calculation based: Each method involved mathematical calculations.

[2]

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

Describe how the method checks for errors.

Method Parity Check.

Description This adds a parity bit to data to make the total number of 1's either even or odd. Data is checked for errors by counting the 1's to see if they match the expected even or odd count. Discrepancies indicate a data error.

[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]

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]

[Turn over

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]

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Cambridge Assessment International Education

Cambridge O Level

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

4191673229

COMPUTER SCIENCE **2210/12**

Paper 1 Computer Systems **October/November 2023**

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 Malware can be used to corrupt data stored on a computer.

(a) Tick (✓) **one** box to show which cyber security threat is **not** a type of malware.

A Phishing ☐

B Ransomware ☐

C Virus ☐

D Worm ☐

[1]

(b) Identify **one** other example of malware than those given in **part 1(a)**.

..... [1]

(c) Identify the type of software that is used to find and remove malware from a computer.

..... [1]

2 A register stores the binary number:

1	1	1	0	0	0	1	1

(a) Give the denary number for the binary number stored in the register.

..... [1]

Working space

.....

.....

.....

(b) Give the hexadecimal number for the binary number stored in the register.

..... [2]

Working space

.....

.....

.....

(c) A logical left shift of **two** places is performed on the binary number stored in the register.

Complete the binary register to show its contents after this logical left shift.

[1]

(d) The negative denary number −99 needs to be stored in the register.

Complete the register to show the binary number that would be stored, using two's complement. Show all your working.

Working space 0 1 1 0 0 0 1 1 +99

1 0 0 1 1 1 0 1 −99

Register:

1	0	0	1	1	1	0	1

[2]

76 227

(e) The number 01001100 is added to 11100011

Add the two 8-bit binary numbers, using binary addition.

Give your answer in binary. Show all your working.

0 1 0 0 1 1 0 0 76

+ 1 1 1 0 0 0 1 1 227

1 / 0 0 1 0 1 1 1 1 303

>255

[4]

3 A user's computer has a central processing unit (CPU) that has a clock speed of 2 GHz.

She wants to change it to a CPU that has a clock speed of 3 GHz.

(a) (i) State what is meant by clock speed.

Refers to the rate at which a CPU can complete cycles of ops

[1]

(ii) Explain the effect this change will have on the performance of the CPU.

- Faster processing
- Improved efficiency.
- Potential drawback.

[2]

(b) The CPU contains a memory address register (MAR).

Describe the role of the MAR in the fetch–decode–execute cycle.

- Stores memory address of the current instruction.
- Interacts with memory.
- Facilitates Data Retrieval.

[2]

(c) The CPU has a list of all the machine code commands it can process.

State the name of this list of commands.

Instruction set [1]

4 A washing machine is an example of an embedded system.

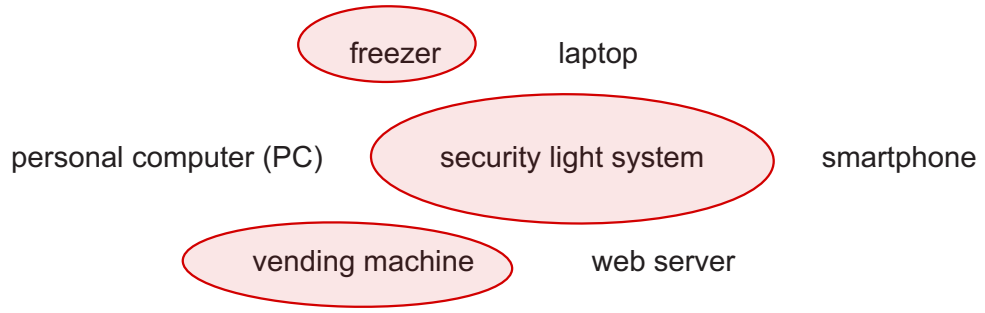
(a) Give **two** characteristics of an embedded system.

1 - Single functioned
- Tightly Constrained

2 - Real-time OPS.
- Long life cycle.

[2]

(b) Circle **three** other examples of an embedded system.



[3]

5 A band is recording their new song. They need to consider the sample rate and sample resolution of their recording.

(a) Give **one** benefit of using a higher sample rate to record the song.

.....

..... [1]

(b) Give **one** drawback of using a higher sample rate to record the song.

.....

..... [1]

(c) Describe what is meant by sample resolution.

.....

.....

.....

..... [2]

(d) The band wants to compress the sound file, but they do **not** want any data to be permanently removed.

Identify the compression method that should be used.

— lossless — [1]

6 The table contains descriptions about data transmission methods.

Complete the table by identifying which data transmission methods are described.

Data transmission method	Description
.....	Data is transmitted down a single wire, one bit at a time, in one direction only.
.....	Data is transmitted down multiple wires, multiple bits at a time, in both directions, but only one direction at a time.
.....	Data is transmitted down a single wire, one bit at a time, in both directions at the same time.
.....	Data is transmitted down multiple wires, multiple bits at a time, in one direction only.

[4]

7 A train station has a ticket inspector who checks each customer's ticket before they are allowed to get on the train.

The train station wants a system that will allow the tickets to be automatically checked.

(a) Identify **two** suitable input devices that can be used to automatically read the tickets.

1 .....

2 .....

[2]

(b) The train driver pushes a button to close the train door when all passengers have boarded the train. The train door will only close when there are no passengers in the doorway.

The system to check there are no passengers in the doorway uses a sensor and a microprocessor.

Explain how the sensor and the microprocessor are used to check whether the train door can be closed.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... [6]

8 **(a)** Draw and annotate a diagram that demonstrates the cyber security threat of data interception.

[4]

(b) Identify **one** security solution that will help keep data safe from data interception and state why it will help keep the data safe.

.....

.....

.....

..... [2]

9 The table contains terms and descriptions about the internet.

Complete the table with the missing terms and descriptions.

Term	Description
.....	the collective name for all the web pages available
.....	a small text file, stored by the web browser, that can store a user's personal data
uniform resource locator (URL)	....
web server	....
.....	the language used to create a website. Example tags are <head> and <body>
.....	a protocol that is used to request and send web pages

[6]

10 A business has a system that is described as having artificial intelligence (AI).

(a) State **one** of the main characteristics of an AI system.

.....

..... [1]

(b) An AI system is an expert system.

Explain how an expert system operates.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... [6]

11 A manufacturing company uses an automated system in its manufacturing process.

(a) The automated system uses a flow sensor.

Identify what a flow sensor measures.

– liquid flow –

.....

..... [1]

(b) Explain **one** advantage to employees of using an automated system in manufacturing.

.....

.....

.....

..... [2]

(c) Explain **one** disadvantage to the company owner of using an automated system in manufacturing.

.....

.....

