**Q1.**

The following are three types of program translator:

|  |  |
| --- | --- |
| **A** | Assembler |
| **B** | Compiler |
| **C** | Interpreter |

Write the label (**A**–**C**) for the type of translator next to the description.

|  |  |
| --- | --- |
| **Description** | **Label (A–C)** |
| Converts a low-level language designed to be human-readable into machine code. |  |
| Reads a high-level program line-by-line and calls corresponding subroutines. |  |
| Takes the entire high-level program as input and produces machine code. |  |

**(Total 2 marks)**

**Q2.**

State **two** advantages of programming using a high-level language compared with programming using a low-level language.

Advantage 1  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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Advantage 2  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**(Total 2 marks)**

**Q3.**

Draw the logic circuit, using only one logic gate, that is represented by the following truth table:

|  |  |  |
| --- | --- | --- |
| **Input A** | **Input B** | **Output Q** |
| 0 | 0 | 0 |
| 0 | 1 | 1 |
| 1 | 0 | 1 |
| 1 | 1 | 1 |



**(Total 1 mark)**

**Q4.**

Shade **one** lozenge to show the Boolean expression that is equivalent to the logic circuit shown in the diagram below.

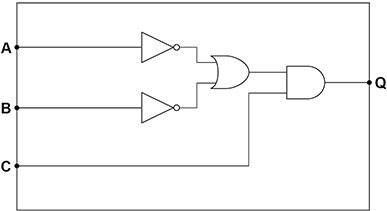


|  |  |  |
| --- | --- | --- |
| **A** | A AND NOT B |  |
| **B** | NOT (A AND B) |  |
| **C** | (NOT A) AND B |  |
| **D** | (NOT A) AND (NOT B) |  |

**(Total 1 mark)**

**Q5.**

Shade **one** lozenge to show the Boolean expression which is equivalent to the logic circuit shown in the diagram below.



|  |  |  |
| --- | --- | --- |
| **A** | NOT ((A OR B) AND C) |  |
| **B** | (NOT A) OR ((NOT B) AND C) |  |
| **C** | (NOT (A OR B)) AND C |  |
| **D** | ((NOT A) OR (NOT B)) AND C |  |

**(Total 1 mark)**

**Q6.**

Draw a logic circuit in the box below for the following scenario.

A sewing machine is running (R) if either the foot pedal is on (F) or the hand dial is on (H) but not both.

You should use **only** the gates AND, OR and NOT in your answer.



**(Total 3 marks)**

**Q7.**

Shade **two** lozenges to show which of the following are functions of an operating system.

|  |  |  |
| --- | --- | --- |
| **A** | Address filtering |  |
| **B** | Application management |  |
| **C** | Clock speed management |  |
| **D** | Data encryption |  |
| **E** | Processor management |  |

**(Total 2 marks)**

**Q8.**

Define the term **application software**.

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**(Total 1 mark)**

**Q9.**

Give **two** examples of application software. You must **not** use brand names in your answer.

Example 1  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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Example 2  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**(Total 2 marks)**

**Q10.**

Three factors that affect the performance of a CPU are:

•   clock speed

•   number of processor cores

•   cache size.

Explain how each of these factors affects CPU performance.

Clock speed  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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Number of processor cores  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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Cache size  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**(Total 6 marks)**

**Q11.**

A farmer uses an automated system to indicate if soil conditions are right for planting.

The conditions are right for planting if the soil is:

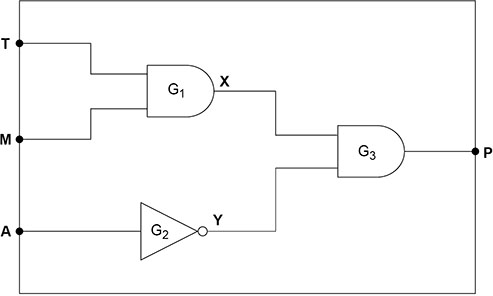
•   warm

•   wet

•   the correct acidity.

**Figure 1** shows the logic circuit for this system.

**Figure 1**

****

The inputs to the system are:

Soil temperature (**T**):

0 if the soil is cold

1 if the soil is warm.

Soil moisture (**M**):

0 if the soil is dry

1 if the soil is wet.

