Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

4170308148

COMPUTER SCIENCE **0478/11**

Paper 1 Theory **October/November 2016**

1 hour 45 minutes

Candidates answer on the Question Paper.

No Additional Materials are required.

No calculators allowed.

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.

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.

The syllabus is approved for use in England, Wales and Northern Ireland as a Cambridge International Level 1/Level 2 Certificate.

This document consists of **14** printed pages and **2** blank pages.

1 To process an instruction, a central processing unit (CPU) goes through a cycle that has three main stages.

Name each stage in this cycle.

Stage 1 .....

Stage 2 .....

Stage 3 .....

[3]

2 Name each of the potential security issues described in the **five** statements below:

Statement	Security issue
The act of gaining unauthorised access to a computer system	.....
Program code that can replicate itself with the intention of deleting or corrupting files stored in a computer	.....
A small file sent by a web server to a web browser; every time the user visits the website, data about user preferences is collected	.....
The act of illegally changing the source code of a program so that it can be exploited for another use	.....
Malicious code installed on a user's hard drive or a web server which redirects the user to a fake website without their knowledge	.....

[5]

3 **Five** computer terms and **seven** descriptions are shown below.

Draw a line to connect each computer term to its correct description.

Computer term	Description
Serial, simplex data transmission	Several bits of data sent down several wires, in both directions, but not at the same time
	Several bits of data sent down several wires, in both directions, at the same time
Parallel, half-duplex data transmission	An even or odd number of bits set to 1 in a byte, used to check if the byte has been transmitted correctly
Parity check	One bit sent at a time, over a single wire in one direction only
	An additional digit placed at the end of a number to check if the number has been entered correctly
Automatic repeat request (ARQ)	A value transmitted at the end of a block of data; it is calculated using the other elements in the data stream and is used to check for transmission errors
Checksum	An error detection method that uses response and time out when transmitting data; if a response is not sent back to the sender in an agreed amount of time, then the data is re-sent

[5]

[Turn over

4 The Henslows Diner is a local restaurant.

(a) Staff currently use a keyboard to input a customer food order into a computer. The food order is then sent to the kitchen.

State **two** disadvantages of using a keyboard to input a customer food order.

1 .....

.....

2 .....

.....

[2]

(b) A concept keyboard has a flat surface that is overlaid with images of food items available from the restaurant menu. Staff can click on an image to add the food item to a customer food order.

The Henslows Diner wants to change to a concept keyboard to input customer food orders.

Explain **two** benefits of making this change.

1 .....

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.....

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2 .....

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[4]

(c) The Henslows Diner stores personal data on a computer. This computer is connected to the Internet to allow the data to be backed up.

There is currently one security method in place to protect the data on the computer from unauthorised access. This is a password.

Give **two** other security methods that could be added to improve the security of the data. Describe how each method will keep the data safe.

Security method 1 .....

Description .....

.....

.....

Security method 2 .....

Description .....

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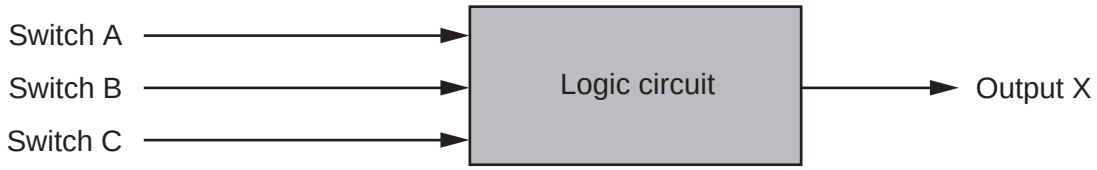
.....

