5 Kiara has a washing machine and a refrigerator.

(a) She has an embedded system in her washing machine.

Describe what is meant by an **embedded system**, using the washing machine as an example.

....

....

....

.... [2]

(b) The washing machine's embedded system makes use of both Random Access Memory (RAM) and Read Only Memory (ROM).

State the purpose of RAM and ROM within the washing machine's embedded system.

RAM ....

....

ROM ....

....
[2]

(c) The temperature in her refrigerator must be kept between 4 and 6 degrees Celsius.

The microprocessor in the refrigerator turns on the cooling if the temperature is too high, and turns off the cooling if the temperature is too low.

Explain why the system in the refrigerator is a control and not a monitoring system.

....

....

....

....

....

.... [2]

9608/11 Jun 18 Q4

4 (a) An alarm system (X) is enabled and disabled using either a switch (A) or a remote control (B). There are **two** infra-red sensors (C, D) and **one** door pressure sensor (E).

Parameter	Description of parameter	Binary value	Condition
A	Switch	1	Switch enabled
A	Switch	0	Switch disabled
B	Remote control	1	Remote enabled
B	Remote control	0	Remote disabled
C	Infra-red sensor	1	Activated
C	Infra-red sensor	0	Not activated
D	Infra-red sensor	1	Activated
D	Infra-red sensor	0	Not activated
E	Door pressure sensor	1	Activated
E	Door pressure sensor	0	Not activated

The alarm sounds (X = 1) if the alarm is enabled **and** any one or more of the sensors is activated.

Draw a logic circuit to represent the alarm system.

A ——

B ——

C ——   X

D ——

E ——

[3]

(b) Complete the truth table for the logic expression: **X** = **A** OR (**B** XOR **C**)

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]

9608/11 Jun 18 Q7

7 A student plays computer games on a games console.

(a) Identify **two** input devices and **one** output device used in a games console.

Input device 1 ....

Input device 2 ....

Output   device ....[3]

(b) The games console has random access memory (RAM) and read only memory (ROM).

(i) State **two** differences between RAM and ROM.

Difference 1 ....

....

Difference 2 ....

....[2]

(ii) Give **one** use for RAM in the games console.

....

....[1]

(iii) Give **one** use for ROM in the games console.

....

....[1]

9608/11 Jun 17 Q2

2   (a)   (i)   The following sequence of steps (1 to 7) describe how a single page is printed on a laser printer.

The statements A, B, C and D are used to complete the sequence.

A	The paper passes through a fuser, which heats up the paper. The toner melts and forms a permanent image on the paper.
B	The electrical charge is removed from the drum and the excess toner is collected.
C	The image is converted on the drum into an electrostatic charge.
D	The oppositely-charged paper picks up the toner particles from the drum. After picking up the toner, the paper is discharged to stop it clinging to the drum.

Complete the sequence by writing one of the letters **A**, **B**, **C** or **D** on the appropriate row.

1.   A laser beam and a rotating mirror are used to draw an image of the page on the photosensitive drum.

2.   ....

3.   Electrostatic charge attracts toner.

4.   The charged paper is rolled against the drum.

5.   ....

6.   ....

7.   ....   [3]

(ii)   A computer user has a laser printer to print letters and documents. The user also prints digital photographs taken using a digital camera.

State the most suitable type of printer for printing the photographs.

....[1]

(b)   The user is considering the purchase of a new laptop computer. She has read many product reviews and knows that there are different types of internal secondary storage available.

List **two** options for internal secondary storage.

Option 1 ....

Option 2 ....

Describe **one** advantage of one of the options.

Advantage of choosing option 1 / 2 *(circle)*

....

.... [3]

9608/12 Jun 18 Q2

2   (a) A greenhouse control system has four input parameters (H, D, T, W) and two outputs (X, Y).

