1. Nov/2021/Paper_11/No.2

   Magda has a mobile telephone.

   She uses the touch screen on her telephone to send emails to her customers. The touch screen breaks, stopping Magda from using it to type her emails.

   (a) Identify **one** other input device that would be built into the mobile telephone that Magda could use to send an email to her customers.

   .... [1]

   (b) The touch screen operates by using the conductive properties of the object that is used to touch the screen.
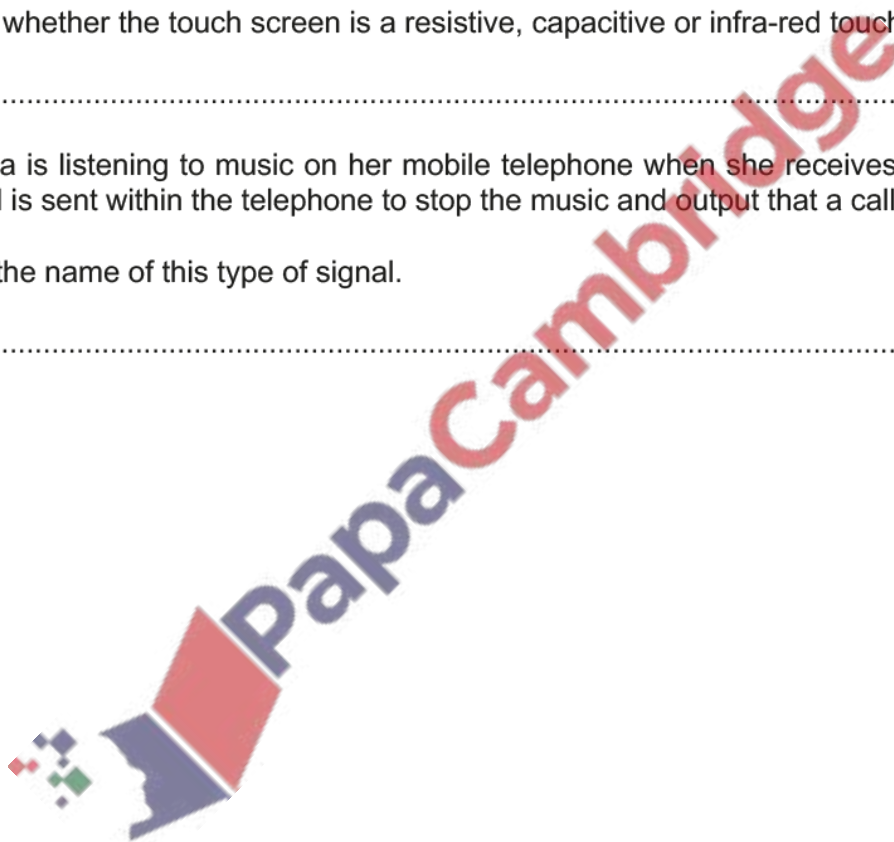
   State whether the touch screen is a resistive, capacitive or infra-red touch screen.

   .... [1]

   (c) Magda is listening to music on her mobile telephone when she receives a telephone call. A signal is sent within the telephone to stop the music and output that a call has been received.

   Give the name of this type of signal.

   .... [1]

Six statements are given about the role of components in the Central Processing Unit (CPU).

(a) Tick (✓) to show whether each statement applies to the Memory Address Register (MAR), Memory Data Register (MDR) or Program Counter (PC).

Some statements may apply to more than one component.

Statement	MAR (✓)	MDR (✓)	PC (✓)
it is a register in the CPU			
it holds the address of the next instruction to be processed			
it holds the address of the data that is about to be fetched from memory			
it holds the data that has been fetched from memory			
it receives signals from the control unit			
it uses the address bus to send an address to another component			

[6]

(b) Identify the component in the CPU that carries out calculations.

.... [1]

(a) Tick (✓) **one** box to identify if an internal Solid State Drive (SSD) is an example of primary, secondary or off-line storage. Justify your choice.

Tick (✓)

☐ Primary

☐ Secondary

☐ Off-line

Justification ....

....

....

....

[3]

(b) Describe the operation of an SSD and how it stores data.

....

....

....

....

....

....

....

