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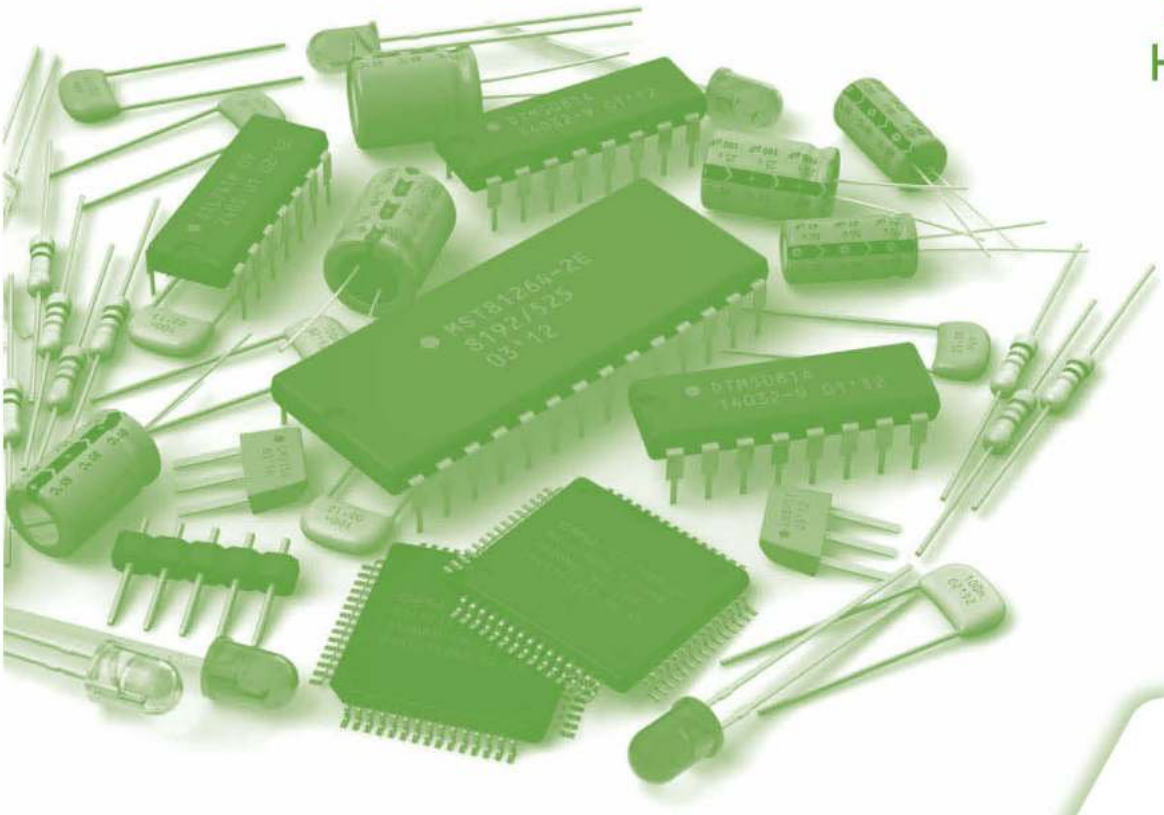
# Computer Science

## Workbook

David Watson
Helen Williams



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# Contents

# 1 Binary systems and hexadecimal

1 Convert the denary number 165 into: [*3 marks*]

a binary

.....

.....

b hexadecimal

.....

.....

.....

2 a Convert the following binary number into denary: [*6 marks*]

0 1 1 1 0 1 1 0

.....

.....

b Convert the following hexadecimal number into denary:

5F

.....

.....

c Convert the following binary number into hexadecimal:

1 0 1 0 1 1 0 0 0 1 0 0

.....

.....

d Convert the following hexadecimal number into binary:

3ED

.....

.....

.....

3 a How many megabytes (MB) of storage would be needed to store 800 photographs each of which are 16 MB in size? [2 marks]

.....

.....

.....

b Write your answer from part a in gigabytes (GB). [2 marks]

.....

.....

4 The ASCII code for 'A' is 65 and for 'a' is 97.

a Write these denary values in 8-bit binary: [2 marks]

i 65

.....

.....

ii 77

.....

.....

b Predict the denary ASCII code for 'V' and 'v': [2 marks]

i 'V'

.....

.....

ii 'v'

.....

.....

c Write the two denary values in part **b** in 8-bit binary format: [2 marks]

i 'V'

.....

.....

ii 'v'

.....

.....

d Using your answers to part **a** and part **b**, suggest an easy way of finding the ASCII binary code for a lower case letter (e.g. 'm') if the ASCII code for the upper case letter (e.g. 'M') is known. [*2 marks*]

.....

.....

.....

.....

5 A computer system uses binary codes for letters of the alphabet as follows:

A = 10, B = 11, C = 12, ..... , X = 33, Y = 34, Z = 35

a Write the denary value for 'X' in binary using an 8-bit register: [*1 mark*]

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | | | |

b To convert the binary code for 'X' to the binary code for 'x', all the bits in the 8-bit register in part **a** are moved (shifted) **two places to the right**.

i Write down the contents of the 8-bit register after the bits have been moved to the right. [*2 marks*]

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | | | |

ii Convert the binary value in part **bi** into denary: [*1 mark*]

.....

.....

c Predict the denary values for the following two letters using the method described in part **b**: [*4 marks*]

i r

.....

.....

ii m

.....

.....

6 a Describe how hexadecimal notation is used in the following: [*6 marks*]

i MAC addresses

.....

.....

.....

.....

ii Memory dumps

.....

.....

.....

.....

iii HTML

.....

.....

.....

.....

b Using the ASCII table (Figure 1.7) on page 12 in the *Cambridge IGCSE® Computer Science* textbook, write down what web address/URL is being represented below: [*3 marks*]

%77%77%77%2E%48%26%53%73%74%75%64%79$20%62%6F%6F%6B%73%2E%63%6F%2E%75%6B

.....

.....

.....

7 a Convert the denary number 44801 into hexadecimal. [*2 marks*]

.....

.....

b Convert the hexadecimal number in part a into a 16-bit binary number. [*2 marks*]

.....

.....

8 a Explain the two parts that make up a typical MAC address. [*2 marks*]

.....

.....

.....

.....

b A MAC address can be termed either *UAA* or *LAA*.

Give **two** reasons why MAC addresses need to be changed when using LAA. [*2 marks*]

.....

.....

.....

.....

9 An 8-bit register is used to control a paint spray gun. Each position in the register refers to a specific function:

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| paint levels are OK | paint levels are low | spray gun switched on | spray gun switched off | red paint chosen | green paint chosen | blue paint chosen | yellow paint chosen |

A 1 value in the register indicates that a specific function is ON; a 0 value indicates it is OFF.

For example:

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 |

indicates:

- all paint levels are OK
- spray gun is switched on
- red and blue paints have been selected.

a What does the following register indicate: [*3 marks*]

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 0 | 1 | 0 | 1 | 0 | 0 | 0 | 1 |

.....

.....

.....

b What would be the contents of the 8-bit register if the following conditions existed: [*3 marks*]

- all paint levels are OK
- the spray gun is switched off
- red and green paint had been selected?

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | | | |

c i What conditions would be represented by: 0 0 0 0 0 0 0 0 ? [*1 mark*]

.....

.....

ii Describe what would happen if the register contained: 1 1 1 1 1 1 1 1 [*1 mark*]

.....

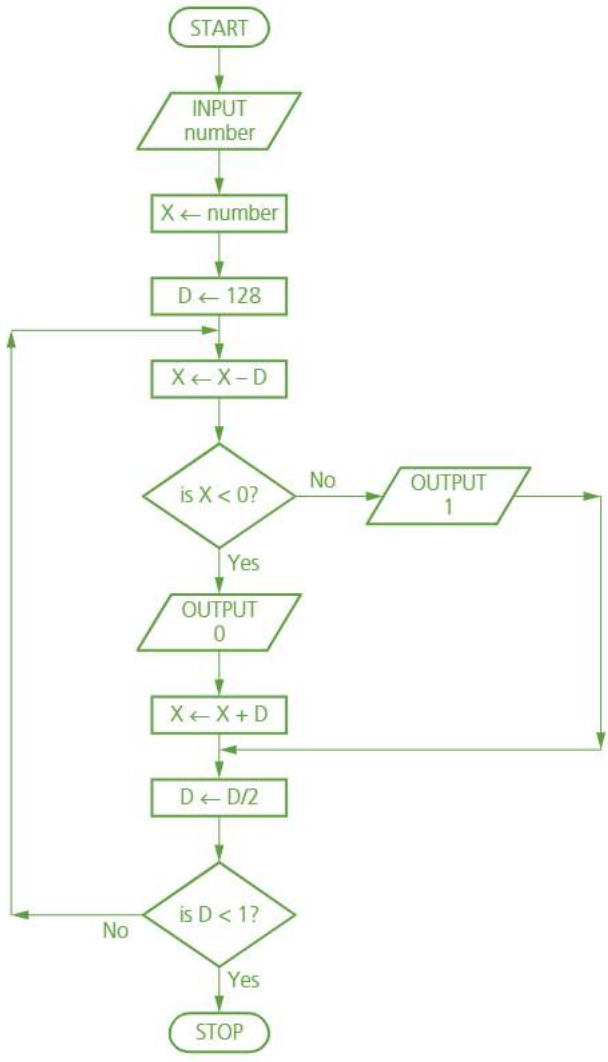
.....