.....

..... [2]

12 Digital currency can be used to pay for products and services.

Digital currencies are often tracked using digital ledgers.

(a) Give **two** other features of digital currency.

1 .....

.....

2 .....

.....
[2]

(b) Identify the process that uses a digital ledger to track the use of digital currency.

..... [1]

13 Storage and memory are important components of a computer system.

(a) Primary storage is one type of storage in a computer system.

(i) Tick (✓) **one** box to show which is an example of primary storage.

A	compact disk (CD)	☐
B	hard disk drive (HDD)	☐
C	random access memory (RAM)	✓
D	solid-state drive (SSD)	☐

[1]

(ii) Give **one** characteristic of primary storage.

Accessed directly by the CPU. [1]

(b) Virtual memory can be created in a computer system.

Complete the description about virtual memory.

Use the terms from the list.

Some of the terms in the list will **not** be used. Some terms may be used more than once.

binary hard disk drive (HDD) hexadecimal operating system

pages random access memory (RAM) read only memory (ROM)

sectors software tracks virtual memory

Virtual memory is used when the random access memory (RAM) is full. It is created by partitioning the HDD . Data is divided into Pages that can be sent from RAM to the HDD / Virtual Memory to be temporarily stored until they are required.

[5]

Cambridge Assessment International Education

Cambridge O Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

7953359895

COMPUTER SCIENCE **2210/13**

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.

CU

..... [1]

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

ALU

..... [1]

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

PC

..... [1]

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

– CIR –

..... [1]

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

– ACC –

..... [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.

8	4	2	1	8	4	2	1	8	4	2	1
1	1	0	0	0	1	0	0	0	0	0	0
C				4				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	✓	

01100101 [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.

Because when two bits are changed the parity will remain correct. [1]

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

– Checksum – – Echo check – [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.

.....

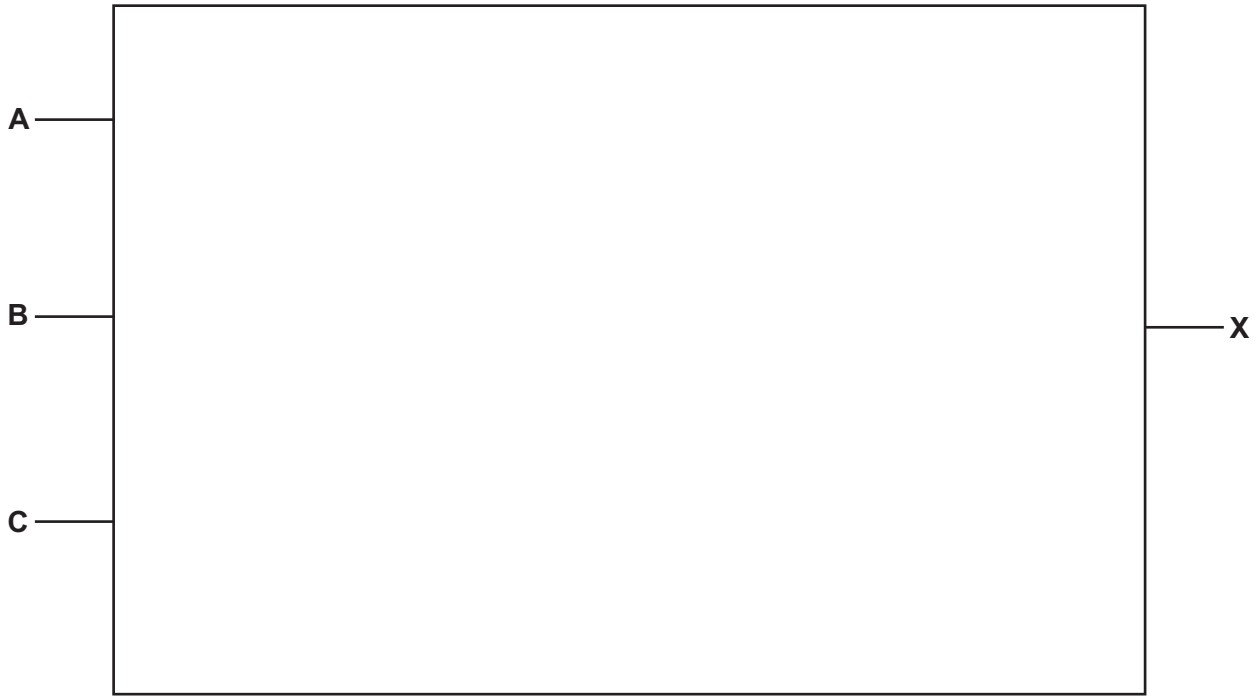
..... [1]

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.

.....

.....

.....

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.....

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.....

.....

.....

.....

..... [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 O Level

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

1094780742

COMPUTER SCIENCE **2210/12**

Paper 1 Theory **May/June 2021**

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. Any blank pages are indicated.

1 A denary value can be converted into hexadecimal and binary.

(a) Complete the table to show the hexadecimal and 8-bit binary values of the given denary values.

Denary	Hexadecimal	8-bit binary
49		
123		
200		

[6]

Working space

.....

.....

.....

.....

.....

(b) Give **two** benefits, to users, of converting binary values to hexadecimal.

Benefit 1 .....

.....

Benefit 2 .....

.....

[2]

(c) Hexadecimal is used to represent Hypertext Markup Language (HTML) colour codes in computer science.

Identify **three** other ways that hexadecimal is used in computer science.

1 .....

2 .....

3 .....

[3]

2 Data storage can be magnetic, solid state or optical.

(a) **Six** statements are given about data storage.

Tick (✓) to show if the statement applies to magnetic, solid state or optical storage. Some statements may apply to more than one type of storage.

Statement	Magnetic (✓)	Solid state (✓)	Optical (✓)
no moving parts are used to store data			
pits and lands are used to store data			
data is stored on platters			
flash memory is used to store data			
parts are rotated to store data			
data can be stored permanently			

[6]

(b) **(i)** Give **one** example of magnetic storage.

..... [1]

(ii) Give **one** example of optical storage.

..... [1]

(iii) Identify which type of storage would be the most suitable for use in a web server and justify your choice.

Type of storage .....

Justification .....

.....

.....

.....

[3]

(c) Describe the operation of USB flash memory and how it stores data.

.....

.....

.....

.....

.....