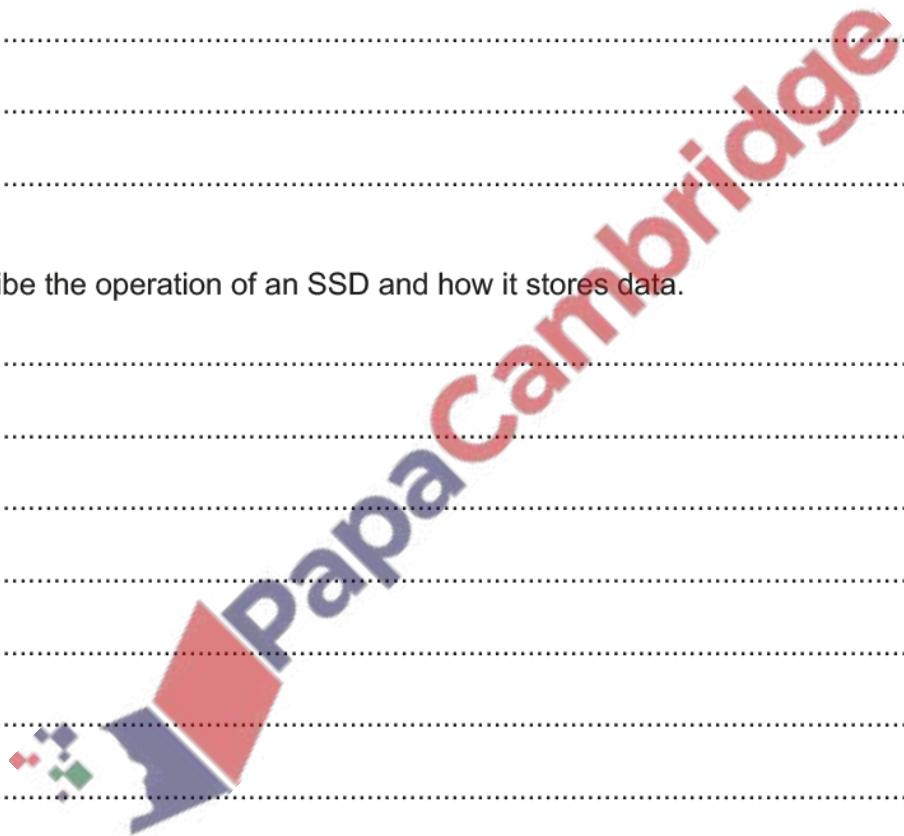.. [4]
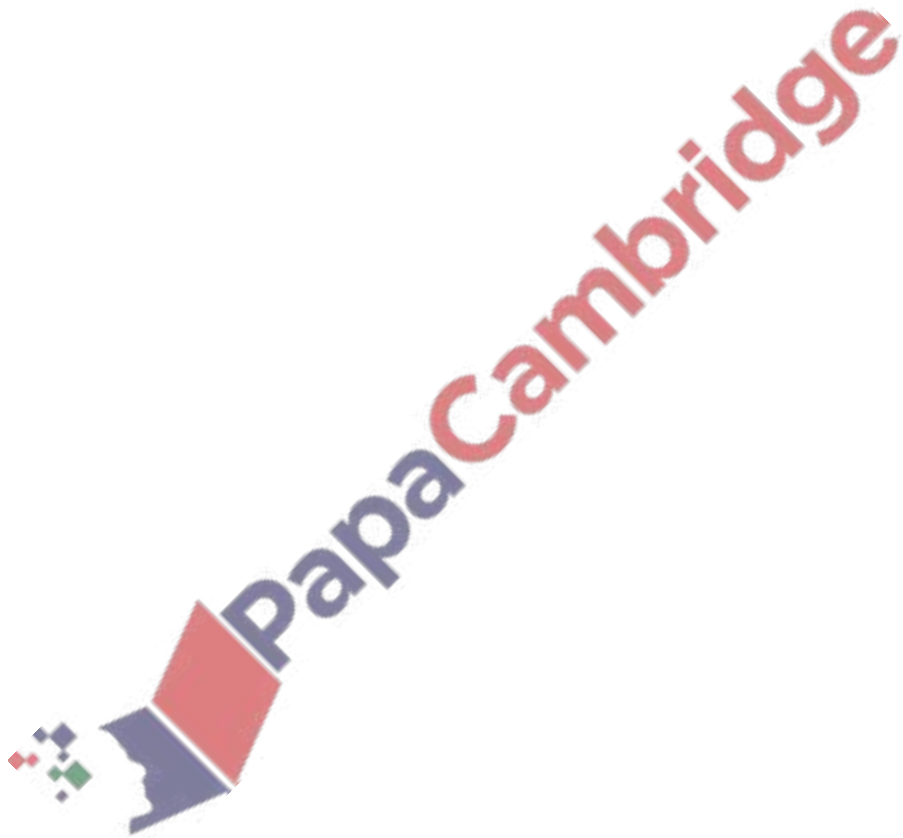
4.

Consider the following logic statement:

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

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

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

A————

B————X

C————

[5]

(b) State the name of a logic gate that does **not** appear in the logic statement and draw the symbol for the logic gate.

Name of logic gate ....   Logic gate symbol:

[2]

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

A	B	C	Working space	X
0	0	0		
0	0	1		
0	1	0		
0	1	1		
1	0	0		
1	0	1		
1	1	0		
1	1	1		

[4]

5. Nov/2021/Paper_12/No.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]

6. Nov/2021/Paper_12/No.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]

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.

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]
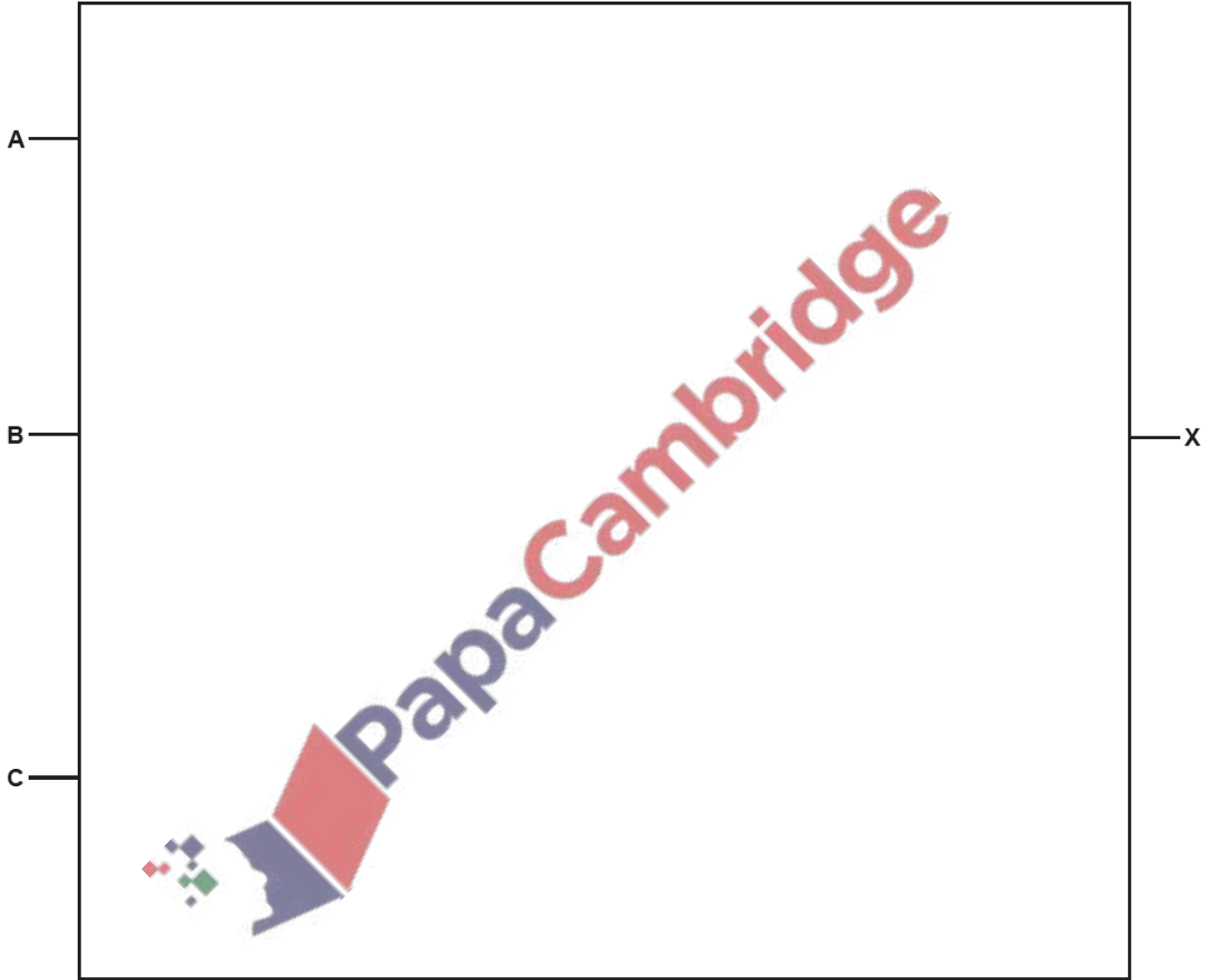
Consider the following logic statement:

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

(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.

