Cambridge Assessment International Education

Cambridge O Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

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.
- 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.

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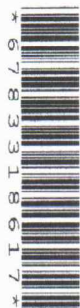
1 Tina is creating a website for charity events. She uses HTML to create the website.

(a) State what is meant by HTML.

Hyper Text Markup Language. *This is a language used to create webpages* .... [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.

presentation. .... [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	0	1	0	0	0	0	1	1
B7	1	0	1	1	0	1	1	1
F0	1	1	1	1	0	0	0	0

[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.

Microphone is an input 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 ...... Lossy compression ......

Description

...... This compression type uses an algorithm that removes parts of the file that can't be heard.

It does this by reducing the bit rate and sampling resolution.

Once the file has been compressed using this method it can't be constructed back to its original form ...... [4]

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

Benefit 1 ...... It saves the loading time of the webpage ......

Benefit 2 ...... Quicker to download a small size file ......

[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 ...... handshake protocol ....

Layer 2 ...... Record protocol ....

[2]

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

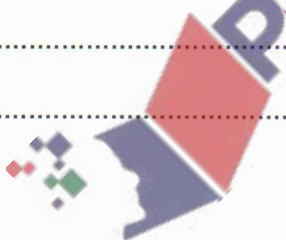A browser will request the server to identify itself.

The server will send back its SSL or digital certificate.

The certificate is confirmed via a certification Authority.

If the certificate is valid then a signal to begin transmission is initiated.

The transmission is encrypted at this point.

Session caching is used.

[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 *Hacking*

2 *Denial of Service*

3 *Viruses*

[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.

The proxy server can be set up to block all unwanted traffic to the network. It can be used to log all incoming and outgoing traffic for later scrutiny. It can control the number of requests so it can stop a denial of service attack

[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.

Checksum error checking method involves a data value calculated from the data being sent.
A value is calculated by the sender of the data. The data and this value are sent to the receiver. The receiver recalculates the value again. The receiver will compare his value with the received one. If they are the same then the data was transmitted correctly. If they are different, then there was an error. [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 Loss of power when work has not yet been saved

2 Accidental deletion of data

3 Software failure

[3]

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

Consistent/Regular backups of the data to [1]
an external hard drive or media

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

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

SSD means Solid State Drive
This is a non-volatile type of memory meaning
even if the power is cut off it will still retain
most of its information. It is a secondary storage
device made up of Nand flash memory.
Data is stored by controlling the flow of electrons
through the transistors/gates.

[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:

$$X = (((A \text{ NAND } B) \text{ NOR } (B \text{ AND } C)) \text{ OR } C)$$

(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.
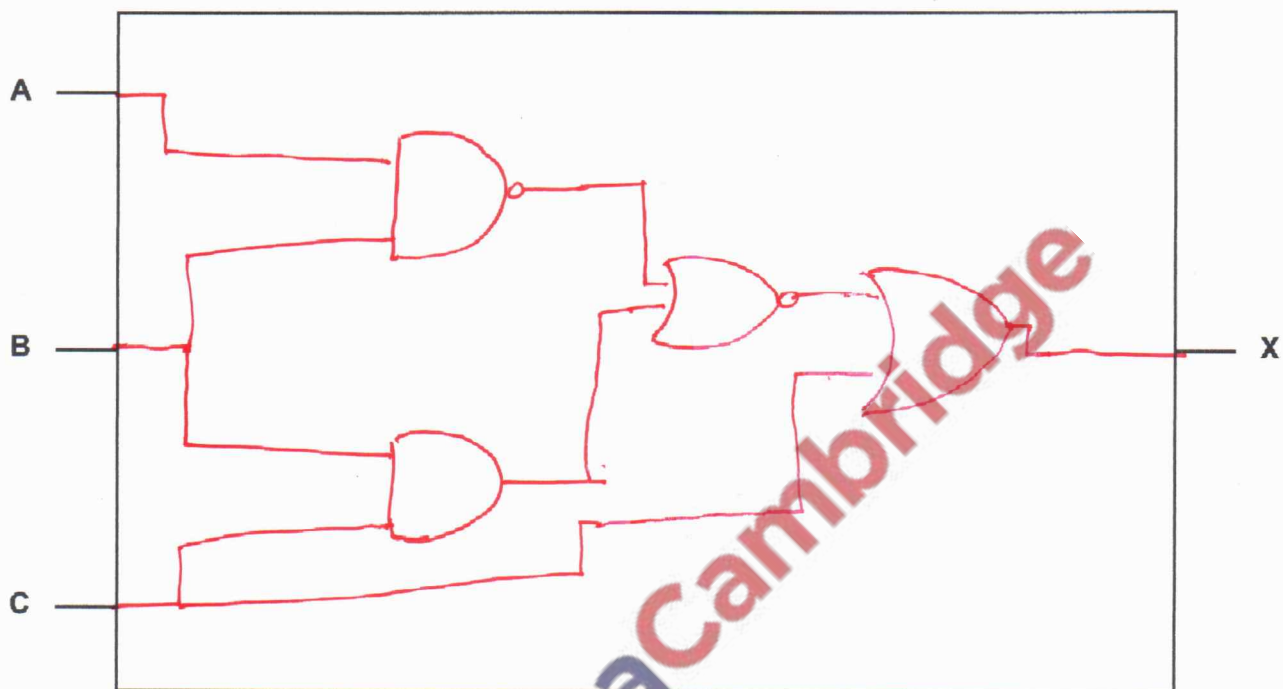
[4]