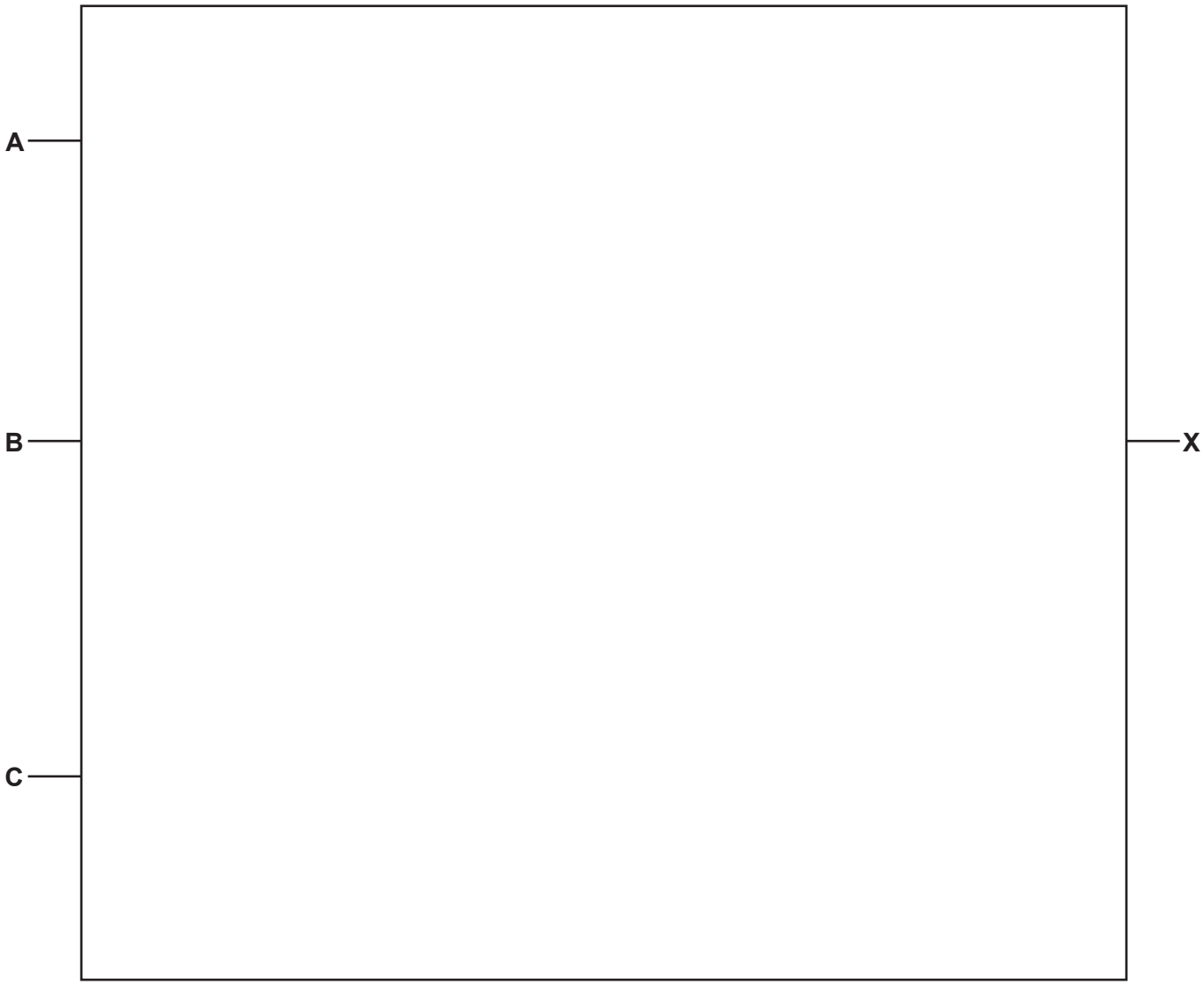
..... [3]

3 Consider the logic statement:

X = ((((NOT **A** AND **B**) OR **C**) AND **B**) NOR (**B** OR **C**))

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

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



[6]

(b) Consider the completed truth table for the given logic statement.

Row number	A	B	C	Working space	X
1	0	0	0		**1**
2	0	0	1		**1**
3	0	1	0		**1**
4	0	1	1		**0**
5	1	0	0		**1**
6	1	0	1		**0**
7	1	1	0		**1**
8	1	1	1		**1**

There are four errors in the truth table in the output (X) column.

Identify the **four** incorrect outputs.

Write the row number to identify each incorrect output.

Row .....

Row .....

Row .....

Row .....

[4]

4 Three types of Internet security risk are virus, spyware and denial of service (DoS) attack.

(a) **Six** statements are given about Internet security risks.

Tick (✓) to show whether the statement applies to virus, spyware or denial of service. Some statements may apply to more than one Internet security risk.

Statement	Virus (✓)	Spyware (✓)	Denial of service (✓)
captures all data entered using a keyboard			
can be installed onto a web server			
prevents access to a website			
is malicious code on a computer			
is self-replicating			
damages the files on a user's hard drive			

[6]

(b) Identify **three** other types of Internet security risks.

1 .....

2 .....

3 .....

[3]

(c) Some Internet security risks can maliciously damage data. Data can also be damaged accidentally.

State **three** ways that data could be accidentally damaged.

1 .....

2 .....

3 .....

[3]

5 A security light system is used by a factory. The light only comes on when it is dark and when movement is detected. The light will stay on for 1 minute before switching off.

Sensors and a microprocessor are used to control the security light system.

(a) Identify **two** sensors that would be used in the security light system.

Sensor 1 .....

Sensor 2 .....
[2]

(b) Describe how the sensors and the microprocessor control the security light system.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... [8]

6 Cookies can be used to store a user's personal data and online browsing habits.

(a) A cookie could be used to automatically enter a user's payment details when the user makes a purchase online.

Describe how cookies can be used to store and automatically enter a user's payment details.

.....

.....

.....

.....

.....

..... [3]

(b) Explain why a user may be concerned about their personal data and online browsing habits being stored in cookies.

.....

.....

.....

.....

.....

.....

.....

..... [4]

7 Jolene uses HTML to create a website. She separates the HTML into structure and presentation.

(a) (i) Give **one** example of HTML structure.

..... [1]

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

1 .....

2 .....
[2]

(b) Explain why Jolene separates the HTML into structure and presentation.

.....

.....

.....

..... [2]

8 A keyboard is a type of input device that can be used to enter data into a computer.

Complete the paragraph that describes one method of operation for a keyboard, using the most appropriate terms from the given list. **Not** all terms in the list need to be used.

- Binary
- Breaks
- Calculated
- Character
- Circuit
- Current
- Information
- Network
- Press
- Processor
- Signal
- Switch

A keyboard has a key matrix underneath the keys. When a key is pressed, it presses a

..... that completes a ..... . This allows

..... to flow. The location of the key pressed is

..... . The location of the key pressed is compared to a

..... map to find the ..... value for the key that

has been pressed.

[6]

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Cambridge Assessment International Education

Cambridge O Level

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

6999986171

COMPUTER SCIENCE **2210/13**

Paper 1 Computer Systems **October/November 2023**

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. Any blank pages are indicated.