Soil acidity (**A**):

0 if the soil is the correct acidity

1 if the soil acidity needs adjusting.

The output (**P**) is:

0 if the conditions for planting have not been met

1 if the conditions for planting have been met.

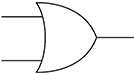
(a)  Complete the truth table for the circuit in **Figure 1**.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **T** | **M** | **A** | **X** | **Y** | **P** |
| 0 | 0 | 0 |  |  |  |
| 0 | 0 | 1 |  |  |  |
| 0 | 1 | 0 |  |  |  |
| 0 | 1 | 1 |  |  |  |
| 1 | 0 | 0 |  |  |  |
| 1 | 0 | 1 |  |  |  |
| 1 | 1 | 0 |  |  |  |
| 1 | 1 | 1 |  |  |  |

**(3)**

(b)  State the type of logic gate shown in **Figure 2**.

**Figure 2**

****

Answer  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**(1)**

(c)  The farmer wants to modify the system so that it will indicate that the soil conditions are right for planting if **at least one** of the three conditions has been met.

Describe changes that could be made to the logic circuit in **Figure 1** to allow this to happen.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**(2)**

**(Total 6 marks)**

**Q12.**

Shade **three** lozenges to show which of the following are essential components of the Von Neumann architecture.

|  |  |  |
| --- | --- | --- |
| **A** | BIOS |  |
| **B** | Control unit |  |
| **C** | Keyboard |  |
| **D** | Memory |  |
| **E** | Movement sensor |  |
| **F** | Multiple cores |  |
| **G** | Network socket |  |
| **H** | Shared bus |  |

**(Total 3 marks)**

**Q13.**

Main memory is any form of memory that is directly accessible by the CPU, except for cache and registers.

Explain how main memory is used.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**(Total 3 marks)**

**Q14.**

An operating system manages the memory of a computer.

State **two** other things that are managed by the operating system.

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**(Total 2 marks)**

**Q15.**

The three examples of code shown in the table below are all equivalent to one another.

|  |  |  |
| --- | --- | --- |
| **Example 1** | **Example 2** | **Example 3** |
| a ← 4  b ← 3  IF a = b THEN    c ← a + b  ENDIF | MOV R0, #4   MOV R1, #3   CMP R0, R1   BNE end   ADD R2, R0, R1  end:   HLT | 1001 0000 0100 0000  1001 0001 0011 0000  0100 0000 0001 0000  1010 0101 0000 0000  1100 0010 0000 0001  1111 0000 0000 0000 |

Shade **one**  lozenge to show the statement that is true about the examples of code.

|  |  |  |
| --- | --- | --- |
| **A** | None of the examples of code is in a low-level language. |  |
| **B** | Only one of the examples of code is in a low-level language. |  |
| **C** | Only two of the examples of code are in a low-level language. |  |
| **D** | All three of the examples of code are in a low-level language. |  |

**(Total 1 mark)**

**Q16.**

Explain why a developer, who is good at both low-level and high-level programming, would normally use high-level languages when writing programs.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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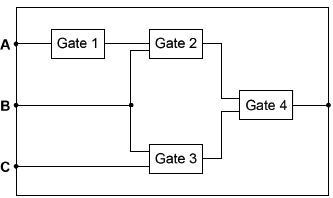
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**(Total 4 marks)**

**Q17.**

The expression (B AND (NOT A)) OR (B AND C) can be represented by the logic circuit shown below. In the circuit the logic gates are marked with labels instead of their proper symbols.



(a)  State the name of the logic gate used at Gate 1 in the logic circuit.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**(1)**

(b)  State the name of the logic gate used at Gate 2 in the logic circuit.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**(1)**

(c)  Draw the logic circuit symbol in the space below for the logic gate used at Gate 3 in the logic circuit.

**(1)**

(d)  Draw the logic circuit symbol in the space below for the logic gate used at Gate 4 in the logic circuit.