10 Six questions are shown on the left and eight numerical values are shown on the right.

By drawing arrows, connect each question to its correct numerical value (two of the numerical values are not used). [*6 marks*]

| | |
|---|---|
| What is the denary value of the hexadecimal digit 'E'? | 10 |
| What is the denary value of the binary number 0 0 0 1 1 1 0 0 ? | 12 |
| If the download speed for broadband is 64 megabits per second, how long would it take to download a 96 megabyte file (in seconds)? | 14 |
| If $2^x$ = 1 terabyte (TB), what is the value of x? | 16 |
| What is the hexadecimal value of the denary number 5 0 ? | 22 |
| How many bits are there in two bytes of data? | 28 |
| | 32 |
| | 40 |

11




a Trace through the flowchart for the following two values:

i 220 *[4 marks]*

| Number | X | D | OUTPUT |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

continue on the next page...

| Number | X | D | OUTPUT |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |

ii 73 [4 marks]

| Number | X | D | OUTPUT |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

b State the function of the flowchart in part a. [1 mark]

.....

.....

12 a The HTML value # FF 00 00 represents the colour red,

value # 00 FF 00 represents the colour green, and

value # 00 00 FF represents the colour blue.

i If the colour *orange* requires value 'FF' for the red hue and value '80' for the green hue, what is the HTML representation for orange? [*1 mark*]

.....

ii If the colour *tan* requires value 'B1' for the red hue, value '89' for the green hue and value '04' for the blue hue, what is the HTML representation for tan? [*1 mark*]

.....

b Describe how HTML is used when developing web pages. [*3 marks*]

.....

.....

.....

.....

.....

c An internet service provider offers the following specifications:

- download speed: 80 megabits per second data transfer rate
- upload speed: 16 megabits per second data transfer rate

i John wishes to download a movie which is 650 megabytes (650 MB) in size. Calculate how long it would take (in seconds) to download the movie. [*2 marks*]

.....

.....

.....

.....

ii John also wishes to upload 30 photographs onto a social media website. Each photograph is 15 megabytes (15 MB).

Calculate how long it would take to upload the 30 photographs (in seconds). [*2 marks*]

.....

.....

.....

.....

13 By drawing arrows, connect each term on the left to its correct description on the right. [*5 marks*]

| | |
|---|---|
| hypertext mark-up language (HTML) | the contents of the computer memory are output to a screen or printer; this enables a software developer to locate errors |
| hexadecimal number system | this is used to develop web pages; it is used in the processing, definition and presentation of text (e.g. the specification of a text colour) |
| memory dump | value, written in hexadecimal, which is used to uniquely identify a device on the network; it is often written in the form: NN-NN-NN-DD-DD-DD |
| media access control (MAC) address | number system which uses the values 0 to 9 and the letters A to F to represent digits |
| web address | also identified as a URL such as: www.books.com |

14 A computer uses a binary system known as **Binary Coded Decimal (BCD)**. In this system, each denary digit (0 to 9) is represented by a 4-bit binary value:

| 8 | 4 | 2 | 1 |
|---|---|---|---|
| | | | |

a Give the 4-bit binary codes for the digits 9 and 6. [*2 marks*]

| | 8 | 4 | 2 | 1 |
|---|---|---|---|---|
| 9 | | | | |

| | 8 | 4 | 2 | 1 |
|---|---|---|---|---|
| 6 | | | | |

b Which denary numbers are represented by the following 4-bit binary codes: [*4 marks*]

| 8 | 4 | 2 | 1 |
|---|---|---|---|
| 1 | 0 | 0 | 0 |

| 8 | 4 | 2 | 1 |
|---|---|---|---|
| 0 | 1 | 0 | 1 |

.....

| 8 | 4 | 2 | 1 |
|---|---|---|---|
| 0 | 1 | 1 | 1 |

| 8 | 4 | 2 | 1 |
|---|---|---|---|
| 0 | 0 | 0 | 0 |

| 8 | 4 | 2 | 1 |
|---|---|---|---|
| 0 | 1 | 0 | 1 |

.....

c What is the largest denary number that can be represented by two bytes using this BCD system? [*1 mark*]

.....

d Using normal binary notation, what is the largest denary number that could be represented by two bytes? [*2 marks*]

.....

.....

.....

e Suggest a use for the BCD system. [*1 mark*]

.....

.....

.....

15 Write down a series of steps that could be used to convert a denary number into a hexadecimal number. Your steps should allow somebody to follow them clearly to give the correct converted value. [*7 marks*]

.....

.....

.....

.....

.....

.....

.....

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.....

# 2 Communication and internet technologies

1 Name the type and method of data transmission being described below:

a Data transmitted in one direction only; one bit at a time over a single channel or wire. [*2 marks*]

.....

b Several bits of data transmitted in both directions at the same time over several channels or wires. [*2 marks*]

.....

c Data transmitted in both directions, but not at the same time, along a single channel or wire. [*2 marks*]

.....

2 a Describe how it is possible to ensure data arrives correctly identified at its destination when using asynchronous data transmission. [*2 marks*]

.....

.....

.....

.....

b Describe how it is possible to ensure that data is received in the correct groups when using synchronous data transmission. [*3 marks*]

.....

.....

.....

.....

c Give **one** advantage and **one** disadvantage of using synchronous data transmission. [*2 marks*]

Advantage: .....

Disadvantage: .....

3 a Give the meaning of the term **USB**. [*1 mark*]

.....

.....

b Indicate with a tick (✓) which of the following statements about USB connections are **true**: [*5 marks*]

| Statement about USB connections | True (✓) |
|---|---|
| All the wires in a USB connector are used in data transmission | |
| The maximum cable length in a USB connection is 2 metres | |
| Devices plugged into the computer using the USB connection are automatically detected | |
| The USB connection has become the industry standard for most computers | |
| The user will always be prompted to download a device driver when the device is plugged in to the computer | |

c Give **two** examples of devices which can be connected to a computer using a USB connection. [*2 marks*]

1 .....

2 .....

4 a A system uses **even parity**. Indicate which of the following bytes has even parity: [*3 marks*]

i

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 |

.....

ii

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1 | 0 | 1 | 1 | 0 | 1 | 1 | 0 |

.....

iii

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 |

.....

b Explain why parity checks are used. [*1 mark*]

.....

.....

c Nine bytes of data were transmitted from one computer to another computer. **Even parity** was used by both systems. An additional byte, called the parity byte was also sent at the end of the transmission.

The following table shows the nine bytes and parity byte following transmission:

| | parity bit | bit 2 | bit 3 | bit 4 | bit 5 | bit 6 | bit 7 | bit 8 |
|---|---|---|---|---|---|---|---|---|
| byte 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 |
| byte 2 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| byte 3 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 0 |
| byte 4 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 1 |
| byte 5 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 0 |
| byte 6 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 1 |
| byte 7 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| byte 8 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 1 |
| byte 9 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| parity byte: | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 |

i One of the bits has been transmitted incorrectly. Indicate which bit is incorrect by giving its bit number and byte number: [*2 marks*]

bit number: .....

byte number: .....

ii Explain how you arrived at your answer to part **ci**. [*3 marks*]

.....

.....

.....

.....

.....

.....

iii Write down the corrected byte: [*1 mark*]

.....

iv Describe a situation where a parity check would not identify which bit had been transmitted incorrectly. [*2 marks*]

.....

.....

.....

.....

v Name and briefly describe another method to check if data has been transmitted correctly. [*2 marks*]

.....

.....

.....

.....

5 Which internet terms are being described below? [*5 marks*]

| | |
|---|---|
| Companies that provide the user with access to the internet; a monthly fee is usually charged for this service | |
| A unique address that identifies the location of a device which is connected to the internet | |
| A unique address that identifies the device that is connected to the internet | |
| A set of rules that must be obeyed when transferring files across the internet | |
| Software that allows a user to display a web page on their computer screen; they translate the HTML from the website | |

6 a HTML is made up of **structure** and **presentation**. Explain the difference between these two terms. [*3 marks*]

Structure: .....

.....

.....

.....

.....

Presentation: .....

.....

.....