1 A mobile telephone has built-in input and output devices.

(a) Give **two** examples of an input device that would be built into a mobile telephone.

1 .....

2 .....
[2]

(b) Give **one** example of an output device that would be built into a mobile telephone.

..... [1]

(c) The data storage in the mobile telephone can be measured using different units of measurement.

(i) State how many bits are equal to a byte.

8 [1]

(ii) State how many kibibytes (KiB) equal a mebibyte (MiB).

1024 KiB = 1 MiB [1]

(d) The mobile telephone has an operating system.

Describe the purpose of the operating system.

.....

.....

.....

.....

.....

..... [3]

2 Humans use a denary number system and computers use a binary number system.

(a) Explain what is meant by a binary number system.

.....

.....

.....

..... [2]

(b) Convert the denary numbers 14, 59 and 234 to binary.

14 .....

59 .....

234 .....
[3]

Working space

.....

.....

.....

.....

(c) Convert the denary numbers 9, 26 and 65 to hexadecimal.

9 .....

26 .....

65 .....
[3]

Working space

.....

.....

.....

.....

(d) Convert the positive denary number 123 to 8-bit binary using two's complement.

Show all your working.

.....

.....

.....

..... [2]

(e) Add the binary values 00110011 and 01111000 using binary addition.

Give your answer in binary. Show all your working.

.....

.....

.....

.....

.....

.....

.....

..... [3]

3 A computer has a central processing unit (CPU).

(a) Circle **three** components that are built into the CPU.

accumulator (ACC) control unit (CU) graphics card

hard disk drive (HDD) motherboard program counter (PC)

random access memory (RAM) read only memory (ROM)

[3]

(b) The CPU has cache.

Explain the purpose of the cache.

.....

.....

.....

..... [2]

(c) The CPU has a component that regulates the number of fetch–decode–execute cycles the CPU can perform in a second.

State the name of this component.

..... [1]

(d) The CPU has a component that carries out all calculations and logical operations.

State the name of this component.

..... [1]

4 An employee uses a web browser on their computer.

(a) Describe the main purpose of a web browser.

.....

.....

.....

..... [2]

(b) The employee wants his payment details to be automatically filled in when he buys products using the internet.

Identify the function of a web browser that could be used for this purpose.

..... [1]

(c) The employee wants to be able to quickly access websites that he regularly uses.

Identify the function of a web browser that could be used for this purpose.

..... [1]

(d) The web browser uses the secure socket layer (SSL) protocol to transmit personal data securely over the internet.

State how the SSL protocol secures the data for transmission.

.....

..... [1]

5 Errors can occur when data is transmitted.

(a) Give **one** reason an error may occur when data is transmitted.

Skew, Crosstalk, electromagnetic interference

[1]

(b) Some error detection methods use a calculated value to check for errors.

Tick (✓) **one** box to show which error detection method does **not** use a calculated value to check for errors.

A Check digit ☐

B Checksum ☐

C Echo check ☑

D Parity check ☐

[1]

(c) An automatic repeat request (ARQ) can be used to make sure that data is received free of errors. It can use a positive or negative acknowledgement method to do this.

Explain how an ARQ operates using a positive acknowledgement method.

- Data transmission: Sender transfer the packet to the receiver.
- Receipt & inspection: receiver upon receiving the signal checks it for errors using methods like parity & checksum.
- Positive Acknowledgement (ACK): If the packet is error free, the receiver sends +ve ACK.
- Resend on NO ACK: If the sender doesn't receive an ACK within a specified timeout period, packet is resend.
- Completion: The process repeats for each packet of data sent until all data is confirmed.

[5]

6 A company uses cloud storage to store its data.

(a) Tick (✓) **one** box to show which is **not** a characteristic of cloud storage.

A Data is accessed through a network ☐

B Data is stored locally ☐

C Data is stored remotely ☐

D Physical servers are used to store the data ☐

[1]

(b) Explain **two** advantages for the owners of the company of storing its data in cloud storage.

1 .....

.....

.....

.....

2 .....

.....

.....

.....

[4]

(c) Explain **one** disadvantage to employees of the company storing data in the cloud.

.....

.....

.....

..... [2]

7 A photographer takes an image with a digital camera. The photographer sets the resolution and colour depth for the image.

(a) State what is meant by the image resolution.

.....

..... [1]

(b) State what is meant by the image colour depth.

.....

..... [1]

(c) Give **one** benefit of increasing the colour depth of the image.

.....

..... [1]

(d) The photographer compresses the image using a method that permanently reduces the colour depth and resolution of the image.

Identify which compression method the photographer uses.

..... [1]

(e) One benefit for compressing the image is to reduce the storage space it uses.

Give **two** other benefits of compressing the image.

1 Faster transmission .....

.....

2 Cost efficiency in storage & bandwidth. .....

.....

[2]

8 Draw and annotate a diagram to represent the role of a router.

[4]

9 A computer has secondary storage.

(a) The table contains statements about secondary storage.

Complete the table by writing the type of secondary storage that applies to each statement. Some types of secondary storage may apply to more than one statement.

Type of secondary storage	Statement
.....	data is stored using pits and lands
.....	data is stored using control gates and floating gates
.....	data is stored using electromagnets
.....	data is stored using a laser
.....	data is stored on a platter that is divided into tracks and sectors

[5]

(b) Explain **two** differences between primary storage and secondary storage.

1 .....

.....

.....

.....

2 .....

.....

.....

.....

[4]

10 A car repair garage uses an expert system.

(a) Complete the description about the operation of the expert system.

Use the terms from the list. Some of the terms in the list will **not** be used.

inference engine interface knowledge base

machine learning mechanical engine output device

question base rule base

An expert system has a ..... that contains a list of facts. The ..... applies the ..... to the ..... to reach a diagnosis for the repair of the car. The user provides data to the system using an ..... .

[5]

(b) The expert system has machine learning capabilities.

Describe what is meant by machine learning capabilities.

.....

.....

.....

.....

.....

.....

.....

..... [4]

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Cambridge
O Level

Cambridge Assessment International Education
Cambridge Ordinary Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

6120402551

COMPUTER SCIENCE **2210/13**

Paper 1 Theory **October/November 2019**

1 hour 45 minutes

Candidates answer on the Question Paper.

No Additional Materials are required.

No calculators allowed.

READ THESE INSTRUCTIONS FIRST

Write your centre number, candidate number and name in the spaces at the top of this page.
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.

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 document consists of **12** printed pages.

Cambridge Assessment International Education

[Turn over

1 A library has a system that allows customers to check out the books that they want to borrow.

Each book has a barcode that can be used to identify the book.