Parameter	Description of parameter	Binary value	Condition
H	Humidity	0	Too low
		1	Acceptable
D	Day	0	Night
		1	Day
T	Temperature	0	Too high
		1	Acceptable
W	Windows	0	Closed
		1	Open

The watering system turns on (X = 1) if:

either   it is daytime **and** the temperature is too high

or   the humidity is too low.

The fan turns on (Y = 1) if the temperature is too high **and** the windows are closed.

Draw a logic circuit to represent the greenhouse control system.

H ——

D ——

T ——

W ——

—— X

—— Y

[6]
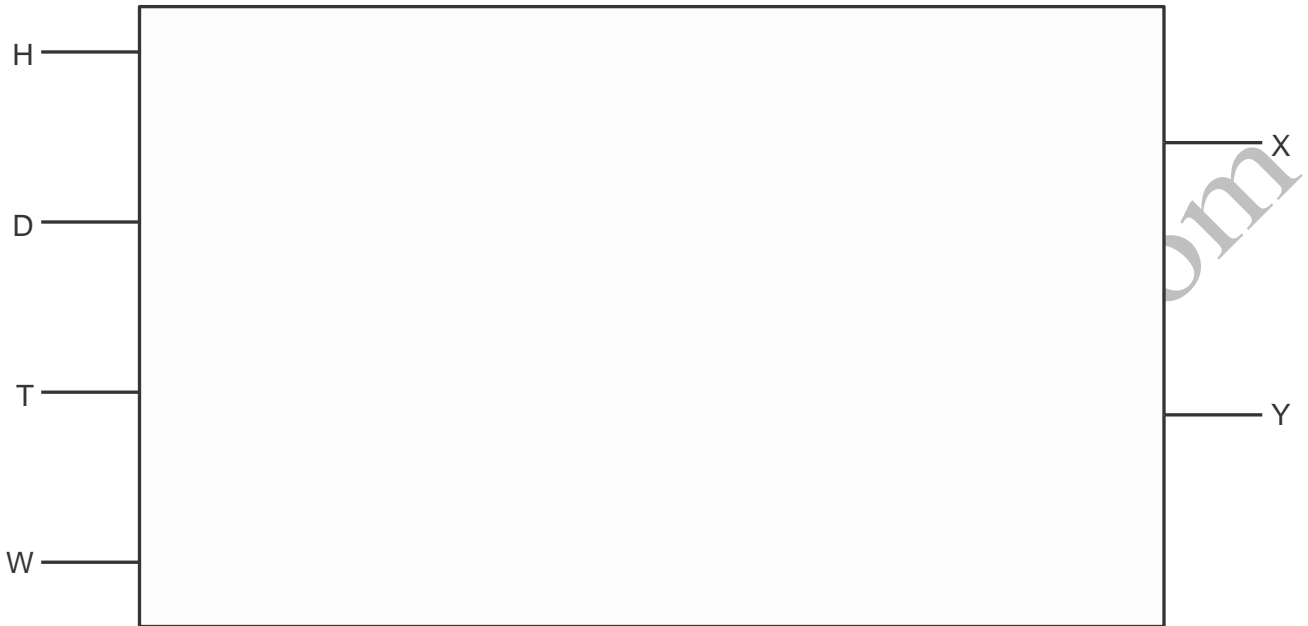
(b) Complete the truth table for the logic expression: **X** = NOT **A** AND (**B** NAND **C**)

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]

9608/12 Jun 17 Q2c

2 **(a)** The first column of the following table gives features of different types of printer.

Put a tick (✓) in the cells to show which features describe a laser and an inkjet printer.

	Type of printer	
	Laser	Inkjet
Impact printer		
Non-impact printer		
Line printer		
Page printer		

[2]

(b) Two of the components of an inkjet printer are a stepper motor and a print head.

Describe how each component is used when printing a page.

(i) Print head ....

....

....

....

....

....

....

....[5]

(ii) Stepper motor

....

....

....[2]

(c) A student has an old working laptop computer. It has a small capacity internal disk drive with almost all the storage space taken up by the operating system and application programs.