.....

b Indicate how you would know whether or not a website was secure. [*1 mark*]

.....

.....

7 Look at the following two HTML parts:

**Part A**

```
h1 {color: #FF00FF;
        font-family: arial,sans-serif;
        text-align: center;
        font-size: 48px}

h3 {color: #440044;
        font-family: serif;
        text-align: justify;
        font-size: 32px}

p {color: #404040;
        font-family: sans-serif;
        text-align: justify;
        font-size: 16px}
```

**Part B**

```
<html>
        <head>
                <link rel = "stylesheet" type = "text/css" href = "example.css">
        </head>

        <body>
                <td>
                        <h1> This is an example of HTML, </h1>
                        <h3> showing a few of the tags. </h3>
                        <p> This sets up the paragraph for the text. </p>
                </td>
        </body>
</html>
```

a Which of the above parts shows the .css file? [*1 mark*]

.....

b Using parts A and B from above, give **two** examples of tags. [*2 marks*]

.....

c Show how a tag is closed. [*1 mark*]

.....

d Explain why there are three groups of data in the **color** definition. [*1 mark*]

.....

.....

.....

e Which number base is used to represent values in the **color** definition? [*1 mark*]

.....

# 3 Logic gates and logic circuits

1 Which logic gates have the following three truth tables? *[3 marks]*

a

| A | B | X |
|---|---|---|
| 0 | 0 | 0 |
| 0 | 1 | 1 |
| 1 | 0 | 1 |
| 1 | 1 | 1 |

.....

b

| A | B | X |
|---|---|---|
| 0 | 0 | 1 |
| 0 | 1 | 1 |
| 1 | 0 | 1 |
| 1 | 1 | 0 |

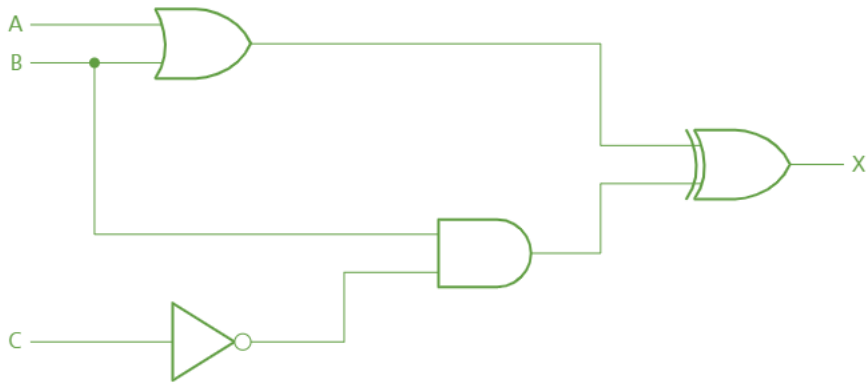
.....

c

| A | B | X |
|---|---|---|
| 0 | 0 | 0 |
| 0 | 1 | 1 |
| 1 | 0 | 1 |
| 1 | 1 | 0 |

.....

2 Complete the truth table for the following logic circuit: *[4 marks]*




| A | B | C | Working area | 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 | | |

3 a Write the following statement as a logic statement: *[3 marks]*

X is 1 if A and B are on or if B is off and C is on

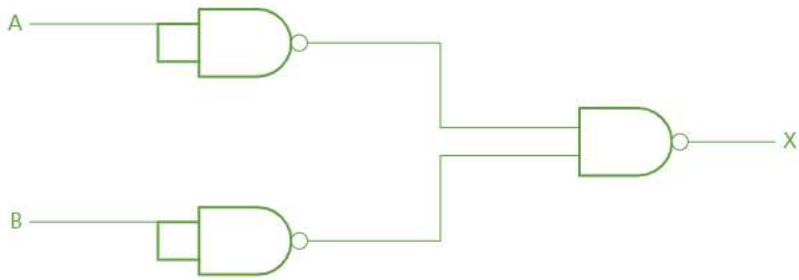
.....

.....

.....

b Draw the logic circuit to represent your statement in part a. [4 marks]


4 a Complete the truth table for the following logic circuit: [2 marks]




| A | B | Working area | X |
|---|---|---|---|
| 0 | 0 | | |
| 0 | 1 | | |
| 1 | 0 | | |
| 1 | 1 | | |

b Which single logic gate is represented by the truth table in part a? [1 mark]

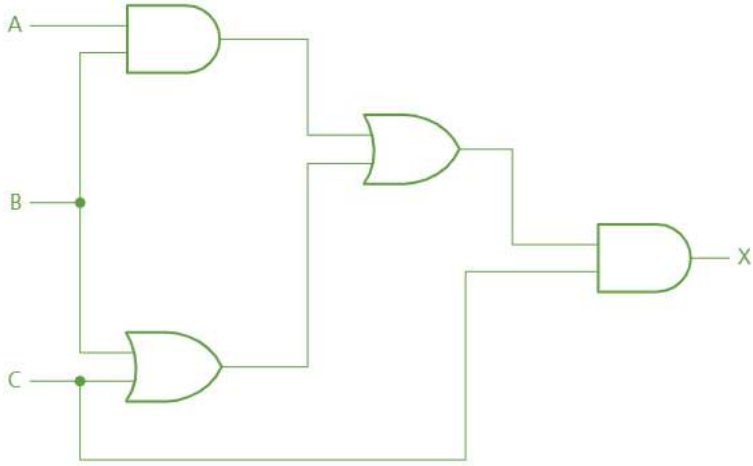
.....

c Explain why a single logic gate is often replaced by a logic circuit such as the one shown in part a. [1 mark]

.....

.....

5 a Complete the truth table for the following logic circuit: [*4 marks*]

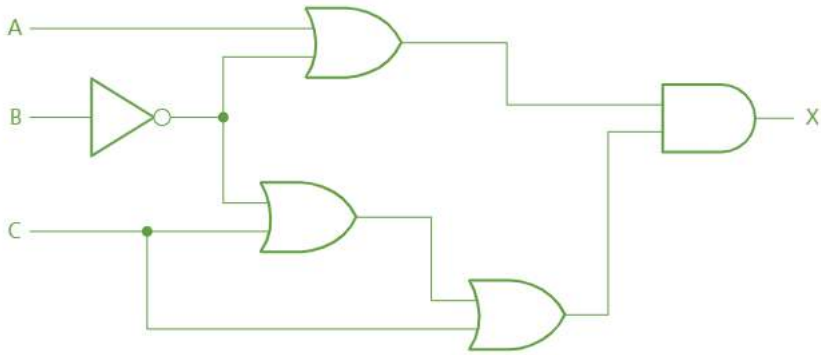



| A | B | C | Working area | X |
|---|---|---|---|---|
| 0 | 0 | 0 | | |
| 0 | 0 | 1 | | |
| 0 | 1 | 0 | | |
| 0 | 1 | 1 | | |
| 1 | 0 | 0 | | |
| 1 | 0 | 1 | | |
| 1 | 1 | 0 | | |
| 1 | 1 | 1 | | |

b Which simplified logic circuit could replace the logic circuit in part a? [*1 mark*]

.....

6 a Complete the truth table for the following logic circuit: [*4 marks*]



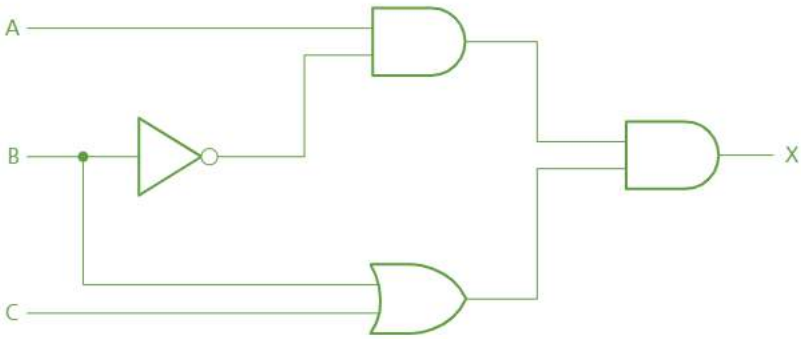

 

| A | B | C | Working area | X |
|---|---|---|---|---|
| 0 | 0 | 0 | | |
| 0 | 0 | 1 | | |
| 0 | 1 | 0 | | |
| 0 | 1 | 1 | | |
| 1 | 0 | 0 | | |
| 1 | 0 | 1 | | |
| 1 | 1 | 0 | | |
| 1 | 1 | 1 | | |

b What single logic gate could replace the following logic circuit? [*2 marks*]

.....

7 a Write down the logic statement to represent the following logic circuit: [*3 marks*]




.....

.....

.....