**(1)**

**(Total 4 marks)**

**Q18.**

A truth table for the complex Boolean expression:

(A1 AND (NOT A2) AND A3) OR (A1 AND A2 AND A3)

is shown below.

|  |  |  |  |
| --- | --- | --- | --- |
| **A1** | **A2** | **A3** | **OUTPUT** |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 1 | 0 |
| 0 | 1 | 0 | 0 |
| 0 | 1 | 1 | 0 |
| 1 | 0 | 0 | 0 |
| 1 | 0 | 1 | 1 |
| 1 | 1 | 0 | 0 |
| 1 | 1 | 1 | 1 |

Shade **one** lozenge which shows a simpler expression which is the equivalent of the original, more complex, expression.

|  |  |  |
| --- | --- | --- |
| **A** | NOT A1 |  |
| **B** | A2 OR A3 |  |
| **C** | A1 AND (NOT A2) |  |
| **C** | A1 AND A3 |  |

**(Total 1 mark)**

**Q19.**

Which **two** of the following are components of a CPU?

Shade **two** lozenges.

|  |  |  |
| --- | --- | --- |
| **A** | Arithmetic logic unit |  |
| **B** | Control unit |  |
| **C** | Fan |  |
| **D** | Hard disk drive |  |
| **E** | Keyboard |  |
| **F** | Power supply unit |  |

**(Total 2 marks)**

**Q20.**

Describe how an optical disk is read.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**(Total 4 marks)**

**Q21.**

Define the term **embedded system**.

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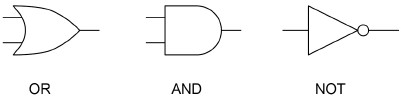
**(Total 2 marks)**

**Q22.**

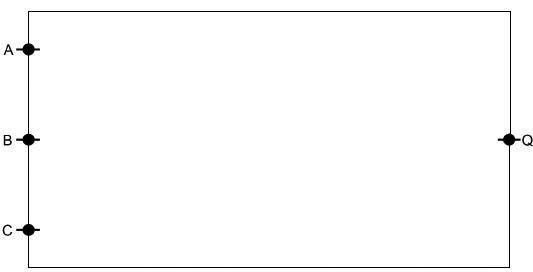
A burglar alarm sounds an alarm when it is armed (turned on) and the window or door is opened.

The truth table for this basic system is below.

|  |  |  |  |
| --- | --- | --- | --- |
| **Armed (A)**  **0 = Off**  **1 = On** | **Door (B)**  **0= Closed**  **1 = Open** | **Window (C)**  **0 = Closed**  **1 = Open** | **Alarm (Q)**  **0 = Off**  **1 = On** |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 1 | 0 |
| 0 | 1 | 0 | 0 |
| 0 | 1 | 1 | 0 |
| 1 | 0 | 0 | 0 |
| 1 | 0 | 1 | 1 |
| 1 | 1 | 0 | 1 |
| 1 | 1 | 1 | 1 |



Draw a logic circuit that represents the truth table above. You **must** use the correct symbols for logic gates. You may not need to use all the gates shown.



**(Total 3 marks)**

**Q23.**

An SD card is a type of solid state storage.

State **two** advantages of solid state storage compared to magnetic storage.

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**(Total 2 marks)**

**Q24.**

Many modern desktop computers have both solid state drives and magnetic hard disk drives.

Give **two** reasons why desktop computers have a magnetic hard disk drive and a solid state drive instead of having just a solid state drive.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**(Total 2 marks)**

**Q25.**

Describe how data is stored on, and read from, a magnetic hard disk.

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**(Total 4 marks)**

**Q26.**

In recent years, there has been a large growth in the use of cloud storage.

Discuss the advantages and disadvantages of using cloud storage.

In your answer you should include an explanation of the reasons for the large growth in recent years and consider any legal, ethical and environmental issues related to the use of cloud storage.

**(Total 9 marks)**

**Q27.**

Complete the truth table for the AND logic gate.

|  |  |  |
| --- | --- | --- |
| **A** | **B** | **A AND B** |
| 0 | 0 |  |
| 0 | 1 |  |
| 1 | 0 |  |
| 1 | 1 |  |

**(Total 1 mark)**

**Q28.**

A logic circuit is being developed for an audio advert in a shop that plays automatically if a customer is detected nearby.

•   The system has two sensors, A1 and A2, that detect if a customer is near. The audio plays if either of these sensors is activated.

•   The system should only play if another audio system, S, is not playing.