She needs to buy an external storage device to store her data files.

(i) List **two** suitable devices.

Device 1 ....

Device 2 ....[2]

(ii) Describe **one** advantage of choosing one of the devices.
Advantage of choosing device 1 / 2 (*circle*)

....

....[1]

9608/13 Jun 18 Q5

5 (a) A student needs to design a logic circuit to model the requirements for membership of a snooker club. Membership (X) depends on four criteria, as shown in the table:

Parameter	Description of parameter	Binary value	Condition
A	Over 18	1	True
A	Over 18	0	False
B	Recommended	1	True
B	Recommended	0	False
C	Full-time	1	True
C	Full-time	0	False
D	Retired	1	True
D	Retired	0	False

Membership is approved (X = 1) if the person:
- is over the age of 18 **and** has been recommended by a pre-existing member **and**
- **either** is working full-time **or** is retired, but not both.

Draw a logic circuit to represent the membership requirements.

A ——

B ——

C ——   —— X

D ——

[3]
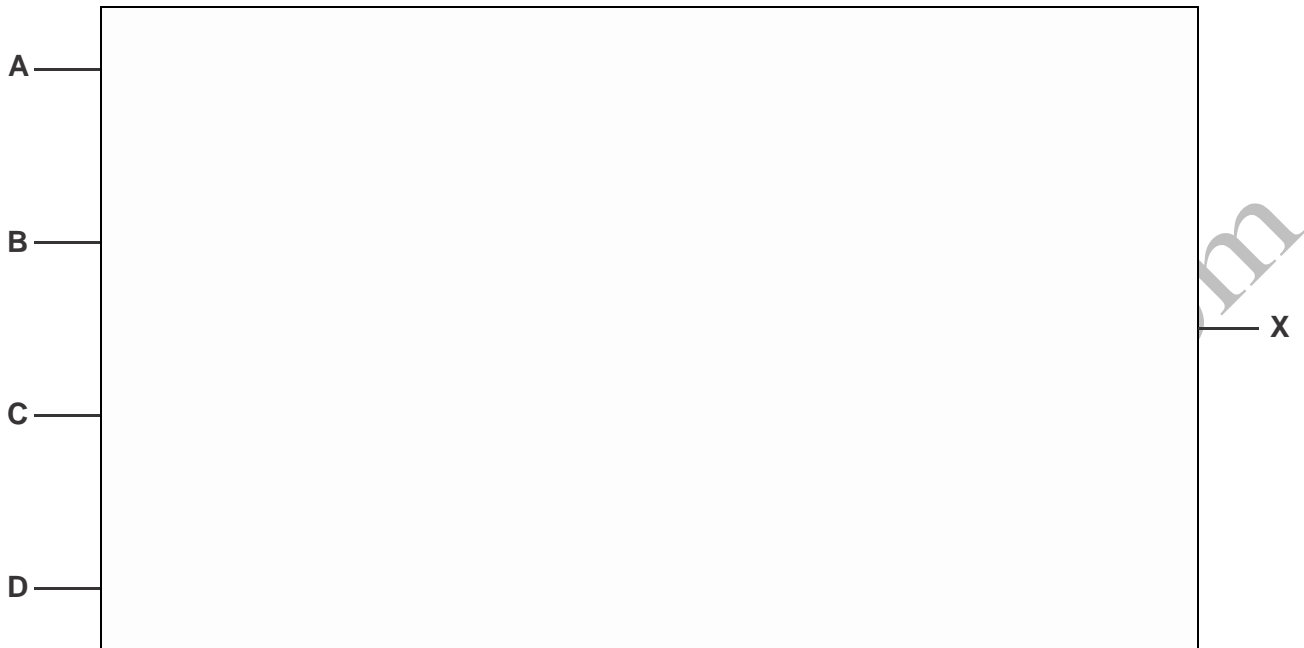
b) Complete the truth table for the logic expression: **X** = (**A** XOR **B**) AND NOT **C**

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]

9608/13 Jun 18 Q7

7 A zoo has a computer system for the visitors to access multimedia content about the zoo and its animals.

(a) The users interact with the computer system through touchscreens.

