Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

2603247663

COMPUTER SCIENCE **0478/12**

Paper 1 Theory **February/March 2017**

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 **11** printed pages and **1** blank page.

DC (CW/JG) 134132/3

CAMBRIDGE International Examinations

[Turn over

1 Name **three** different sensors.

Sensor 1 .....

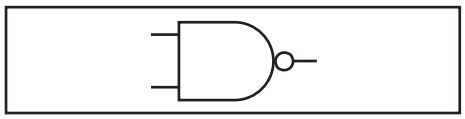
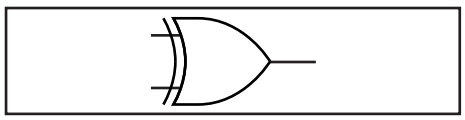
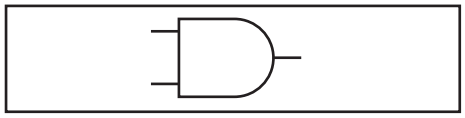
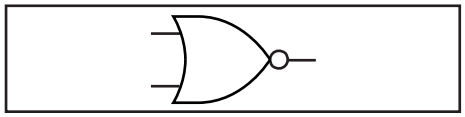
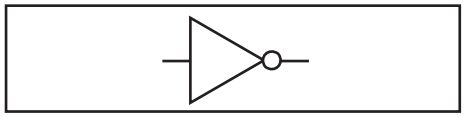
Sensor 2 .....

Sensor 3 .....

[3]

2 The diagram below shows **five** logic gate symbols and **five** names.

Draw a line between each logic gate symbol and its correct name.

Logic Gate Symbol	Name
	AND
	NOT
	NOR
	XOR
	NAND

[4]

3 A company has a number of offices on one site. Data are transmitted, using a wired network, from one office and stored at another office.

(a) State, with reasons, which data transmission, serial or parallel, should be used.

Type .....

Reasons .....

.....

.....

[3]

(b) The two registers' contents shown include parity bits.

Parity bit								
1	0	0	1	0	1	1	1	Register 1
1	0	0	0	0	1	1	1	Register 2

State which type of parity each register is using.

Register 1 .....

Register 2 .....

[2]

(c) Give one method, other than parity checking, that could be used for checking for errors in the transmission of data.

Method .....

.....[1]

[Turn over

4 A simple symmetric encryption system is used to encrypt messages. Each letter of the alphabet is substituted by another letter.

Plain text

a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z

Cypher text

v	p	n	a	q	b	r	u	z	s	c	o	y	k	w	f	x	i	e	m	d	j	t	l	h	g

(a) Convert the following plain text to cypher text.

Plain text: **d a t a s e c u r i t y**

Cypher text: .....[2]

(b) A new cypher text is created by shifting each letter of the alphabet **five** places to the right.

Show the new cypher text below.

Plain text

a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z

New cypher text

[2]

(c) State, giving a reason, which cypher text would be more secure.

.....

.....

.....

.....[2]

5 Give the meaning of the following terms.

HTML .....

.....

http .....

.....

https .....

.....

[3]

6 The diagram shows **five** operating system functions and **five** descriptions.

Draw a line between each operating system function and its description.

Function	Description
Interrupt	Many processes appear to run simultaneously
Utility	Data are temporarily held in a buffer waiting for an output device to access it
Memory management	A signal that causes the operating system to take a specified action
Spooling	A program that performs a specific task required for the operation of a computer system
Multitasking	A process of assigning blocks of memory to programs running in a computer

[4]

7 A high definition video and a large text file are to be sent as email attachments. Both files are compressed before sending. Each file is compressed using a different type of data compression algorithm.

Explain, with reasons, which type of data compression algorithm should be chosen for each file.

.....

.....

.....

.....

.....

.....

.....[4]

[Turn over

8 A register in a computer contains binary digits.

0	**0**	**1**	**1**	**0**	**1**	**1**	**1**

(a) The contents of the register could represent a binary integer.
Convert the binary integer to denary and hexadecimal.

Denary .....

Hexadecimal .....
[2]

(b) The contents of the register could represent the ASCII value for the single denary digit '7'.
Write down the ASCII value for '9' in binary, denary and hexadecimal.

Binary .....

Denary .....

Hexadecimal .....
[3]

(c) Write in Register X the binary number you would use with AND gates to convert the ASCII value of '7' to its binary integer value.

0	**0**	**1**	**1**	**0**	**1**	**1**	**1**	**ASCII**
								Register X

[1]

9 Passwords are used to keep data safe.

Explain the differences between a *text-based password* and a *biometric password*.

.....

.....

.....

.....

.....

.....

.....[4]

10 Describe the differences between a barcode and a Quick Response (QR) code.

.....

.....

.....

.....

.....