•   The output from the circuit, for whether the advert should play or not, is Q.

Complete the logic circuit for this system.



**(Total 3 marks)**

**Q29.**

ROM is a type of memory used in computers.

Shade **two** lozenges to show which statements are true about ROM.

|  |  |  |
| --- | --- | --- |
| **A** | Desktop computers usually store application software in ROM |  |
| **B** | Desktop computers typically have more ROM than RAM |  |
| **C** | ROM is commonly used to store start-up instructions |  |
| **D** | ROM is non-volatile |  |
| **E** | ROM is used to increase the quality of graphics on a computer |  |

**(Total 2 marks)**

**Q30.**

Explain how a magnetic hard disk drive (HDD) operates.

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**(Total 4 marks)**

**Q31.**

The diagram below shows a simplified diagram of the Fetch-Execute cycle.

Fill in the name of the missing stage in the diagram below.



**(Total 1 mark)**

Mark schemes

**Q1.**

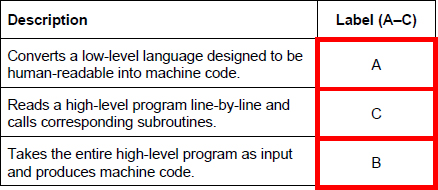
**2 marks for AO1 (understanding)**

1 mark for one row correct;

2 marks for all rows correct;

**R.** any duplicated answers

Correct table as follows:



**[2]**

**Q2.**

**2 marks for AO1 (understanding)**

**Max two** from:

(High-level languages) are easier to test // identify mistakes (than low-level languages);

(High-level languages) allow faster development (than low-level languages);

(High-level languages) are better documented (than low-level languages);

(High-level languages) contain complex data structures;

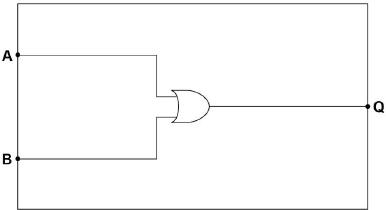
(High-level languages) allow code to be more portable (than low-level languages);

Refer other plausible answers to Team Leader.

**[2]**

**Q3.**

**Mark is for AO2**

****

Answers **must** show two inputs and one output from the gate.

**I.** any labels on inputs or output.

**[1]**

**Q4.**

**Mark is for AO2**

**C** (NOT A) AND B;

**R.** If more than one lozenge shaded

**[1]**

**Q5.**

**Mark is for AO2**

**D** ((NOT A) OR (NOT B)) AND C;

**R.** If more than one lozenge shaded

**[1]**

**Q6.**

**3 marks for AO2**

1 mark for using gates to implement (F and NOT H);

1 mark for using gates to implement (H and NOT F);

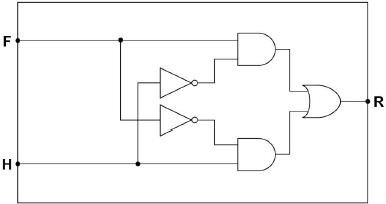
1 mark for an OR gate having two inputs, whose output is R;

**Max 2 marks if any errors.**

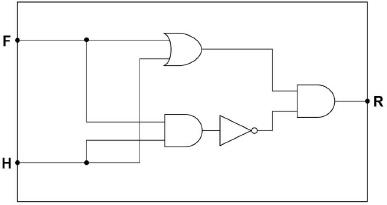
**Award full marks if a different, but logically correct, solution is given using only AND, OR or NOT gates.**

**Max 1 mark if gates other than AND, OR or NOT are used**.

This is an example of a correct logic circuit:



Another example of a correct logic circuit:



**[3]**

**Q7.**

**2 marks for AO1 (recall)**

**B** Application management;

**E** Processor management;

**R.** If more than two lozenges shaded.

**[2]**

**Q8.**

**Mark is for AO1 (recall)**

Example answers:

(Software) that is for end-user tasks;

(Software) that allows the user to carry out day to day tasks/work;

**[1]**

**Q9.**

**2 marks for AO1 (recall)**

Any two relevant examples (maximum of **two** marks), such as:

•   word-processing software;

•   database software;

•   spreadsheet software;

•   social media application;

•   communication software;

•   online ordering applications;

•   online auction software;

•   gaming software;

**R.** Proprietary names.

**R.** Utility software such as anti-virus, disk defragmenter / disk cleaner.

**[2]**

**Q10.**

**6 marks for AO1 (understanding)**

One mark for each point (maximum of **two** marks per section).