Describe the internal operation of a **touchscreen**.

....

....

....

....

....

....

....

....

....[4]

(b) (i) Give **one** output device, other than a touchscreen, that may be part of this computer system.

....[1]

(ii) Give **two** input devices, other than a touchscreen, that may be part of this computer system. State how each device will be used by the visitors.

Device 1 ....

Use ....

....

Device 2 ....

Use ....

.... [4]

(c) Give the most appropriate secondary storage device for this computer system.

Describe **two** reasons for your choice.

Device ....

Reason 1 ....

....

....

Reason 2 ....

....

....

.... [5]

(d) This computer system has Random Access Memory (RAM) and Read Only Memory (ROM).

State what will be stored in RAM and ROM for this computer system.

RAM ....

....

ROM ....

.... [2]

9608/12 Nov 16 Q6

6 (a) Describe **two** differences between RAM and ROM.

1 ....

....

2 ....

....[2]

(b) State **three** differences between Dynamic RAM (DRAM) and Static RAM (SRAM).

1 ....

....

2 ....

....

3

....[3]

9608/12 Nov 16 Q1

1   (a) A student writes the following logic expression:

X is 1 IF   (B is NOT 1 AND S is NOT 1)   OR   (P is NOT 1 AND S is 1)

Draw a logic circuit to represent this logic expression.

Do not attempt to simplify the logic expression.

B ────

S ────   ─── X

P ────

[6]

(b) Complete the truth table for the logic expression given in **part (a)**.

B	S	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]

9608/12 Nov 16 Q3

3 When an application program requests a file stored on a hard disk, the computer system reads the file. Use the statement labels A to H to complete the sequence of steps that describe how this happens.

Label	Statement
A	When the hard disk drive has read the file, it generates an interrupt.
B	While the file continues, the head reads successive clusters of sectors from the disk and writes data into the disk buffer.
C	The head reads the first cluster of sectors from disk and writes data into the disk buffer.
D	The head moves to the correct track.
E	The operating system transfers the contents of the disk buffer to the application program's data memory.
F	In the relevant directory file, the operating system looks up the track and sector where the file begins.
G	Application program passes file read request to the operating system.
H	The hard disk drive waits for the correct sector to arrive under the head.

1. The application program executes a statement to read a file.

2. ....

3. The operating system begins to spin the hard disk, if it is not currently spinning.

4. ....

5. ....

6. ....

7. ....

8. ....

9. ....

10. ....   [8]

9608/11 Nov 17 Q5

5 A Personal Computer (PC) has a number of input and output devices.

(a) (i) Name **three** components of a speaker.

1 ....

2 ....

3 ....

[3]

(ii) Explain the basic internal operation of a speaker.

....

....

....

....

....

....

....[4]

(b) (i) The user is considering the purchase of a removable device for secondary storage.

Name **one** suitable device.

....[1]

(ii) Describe **two** possible uses for this device on a home Personal Computer (PC).

1 ....

....

2 ....

.... [2]

9608/11 Nov 18 Q1a

1 A student is creating a short video and needs to record music to play in the background.

(a) The student uses a microphone to capture the music.

Explain how the microphone captures the music.

....

....

....

....

....

....[3]

9608/12 Nov 17 Q6

6 (a) A personal computer (PC) is extensively used for a wide range of applications, including the three shown in the following table.

Write in the table, a suitable input device, output device, or both needed for each application.

Do not give a **monitor, keyboard or mouse** in your answers.

Application	Input device	Output device
Capture the text from a paper document, in order that the text can be word processed		
Producing a replica of a small plastic component from a washing machine		
A museum has interactive information facilities throughout the building		

[3]

(b) Explain the basic internal operation of a hard disk drive.