[4]

5 Three switches, A, B and C, each send values of 0 or 1 to a logic circuit. Value X is output from the logic circuit.



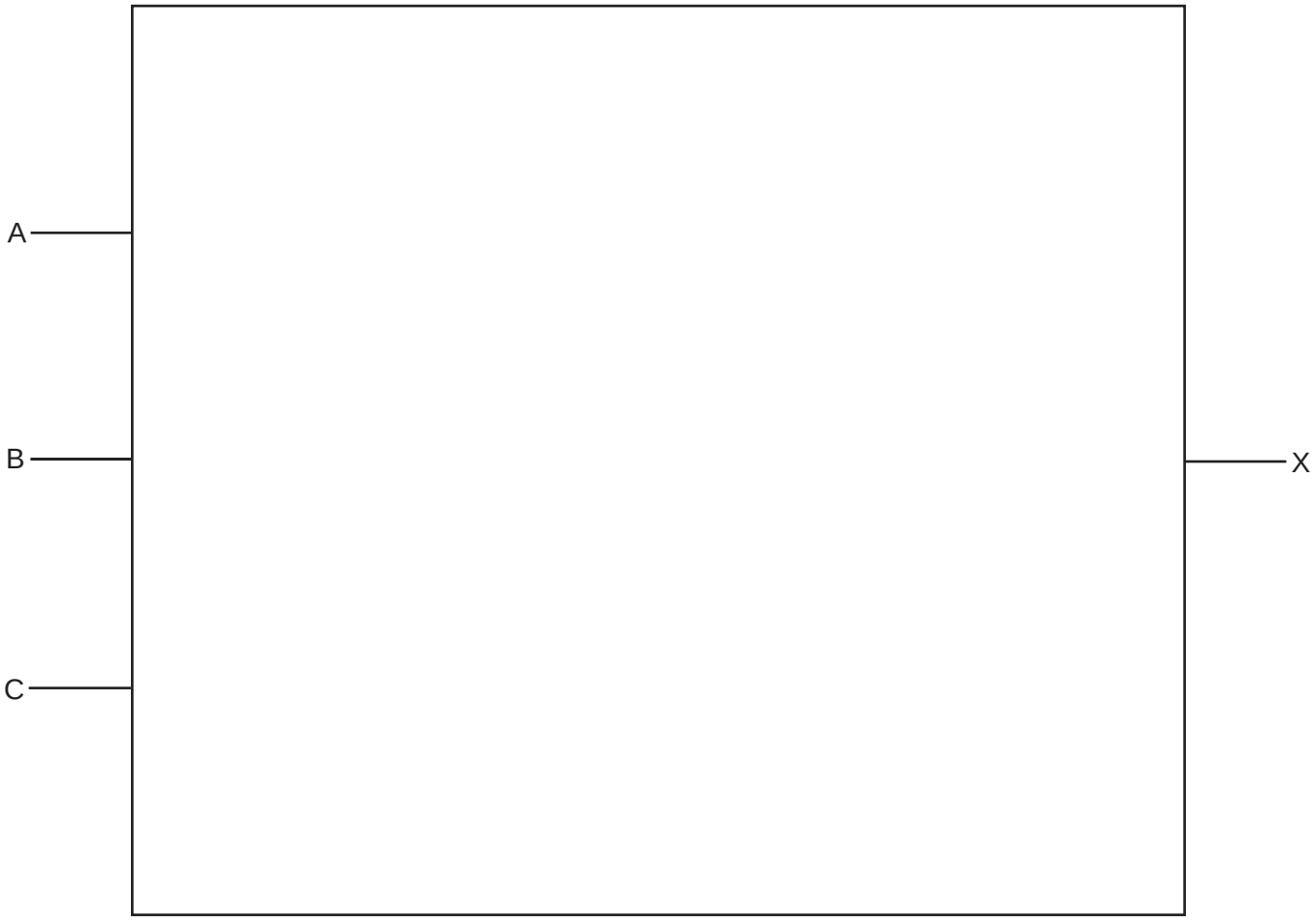
Output X has a value of 1 depending on the following conditions:

Switch A sends value 1 AND Switch B sends value 0

OR

Switch B sends value 1 AND Switch C sends value 0

(a) Draw a logic circuit to represent the conditions above.