(a) (i) Identify **two** input devices that may be used in the library's system.

Input device 1 .....

Input device 2 .....
[2]

(ii) Identify **two** storage devices that may be used in the library's system.

Storage device 1 .....

Storage device 2 .....
[2]

(iii) Identify **two** output devices that may be used in the library's system.

Output device 1 .....

Output device 2 .....
[2]

(b) The data stored by the library is archived at the end of each day. The archive is held on a server in the library office.

The data is encrypted with an 8-bit key. As some of the data is confidential, the library wants to make the encryption more secure.

(i) State how the library could make the encryption more secure.

.....

..... [1]

(ii) The term used to describe data before it is encrypted is plain text.

State the term used to describe encrypted data.

..... [1]

(iii) The library's archive system uses an error detection and correction system that combines a parity check with an automatic repeat request (ARQ).

Describe how this system uses the parity check and ARQ.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... [6]

(c) The library has a website that customers can use to search for a book.

(i) The website has a background colour with the hexadecimal colour code #F92A10

The colour code is stored in two 12-bit binary registers.

Show how the colour code would be stored in the registers.

F92												
A10												

[6]

(ii) Videos on the library website show customers which books the library will soon have in stock.

The library wants the file size of a video to be as small as possible.

Identify **and** describe a method the library could use to reduce the file size of a video as much as possible.

.....

.....

.....

.....

.....

.....

.....

..... [4]

(d) The library often holds events that introduce new authors.

At the events, the library has a Liquid Crystal Display (LCD) screen that displays data, including an image and information about the author.

Describe how an LCD screen operates to display this data.

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... [5]

2 A programmer uses a high-level language to write a computer program.

(a) **Four** statements are given about high-level programming languages.

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

Statement	True (✓)	False (✓)
High-level languages need to be translated into machine code to run on a computer		
High-level languages are written using mnemonic codes		
High-level languages are specific to the computer's hardware		
High-level languages are portable languages		

[4]

(b) **Tick (✓)** to show which of the following is an example of a high-level language program.

Example program	Tick (✓)
1011100000110000 0000011011100010	
INP STA ONE INP STA TWO ADD ONE	

a = input()
b = input()
if a == b:
  print("Correct")
else:
  print("Incorrect")	

[1]

3 Blair writes a paragraph about data transmission in her Computer Science examination.

Use the list given to complete Blair's paragraph by inserting the correct **five** missing terms. Not all terms will be used. Terms can be used more than once.

- duplex
- half-duplex
- parallel
- serial
- simplex

..... data transmission is when data is transmitted a single bit at a time. ..... data transmission is when multiple bits of data are sent all at once. If a user wants to transmit data over a long distance, with the highest chance of accuracy, ... data transmission should be used. If data needs to be transmitted in one direction only, for example from a computer to a printer, ... data transmission should be used. If a user has a large amount of data to transmit and this needs to be done as quickly as possible ..... data transmission should be used.

[5]

Question 4 starts on page 8.

4 A factory that manufactures cleaning products has a system that monitors conditions throughout the manufacturing process.

The inputs to the system are:

Input	Binary value	Condition
A	1	pH > 7
	0	pH < = 7
T	1	Temperature < 35 °C
	0	Temperature > = 35 °C
P	1	Pressure > = 80 %
	0	Pressure < 80 %

(a) The system will sound an alarm (**X**) when certain conditions are detected.

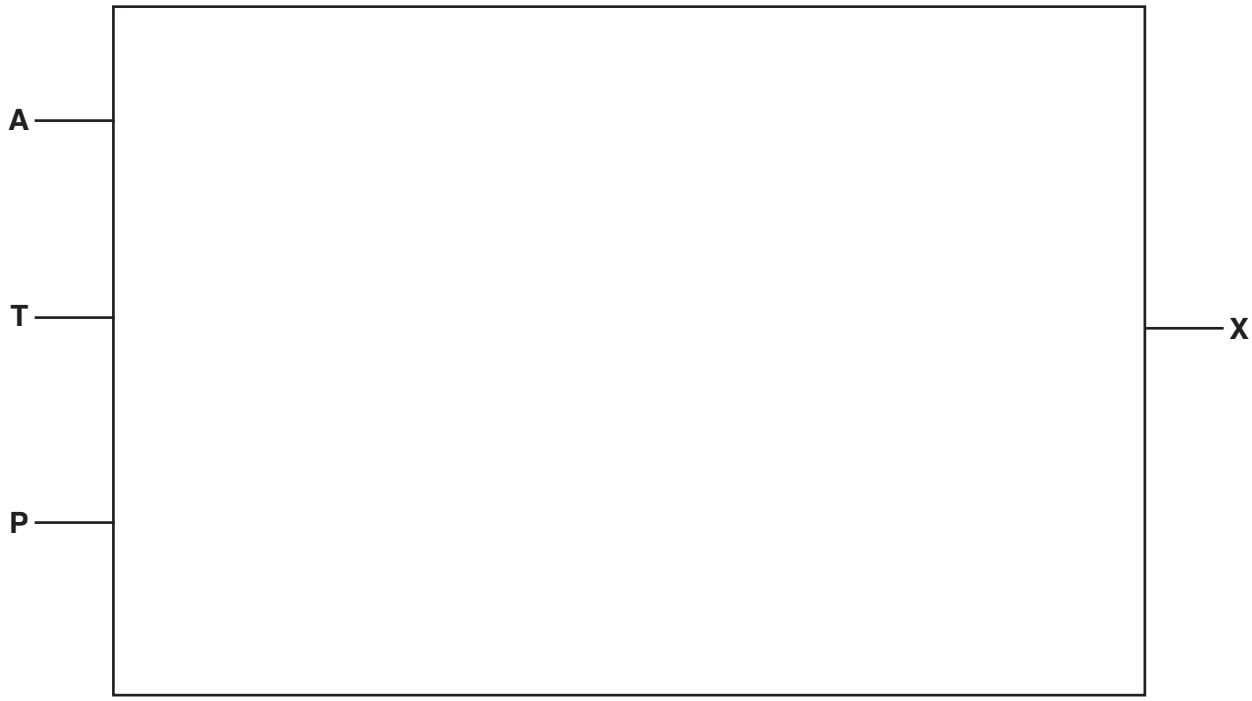
The alarm will sound when:

- The pressure > = 80 % and the temperature > = 35 °C

or

- The temperature < 35 °C and the pH > 7

Draw a logic circuit to represent the alarm system in the factory. Each logic gate must have a maximum of two inputs.



[4]

(b) Complete the truth table for the given logic problem.

A	T	P	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]

(c) A sensor and a microprocessor are used to monitor the pH of the cleaning products. The system records each reading that is taken. If the reading is greater than 7 a warning message is displayed on a monitor.