A ————

B ———————————————————————————————— X

C ————

[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]

10

10.
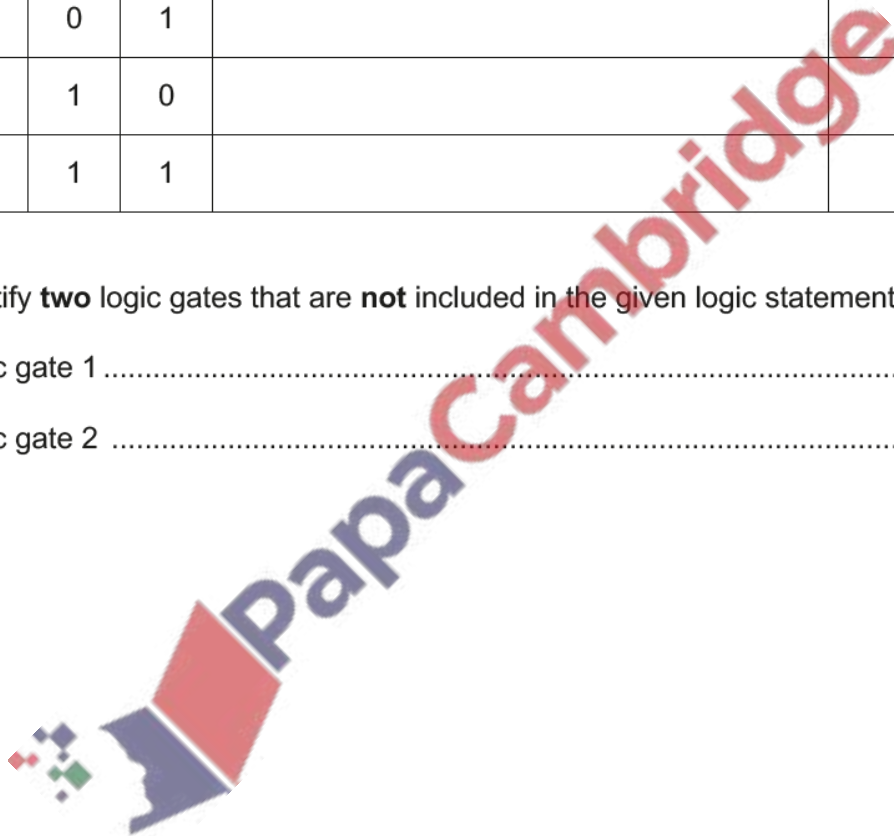
Frederick prints a document that he has typed.

The printer begins to print the document, but then a message is displayed on Frederick's computer to say that the paper has jammed.

(a) Describe the role of an interrupt in generating a message on the computer that the paper has jammed.

....

....

....

....

....

....

....

.... [4]

(b) Give **two** other examples of when an interrupt signal could be generated.

1 ....

2 ....

[2]

(c) The type of data transmission between the computer and the printer is serial half-duplex data transmission.

(i) Describe how data is transmitted using serial half-duplex data transmission.
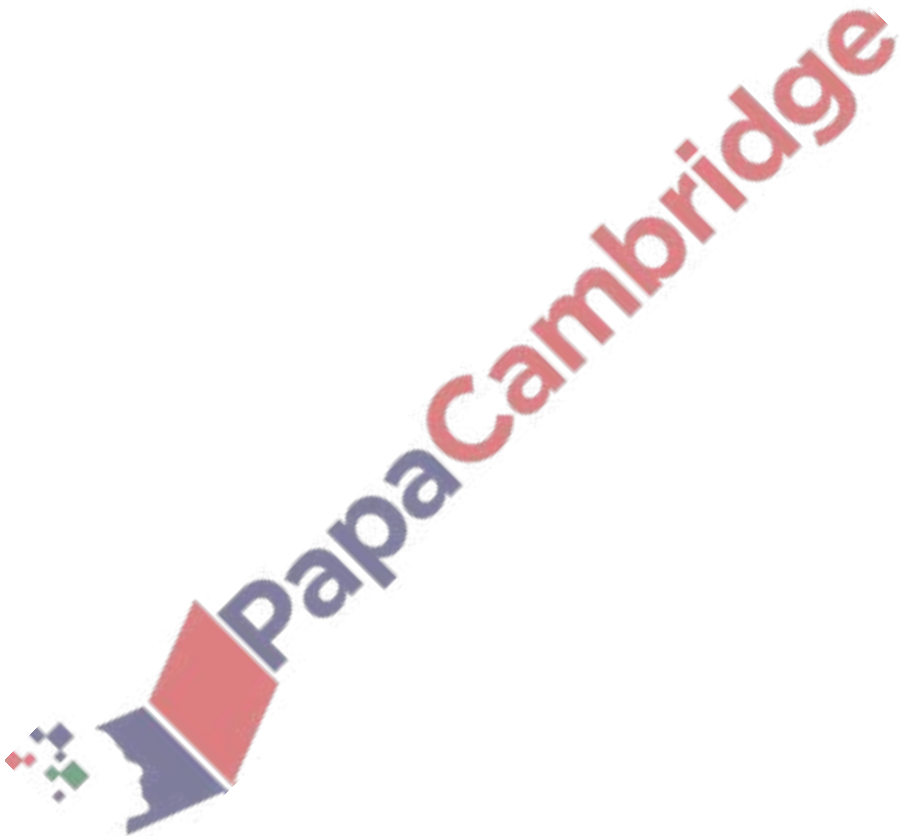
....

....

....

....

....

....

....

.... [4]

(ii) Explain why the data transmission needs to be half-duplex rather than simplex.

....

....

....