[5]

(b) Complete the truth table for the conditions given at the start of question 5.

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) A microprocessor regularly samples the output, X. Each sample value is stored in an 8-bit register as shown below. One bit of this register is reserved as a parity bit.

Five consecutive output values of 1 indicate a fault condition.

Identify which of the following registers shows a fault condition.

Parity bit

1	1	1	1	1	0	0	1	**Register Y**

0	1	0	1	1	1	1	1	**Register Z**

Register .....[1]

(d) When eight bytes of data have been collected, they are transmitted to a computer 100 km away. Parity checks are carried out to identify if the data has been transmitted correctly. The system uses **even parity** and column 1 is the parity bit.

The eight bytes of data are sent together with a ninth parity byte:

	parity bit	**column 2**	**column 3**	**column 4**	**column 5**	**column 6**	**column 7**	**column 8**
byte 1	1	0	0	0	0	1	0	0
byte 2	1	1	1	1	0	0	1	1
byte 3	0	1	0	0	1	0	0	0
byte 4	0	1	1	1	0	0	0	1
byte 5	1	0	0	0	1	1	1	1
byte 6	0	0	0	0	0	0	0	0
byte 7	1	1	1	0	1	0	0	0
byte 8	1	0	0	0	1	1	1	0
parity byte	1	0	1	1	0	1	1	1

(i) Identify which of the eight bytes contains an error.

byte .....[1]

(ii) Identify which column contains an error.

column .....[1]

(iii) The incorrect bit is indicated where the byte number and column cross.

Give the corrected byte.

[1]

(iv) Calculate the denary value of the corrected byte.

.....

.....[1]

(v) Considering the fault condition given in **part (c)**, explain why it is very important that the incorrect bit is located and corrected.

.....

.....

.....

.....[2]

6 High-level or low-level languages can be used when writing a computer program.

State **two** advantages of using a high-level language and **two** advantages of using a low-level language.

High-level language advantage 1 .....

.....

High-level language advantage 2 .....

.....

Low-level language advantage 1 .....

.....

Low-level language advantage 2 .....

.....

[4]

7 Modern Liquid Crystal Display (LCD) monitors use Light-Emitting Diode (LED) backlit technology.

Give **four** benefits of using LED technology.

1 .....

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2 .....

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3 .....

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4 .....

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[4]

8 **Four** descriptions about compilers and interpreters are shown below.

Draw lines to indicate which descriptions refer to a compiler and which descriptions refer to an interpreter.

Description	
It is more difficult to debug the code since one error can produce many other associated errors.	
The speed of execution of program loops is slower.	Compiler
It produces fast, executable code that runs directly on the processor.	Interpreter
It is easier to debug the code since an error is displayed as soon as it is found.	

[4]

9 A security light is controlled by sensors and a microprocessor.

Describe how the sensors and microprocessor interact to switch on the security light when an intruder is detected.

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.....[6]

10 **(a)** A manufacturer of aeroplane engines assigns a denary identification number (ID) to each engine.

One engine has the ID: 0431

(i) Convert this denary number to a 12-bit binary format.

[2]

(ii) Show how this number would be represented in hexadecimal.

.....

.....

[3]

(b) The current status of the engine is sent to a computer in the aeroplane.

Each piece of data collected is 8 bytes in size. Data collection occurs every 30 seconds.

Calculate the number of kilobytes that would be needed to store the data collected during a 10-hour flight. Show your working.

.....

.....

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.....

..... kilobytes

[3]

(c) At the end of the flight, all of the data are sent to the aeroplane engine manufacturer using the Internet.

The computer in the aeroplane has a MAC address and an IP address.

State what is meant by these two terms.

MAC address .....

.....

.....

IP address .....

.....

.....
[2]

(d) When sending this data, security is very important. Data are sent over the Internet using Transport Layer Security (TLS) protocol.

Name the **two** layers that make up TLS.

1 .....

2 .....
[2]

11 Explain why ethics are important when using computers.

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.....[6]

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