.....

b Draw the logic circuit which corresponds to the following truth table: [*4 marks*]

| A | B | C | X |
|---|---|---|---|
| 0 | 0 | 0 | 1 |
| 0 | 0 | 1 | 0 |
| 0 | 1 | 0 | 1 |
| 0 | 1 | 1 | 1 |
| 1 | 0 | 0 | 1 |
| 1 | 0 | 1 | 0 |
| 1 | 1 | 0 | 1 |
| 1 | 1 | 1 | 1 |


8 A chemical process is monitored using a logic circuit. There are three inputs to the logic circuit representing the parameters being monitored in the chemical process. An alarm, X, will give an output value of 1 depending on certain conditions.

The following table describes the process conditions being monitored:

| Parameter description | Parameter | Binary value | Description of condition |
|---|---|---|---|
| reaction temperature | T | 0 | temperature > 120 °C |
| | | 1 | temperature <= 120 °C |
| pressure of CO gas evolved | P | 0 | pressure > 2 bars |
| | | 1 | pressure <= 2 bars |
| acid concentration | A | 0 | acid concentration > 4 moles |
| | | 1 | acid concentration <= 4 moles |

An alarm, X, will generate the value 1 if:

- either temperature > 120 °C and acid concentration <= 4 moles
- or temperature <= 120 °C and gas pressure <= 2 bars
- or acid concentration > 4 moles and gas pressure <= 2 bars

a Write the logic statement to represent this system. [3 marks]

.....

.....

.....

.....

.....

b Draw the logic circuit to represent this system. [7 marks]


c Complete the truth table to represent this system. [4 marks]

| T | A | P | Working area | 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 | | |

9 A safety system uses the input from three sensors A, B and C. The binary values from these sensors form the input to a logic circuit.


The output, X, from the logic circuit is 1 if:

- either A is 1 and B is 1
- or A is 0 and C is 1
- or B is 0 and C is 1

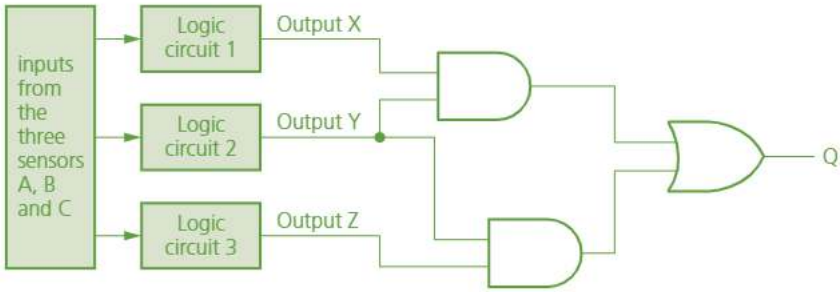
a Draw the logic circuit to represent the above system. [*7 marks*]


b Complete the truth table for the above system. [*4 marks*]

| A | B | C | Working area | 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 | | |

c For safety reasons, the sensors feed into three different logic circuits (numbered 1, 2 and 3) which produce the outputs X, Y and Z. These three outputs then form the inputs to another logic circuit that has the output, Q.

The three logic circuits are connected to this extra logic circuit as shown below:




Complete the truth table for this system. [*4 marks*]

| X | Y | Z | Working area | Q |
|---|---|---|---|---|
| 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 Operating systems and computer architecture

1 Give **six** functions of a typical operating system (OS). [*6 marks*]

1 .....

2 .....

3 .....

4 .....

5 .....

6 .....

2 a Describe **three** different types of interrupt. [*3 marks*]

1 .....

.....

2 .....

.....

3 .....

.....

b What is meant by the term **buffer**? [*1 mark*]

.....

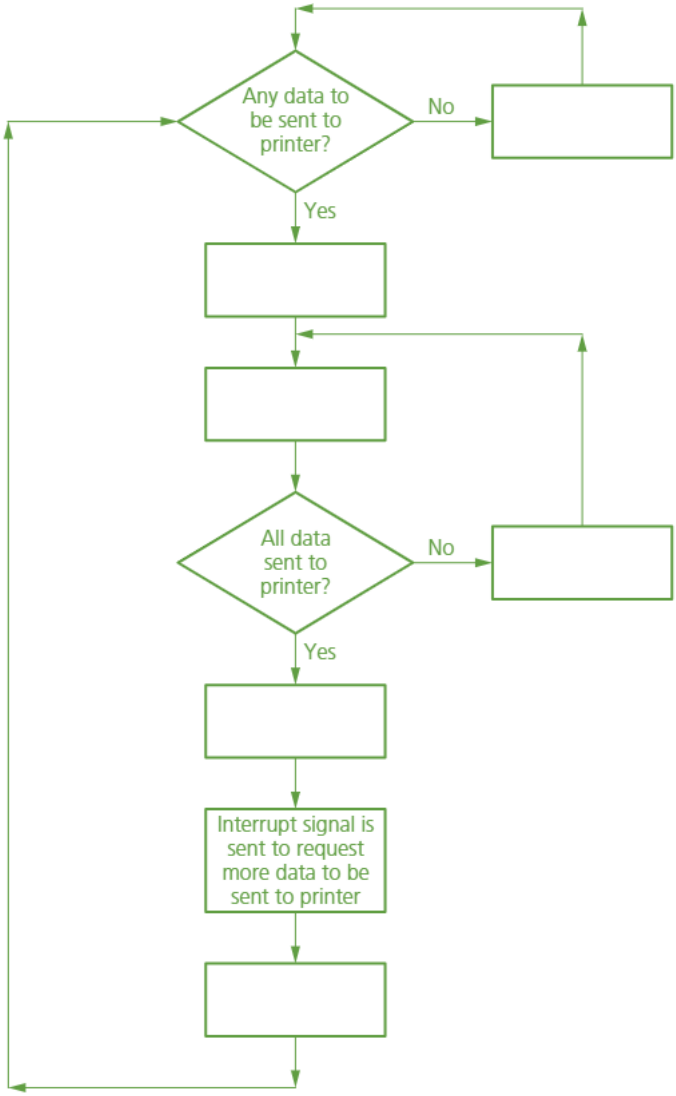
.....

.....

c The flowchart on the opposite page shows how buffers and interrupts are used when the processor sends data to a printer. Some of the items are missing from the flowchart.

**Using item numbers only**, complete the flowchart using the following list of items: [*6 marks*]

| Item number | Item |
|---|---|
| 1 | contents of printer buffer emptied to printer |
| 2 | current task is suspended while interrupt is serviced |
| 3 | data to be printed out is sent to the printer buffer |
| 4 | processor continues with its current tasks |
| 5 | processor continues with current tasks while printer buffer is emptied |
| 6 | when all the data is printed, printer buffer becomes empty |




3 a Name **three** types of bus used in the von Neumann architecture. [*3 marks*]

.....

.....

.....

b Name **three** types of address used in the von Neumann architecture. [*3 marks*]

.....

.....

.....

c The memory contents of a computer are shown below.

| Address | Contents |
|---|---|
| 1000 0000 | 0111 1100 |
| 1000 0001 | 1000 0011 |
| 1000 0010 | 1111 1101 |
| 1000 0011 | 0111 1110 |
| 1000 0100 | 1100 1101 |
| ↓ | ↓ |
| 1111 1100 | |
| 1111 1101 | 0110 0011 |
| 1111 1110 | 1010 0111 |
| 1111 1111 | 1111 0011 |

i Show the contents of the **MAR** and **MDR** if we want to READ the contents of memory location **1 1 1 1  1 1 1 0**. [*2 marks*]

MAR: | | | | | | | | |

MDR: | | | | | | | | |

ii Show the contents of the **MAR** and **MDR** if we wish to write **1 1 0 0  1 1 0 1** into memory location **1 0 0 0  0 1 0 0**. [*2 marks*]