.... [2]

In a Von Neumann model for a computer system, a Central Processing Unit (CPU) contains a number of different components.

The table contains the name of a component or a description of their role in the fetch-execute cycle.

Complete the table with the missing component names and descriptions.

Component name	Description
Memory Address Register (MAR)	....
Program Counter (PC)	....
....	This is a register that is built into the arithmetic logic unit. It temporarily holds the result of a calculation.
....	This is a register that holds data or an instruction that has been fetched from memory.
Control Unit (CU)	....
....	This carries addresses around the CPU.

[6]

12.

The paragraph describes an MP3 file, MP4 file and a MIDI file.

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

- can
- cannot
- compressed
- image
- microphone
- MIDI
- MP3
- MP4
- notes
- pixels
- speaker
- should
- uncompressed

.... files are a multimedia format that stores video and audio.

.... files are only used as a digital recording of sound; they

are created using a .... and recording software. The data in

the file is ....

.... files contain instructions on how to create the

sound. They are created using digital instruments. The file stores individual

...., each **one** .... be

changed in this type of file.

[7]

Nov/2021/Paper_13/No.8

Consider the following logic statement:

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

(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]

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

....

....

....

....

[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.

....

.... [1]

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

Difference 1 ....

....

....

Difference 2 ....

....

....

[2]

15.

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.

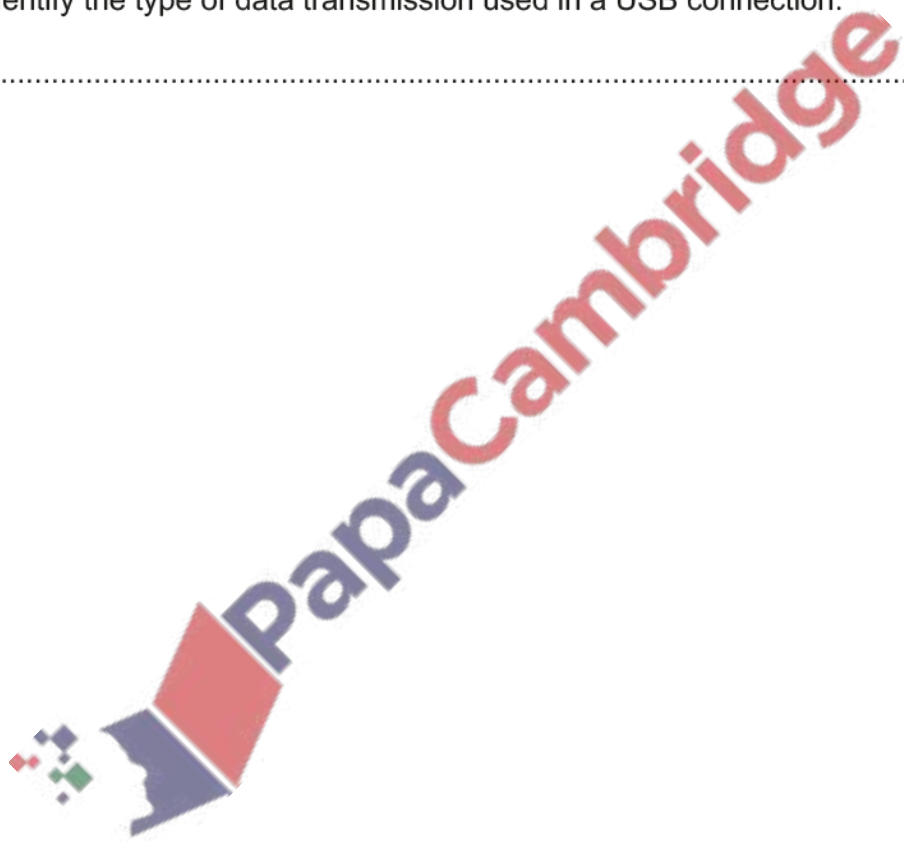State **two** other benefits of using a USB connection.

Benefit 1 ....

....

Benefit 2 ....

....

[2]

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

.... [1]

Consider the logic statement:

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

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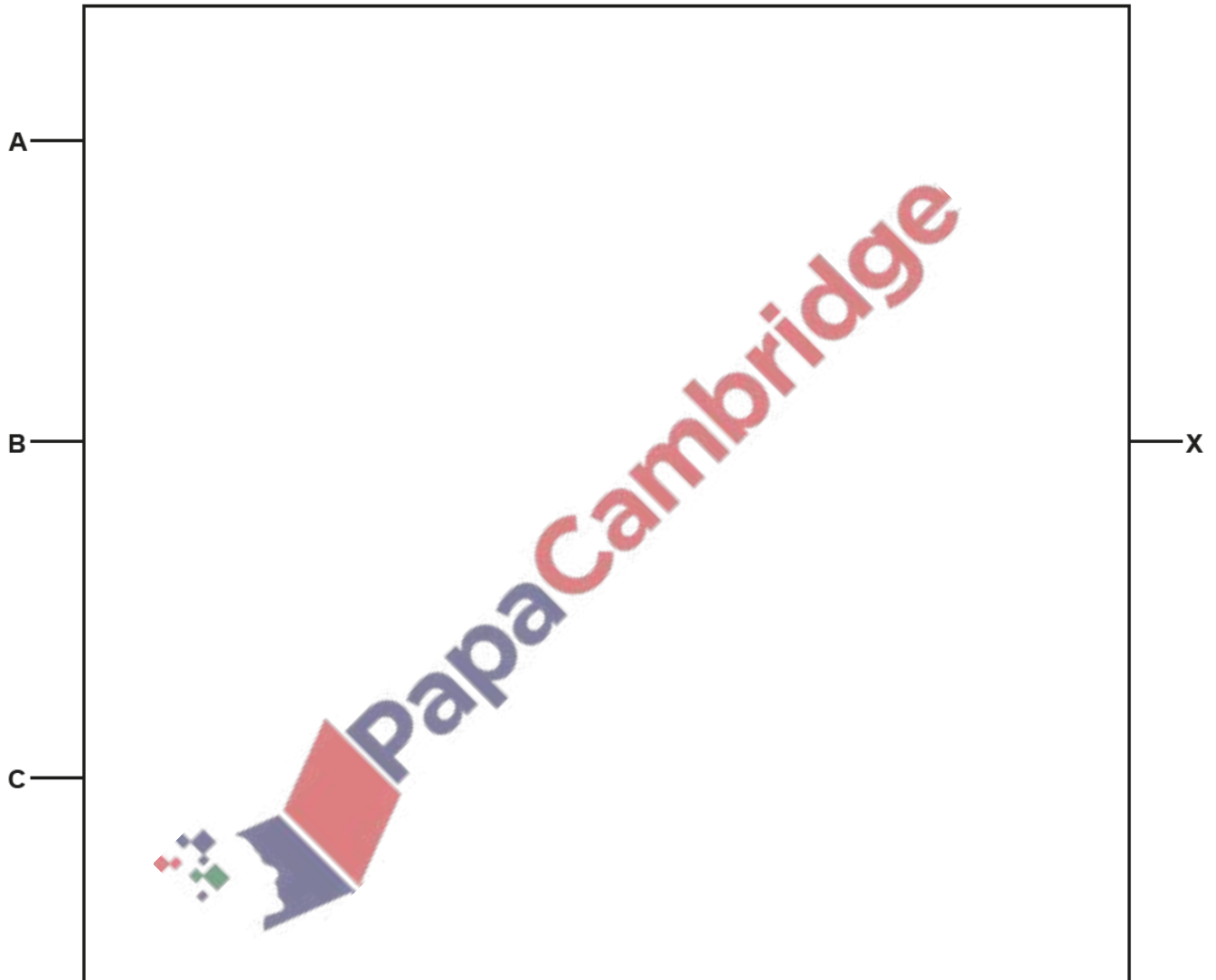
(b) Consider the completed truth table for the given logic statement.

