Cambridge International Examinations
Cambridge International General Certificate of Secondary Education (9–1)

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER			

COMPUTER SCIENCE **0984/01**

Paper 1 Theory **For Examination from 2019**

SPECIMEN PAPER

1 hour 45 minutes

Candidates answer on the Question Paper.

No Additional Materials are required.

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name in the spaces at the top of this page.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams, graphs or rough working.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.
Calculators must not be used in this paper.

Answer **all** questions.
No marks will be awarded for using brand names of software packages or hardware.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.
The maximum number of marks is 75.

This document consists of **14** printed pages.

1 A company selling CDs uses a unique 6-digit identification number for each CD title. The right-most digit (position 1) is a *check digit*.

For example,

6	5	4	3	2	1	← digit position
3	0	6	1	4	9	← identification number

check digit

The validity of the number and check digit is calculated as follows:

- multiply **each** digit by its digit position
- add up the results of the multiplications
- divide the answer by 11
- if the remainder is 0, the identification number and check digit are valid.

(a) Show whether the following identification numbers are valid or not. You **must** show how you arrived at your answer.

Identification number 1: 4 2 1 9 2 3

working: .....

.....

.....

.....

valid or not valid? .....

Identification number 2: 8 2 0 1 5 6

working: .....

.....

.....

.....

valid or not valid? ..... [3]

(b) Find the check digit for this identification number.

5 0 2 4 1 __

working: .....

.....

.....

.....

check digit: ..... [2]

(c) Describe, with examples, **two** different types of data entry errors that a check digit would detect.

1 .....

.....

2 .....

..... [2]

2 Kamil is setting up a new computer system to record television programmes. He wants to be able to record, view and then erase programmes that he does not want to keep. He has chosen to use DVD-RAM as an optical storage medium.

Explain to Kamil why it is better to use DVD-RAM rather than DVD+RW or DVD-RW.

1 .....

.....

2 .....

..... [2]

3 An alarm, Y, sends a signal (Y = 1) when certain fault conditions in a chemical process are detected. The inputs are:

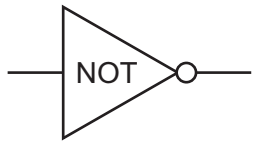
Input	Binary value	Condition
A	1	acidity > 5
	0	acidity <= 5
T	1	temperature >= 120°C
	0	temperature < 120°C
S	1	stirrer bar ON
	0	stirrer bar OFF

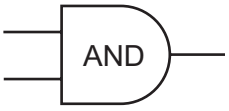
The alarm, Y, returns a value of 1 if:

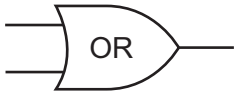
either temperature >= 120°C AND stirrer bar is OFF

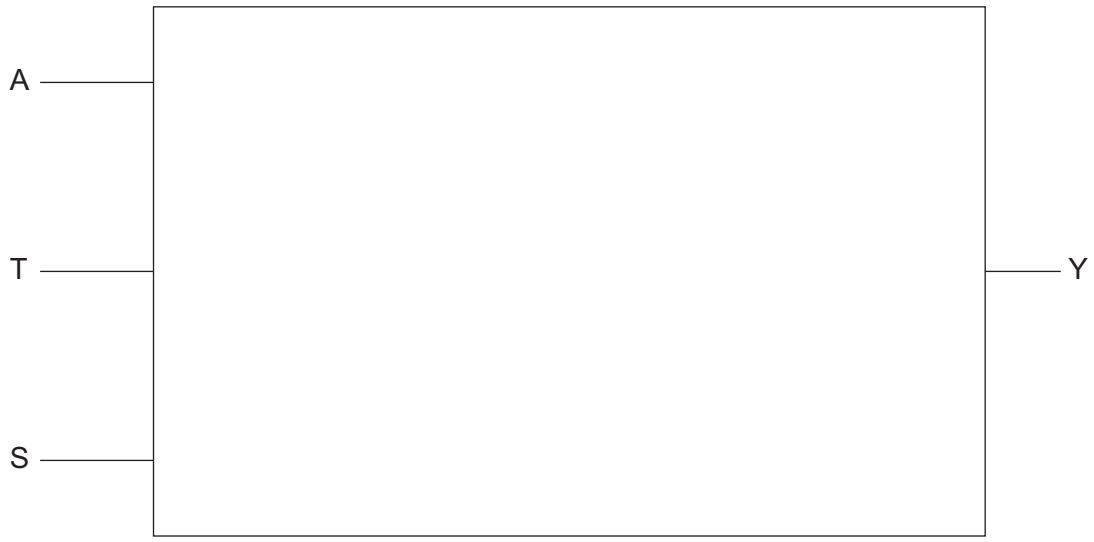
or acidity > 5 AND temperature < 120°C

(a) Draw the logic circuit for the above system using these logic gates.