MAR: | | | | | | | | |

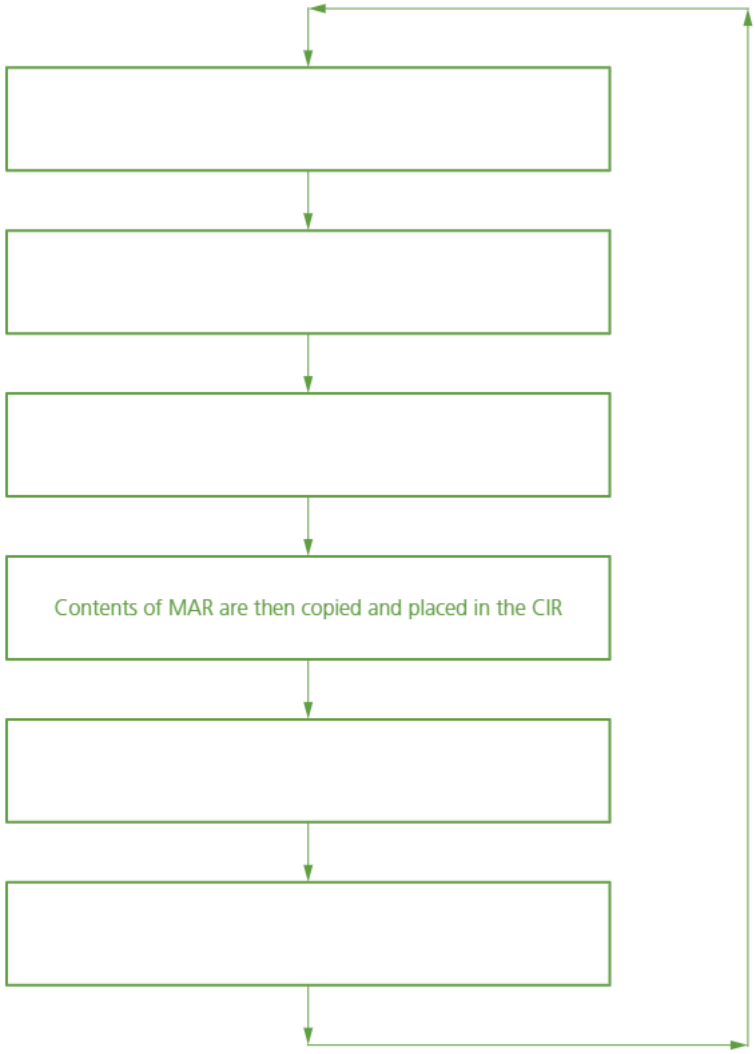
MDR: | | | | | | | | |

iii If **MAR** contains **1 1 1 1  1 1 0 0** and **MDR** contains **0 0 1 1  1 1 0 0**, fill in the shaded cell of the memory contents diagram above. [*1 mark*]

4 The diagram on the opposite page shows a typical fetch–execute cycle; however, five of the stages have been omitted. Complete the cycle by writing the following stages in their correct position.

| Stage | Description of stage |
|---|---|
| **1** | Address is then copied from PC to MAR via the address bus |
| **2** | Contents of memory location contained in MAR are then copied into MDR |
| **3** | Instruction is decoded and then executed by sending out signals via control bus to the computer components |
| **4** | The PC contains the address of memory location of the next instruction to be fetched |
| **5** | Value of PC is then incremented by 1 so it now points to the next instruction to be fetched |

[*5 marks*]




5 a Explain why some devices do not need to have an operating system. [*2 marks*]

.....

.....

.....

.....

.....

b Give an example of a device which does not require an operating system. [*1 mark*]

.....

# 5 Input and output devices

1 Describe how face recognition software is used at an airport to verify the identity of passengers. [*4 marks*]

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.....

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.....

.....

.....

.....

2 Explain each of the following scanner terms. [*6 marks*]

CCD: .....

.....

.....

CT: .....

.....

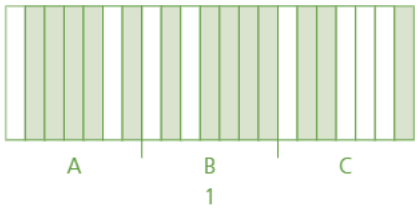
.....

MRI: .....

.....

.....

3 a A barcode showing three digits is shown below.



Give the binary value of each digit. [3 marks]

A: .....

B: .....

C: .....

b A supermarket uses barcodes on all its items. When a customer goes to check out, a number of input and output devices may be used.

Name **two** input devices and **two** output devices. Give a different use for each named device. [8 marks]

Input device 1: .....

Use: .....

.....

Input device 2: .....

Use: .....

Output device 1: .....

Use: .....

.....

Output device 2: .....

Use: .....

.....

c Give **two** benefits to the supermarket manager and **two** benefits to customers of using barcodes on all items. [4 marks]

**Manager**

1 .....

.....

2 .....

.....

**Customer**

1 .....

.....

2 .....

.....

3 The barcode on the right is known as a QR code:

a What does 'QR' mean? [*1 mark*]

.....

b Give **two** benefits of using QR codes. [*2 marks*]

1 .....

.....

2 .....

.....

c Explain how a tourist could use QR codes at an airport to help plan a holiday. [*3 marks*]

.....

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.....

4 Give the **most suitable** input device for each of the following applications. A different device must be given in each case. [*5 marks*]

| Application | Suitable input device |
|---|---|
| Entering text and data into a word processor or spreadsheet | |
| Selecting an option or icon from an onscreen menu | |
| Input a user's voice into a computer as part of a voice recognition system | |
| Converting a hard copy document into an electronic form to be stored in a computer | |
| System that allows a user to write and draw on a screen which then automatically saves the text and images in a memory | |

5 a Inkjet printers usually fall into two categories: **thermal bubble** or **piezoelectric**.

Choose one of these categories and describe how ink droplets are produced. [*3 marks*]

Category: .....

.....

Description: .....

.....

.....

.....

.....

.....

.....

.....

b Give **one** advantage and **one** disadvantage of inkjet printers compared with laser printers. [*2 marks*]

Advantage: .....

.....

.....

.....

Disadvantage: .....

.....

.....

.....

c The diagram on the following page shows the steps carried out when an inkjet printer prints a document.

The steps have not been written in the correct order. By writing the numbers 1 to 9 next to each step, place them in the correct order.

The first one has been done for you. [*8 marks*]

| Steps | Order |
|---|---|
| The printer driver checks whether the chosen printer is ready to print the document | |
| Once the printer buffer is empty, the printer sends an interrupt to the processor requesting more data to be sent; this action continues until the whole document is printed | |
| A sheet of paper is fed into the printer body; if no paper is available or the paper is jammed, an error message is sent to the computer | |
| At the end of each full pass of the print head, the paper is advanced slightly to allow the next line to be printed | |
| The printer driver ensures that the data is in a format that the chosen printer can process | |
| Data is sent to the printer and is stored in a temporary memory, known as the printer buffer | |
| Data from the document is first of all sent to the printer driver | 1 |
| As a sheet of paper is fed through the printer, the print head moves from side to side printing text/image in the four colours | |
| The whole process is continued until the printer buffer is empty | |

6 a 3D printers use various ways to produce solid objects. Explain each of the following terms: *[3 marks]*

Additive: .....

.....

.....

.....

.....

Direct 3D printing: .....

.....

.....

.....

.....

Binder 3D printing: .....

.....

.....

.....

.....

b A car enthusiast has bought a car made in 1921. Unfortunately, none of the parts for the car are still made.

Explain how 3D technology could be used to create any part for this car. [*3 marks*]

.....

.....

.....

.....

.....

.....

.....

c Describe **three other** uses of 3D printers. [*3 marks*]

1 .....

.....

.....

2 .....

.....

.....

3 .....

.....

.....

7 a Most modern televisions and computer screens are LCD and use LED back-lit technology.

Give **three** advantages of using LED back-lit technology rather the older CCFL (fluorescent lamp) technology. [*3 marks*]

1 .....

.....

2 .....

.....

3 .....

.....

b i Explain the term **OLED**. [*1 mark*]

.....

.....

ii Give two benefits of using OLED technology rather than LCD. [*2 marks*]

1 .....

.....

2 .....

.....

8 Describe a suitable **different** application that uses each of the following sensors. [*4 marks*]

| Sensor | Application |
|---|---|
| **temperature** | |
| **light** | |
| **infrared** | |
| **magnetic field** | |

9 A burglar alarm system uses pressure sensors and acoustic (sound) sensors to detect the presence of an intruder.

A microprocessor is used to monitor and control the whole system. A keypad is used to key in a 4-digit PIN that either activates or deactivates the system.

If an intruder is detected, an alarm is sounded and also a blue flashing light outside the building.

Describe in detail how the sensors and microprocessor interact to detect and warn of an intruder. [*7 marks*]

# 6 Memory and data storage

1 Five file terms are shown on the left and five file descriptions are shown on the right. By drawing arrows link each file term to its correct file description. [*5 marks*]

| | |
|---|---|
| MP3 file | uses compression technology to reduce the size of an image |
| BMP file | uses compression technology to reduce the size of a music file by up to 90% |
| MIDI file | file compression algorithm that reduces file size by eliminating unnecessary bits of data |
| jpeg image | a raw bitmap image that has not yet been compressed |
| lossy file format | communication protocol that allows electronic musical instruments to interact with each other |

2 a Give **three** differences between RAM and ROM memories. [*3 marks*]

1 .....

.....

.....

2 .....

.....

.....

3 .....

.....

.....

b Two types of RAM are **DRAM** and **SRAM**. In the diagram below, draw arrows to link each type of RAM to its correct feature(s). [*5 marks*]

| | |
|---|---|
| | needs to be constantly refreshed to retain the data |
| DRAM | consumes the least power of the two types of RAM |
| SRAM | makes use of 'flip flops' to hold bits of memory |
| | used in computers where high speed processing is needed; e.g. memory cache |
| | has the higher storage capacity of the two types of RAM |

3 a Give an example of data which matches the data formats below. [*3 marks*]

Real: .....