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.
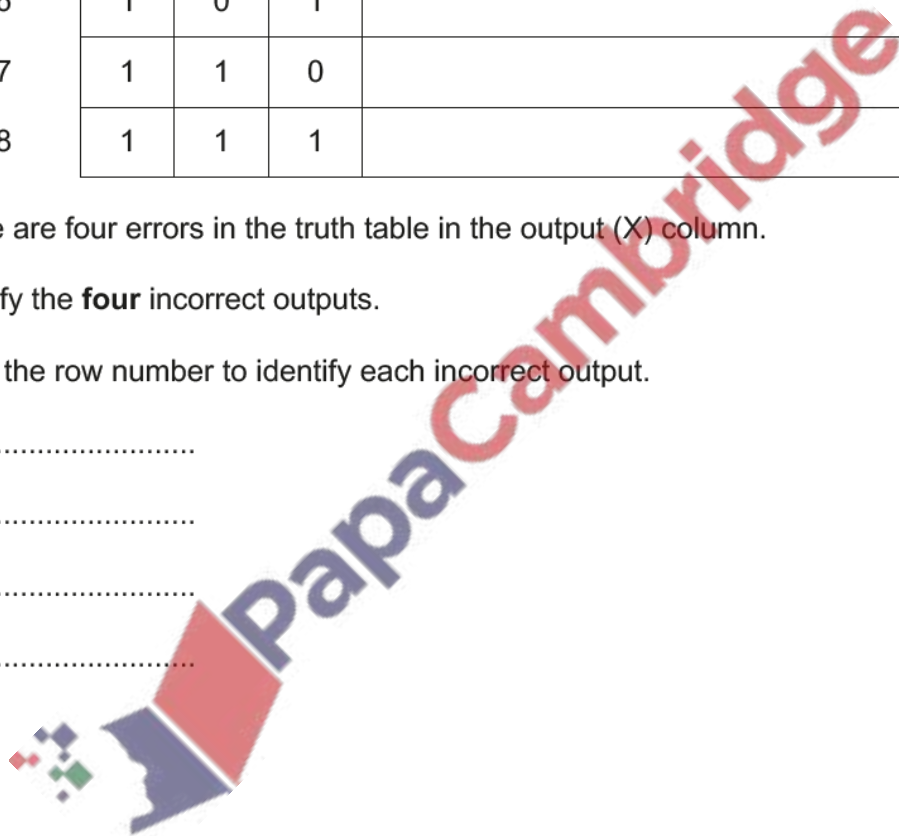
Identify the **four** incorrect outputs.

Write the row number to identify each incorrect output.

Row ....

Row ....

Row ....

Row ....

[4]

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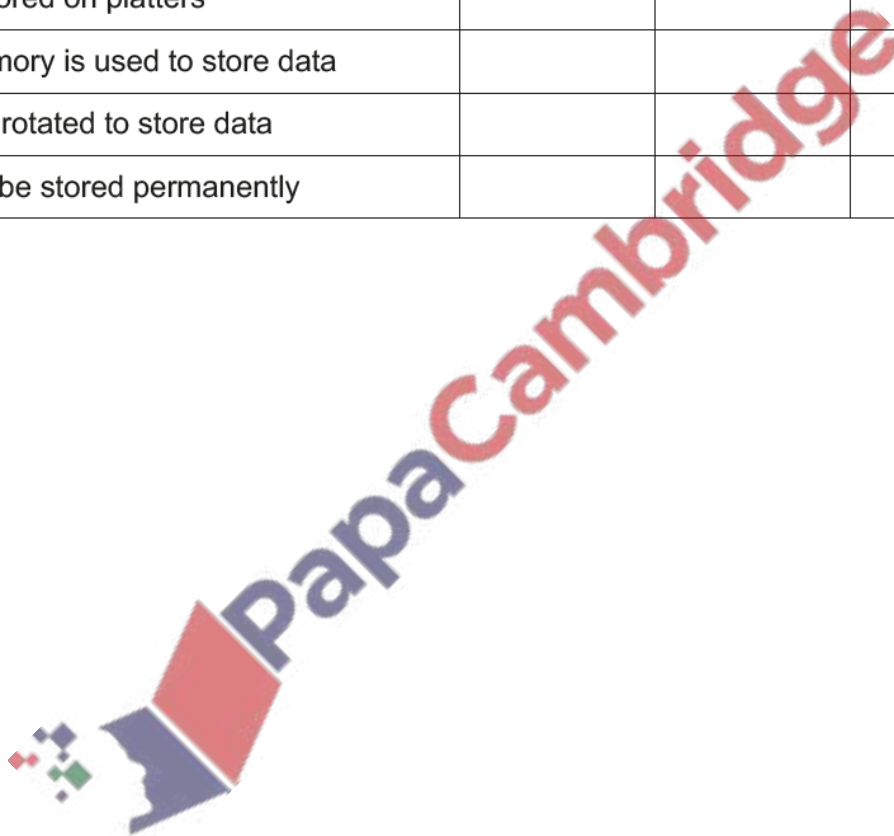
(b) (i) Give **one** example of magnetic storage.