[5]

(b) Complete the truth table for this alarm system.

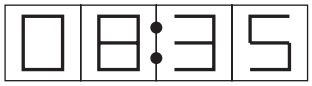
A	T	S	Y
0	0	0	
0	0	1	
0	1	0	
0	1	1	
1	0	0	
1	0	1	
1	1	0	
1	1	1	

[4]

4 A digital alarm clock is controlled by a microprocessor. It uses the 24-hour clock system (i.e. 6 pm is 18:00).

Each digit in a typical display is represented by a 4-digit binary code.

For example:



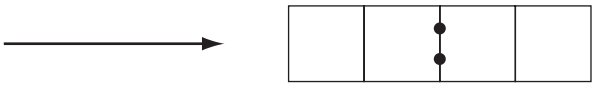
(clock display)

is represented by:

0	0	0	0	1st digit (0)
1	0	0	0	2nd digit (8)
0	0	1	1	3rd digit (3)
0	1	0	1	4th digit (5)

(a) What time is shown on the clock display if the 4-digit binary codes are:

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



(clock display)

[2]

(b) What would be stored in the 4-digit binary codes if the clock display time was:

	1st digit
	2nd digit
	3rd digit
	4th digit

[4]

(c) The clock alarm has been set at 08:00.

Describe the actions of the microprocessor which enable the alarm to sound at 08:00.

.....

.....

.....

.....

..... [2]

5 Bytes of data transferred using a serial cable are checked for errors at the receiving end using an even parity check.

Can these bytes of data pass the even parity check?

(a) 01010101

..... [1]

(b) 11001000

..... [1]

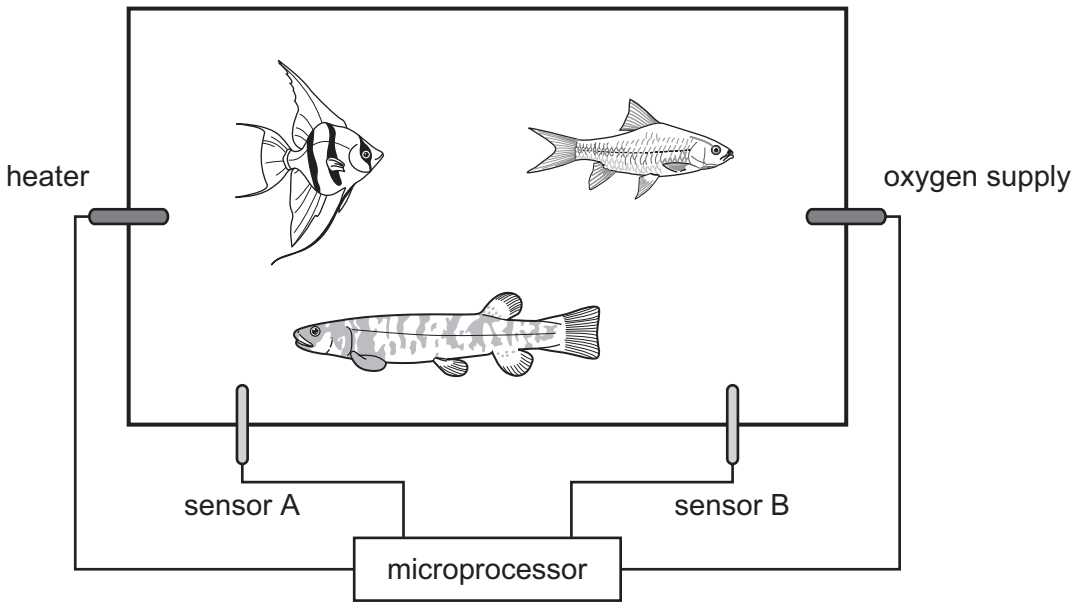
(c) How can any errors be corrected?

.....

.....

..... [2]

6 The conditions in a fish tank are being controlled using sensors and a microprocessor. To keep the fish healthy, the temperature must be at 25°C and the oxygen content needs to be 20 ppm (parts per million). The tank contains a heater and an oxygen inlet controlled by a valve.



