



GCSE

3500U10-1

FRIDAY, 27 MAY 2022 – AFTERNOON

COMPUTER SCIENCE

Unit 1: Understanding Computer Science

1 hour 45 minutes plus your additional time allowance

Surname _____

First name(s) _____

Centre Number _____

Candidate Number 0 _____

For Examiner's use only

Question	Maximum Mark	Mark Awarded
1.	4	
2.	4	
3.	7	
4.	10	
5.	6	
6.	14	
7.	7	
8.	4	
9.	7	
10.	19	
11.	6	
12.	3	
13.	9	
Total	100	

INSTRUCTIONS TO CANDIDATES

Use black ink, black ball-point pen or your usual method.

Write your name, centre number and candidate number in the spaces provided on the front cover.

Answer ALL questions.

Write your answers in the spaces provided in this booklet.

If you run out of space, use the continuation page(s) at the back of the booklet, taking care to number the question(s) correctly.

INFORMATION FOR CANDIDATES

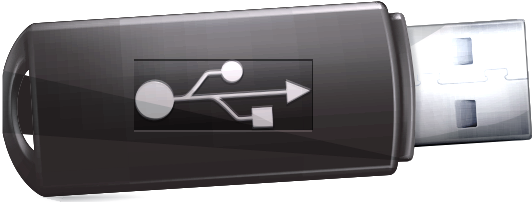
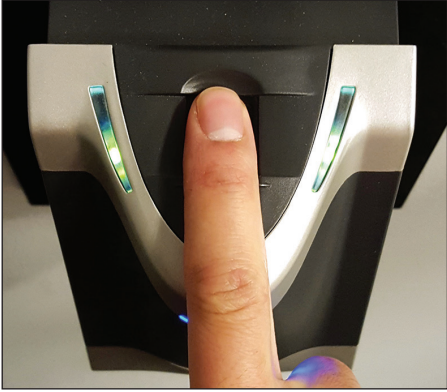


The number of marks is given in brackets at the end of each question or part-question.

You are reminded of the need for good English and orderly, clear presentation in your answers.

The total number of marks is 100.

Some questions will require you to draw on your knowledge from multiple areas of your course of study.

(Turn over)

DEVICE	INPUT	OUTPUT	STORAGE
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Answer ALL questions.

- TICK (✓) ONE BOX ONLY** for each device in the table opposite to show if it is used for input, output or storage. [4 marks]
- Complete the tables to show the relationship between the data storage units.
The first row has been completed for you. [4 marks]

NO.	UNIT
4	bits
2	
1024	
1024	kilobytes
1024	megabytes

=

=

=

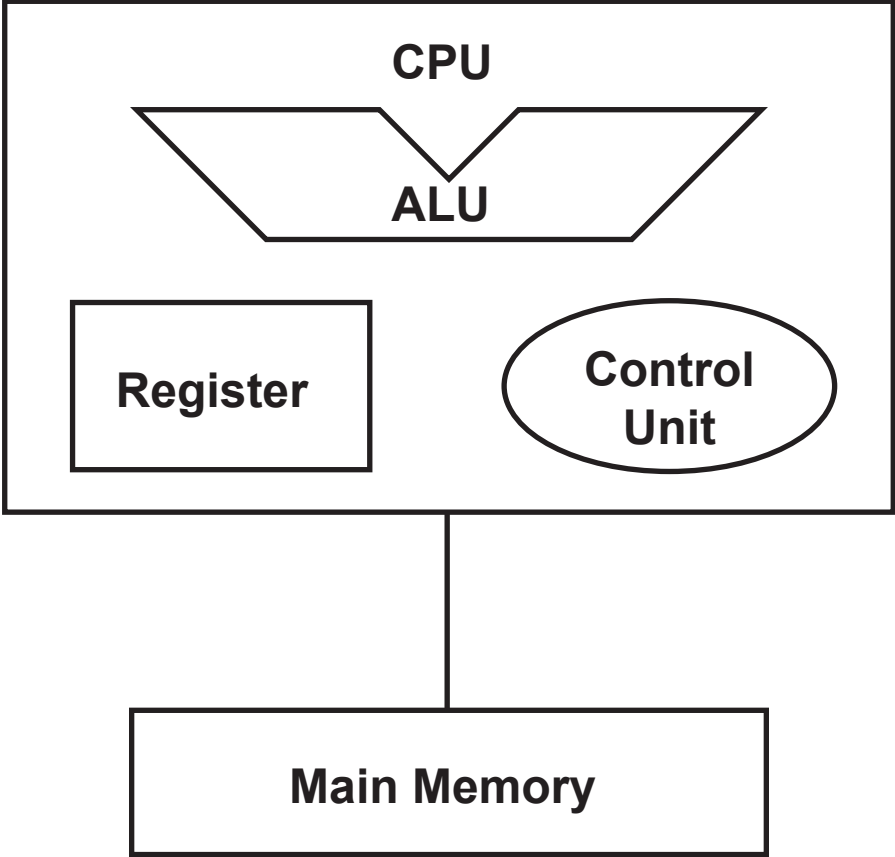
=

=

NO.	UNIT
1	nybble
1	byte
1	kilobyte
1	
1	

(Turn over)

DESCRIPTION	FORM OF CYBERATTACK			
	WORM	SPYWARE	SQL INJECTION	TROJAN
A program that appears to perform a useful function but also provides a 'backdoor' that enables data to be stolen.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A program installed by opening attachments that can be used to collect stored data without the user's knowledge.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Self-replicating program that identifies weaknesses in operating systems and enables remote control of the infected computer.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



4 (b) Describe how a RISC type processor differs from a CISC type processor. [2 marks]

4 (c) Describe the role of each of the following.