.... [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.

....

....

....

....

....

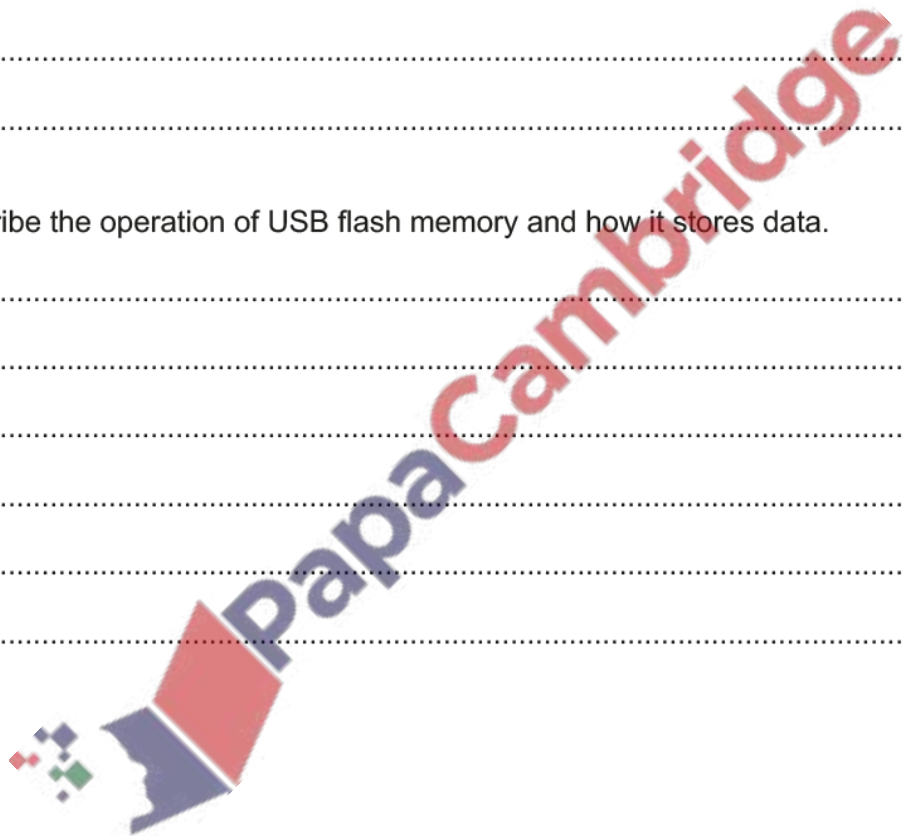... [3]
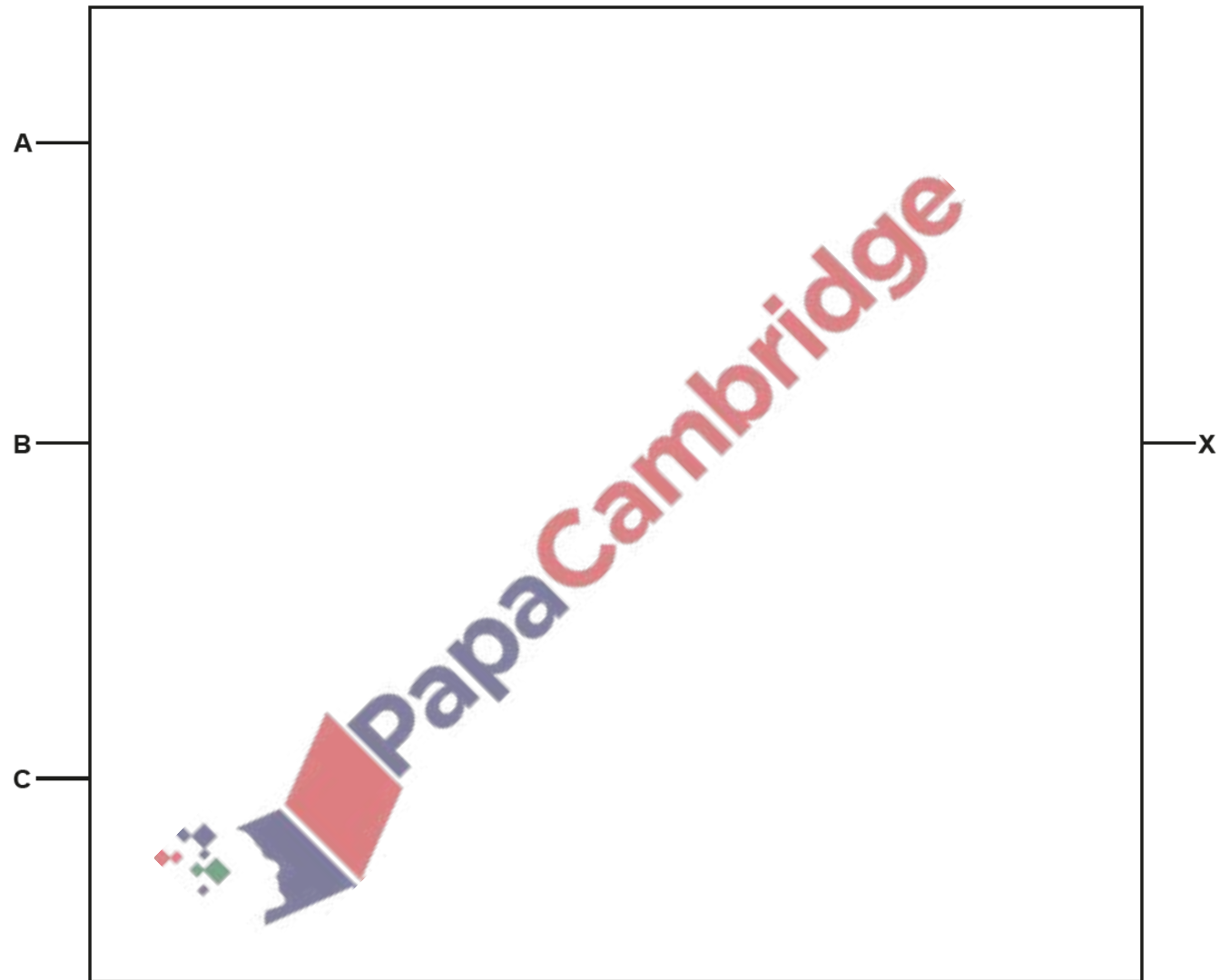
Consider the logic statement:

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

(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.