(a) Name the **two** sensors used in this application.

Sensor A .....

Sensor B ..... [2]

(b) Describe how the sensors and the microprocessor are used to maintain the correct conditions in the fish tank.

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... [4]

(c) What safeguards are needed to stop the fish tank temperature rising too high?

.....

..... [1]

7 Ahmed uses the Internet for some time and is puzzled by the terminology.

(a) Draw a line to match each description to the appropriate technical term.

authoring language used to create documents to be viewed on the World Wide Web	Browser
computer that responds to requests to provide information and services over the Internet	HTML
defines how messages are transmitted and formatted over the Internet	MAC address
numerical ID for each device on the Internet	Internet Server
software that enables users to access/view documents and other resources on the Internet	IP address
unique ID for a network interface card	http

[5]

(b) Ahmed sees the message “Set your browser to accept cookies”.

Explain why some websites make this request.

.....

.....

.....

..... [2]

8 Computer memories are measured in terms of the number of *bytes*.

(a) (i) What is meant by the term *byte*?

.....

..... [1]

(ii) The number of bytes in a Gigabyte can be written as 2^x

What is the value of x?

..... [1]

(b) Flash memories and CD-RWs are used as backing media for computers.

Give **two** differences between these two media.

1 .....

.....

2 .....

..... [2]

9 Andrew sends a large document to a printer.

(a) State the name for the area of memory used to store temporarily the data being sent to the printer.

..... [1]

(b) The printer runs out of paper during the printing job. A signal is sent back to the computer to stop temporarily its current task.

Name this type of signal.

..... [1]

10 In a simple symmetric encryption system, each letter of the alphabet is substituted with another.

The plain text message:

The quick brown fox jumps over the lazy dog.

becomes the cypher text message:

Zag towvs jumpy dmh coilr mngu zag bfke qmx.

(a) (i) Decode this cypher text message.

Agbbm Pmubq

.....

..... [2]

(ii) Convert these words to cypher text.

Computer Science

.....

..... [2]

(b) Both the person who sends the message and the person who receives it need to know what the substitution key is, and they need to keep this secret. A copy of the substitution key has been sent using SSL transmission.

(i) What is meant by SSL?

..... [1]

(ii) How does SSL keep the copy of the key secret during transmission?

.....

..... [1]

[Turn over

11 Five security or data loss issues are shown on the left-hand side.

Five possible methods of data recovery or protection are shown on the right.

Draw a line to match each definition/description of **Issues** to the most appropriate **Methods of Data Recovery**.

Issues	Methods of Data Recovery
data loss caused by hard disk head crash	anti-spyware software
hacking into files and changing or deleting data	anti-virus software
introduction of software that self-replicates and can cause data loss	back-up files
reading of illegally accessed documents	encryption
software that logs/records all key presses on your computer without you knowing	passwords and a firewall

[4]

12 Look at these two pieces of code:

A:

```
      CLC
      LDX #0
loop: LDA A,X
      ADC B,X
      STA C,X
      INX
      CPX #16
      BNE loop
```

B:

```
FOR Loop = 1 TO 4
    INPUT Number1, Number2
    Sum = Number1 + Number2
    PRINT Sum
NEXT
```

(a) Which of these pieces of code is written in a high-level language?

.... [1]

(b) Give **one** benefit of writing code in a high-level language.

....

....

.... [1]

(c) Give **one** benefit of writing code in a low-level language.

....

....

.... [1]

(d) High-level languages can be *compiled* or *interpreted*.

Give **two** differences between a compiler and an interpreter.

1 ....

....

2 ....

.... [2]

13 When a key is pressed on the keyboard, the computer stores the ASCII representation of the character typed into main memory.

The ASCII representation for A is 65 (denary), for B is 66 (denary), etc.

There are two letters stored in the following memory locations:

Location 1	A
Location 2	C

(a) (i) Show the contents of Location 1 and Location 2 as binary using 8 bits.

Location 1								
Location 2								

[2]

(ii) Show the contents of Location 1 and Location 2 as hexadecimal.

Location 1 .....

Location 2 ..... [2]

(b) The following machine code instruction is stored in a location of main memory:

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

Convert this binary pattern into hexadecimal.

..... [4]

(c) Explain why a programmer would prefer to see the contents of the locations displayed as hexadecimal rather than binary, when debugging his program that reads the key presses.

.....

.....

.....

..... [2]