(i) Graphics card (GPU). [2 marks]

4 (c) (ii)

Motherboard. [2 marks]

5 (a) State the logical operator used in the following truth table. [1 mark]

INPUT		OUTPUT
A	B	C
0	0	0
1	0	1
0	1	1
1	1	1

5 (b) TICK (✓) ONE BOX ONLY to show the Boolean expression that represents the function described by each truth table.

KEY: $+$ = *OR* \cdot = *AND* \oplus = *XOR* $\bar{\quad}$ = *NOT*

(i)

INPUT		OUTPUT
P	Q	R
0	0	1
1	0	1
0	1	1
1	1	0

[1 mark]

$R = P \cdot Q$

$R = \overline{P \cdot Q}$

$R = P \cdot \overline{Q}$

$R = P + Q$

(ii)

INPUT		OUTPUT
X	Y	Z
0	0	1
1	0	0
0	1	0
1	1	1

[1 mark]

$Z = X \cdot Y$

$Z = \overline{X \oplus Y}$

$Z = X \oplus Y$

$Z = \overline{X \cdot Y}$

(Turn over)

5 (c) Complete the truth table for the following Boolean expression:

$$A + (B + C)$$

<i>A</i>	<i>B</i>	<i>C</i>	<i>B + C</i>	<i>A + (B + C)</i>

[3 marks]

(Turn over)

6. The TCP/IP 5-layer model defines how applications can communicate over a network.

(a) Complete the following sentences about the TCP/IP 5-layer model using only the words given:

TRANSPORT

BOOLEAN

APPLICATION

SUSPENSION

GATEWAY

NETWORK

PHYSICAL

DATA LINK

6 (a) (i)

The _____ layer provides interfaces to the software to allow it to use the network. [1 mark]

(ii) The _____ layer ensures that data is transferred from one point to another reliably and without errors. [1 mark]

(iii) Addressing and routing is provided by the _____ layer. [1 mark]

(iv) The _____ layer prepares data to be passed to the physical layer. [1 mark]

(v) The _____ layer transmits the raw data. [1 mark]

(Turn over)

6 (b) (i)

Draw a diagram of a star network topology.

[1 mark]

(Turn over)

6 (b) (iii)

Give ONE disadvantage of a star network topology. [1 mark]

7 (a) (i)

Convert 01101010_2 into hexadecimal. [1 mark]

7 (a) (ii)

Convert $B9_{16}$ into binary. [1 mark]

7 (a) (iii)

Give ONE reason why hexadecimal notation is used as shorthand for binary numbers. [1 mark]

7 (b) Using binary addition,
add 10101011_2 to 00110110_2 .

Show your workings. [2 marks]

7 (c) State the effect of arithmetic shift functions by one place. [2 marks]

LEFT SHIFT

RIGHT SHIFT



8. When graphics are stored using a certain computer system, every colour pixel is created using a combination of the three primary colours: red, green and blue.

The 600×500 pixels 8-bit colour image opposite has been created.

(a) State the range and number of different colours in denary that can be represented using this colour model. [2 marks]

9. Clearly showing each step, simplify the following Boolean expressions using Boolean algebra and identities:

(a) $A.(B + \bar{B})$

[2 marks]

(Turn over)

10. **Betty's B&B** wants to store booking data on a computer system.

The table opposite shows the booking data to be stored by **Betty's B&B**.

(a) (i) State why an array would NOT be suitable for storing this data. [1 mark]

10 (a) (ii)

Give a suitable example of data that may be stored by **Bettys B&B** using an array. [2 marks]

10 (b)

Design different types of validation check for **THREE** of the fields from the booking data table. Do not use presence check in your answer.

[6 marks]

VALIDATION CHECK 1

FIELD:

TYPE OF CHECK:

RULE:

(Turn over)

10 (b)

VALIDATION CHECK 2

FIELD:

TYPE OF CHECK:

RULE:

10 (b)

VALIDATION CHECK 3

FIELD:

TYPE OF CHECK:

RULE:

(Turn over)

10 (c) (iii)

Describe the need to archive files. [2 marks]

```
1 set firstNumber as integer
2 set secondNumber as integer
3
4 input firstNumber
5 input secondNumber
6
7 output "The sum is, FirstNumber - secondNumber"
```

11. The program opposite is intended to add together two numbers and output the answer, but it contains errors.

Identify **THREE** errors in the program and name each error type. [6 marks]

ERROR 1

Error: _____

Line: _____

Error Type: _____

ERROR 2

Error: _____

Line: _____

Error Type: _____

11. ERROR 3

Error: _____

Line: _____

Error Type: _____

12. Describe the environmental impact of digital technology on wider society. [3 marks]

END OF PAPER

(Turn over)