Integer: .....

Currency: .....

b i Assuming each character is 1 byte in size, and ignoring spaces, how many bytes of memory would be needed to store the following sentence? [*1 mark*]

'this shows you how lossless would use less memory'.....

ii A file compression system replaces parts of the text in the sentence as follows:

th = 1, is = 2, how = 3, ou = 4, less = 5

Rewrite the sentence in part **bi** using the above numerical values where possible. [*2 marks*]

.....

.....

iii How many bytes of memory does your new sentence in part **bii** require? [*1 mark*]

.....

iv Explain why the method described in part **bii** is lossless compression. [*1 mark*]

.....

.....

4 a Place each of the following storage and memory devices into their correct category: [*6 marks*]

- Blu-ray disc
- DVD-RAM
- Fixed hard-disk drive (HDD)
- Fixed solid-state drive (SSD)
- Flash memory/memory stick
- RAM
- Removable hard-disk drive (HDD)
- ROM

| Primary | Secondary | Off-line |
|---|---|---|
| | | |

b Give **three** advantages of using SSD rather than HDD in a computer system. [*3 marks*]

1 .....

.....

2 .....

.....

3 .....

.....

5 a The following table shows six features of optical media. By placing ticks (✓) in the correct boxes, indicate which features refer to which optical media. [*3 marks*]

| Optical media | Use red lasers to read/write | Use blue lasers to read/write | Use two polycarbonate layers | Use one polycarbonate layer | Track pitch < 1 µm | Track pitch > 1 µm |
|---|---|---|---|---|---|---|
| CD | | | | | | |
| DVD | | | | | | |
| Blu-ray | | | | | | |

b Describe **three** advantages of using Blu-ray discs rather than normal DVDs to store movies. [*3 marks*]

1 .....

.....

.....

2 .....

.....

.....

3 .....

.....

.....

 

6 A student wrote: *'The future of optical media is one of obsolescence in the next five years'.*

Discuss this statement by reference to modern technologies. [*3 marks*]

# 7 High- and low-level languages

1 What is a program? [*2 marks*]

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.....

2 The following terms are used about high-level programming languages. [*3 marks*]

State what each term means.

a Portable

.....

.....

b Problem solving

.....

.....

c Translation

.....

.....

3 Give **four** examples of high-level programming languages. [*4 marks*]

1 .....

2 .....

3 .....

4 .....

4 Give **four** benefits to a programmer of developing a program using a high-level programming language. [*4 marks*]

1 .....

.....

2 .....

.....

3 .....

.....

4 .....

.....

5 The following terms are used about low-level programming languages. [*2 marks*]

State what each term means.

a Machine code

.....

.....

b Assembly language

.....

.....

6 Give **four** benefits to a programmer of developing a program using a low-level programming language. [*4 marks*]

1 .....

.....

2 .....

.....

3 .....

.....

4 .....

.....

7 Using the programming statements in Chapter 7 of the *Cambridge IGCSE Computer Science* textbook, show what the program code for adding two numbers (`FirstNumber` and `SecondNumber`) together could look like: [*4 marks*]

a HLL

.....

b LLL

.....

.....

.....

c Hexadecimal

.....

.....

.....

d Binary

.....

.....

.....

8 a What is a translator? [*2 marks*]

.....

.....

.....

.....

.....

b Name **three** different types of translator. [*3 marks*]

1 .....

2 .....

3 .....

c For each translator describe which type of language it is used for and what is produced after a successful translation. [6 marks]

1 .....

.....

.....

2 .....

.....

.....

3 .....

.....

.....

9 a What is meant by a syntax error? [2 marks]

.....

.....

.....

.....

.....

b What is meant by a logic error? [2 marks]

.....

.....

.....

.....

.....

c What happens when a compiler finds a syntax error? [2 marks]

.....

.....

.....

.....

.....

d What happens when an interpreter finds a syntax error? [*2 marks*]

.....

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.....

.....

10 Eight statements are shown on the left and three translators are shown on the right.

Draw lines to connect each statement to the translator it applies to (there can be more than one line to a translator). [*8 marks*]

| | |
|---|---|
| One low-level language statement is usually translated into one machine code instruction. | |
| Translates a high-level language program into machine code. | Compiler |
| Assembled programs can be used without this. | |
| No executable file of machine code is produced | |
| Executes a high-level language program a statement at a time | Interpreter |
| Compiled programs are used without this. | |
| Translates a low-level language program into machine code. | |
| One high-level language statement can be translated into several machine code instructions. | Assembler |

11 What is an IDE? [*2 marks*]

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12 a Give **three** disadvantages of using a compiler rather than an interpreter. [*3 marks*]

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.....

.....

b Give **three** advantages of using a compiler rather than an interpreter. [*3 marks*]

.....

.....

.....

.....

# 8 Security and ethics

1 Six security terms are shown on the left and six descriptions are shown on the right.
By drawing arrows, link each security term to its correct description. [*6 marks*]

| | |
|---|---|
| hacking | legitimate-looking email sent out to a user; as soon as they click on the link in the email, they are sent to a fake website |
| viruses | act of locating and using wireless internet connections illegally; requires a mobile device, wireless network card and an antenna to pick up wireless signals |
| phishing | act of gaining illegal access to a computer system |
| pharming | software that gathers information by monitoring key presses on a user's computer; the key presses are sent back to the person who sent the software |
| war driving | malicious code installed on a user's hard drive or on a web server; the code will redirect the user to a fake website without their knowledge |
| spyware | program or program code that can replicate/copy itself with the intention of deleting or corrupting files or to cause a computer malfunction |

2 a Describe how websites make use of **cookies**. [*3 marks*]

.....

.....

.....

.....

.....

b Give **three** of the tasks carried out by a **firewall**. [*3 marks*]

1.....

.....

2.....

.....

3.....

.....

c Describe three ways to prevent accidental loss of data such as file deletion, software or hardware fault. [*3 marks*]

1 .....

.....

2 .....

.....

3 .....

.....

3 a What is meant by the two terms **SSL** and **TLS**? [*3 marks*]

.....

.....

.....

.....

.....

b Describe how TLS differs from SSL. [*2 marks*]

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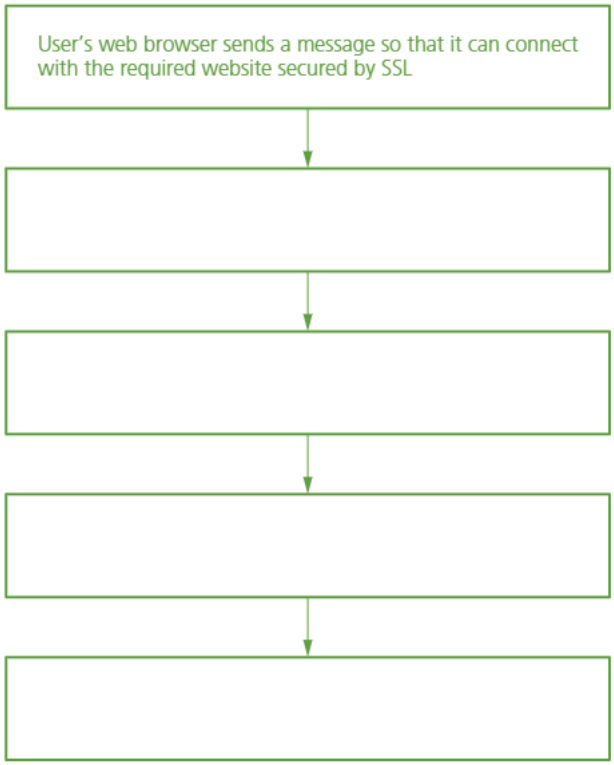
.....

.....

c The five stages when a user wants to access a secure website using SSL are shown in the diagram below. However, four of the stages are missing.

