

**[Turn over**

- 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.

05 .....

20 .....

1A .....

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.

..... [1]

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

..... [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<br>(✓) | Parallel simplex<br>(✓) | Parallel half-duplex<br>(✓) | Serial duplex<br>(✓) |
|---------------------------------------------------------------------------------|-----------------------|-------------------------|-----------------------------|----------------------|
| 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 <b>not</b> arrive in the correct sequence                              |                       |                         |                             |                      |
| data is transmitted in both directions, but only <b>one</b> 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<br>(✓) | Barcode reader<br>(✓) | QR code reader<br>(✓) |
|----------------------------------------------------------------------------------------------------------|-------------------|-----------------------|-----------------------|
| 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.

.....

.....

.....

.....

.....

.....

.....

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.....

.....

.....

.....

..... [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:

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

(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.



[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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