**Clock speed:**

•   the more pulses a second the more fetch-execute cycles / processes per second;

•   each instruction starts on a clock pulse;

•   the more pulses per second the more instructions are likely to be carried out // a higher clock speed means more instructions can start per second;

**A.** Opposites of above.

**A.** Limitations including consequences of overclocking; heat build-up affecting performance.

**Number of processor cores:**

•   affects the number of instructions that may be executed simultaneously // the greater the number of (processor) cores the greater the number of instructions that may be executed simultaneously;

•   different (processor) cores dealing with different types of instruction (eg graphics, maths) (improve the execution of software);

•   each (processor) core can fetch / execute its own instructions (which increases the speed at which instructions can be executed);

**A.** Opposites of above.

**Cache size:**

•   instructions / data take less time to transfer to the processor from cache;

•   because cache is held closer to the processor;

•   the more cache the more data / instructions can be held (close to the CPU);

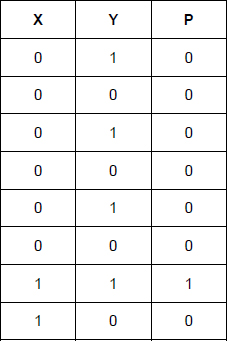
•   the more cache the faster the CPU can access frequently needed instructions / data;

**A.** Opposites of above.

**[6]**

**Q11.**

(a)  **3 marks for AO2 (apply)**

****

One mark for each column completed correctly;

**A.** Follow through on column **P** from incorrect columns **X** or **Y**.

**3**

(b)  **Mark is for AO1 (recall)**

OR;

**1**

(c)  **2 marks for AO2 (apply)**

One mark for each of the following:

•   replace (gate) G1 with an OR gate;

•   replace (gate) G3 with an OR gate;

**A.** Any other acceptable alternative.

**2**

**[6]**

**Q12.**

**3 marks for AO1 (recall)**

**B** Control unit;

**D** Memory;

**H** Shared bus;

**R.** if more than three lozenges shaded.

**[3]**

**Q13.**

**3 marks for AO1 (understanding)**

A **maximum of 3 marks** can be awarded.

Example mark points include:

•   it stores instructions whilst a program is being executed;

•   it stores data whilst a program is being executed;

•   each unique memory location in memory holds one value;

•   every memory location has a unique address;

•   once data has been stored in memory it can be found again later (when it's needed);

•   data and instructions are replaced in memory as needed;

**[3]**

**Q14.**

**2 marks for AO1 (recall)**

A **maximum of 2 marks** can be awarded for any two of the following:

•   Processor/CPU;

•   I/O devices;

•   Applications/programs;

•   Security;

•   File storage/management;

**R.** references to memory

**[2]**

**Q15.**

**Mark is for AO1 (understanding)**

**C** Only two of the examples of code are in low-level languages;

**If more than one lozenge shaded then mark is not awarded**

**[1]**

**Q16.**

**4 marks for AO1 (understanding)**

Maximum four marks from:

•   High-level languages have built-in functions;

•   High-level languages have built-in libraries;

•   High-level languages have more support / help;

•   High-level languages have structures (such as selection and iteration);

•   High-level languages can be less machine dependent / more portable;

•   It (usually) requires fewer lines of code to be written;

•   It is (usually) quicker to develop code in high-level languages;

•   It is easier to find mistakes in code;

•   The code is easier to maintain / understand;

•   It is easier to structure code in high-level languages;

**NE.** References to efficiency or speed unless correctly qualified;

**A.** Easier to read in place of easier to understand on this occasion;

**R.** Answers relating to programmer expertise;

**[4]**

**Q17.**

(a)  **Mark is for AO2 (apply)**

NOT;

**1**

(b)  **Mark is for AO2 (apply)**

AND;

**1**

(c)  **Mark is for AO2 (apply)**

****

**I.** all labels;

**1**

(d)  **Mark is for AO2 (apply)**

****

**I.** all labels;

**1**

**[4]**

**Q18.**

**Mark is for AO2 (apply)**

**D**  A1  AND  A3;

**If more than one lozenge shaded then mark is not awarded**

**[1]**

**Q19.**

**2 marks for AO1 (recall)**

**A** Arithmetic logic unit;

**B** Control unit;

**If more than two lozenges shaded then marks are not awarded.**

**[2]**

**Q20.**

**4 marks for AO1 (understanding)**

Max of four marks.