Complete the diagram on the following page using the following descriptions in their correct order. [*4 marks*]

| Stage number | Description |
|---|---|
| 1 | If the web browser can authenticate the SSL certificate it sends a message back to the web server to allow communications to begin |
| 2 | Once the message is received from the browser, the web server acknowledges the web browser and SSL two-way data transfer begins |
| 3 | Web browser then requests that the web server identifies itself |
| 4 | Web server responds by sending a copy of its SSL certificate to the user's web browser |

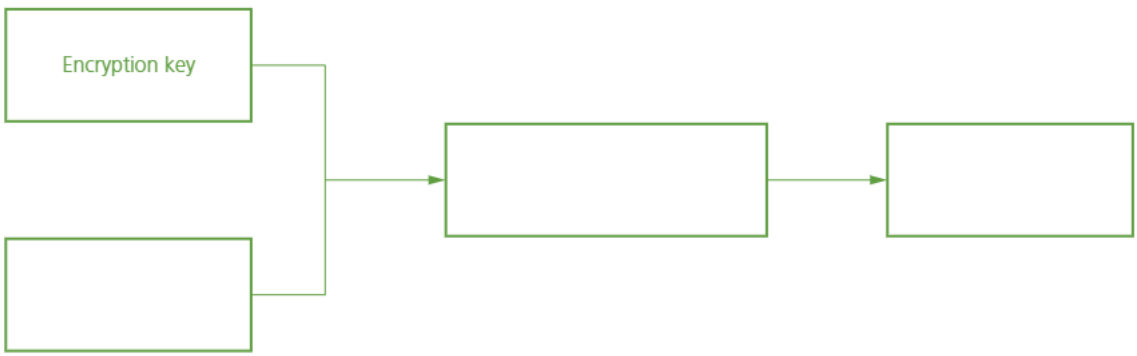



4 a Complete the diagram about encryption below by using the following terms. [*3 marks*]

1 Cypher text

2 Plain text

3 Encryption algorithm




b Explain what is meant by the following terms. [*3 marks*]

i Hashing algorithm

.....

.....

.....

.....

ii Encryption algorithm

.....

.....

.....

.....

iii MD4 software

.....

.....

.....

.....

c Explain what the advantage is of using 128-bit or 256-bit data encryption rather than 56-bit encryption. [*2 marks*]

.....

.....

.....

.....

.....

5 a Explain what is meant by **denial of service attack**. [*2 marks*]

.....

.....

.....

.....

b Describe how it is possible for a user to guard against denial of service attacks. [*2 marks*]

.....

.....

.....

.....

c Describe what signs would indicate to users that they had become victims of denial of service attacks. [2 marks]

.....

.....

.....

.....

6 Describe **five** ways a bank can protect its customers from security risks when visiting its website. [5 marks]

1 .....

.....

2 .....

.....

3 .....

.....

4 .....

.....

5 .....

.....

7 Which five terms are being described below? [5 marks]

| Description | Term |
|---|---|
| Set of principles set out to regulate the use of computers and computer systems | |
| The taking of another person's idea or work and claiming it as their own work without any acknowledgement to the originator | |
| Software a user can download from the internet free of charge; once downloaded, there are no fees when using it; however, it is subject to copyright laws | |
| Software that users are allowed to try out free of charge for a trial period; at the end of the trial period, users will be requested to pay a fee if they want to continue using it | |
| Users have freedom to run, copy, change or adapt this software without the need to seek permission; the software is not protected by copyright but there are still some restrictions | |

# 9 Problem-solving and design

1 What makes up a computer system? [*5 marks*]

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.....

2 What is top-down design? [*3 marks*]

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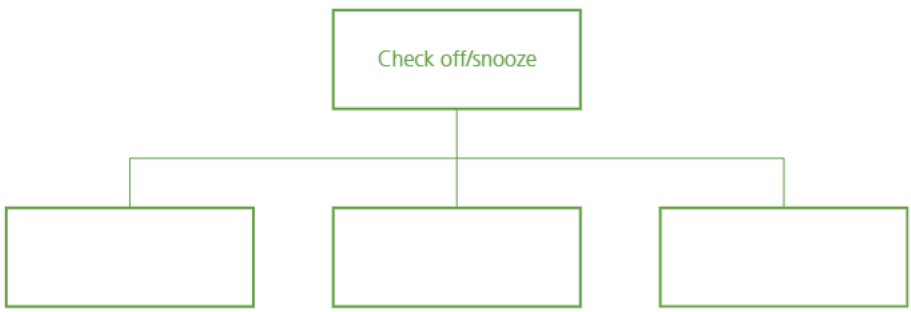
3 Using the structure diagram in Figure 9.1 of the textbook, break down the check off/snooze sub-system into further sub-systems. [*3 marks*]




4 Describe a library routine and give an example of one. [*3 marks*]

Description: .....

.....

.....

Example: .....

.....

5 a What is an algorithm? [*2 marks*]

.....

.....

b Give **two** ways of representing an algorithm. [*2 marks*]

1 .....

2 .....

6 Name and describe **three** types of test data. [*6 marks*]

1 .....

.....

.....

2 .....

.....

.....

3 .....

.....

.....

7 Explain, using an example, what is meant by a set of test data. [*3 marks*]

Explanation: .....

.....

.....

Example: .....

.....

.....

8 a Explain the difference between *validation* and *verification*. [*2 marks*]

.....

.....

.....

.....

.....

b Give **two** examples of validation. [*2 marks*]

1 .....

.....

2 .....

.....

c Give **two** examples of verification. [*2 marks*]

1 .....

.....

2 .....

.....

9 Name and describe **two** validation checks. Give an example of each validation check in use. [*6 marks*]

Name: .....

Description: .....

.....

Use: .....

.....

Name: .....

Description: .....

.....

Use: .....

.....

10 Six examples are shown on the left and six validation checks are shown on the right.

Draw a line to connect each example to the validation check it applies to. [*5 marks*]

| | |
|---|---|
| The number of pupils in a class is a whole number. | Range check |
| A person's name only contains alphanumeric characters. | Length check |
| Check that a code contains two letters followed by three numbers. | Type check |
| A name field is not left blank | Character check |
| Numbers are in the range 10 to 20. | Format check |
| A password must contain exactly 10 characters. | Presence check |

11 a What is a check digit? [*2 marks*]

.....

.....

.....

.....

.....

b Is this ISBN correct? Use the ISBN 13 method on page 122 of the textbook to check and show your working. [*3 marks*]

9780 7487 8296 3

.....

.....

.....

.....

.....

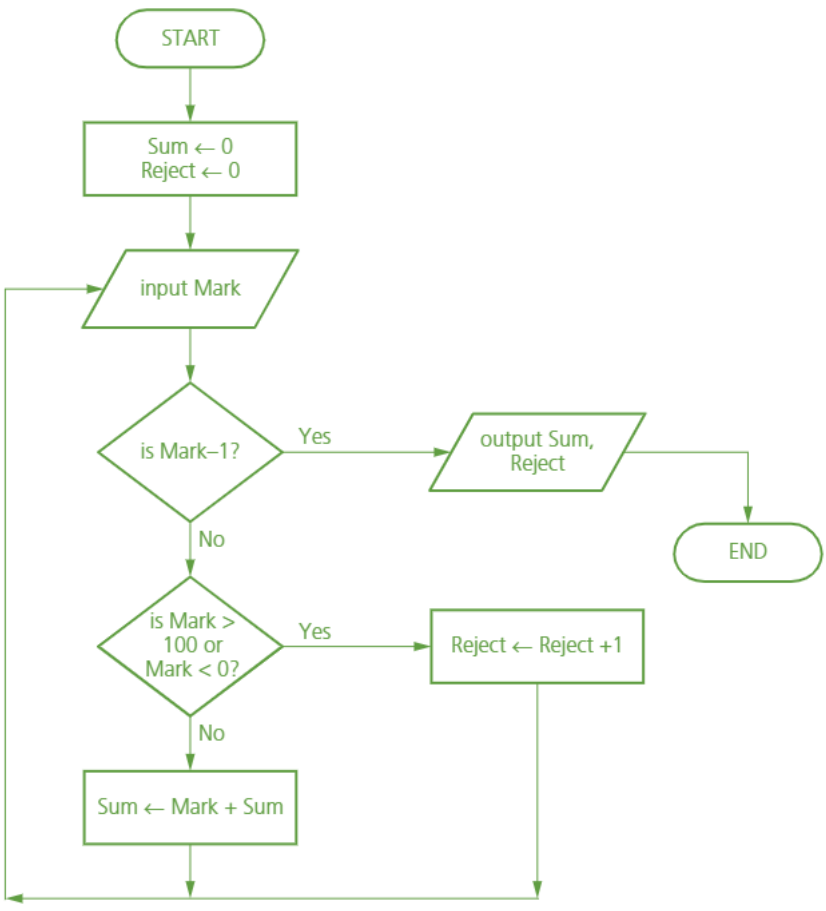
.....

c Use the modulo 11 method to calculate the check digits for these numbers. Show your working. [*4 marks*]

1127

47857

12 The following algorithm shown as a flowchart checks the marks that are input and outputs the sum of all the marks.



a What are the rules for a mark to be accepted? [2 marks]

.....

.....

b What value terminates the input? [1 mark]

.....

c Use this data and the trace table below to dry run the algorithm. [4 marks]

17, 35, 24, –5, 0, 67, 82, 97, –21, 45, 23, –1, 99

| Sum | Reject | Mark | Output |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

d Explain why this is an effective solution to adding up marks and point out any improvements that could be made. [3 marks]

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# 10 Pseudocode and flowcharts

1 What values will be stored in the following variables when the assignment statements below are completed? [*5 marks*]

```
Age ← 21

Name ← "Richard"

Value ← 18 * 2

Sum ← Value + Age

Flag ← True
```

Age .....