Explain how the sensor and microprocessor are used in the system.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... [6]

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

The outcome after transmission is:

- **Register A** and **Register B** have been transmitted **correctly**.
- **Register C** has been transmitted **incorrectly**.

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

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

[3]

6 Jesse is taking his Computer Science examination. He answers **five** questions about ethics.

(a) For the first question, he writes the answer:

"This type of software can be copied and shared without the permission of the owner."

State what Jesse is describing.

..... [1]

(b) For the second question, he writes the answer:

"With this type of software, the owner still retains the copyright for the software, but he gives away copies of it for free."

State what Jesse is describing.

..... [1]

(c) For the third question, he writes the answer:

"This type of software is often a trial version of the full software. To use the full version the user normally needs to pay a fee."

State what Jesse is describing.

..... [1]

(d) For the fourth question, he writes the answer:

"This is when a person copies another person's computer program and tries to claim it as his own."

State what Jesse is describing.

..... [1]

(e) For the fifth question, he writes the answer:

"This is the legal protection that a person can obtain, to provide protection against his work being stolen."

State what Jesse is describing.

..... [1]

7 The Von Neumann model for a computer system has several components that are used in the fetch-execute cycle.

(a) One component is main memory.

(i) Describe what is meant by main memory and how it is used in the Von Neumann model for a computer system.

Main Mem (RAM).
Usage in Von-Neumann Mode.

..... [3]

(ii) State **two** other components in the Von Neumann model for a computer system.

1 ALU

2 CU

[2]

(b) Computer systems often use interrupts.

Five statements are given about interrupts.

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

Statement	True (✓)	False (✓)
Interrupts can be hardware based or software based	✓	
Interrupts are handled by the operating system	✓	
Interrupts allow a computer to multitask	✓	
Interrupts work out which program to give priority to		✓
Interrupts are vital to a computer and it cannot function without them	✓	✓

[5]

8 A company discovers malware on its network.

Explain **two** ways that the malware could have been introduced to the company's network.

1. Email Attachment.

2. Compromised website

[4]

Cambridge Assessment International Education

Cambridge O Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

1122742869

COMPUTER SCIENCE **2210/13**

Paper 1 Theory **October/November 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 **Five** components are shown.

Tick (✓) to show whether each component is an example of input, output or storage.

Component	Input (✓)	Output (✓)	Storage (✓)
actuator			
register			
sensor			
mouse			
Digital Versatile Disc (DVD)			

[5]

2 **(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
	11110101
72	01110010
	11100101
245	00010101
15	00001111
	01001000

Working space

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[3]

(b) Binary values can be converted to hexadecimal values.

Give the hexadecimal value for the 16-bit binary value 0000100110101110

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Working space

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[3]

3 Jessica wants to store a large number of small thumbnail images on a USB flash memory drive. Each thumbnail image is 16-bit colour and is 100 pixels wide and 100 pixels high.

She has 5 MB of storage space available on her USB flash memory drive.

Calculate how many images she can store in the 5 MB of storage space. Show all your working.

100 x 100 x (16/8)

100 x 100 x 2

20000 Bytes / 1024 = 19.5 KiB

5 MiB x 1024 = 5120 KiB

same unit

available storage

5120 / 19.5 = 262.564

single image size

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Number of images 262

[4]

4 A company wants to manufacture a mobile phone.

(a) The company needs to decide which touch screen technology to use.

State **one** type of touch screen technology that you recommend the company use.

Justify your choice.

Touch screen type .....

Justification .....

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[4]

(b) The mobile phone uses Random Access Memory (RAM) and Read Only Memory (ROM).

RAM and ROM are both examples of the same type of storage.

Identify this type of storage and justify your answer.

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..... [2]

(c) The mobile phone has a USB port to allow a USB connection to a computer.

(i) Describe how data is transmitted using a USB connection.

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..... [2]

(ii) One benefit of a USB connection is that the cable can only be inserted into the port one way, so an incorrect connection cannot be made.

Give **three** other benefits of using a USB connection to connect a mobile phone to a computer.

Benefit 1 .....

.....

Benefit 2 .....

.....

Benefit 3 .....

.....

[3]

(d) When a user is reading a text on the mobile phone, they may also get a telephone call on the mobile phone. An interrupt signal is generated that results in an output to inform the user that a person is calling them.

Describe how the interrupt signal is processed to inform the user that a person is calling them.

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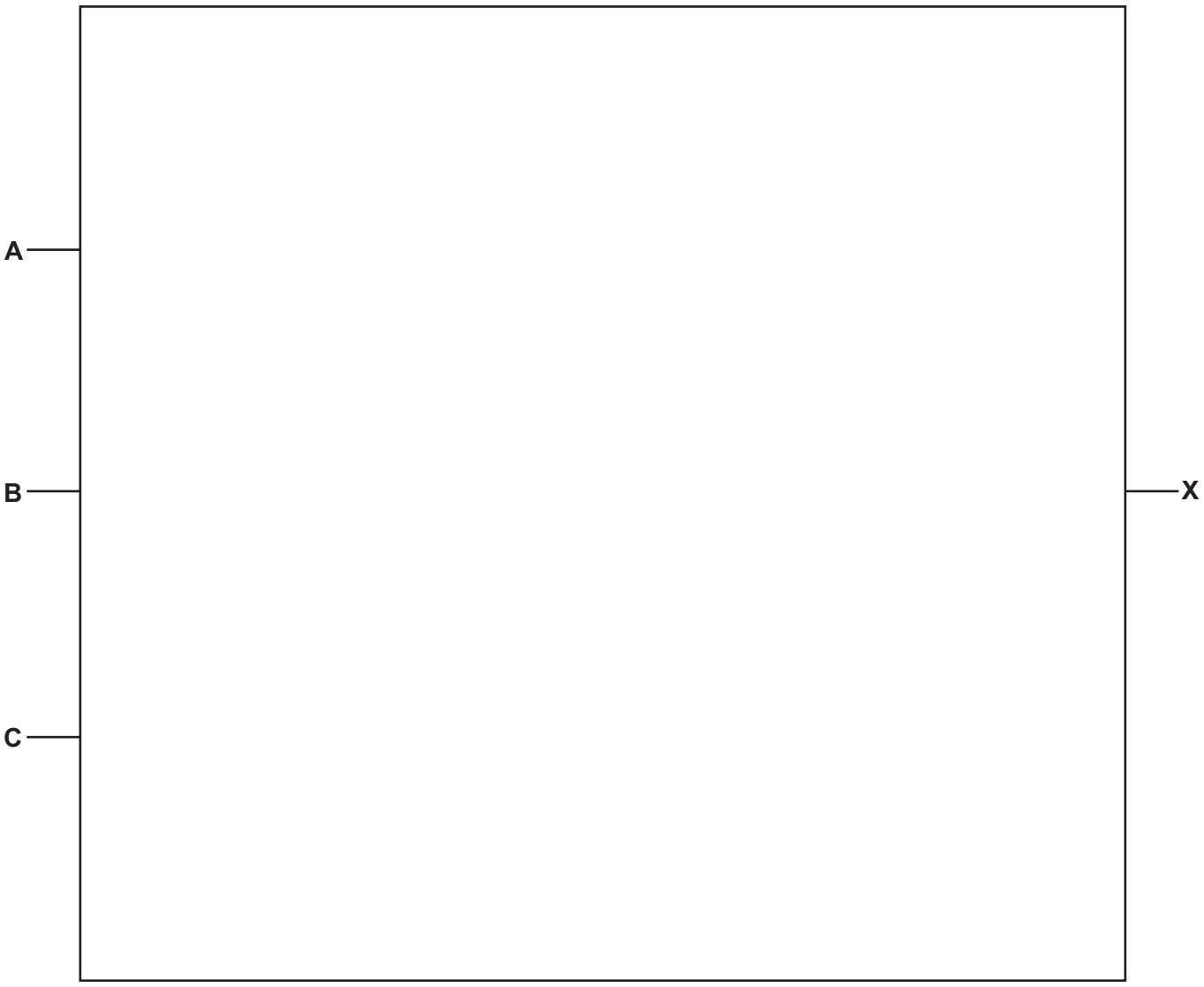
..... [4]