•   Disk rotates (at high speed);

•   Laser head moves across (radius of) disk;

•   Laser shines onto the disk;

•   Tiny indentations / pits / bumps reflect light differently (to lands / flats)//Different colour of dye reflects or blocks laser light;

•   Reflected light is interpreted into 1s and 0s representing data stored on disk;

•   Data is stored on a single spiral track (rather than concentric tracks);

**R.** Reference to pits and lands corresponding to ones and zeros unless combined with a description of how they reflect light.

**[4]**

**Q21.**

**2 marks for AO1 (recall)**

A computer system:

•   with a dedicated / specific purpose or function;

•   built in to a physical product / device / machine;

**A.** AQ (computer) system with firmware / software inside a product / device;

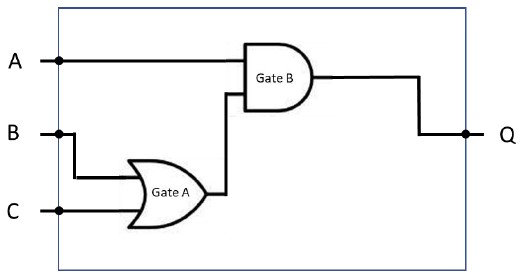
**A.** Reference to ‘system’ if relevant examples are given for clarification;

**NE.** A specific example e.g. “like in a washing machine” without further qualification.

**[2]**

**Q22.**

**3 marks for AO2 (apply)**

****

•   **OR Gate**, with correct symbol used, with **TWO inputs** from B and C;

•   **AND Gate**, with correct symbol used, with **TWO inputs** from A and Gate A (even if Gate A is an incorrect gate);

•   Output from Gate B is the only connection to Q (even if Gate B is an incorrect gate);

**[3]**

**Q23.**

**All marks AO1 (understanding)**

Lighter; Smaller;

Uses less power; More robust;

Generates less heat; Quieter;

**Max 2**

**[2]**

**Q24.**

**2 marks for AO2 (apply)**

Using just solid state would cost much more;

Can get higher storage capacity by including magnetic hard disk;

**[2]**

**Q25.**

**All marks AO1 (understanding)**

On a hard disk binary data represented by tiny magnetised regions;

where the magnetic orientation in one direction represents 0, and the other direction represents 1;

When reading data the read/write head is moved (to be over correct track); and the platter/disk spins round;

A whole sector/block read in one go (by the read/write head);

**Max 4**

**[4]**

**Q26.**

**All marks AO2 (apply)**

|  |  |  |
| --- | --- | --- |
| **Level** | **Description** | **Mark Range** |
| 3 | Answer demonstrates a **sustained line of reasoning** with a **substantiated** explanation for the recent large growth in the use of cloud storage that includes **both** technological and social reasons.  There is a **logically structured** consideration of the advantages and the disadvantages associated with the use of cloud storage - including **relevant** points covering **at least two** of legal, ethical and environmental issues. | 7 – 9 |
| 2 | Answer includes an explanation for the recent large growth in the use of cloud storage that includes **both** technological and social reasons.  There is a **logically structured** consideration of the advantages and the disadvantages associated with the use of cloud storage - including **one or two relevant** points related to legal, ethical and environmental issues. | 4 – 6 |
| 1 | The answer includes either a description of some of the reasons for the recent large growth in the use of cloud computing and/or brief consideration of the advantages and/or disadvantages associated with using cloud storage. | 1 – 3 |
| No creditworthy answer | | 0 |

**Guidance - Indicative Response (reasons for growth)**

Higher bandwidth mobile networks (eg 4G); Increased availability of mobile devices;

Reduction in cost of large capacity storage devices;

Improvements in network security;

People have a higher level of trust in cloud storage; Improvements in web browser software;