A—

B—   —X

C—

[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.
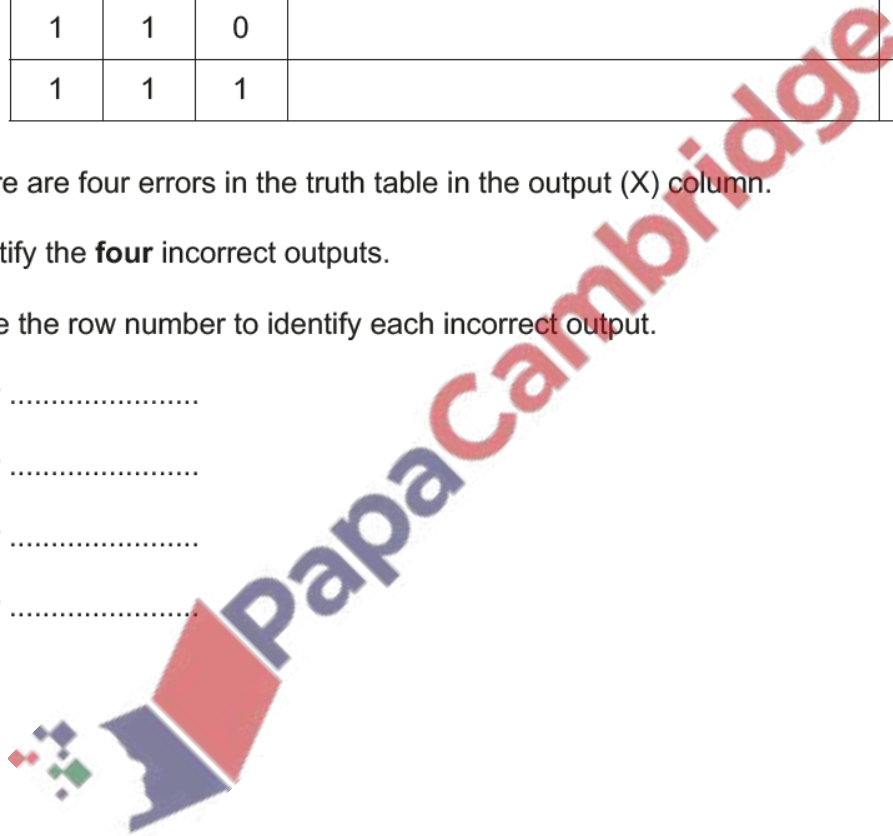
Identify the **four** incorrect outputs.

Write the row number to identify each incorrect output.

Row ....

Row ....

Row ....

Row ....

[4]

19.

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]

20.

Greta has a computer that she uses for schoolwork and leisure.

(a) The computer has the Media Access Control (MAC) address:

00:A0:C9:14:C8:29

(i) Tick (✓) to show whether the MAC address is initially assigned to the computer by the network, the manufacturer or the user.

Tick (✓)

Network ☐

Manufacturer ☐

User ☐

[1]

(ii) The values in the MAC address are hexadecimal values.

Convert the **three** given hexadecimal values into 8-bit binary.

14 ....

A0 ....

C9 ....

[3]

Working space

....

....

....

(iii) Convert the **two** given hexadecimal values into denary.

29 ....

C8 ....

[2]

Working space

....

....

....

(b) Greta stores data on several off-line storage devices, including an external hard disk drive (HDD), a USB flash memory drive and a compact disc (CD).

(i) Identify the type of storage for each device.

External HDD ....

USB flash memory drive ....

CD ....

[3]

(ii) Describe the operation of a HDD and how it stores data.

....

....

....

....

....

....

....

.... [4]

21. June/2021/Paper_13/No.1b

An optical mouse is a type of input device that can be used to input data into a computer system.

(a) Complete the paragraph about the operation of an optical mouse, using the most appropriate terms from the given list. **Not** all terms need to be used.

- Ball
- Battery
- LCD
- LED
- Lens
- Magnifies
- Matrix
- Microswitch
- Photoelectric
- Photographic
- Reduces
- USB

An optical mouse shines an .... from the bottom of the mouse onto a

surface. Light bounces straight back from the surface into a .... cell.

This has a .... that .... the reflected light to

allow detection of smaller movements. When a button on the mouse is clicked, a

.... is pressed. A .... connection is used to

carry the data to the computer.

[6]

(b) Identify **two** other input devices that can be used to enter data into a computer.

1 ....

2 ....
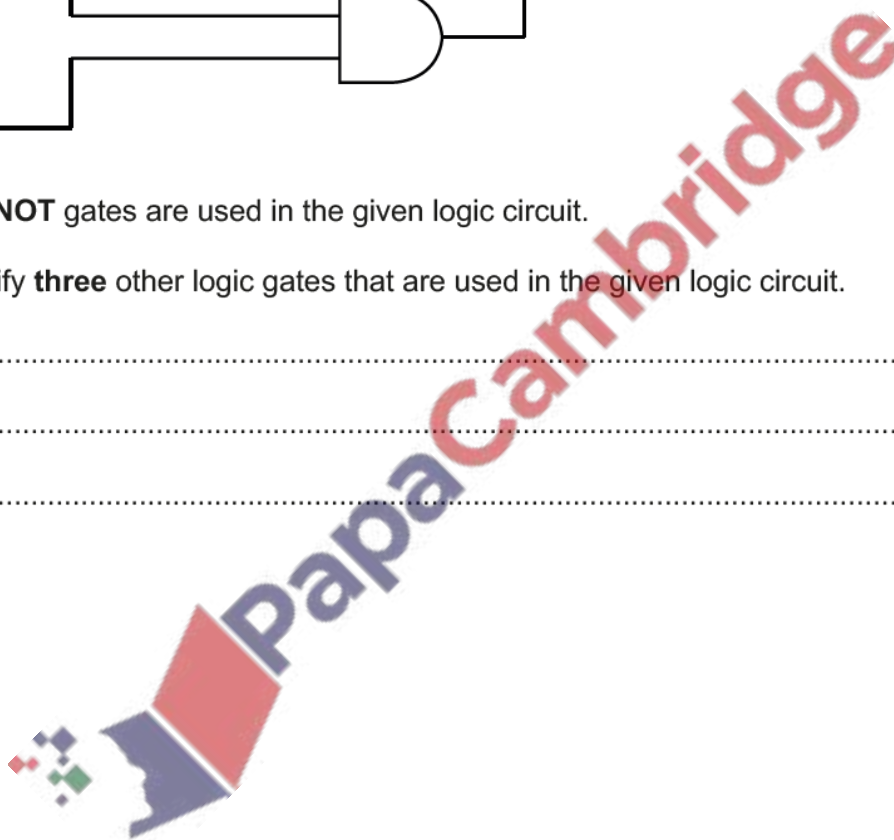
[2]

22.