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

| A	B	C	Working space	X
0	0	0		6
0	0	1		1
0	1	0		0
0	1	1		1
1	0	0		0
1	0	1		1
1	1	0		1
1	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]
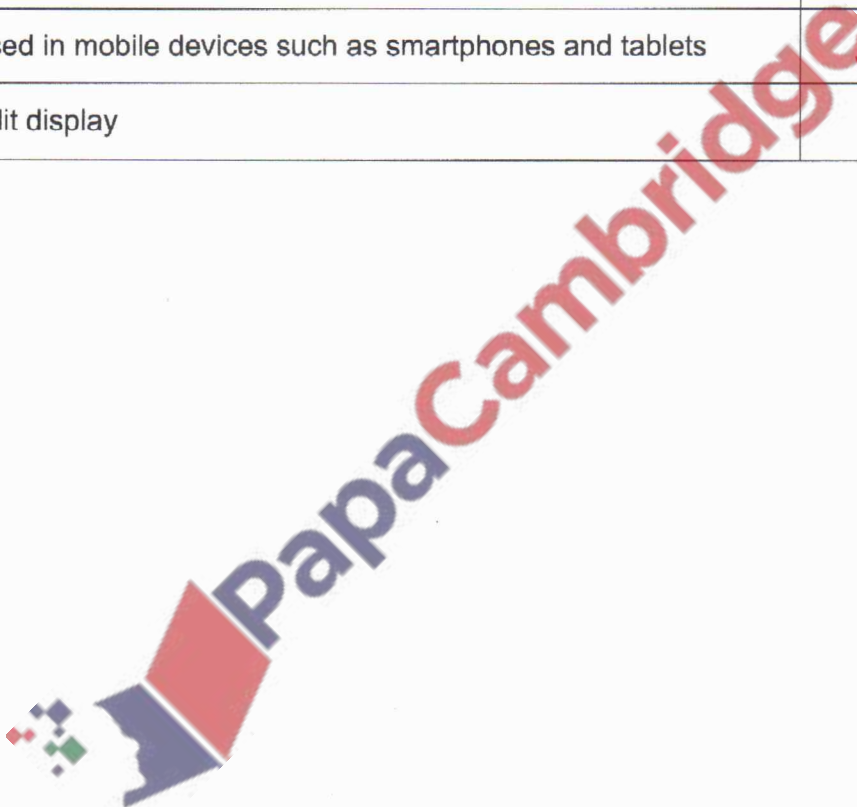
(b) Tammy connects the computer to her home network. The computer has a MAC address and an IP address.

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.

..........The browser is a software application that enables Tammy to view web pages. Tammy would type in the URL of the desired webpage. The request is sent to the server. The server returns the HTML of the webpage. The browser interprets this code to a form that the user can understand. [4]