5 Consider the logic statement:

X = ((((**B** AND **C**) OR NOT **C**) NOR **B**) XOR 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) 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 museum has Quick Response (QR) codes that allow visitors to view videos for extra information about items in the museum.

The visitor is given a portable device with a display screen, that they can use to read each QR code.

(a) Describe how the QR code is read and processed to display the video for the visitor.

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..... [4]

(b) Tick (✓) to show whether the videos are MP3 files, MP4 files or MIDI files.

	Tick (✓)
MP3 files	☐
MP4 files	☐
MIDI files	☐

[1]

(c) The video files are compressed using lossy compression.

Give **two** benefits of using lossy compression to compress the video files.

Benefit 1 .....

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Benefit 2 .....

.....

[2]

(d) The portable device has a Light-Emitting Diode (LED) display screen to allow the visitor to watch a video.

Describe how the LED screen operates to display the video.

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..... [4]

7 The paragraph explains how an instruction is processed by the Central Processing Unit (CPU).

Complete the paragraph using the list of terms. **Not** all terms in the list need to be used.

- address bus
- Arithmetic Logic Unit (ALU)
- calculations
- data bus
- decoded
- execute
- fetched
- interrupt
- Memory Address Register (MAR)
- Memory Data Register (MDR)
- Program Counter (PC)
- protocol
- ROM
- stored

An instruction is ..... from RAM into the CPU, where it is temporarily stored in the ..... . The instruction is then sent along the ..... to the Control Unit (CU) to be ..... . The ..... will then perform any ..... and logic operations that are required to ..... the instruction.

[7]

8 A computer can have both a Media Access Control (MAC) address and an Internet Protocol (IP) address.

(a) Give **two** similarities between a MAC address and an IP address.

Similarity 1 .....

.....

Similarity 2 .....

.....

[2]

(b) Give **two** differences between a MAC address and an IP address.

Difference 1 .....

.....

Difference 2 .....

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[2]

9 A system uses parity checks and Automatic Repeat reQuests (ARQ) to detect and correct errors in the transmission of data.

Describe how parity checks and ARQ operate together to detect and correct errors.

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..... [6]

10 Mario has a website that he uses to sell his artwork.

(a) The website uses HTTPS to transmit data.

(i) Describe what is meant by HTTPS.

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..... [3]

(ii) One way a user can check a website uses HTTPS is to check whether the Uniform Resource Locator (URL) begins with HTTPS.

Give **one** other way a user can check if a website uses HTTPS.

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..... [1]

(b) There is a risk that people that use the Internet to access websites can have their stored data maliciously damaged.

State **three** ways that stored data can be maliciously damaged.

1 .....

2 .....

3 .....

[3]

Cambridge Assessment International Education

Cambridge O Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

COMPUTER SCIENCE **2210/11**

Paper 1 Theory **May/June 2021**

1 hour 45 minutes

You must answer on the question paper.

No additional materials are needed.

INSTRUCTIONS

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INFORMATION

- The total mark for this paper is 75.
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This document has **16** pages. Any blank pages are indicated.

DC (LO) 213859

[Turn over

1 Benedict has a computer that is assigned an Internet Protocol (IP) address. The IP address is:

198.167.214.0

The IP address is represented as denary values.

(a) Convert the denary values 167 and 214 from the IP address to 8-bit binary.

167								

214								

Working space

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..... [2]

(b) Benedict's computer is also assigned a Media Access Control (MAC) address.

(i) Identify **one** similarity between an IP address and a MAC address.

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..... [1]

(ii) Identify **two** differences between an IP address and a MAC address.

Difference 1 .....

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Difference 2 .....

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..... [2]

2 Julia inputs personal data into her computer.

She stores three copies of the data using a hard disk drive (HDD), a solid state drive (SSD) and a USB flash memory drive.

(a) Identify **three** devices Julia can use to input personal data into her computer.

Device 1 .....

Device 2 .....

Device 3 .....

[3]

(b) Six statements are shown about HDDs, SSDs and USB flash memory drives.

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

Statement	HDD (✓)	SSD (✓)	USB flash memory drive (✓)
it has no moving parts		✓	✓
it is non-volatile	✓	✓	✓
it can use NAND gates to store data		✓	✓
it uses magnetic properties to store data	✓		
it has the smallest physical size			✓
it has the slowest read/write speeds	✓		

[6]

(c) Julia uses a USB connection to transfer data onto her USB flash memory drive.

(i) One benefit of using a USB connection is that it is a universal connection.

State **two** other benefits of using a USB connection.

Benefit 1 .....

.....

Benefit 2 .....

.....

[2]

(ii) Identify the type of data transmission used in a USB connection.

– Serial –

..... [1]

3 A firewall can be used to help keep the data secure that is stored on a computer.

(a) The given paragraph describes how the firewall operates to help keep the data secure.

Complete the paragraph using the most appropriate terms from the given list. **Not** all of the terms on the list need to be used.

- Accept
- Criteria
- Hacking
- Input
- Network
- Outgoing
- Output
- Processor
- Reject
- Software
- Store
- Storage

A firewall can be ..... or hardware based. It monitors traffic between the computer and the ..... The user sets ..... for the traffic. The firewall will ..... or ..... the traffic based on this. It can help prevent ..... and malicious software that could be a threat to the security of the data.