Consider the following logic circuit:
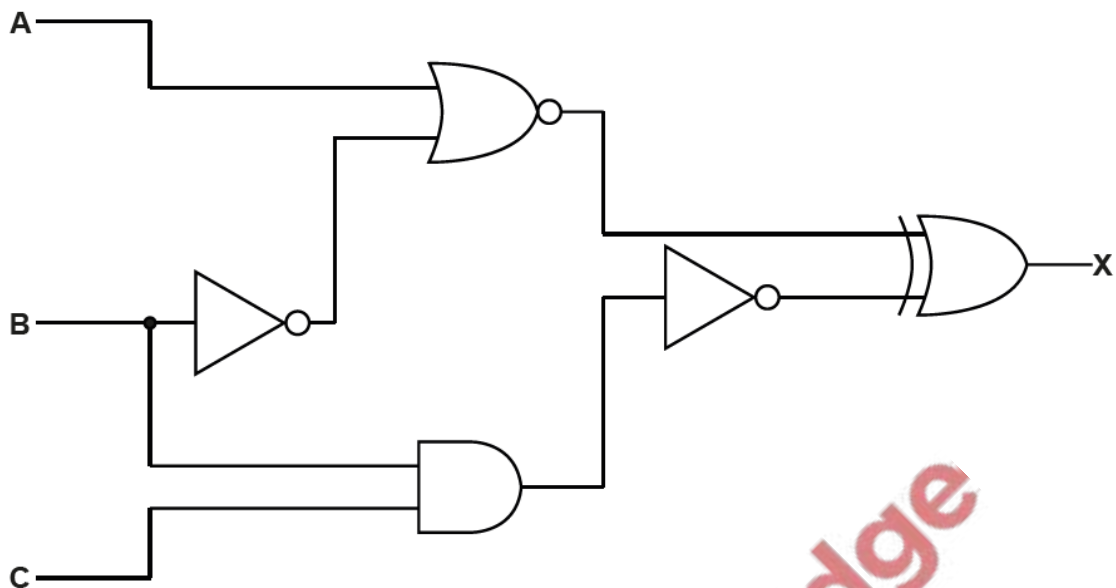
(a) Two **NOT** gates are used in the given logic circuit.

Identify **three** other logic gates that are used in the given logic circuit.

1 ....

2 ....

3 ....

[3]

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

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		0
5	1	0	0		1
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.
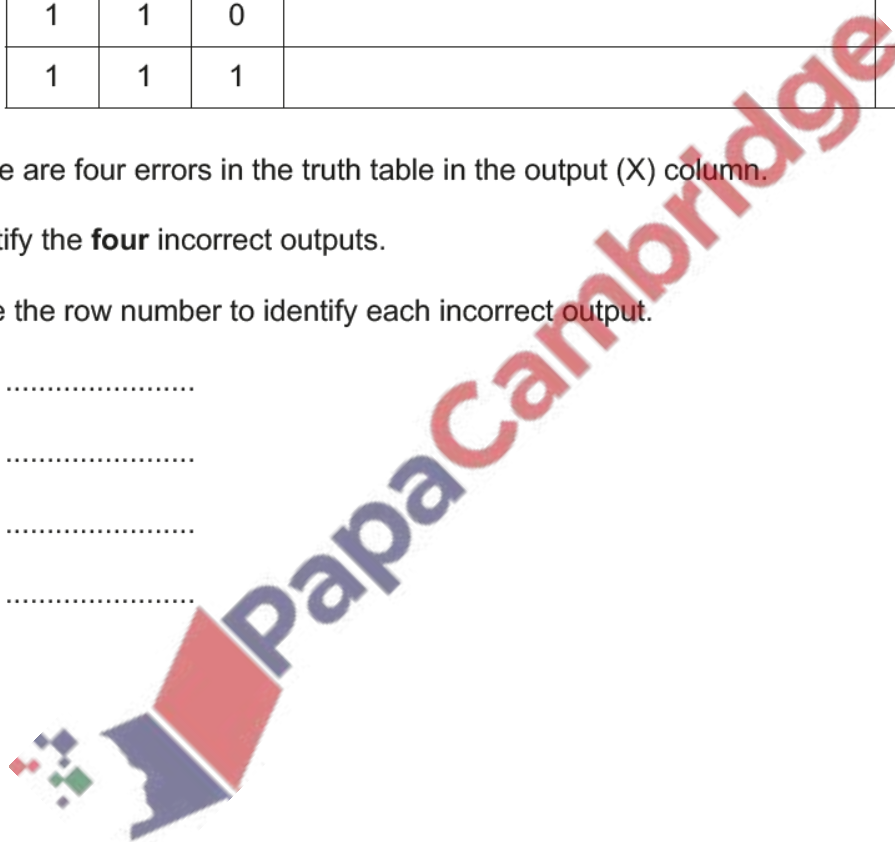
Identify the **four** incorrect outputs.

Write the row number to identify each incorrect output.

Row ....

Row ....

Row ....

Row ....

[4]

23.

Several components are involved in processing an instruction in a Von Neumann model for a computer system.

Three of these components are the arithmetic logic unit (ALU), control unit (CU) and random access memory (RAM).

(a) Six statements are given about the components.

Tick (✓) to show if each statement applies to the ALU, CU or the RAM. Some statements may apply to more than one component.

Statement	ALU (✓)	CU (✓)	RAM (✓)
stores data and instructions before they enter the central processing unit (CPU)			
contains a register called the accumulator			
manages the transmission of data and instructions to the correct components			
contained within the CPU			
uses the data bus to send data into or out of the CPU			
carries out calculations on data			

[6]

(b) The accumulator is a register that is part of the Von Neumann model.

Give **two** other registers that are part of the Von Neumann model.

1 ....

2 ....

[2]