.....[3]

11 Three programmers are working on different projects:

- Alice is developing a program written in a low-level language
- Akbar is developing a program written in a high-level language
- Alex is preparing a program written in a high-level language for sale

State, with reasons, which type of translator each programmer should use. Each programmer should be using a different type of translator.

Alice .....

.....

.....

.....

Akbar .....

.....

.....

.....

Alex .....

.....

.....

.....

[6]

12 **(a)** Identify **three** uses for hexadecimal and for each one give an example of hexadecimal that matches the use.

Use 1 .....

.....

Example .....

Use 2 .....

.....

Example .....

Use 3 .....

.....

Example .....

[6]

(b) Explain why hexadecimal is used to represent binary numbers.

.....

.....

.....

.....

.....

.....[2]

13 (a) Explain what is meant by primary, secondary and off-line storage. Give an example of each.

Primary storage .....

.....

.....

Example .....

Secondary storage .....

.....

.....

Example .....

Off-line storage .....

.....

.....

Example .....

[6]

(b) A set of photographs has been taken for a wedding. **All** the guests are to be sent digitally stored copies through the ordinary postal service. There are fifty photographs and each photograph is between 1.8 and 2.5 megabytes in size.

Work out the maximum storage space required for a set of photographs. State, with a reason, a suitable medium to use for the copies to be sent to the guests.

Maximum storage space .....

.....

Medium .....

Reason .....

.....

.....

[3]

[Turn over

14 A system controls the flow of vehicles through a barrier based on three lights, A, B and C.

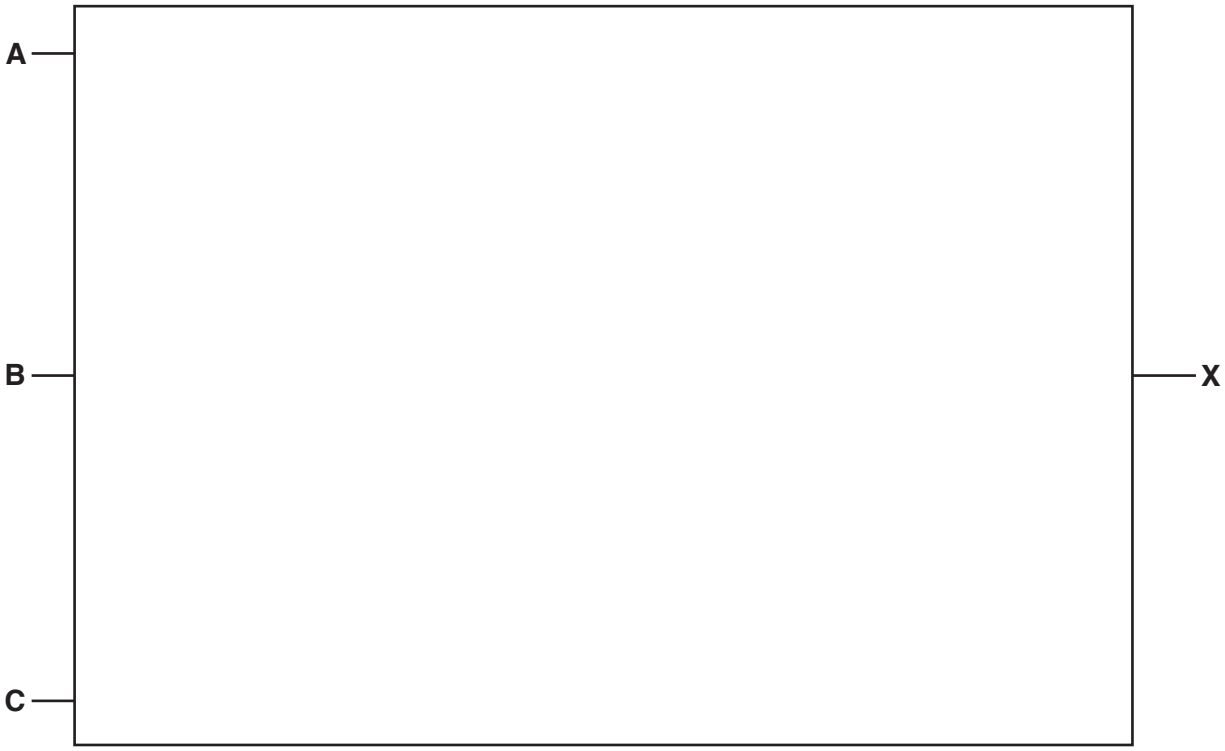
When a light is red, the signal is zero. When a light is green, the signal is one.

The barrier will open when the output X is one.

The barrier opens if either:

- light A is red and lights B and C are both green
  or
- light A is green and lights B and C are both red

(a) Design a logic circuit for the system.



[5]

(b) Complete the truth table for the system given at the start of Question 14.

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]

BLANK PAGE