[6]

(b) Identify **three** other methods that could be used to keep the data secure.

Method 1 .....

Method 2 .....

Method 3 .....

[3]

4 Two internet risks are phishing and pharming.

Describe what is meant by phishing and pharming.

Phishing .....

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Pharming .....

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[6]

5 Jamelia has a greenhouse that she uses to grow fruit and vegetables. She needs to make sure the temperature in the greenhouse stays between 25 °C and 30 °C (inclusive).

A system that has a temperature sensor and a microprocessor is used to maintain the temperature in the greenhouse. The system will:

- open a window and turn a heater off if it gets too hot
- close a window and turn a heater on if it gets too cold.

Describe how the system uses the temperature sensor and the microprocessor to maintain the temperature in the greenhouse.

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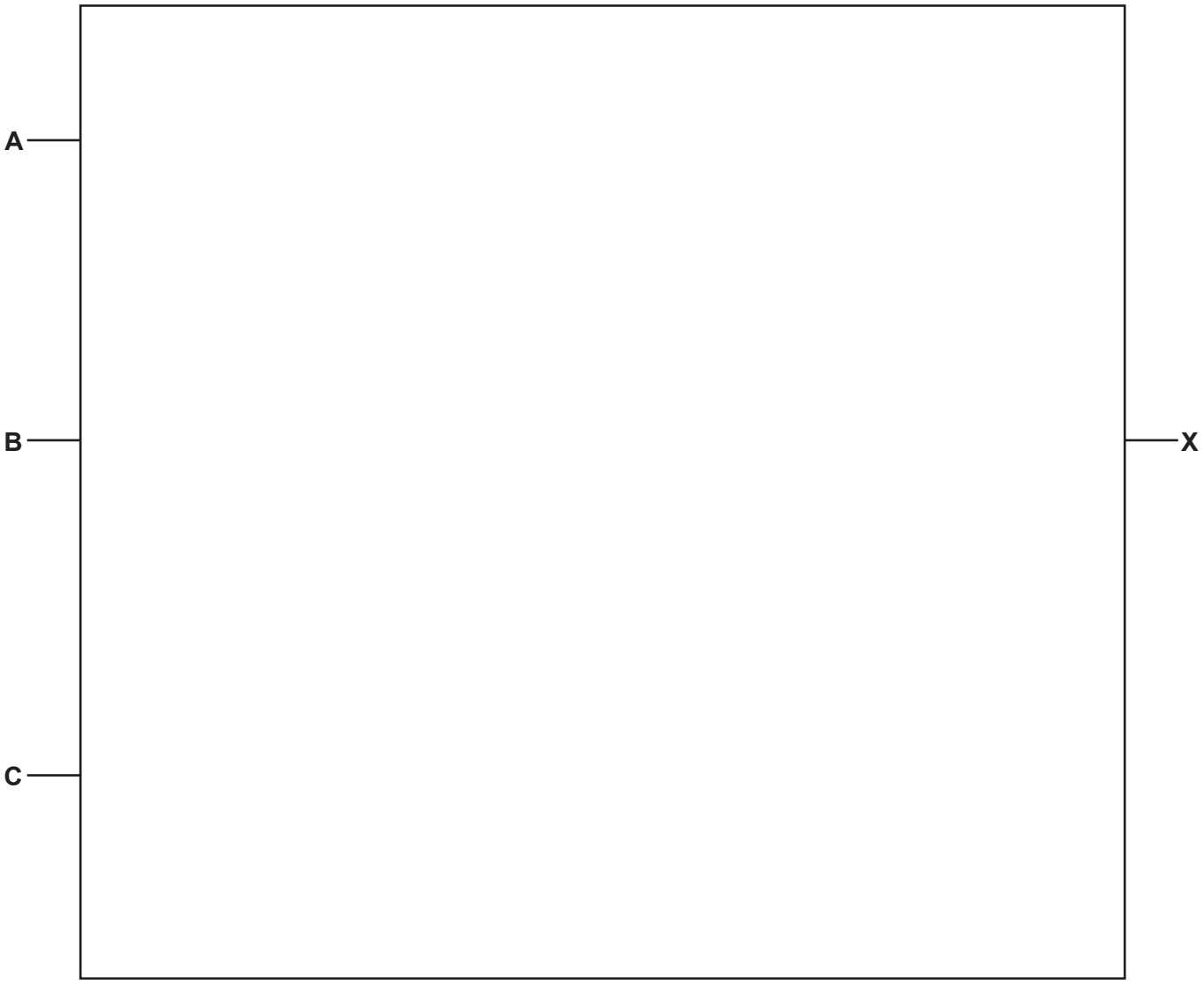
..... [8]

6 Consider the logic statement:

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

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

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



[6]

(b) Consider the completed truth table for the given logic statement.

Row number	**A**	**B**	**C**	Working space	**X**
1	0	0	0		**0**
2	0	0	1		**1**
3	0	1	0		**0**
4	0	1	1		**1**
5	1	0	0		**0**
6	1	0	1		**1**
7	1	1	0		**0**
8	1	1	1		**1**

There are four errors in the truth table in the output (X) column.

Identify the **four** incorrect outputs.

Write the row number to identify each incorrect output.

Row .....

Row .....

Row .....

Row .....

[4]

7 A music company has a website that allows users to stream music. The music is stored in sound files.

(a) The sound files are compressed using lossless compression.

(i) Describe how the sound files are compressed using lossless compression.

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..... [4]

(ii) State **one** reason why the music company would compress the sound files using lossless, rather than lossy, compression.

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..... [1]

(iii) Give **one** benefit, to the user, of the music company compressing the sound files.

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..... [1]

(iv) Give **one** drawback of the music company using lossless, rather than lossy, compression for the sound files.

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..... [2]

(b) Describe how the web pages for the website are requested and displayed on a user's computer.

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..... [4]

(c) The web server that hosts the website suffers a denial of service (DoS) attack.

Explain why this will prevent users from accessing the website.

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..... [2]

8 Four 7-bit binary values are transmitted from one computer to another. A parity bit is added to each binary value creating 8-bit binary values. All the binary values are transmitted and received correctly.

(a) Identify whether each 8-bit binary value has been sent using odd or even parity by writing odd or even in the type of parity column.

8-bit binary value	Type of parity
01100100	
10010001	
00000011	
10110010	

[4]

(b) An error may **not** be detected when using a parity check.

Identify why an error may **not** be detected.

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..... [1]

(c) The data is sent using parallel half-duplex data transmission.

(i) Describe how data is sent using parallel half-duplex data transmission.

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..... [4]

(ii) State **two** drawbacks of using parallel data transmission.

Drawback 1 .....

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Drawback 2 .....

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[2]

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