Name .....

Value .....

Sum .....

Flag .....

2 Write down **two** types of conditional statement and for each one show how you would select someone whose age was either 10 or 20. [*6 marks*]

.....

.....

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.....

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.....

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.....

3 a Write down **three** different types of loop structure. [*3 marks*]

1 .....

2 .....

3 .....

b Here are **three** problems. For each one, choose a different loop structure for your pseudocode solution.

i Input 10 numbers and print out their total. [*6 marks*]

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ii Input some numbers and calculate their total, an input of –1 stops the process. [*6 marks*]

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iii Input some numbers and calculate their total, stop when the total is greater than 20. [*6 marks*]

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4 a Write down **two** different statements that can be used for input. [*2 marks*]

1 .....

2 .....

b Write down **two** different statements that can be used for output. [*2 marks*]

1 .....

2 .....

5 Write a pseudocode algorithm to check the level of stock, `StockLevel`, and output `'Reorder'` when the value falls below 10. [*2 marks*]

.....

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.....

.....

6 a Write a pseudocode algorithm to input 20 numbers and find the average of the positive numbers. [*7 marks*]

.....

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.....

b Explain how you would change your algorithm to reject any negative numbers. [*2 marks*]

.....

.....

.....

.....

7 Seven examples are shown on the left and four types of statement are shown on the right.

Draw lines to connect each type of statement to the example(s) it applies to. [*7 marks*]

```
WHILE … DO … ENDWHILE
```

```
Sum ← Num1 + Num2
```

```
REPEAT … UNTIL
```

```
INPUT Num1
```

```
PRINT 'Goodbye'
```

```
IF … THEN … ENDIF
```

```
FOR … TO … NEXT
```

**Conditional**

**Loop**

**Assignment**

**Input/Output**

8 Four flowchart symbols are shown on the left and four descriptions are shown on the right.

Draw lines to connect each symbol to the correct description. [*3 marks*]

**Process**

**Terminator**

**Decision**

**Input/Output**

9 a Draw a flowchart to input 20 numbers and find the average of the positive numbers. [7 marks]

b Explain how you would change your flowchart to work for 30 numbers that are between 0 and 100. [*3 marks*]

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# 11 Programming concepts

1 Five descriptions are shown on the left and five data types are shown on the right.

Draw lines to connect each data type to the correct description. [*4 marks*]

| | |
|---|---|
| Only two values TRUE and FALSE | Integer |
| A single character | Real |
| A whole number | Boolean |
| A number with a fractional part | String |
| Several characters | Char |

2 Explain, using examples, when you would use a variable and when you would use a constant. [*4 marks*]

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3 State, giving reasons, whether these data stores should be variables or constants. [*6 marks*]

a Average Mark

.....

.....

b Number of months in a year

.....

.....

c Number of pupils in a class

.....

.....

4 a Here are **three** problems. For each one, write an efficient program to solve the problem.

i Input eight whole numbers and print out their total. [*6 marks*]

ii Input some whole numbers and calculate their total, an input of –1 stops the process. [*6 marks*]

iii Input some whole numbers and calculate their total, stop when the total is greater than 10. [*6 marks*]

b Give a set of test data that you could use for each program. [3 marks]

i .....

ii .....

iii .....

c Explain whether you would need to make any changes to your programs if real numbers were used instead of whole numbers. [2 marks]

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5 a Write a program to input 10 numbers and find the average of the negative numbers. [7 marks]

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b Explain how you would change your program to reject any positive numbers. [2 marks]

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c Give a set of test data that you could use for the program. [1 mark]

.....

# 12 Data structures: arrays and using pre-release material

1 Explain what the terms below mean when used about arrays. [*6 marks*]

Name: .....

.....

Size: .....

.....

Element: .....

.....

Index: .....

.....

Type: .....

.....

Dimension: .....

.....

2 Explain, using an example, when you would use an array. [*3 marks*]

.....

.....

.....

3 Using a high-level programming language, declare arrays to be used in the following situations.

a The names of 20 students. [*1 mark*]

.....

b The marks of 200 students. [*1 mark*]

.....

c Whether 30 students have enrolled or not. [*1 mark*]

.....

4 a Here are **three** problems. For each one, write an efficient program using an array to solve the problem. You can extend your program for each problem.

i Store the number of enquiries made each day for a week. [*6 marks*]

ii Find the day with the most enquires and the one with the least enquiries. [*6 marks*]

iii Find the total number of enquiries for the week and the average number of enquiries per day. [*6 marks*]

b Give a set of test data that you could use for these programs. [*1 mark*]

**You will need to use the pre-release material for your examination to answer the following questions.**

5 a Write an algorithm, using pseudocode for task 1. [*6 marks*]

b Write an algorithm, using pseudocode for task 2. [*6 marks*]

c Write an algorithm, using pseudocode for task 3. [6 marks]

d For task 3 use a flowchart to show the algorithm. [6 marks]

6 a Choose **three** sets of test data for task 1: normal, abnormal/erroneous and boundary. [*3 marks*]

Normal: .....

.....

.....

Abnormal: .....

.....

.....

Boundary: .....

.....

.....

b Choose **three** sets of test data for task 2: normal, abnormal/erroneous and boundary. [*3 marks*]

Normal: .....

.....

.....

Abnormal: .....

.....

.....

Boundary: .....

.....

.....

c Choose **three** sets of test data for task 3: normal, abnormal/erroneous and boundary. [*3 marks*]

Normal: .....

.....

.....

Abnormal: .....

.....

.....

Boundary: .....

.....

.....

 

7 a Draw and complete a trace table for task 1. Use your normal data for the trace. [*5 marks*]

b Draw and complete a trace table for task 1. Use your abnormal data for the trace. [*5 marks*]

8 a For every variable you have used in your program(s) for tasks 1, 2 and 3, write the variable declaration and explain why you have used this variable. [*6 marks*]

b For every constant you have used in your program(s) for tasks 1, 2 and 3, write the variable declaration and explain why you have used this variable. [*3 marks*]

c For every array you have used in your program(s) for tasks 1, 2 and 3, write the variable declaration and explain why you have used this variable. [*3 marks*]

# 13 Databases

1 Give **three** benefits of using databases. [*3 marks*]

1 .....

.....

2 .....

.....

3 .....

.....

2 Explain the following terms used about databases. [*4 marks*]

Table: .....

.....

Record: .....

.....

Field: .....

.....

Primary key: .....

.....

3 A school keeps a database table (TEXTBOOK) of all the textbooks that are available for student use. The following information is stored for each set of books: the name of the textbook, the ISBN, the authors, the number of copies available for use, the subject it is used for.

a Select names and data types for each field in the table. [*5 marks*]

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.....

b i Name the fields that should be verified. [*1 mark*]

.....

ii Name the fields that should be validated. [*1 mark*]

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c Which field would you choose for the primary key and why would you choose it? [*2 marks*]

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d Give the validation rules you would use for each field that is to be validated. [*4 marks*]

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e A teacher wants to know the names of the textbooks available for a history class with 30 students in it.

Complete the query-by-example grid below to show the search condition required. [*3 marks*]

| Field: | | | |
|---|---|---|---|
| Table: | | | |
| Sort: | | | |
| Show: | ☐ | ☐ | ☐ |
| Criteria: | | | |
| or: | | | |

4 a Write a query-by-example grid for the search condition in end of chapter question 3b (on page 177 of the textbook); the table name is OILCO. [*3 marks*]

| Field: | | | |
|---|---|---|---|
| Table: | | | |
| Sort: | | | |
| Show: | ☐ | ☐ | ☐ |
| Criteria: | | | |
| or: | | | |

b Write a query-by-example grid for the search condition in end of chapter question **4b**; the table name is SHOP. [*3 marks*]

| | | | |
|---|---|---|---|
| Field: | | | |
| Table: | | | |
| Sort: | | | |
| Show: | ☐ | ☐ | ☐ |
| Criteria: | | | |
| or: | | | |

5 a Write a query-by-example grid for the search condition in end of chapter question **3c**; the table name is OILCO. [*3 marks*]

| | | | |
|---|---|---|---|
| Field: | | | |
| Table: | | | |
| Sort: | | | |
| Show: | ☐ | ☐ | ☐ |
| Criteria: | | | |
| or: | | | |

b Write a query-by-example grid for the search condition in end of chapter question **4c**; the table name is SHOP. [*3 marks*]

| | | | |
|---|---|---|---|
| Field: | | | |
| Table: | | | |
| Sort: | | | |
| Show: | ☐ | ☐ | ☐ |
| Criteria: | | | |
| or: | | | |

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