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....[4]

`

9608/31 Jun 17 Q3a, b,

3 Consider the following logic circuit, which contains a redundant logic gate.

(a) Write the Boolean algebraic expression corresponding to this logic circuit.

X = ...[3]

(b) Complete the truth table for this 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		

[2]

9608/31 Jun 17 Q6a, b

6 A computer system is used to manage some of the functions in a vehicle. The vehicle has a number of sensors and actuators. One sensor is used to monitor the moisture on the screen. If the moisture exceeds a pre-set value, the windscreen wiper motor turns on automatically.

The software used in the computer system is dedicated to the sensor management functions. When the system starts, the software runs some initial tasks. It then loops continuously until the system is switched off.

(a) (i) State the name given to the type of system described.

....[1]

(ii) Explain your answer to **part (i)**.

....

....[1]

(b) Within the software loop, the value of each sensor is read in turn. The value read from the sensor is then processed.

State **two** drawbacks with this method of reading and processing sensor data.

Drawback 1 ....

....

Drawback 2 ....

....[2]

9608/32 Jun 17 Q3a, b,

3 A logic circuit is shown:
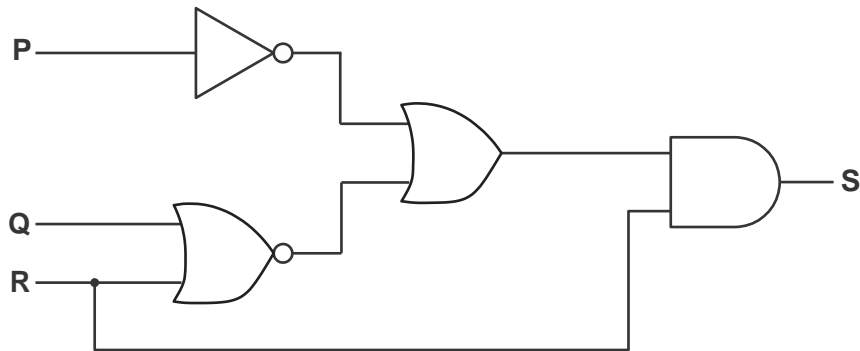
(a) Write the Boolean algebraic expression corresponding to this logic circuit:

S = ...[4]

(b) Complete the truth table for this logic circuit:

P	Q	R	Working space	S
0	0	0		
0	0	1		
0	1	0		
0	1	1		
1	0	0		
1	0	1		
1	1	0		
1	1	1		

[2]

9608/32 Jun 17 Q6a

6 A large office building has many floors. On each floor there are security sensors and security cameras. There is the same number of sensors on each floor. The building has a single security room.

The images from the security cameras are output on monitors (one monitor for each floor) placed in the security room.

The data from the sensors are read and processed by a computer system. Sensor readings and warning messages can be displayed on the monitors.

(a) (i) State the name given to the type of system described.

....[1]

(ii) Explain your answer to **part (i)**.

....

....[1]

(iii) State **two** sensors that could be used in this system.

Sensor 1 ....

Sensor 2 ....

[2]

9608/31 Jun 18 Q7

7 A museum stores antique items that need to be kept at constant temperature.

The museum is not sure about the actual temperatures. The museum installs some equipment. This records the temperatures every hour and ensures the temperature stays within a set range.

(a) Identify the type of system described.

....[1]

(b) The system has a temperature sensor.

Identify **two** other items of hardware that the museum can use for the type of system identified.

Describe the purpose of each item.

Item 1 ....

Purpose ....

....

Item 2 ....

Purpose ....

.... [4]

9608/32 Jun 18 Q6a, b

6 (a) There are five scenarios on the left and two types of system on the right.

Draw a line to link each scenario to its correct type of system.

Scenario

Car speed display

Aeroplane autopilot

Rollercoaster

Recording the rainfall at a weather station

Robot loading a part onto a conveyor belt

System

Control

Monitoring

[2]

(b) Mary has six fish tanks. The temperature of the water in each tank needs to be within a specific range.