Increased availability of supercomputers (for cloud processing);

Companies have managed to develop business models based on cloud computing that allow them to make a profit;

**Guidance - Indicative Response (advantages of cloud storage)**

Enables user to access their data from more places/devices;

Enables user to more easily share data with others (can make parts of their cloud storage publicly available);

Increases the amount of storage available;

Reduced cost of computing devices for users as no need for as much built-in secondary storage;

**Guidance - Indicative Response (disadvantages of cloud storage)**

Increased security risks;

Relies on access to high-bandwidth network connection; Could potentially cost more due to ongoing costs; Reliance on company providing the cloud service;

Increased chance of others accessing personal data (data privacy issues);

**[9]**

**Q27.**

**Mark is for AO1 (understanding)**

Only reward if column **A AND B** is completely correct;

|  |  |  |
| --- | --- | --- |
| **A** | **B** | **A AND B** |
| 0 | 0 | 0 |
| 0 | 1 | 0 |
| 1 | 0 | 0 |
| 1 | 1 | 1 |

**[1]**

**Q28.**

**3 marks for AO2 (apply)**

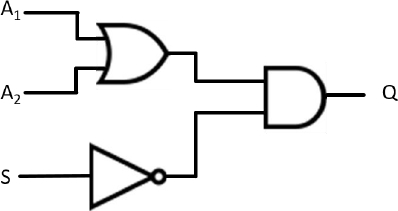
Max 2 marks if not fully correct (the fully correct answer is given in example 1).

**Mark A** if A1 and A2 are the inputs to an OR gate;

**Mark B** if S is the only input into a NOT gate;

**Mark C** if Q has a single output connection from an AND gate;

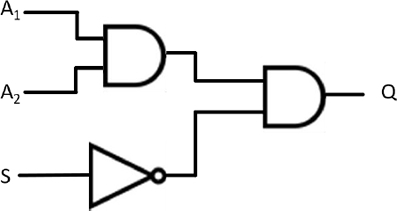
**Example 1 (Fully correct answer)**

****

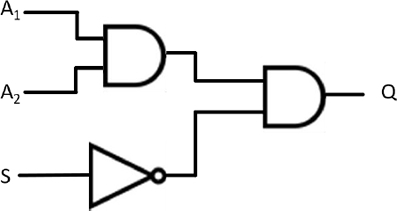
**R.** Incorrect symbols

**Partially correct answers**

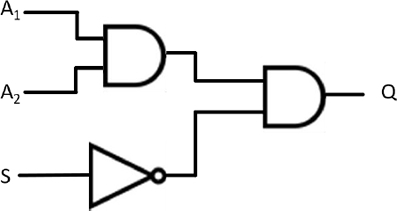
**Example 2 (Marks B and C)**

****

**Example 3 (Marks B and C)**

****

**Example 4 (Marks A and B)**

****

**[3]**

**Q29.**

**2 marks for AO1 (recall)**

**1 mark: C:** ROM is commonly used to store start-up instructions

**1 mark: D:** ROM is non-volatile

**If more than two lozenges shaded then marks are not awarded.**

**[2]**

**Q30.**

**4 marks for AO1 (understanding)**

1 mark for each correct point that explains how a Hard Disk Drive operates, up to a maximum of 4 marks.

**Examples Include:**

•   a HDD can contain multiple platters (disks);

•   A disk / disks that move / spin

•   Each platter is divided into sectors;

•   The disks are spun at a very high speed (approximately 7,200 rpm to 10,000 + rpm);

•   Read \ write heads (move across the disk to) read and write data;

•   There is one read \ write head for each side of a platter ie two heads per platter;

•   Data is written to \ read from the disk by magnetising \ polarising \ sensing microscopic regions on the disk;

•   Data is organised in concentric rings called tracks;

•   There is a small circuit board on the drive that controls the reading and writing of data;

•   Data is transferred from and to the disk via a cable / electrical current being passed;

•   The intersection of sectors and tracks are called blocks;

•   Data is read 1 block at a time;

**NE** Storing binary, or 1s and 0s without reference to magnetising

**[4]**

**Q31.**

**Mark is for AO1 (recall)**

decode;

**I.** Minor spelling errors or hyphenated word

**I.** Case

**[1]**