Identify **three** items of hardware that Mary can add to her tanks to help maintain the temperature. Describe the purpose of each item.

Item 1 ....

Purpose ....

....

Item 2 ....

Purpose ....

....

Item 3 ....

Purpose ....

....[6]

9608/31 Nov 17 Q6a, b

6 A large warehouse stores goods that must be kept above a temperature of 15 degrees Celsius.

The warehouse has six temperature sensors which are each placed at a different location in the

warehouse.

A computer system is programmed to turn on appropriate heaters when one of the sensors is below the minimum temperature.

(a) (i) State the name given to the type of system described.

.... [1]

(ii) Justify your answer to **part (i)**.

....

.... [1]

(b) Sensors and heaters are two types of device used in this system.

State **two** other devices that are used. Justify your choice.

Device 1 ....

Justification ....

....

Device 2 ....

Justification ....

....[4]

9608/31 Jun 16 Q6
6 An intruder detection system for a large house has four sensors. An 8-bit memory location stores the output from each sensor in its own bit position.

The bit value for each sensor shows:

• 1 – the sensor has been triggered

• 0 – the sensor has not been triggered

The bit positions are used as follows:

	Not used			Sensor 4	Sensor 3	Sensor 2	Sensor 1
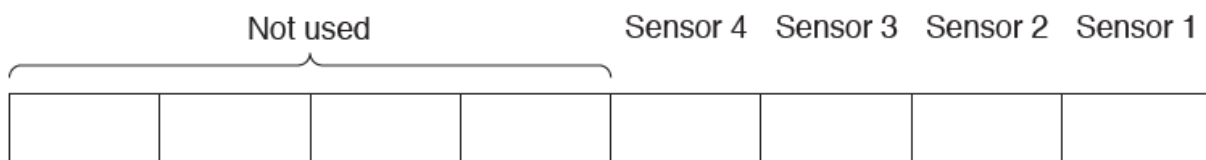
The output from the intruder detection system is a loud alarm.

(a) (i) State the name of the type of system to which intruder detection systems belong.

....[1]

(ii) Justify your answer to **part (i)**.

....

....[1]

(b) Name **two** sensors that could be used in this intruder detection system. Give a reason for
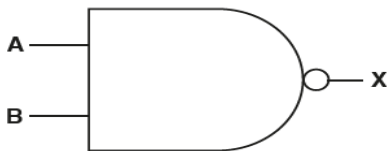
your choice.

Sensor 1 ....

Reason ....

....

Sensor 2 ....

Reason ....

....[4]

9608/31 Nov 17 Q5ai

5 (a) (i) Complete the truth table for this 2-input NAND gate:

A	B	X
0	0	
0	1	
1	0	
1	1	

[1]

(ii) Complete the truth table for this 3-input NAND gate:

A	B	C	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	

[1]

9608/32 Nov 17 Q5a

5 (a) Complete the truth table for this NOR gate:
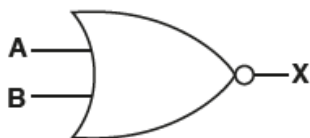
A	B	X
0	0	
0	1	
1	0	
1	1	

[1]

9608/32 Nov 17 Q6

6 The environment in a very large greenhouse is managed by a computer system. The system uses a number of different sensors that include temperature sensors. In addition, the system controls a number of heaters, windows and sprinklers.

(a) State one other type of sensor that could be used with this system.

Justify your choice.

Sensor ....

Justification ....

....[2]

(b) Describe why feedback is important in this system.

....

....

....

....

....

....[3]

(c) (i) The system makes use of a number of parameters. These parameters are used in the code that runs the system.

State **one** of the parameters used in controlling the temperature in the greenhouse.

....[1]

(ii) Explain how the parameter identified in **part (c)(i)** is used in the feedback process.

....

....

....

....[2]