Cambridge
O Level

Cambridge International Examinations
Cambridge Ordinary Level

CANDIDATE NAME	
CENTRE NUMBER	
CANDIDATE NUMBER	

2942176951

COMPUTER SCIENCE **2210/12**

Paper 1 Theory **May/June 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.

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

DC (CW/JG) 127298
© UCLES 2016

CAMBRIDGE
International Examinations

[Turn over

1 Complete the following by writing either ***compiler***, ***interpreter*** or ***assembler*** in the spaces provided.

..... – translates source code into object code.

..... – translates low-level language into machine code.

..... – stops the execution of a program as soon as it encounters an error.

[3]

2 Motion sensors are used in a security system to detect intruders.

Name **three** other sensors that could be used in the following applications.

Give a different type of sensor for each application.

Application	Sensor
controlling street lights	
monitoring a river for pollution	
controlling traffic lights	

[3]

© UCLES 2016

3 **(a)** Convert the following hexadecimal number into 12-bit binary:

4 A F

[3]

(b) The 2016 Olympic Games will be held in Rio de Janeiro. A timer that counts down to the opening of the Games is shown on a microprocessor-controlled display.

The number of hours, minutes and seconds until the Games open are held in three 8-bit registers.

The present register values are:

0	1	1	0	1	0	0	1	105 hours

0	0	1	0	0	0	0	0	32 minutes

0	0	0	1	0	1	0	0	20 seconds

The timer will count **down** in seconds.

(i) Show the values in each 8-bit register **30 seconds** after the time shown above:

								hours

								minutes

								seconds

[3]

(ii) Write the hexadecimal value of the **minutes** register from **part (b)(i)**.

.....[1]

4 Nigel wants to send a large text file electronically to Mashuda.

(a) Describe how the size of the text file can be reduced.

.....

.....

.....

.....

.....

.....

.....[3]

(b) This file will be transmitted to Mashuda as an email attachment. Mashuda then stores it on her computer.

Explain how checksums can be used to verify that the file has not been corrupted during transmission or data storage.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....[4]

© UCLES 2016

5 **Six** descriptions and **six** devices are shown below.

Draw a line to link each description to the correct device.

Description	Device
Allows a user to write on a surface using a pen; text and drawings are then captured electronically and stored for later use.	Digital Light Projector
Converts sound into an electrical signal/voltage.	Inkjet printer
Uses thermal bubble and piezoelectric technology to produce a hard copy.	Interactive whiteboard
Uses a bright white light source and micro mirrors (on a chip) to produce an image to be shone onto a wall or screen.	Laser printer
Converts a hard copy document into an electronic form to be stored as a file on a computer.	Microphone
Uses negatively charged images on a rotating drum and positively charged toner to output a hard copy.	Scanner (2D)

[5]

6 **(a)** **Three** descriptions of data transmission are given below.

Tick (✓) the appropriate box in each table to show the:

- type of transmission
- method of transmission

Description 1:

Data is transmitted several bits at a time down several wires in both directions simultaneously.

Type	Tick (✓)
simplex	
half-duplex	
full-duplex	

Method	Tick (✓)
serial	
parallel	

Description 2:

Data is transmitted in one direction only, one bit at a time, down a single wire.

Type	Tick (✓)
simplex	
half-duplex	
full-duplex	

Method	Tick (✓)
serial	
parallel	

Description 3:

Data is transmitted one bit at a time down a single wire; the data is transmitted in both directions but not at the same time.

Type	Tick (✓)
simplex	
half-duplex	
full-duplex	

Method	Tick (✓)
serial	
parallel	

[6]

(b) Give **two** reasons why serial transmission, rather than parallel transmission, is used to connect devices to a computer.

1 .....

.....

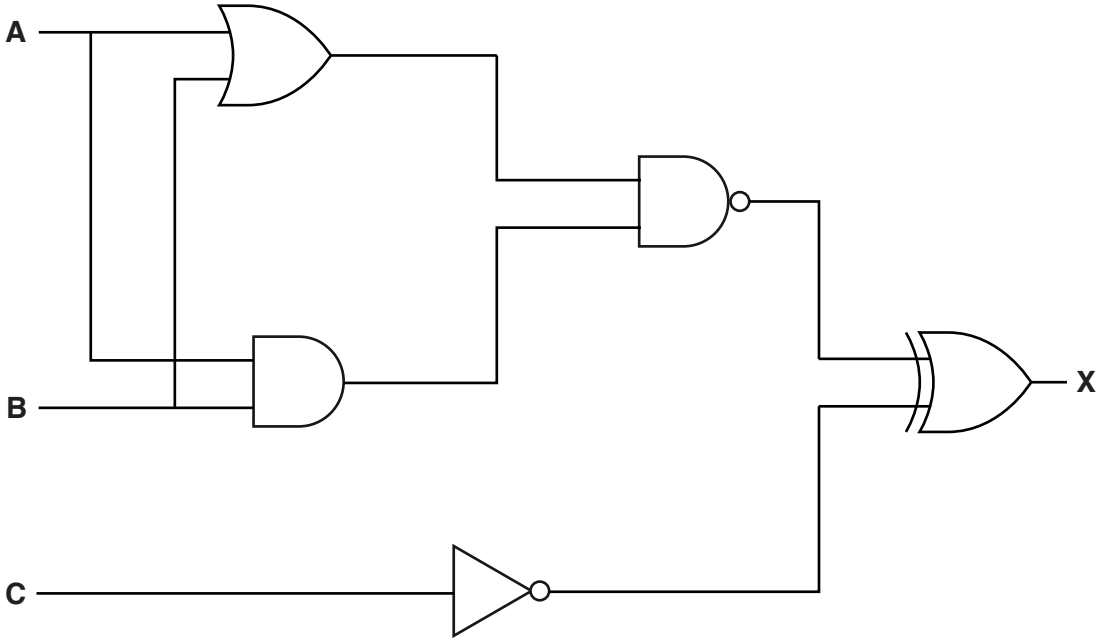
2 .....

.....

[2]

© UCLES 2016

7 (a)



Complete the truth table for this logic circuit.

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		

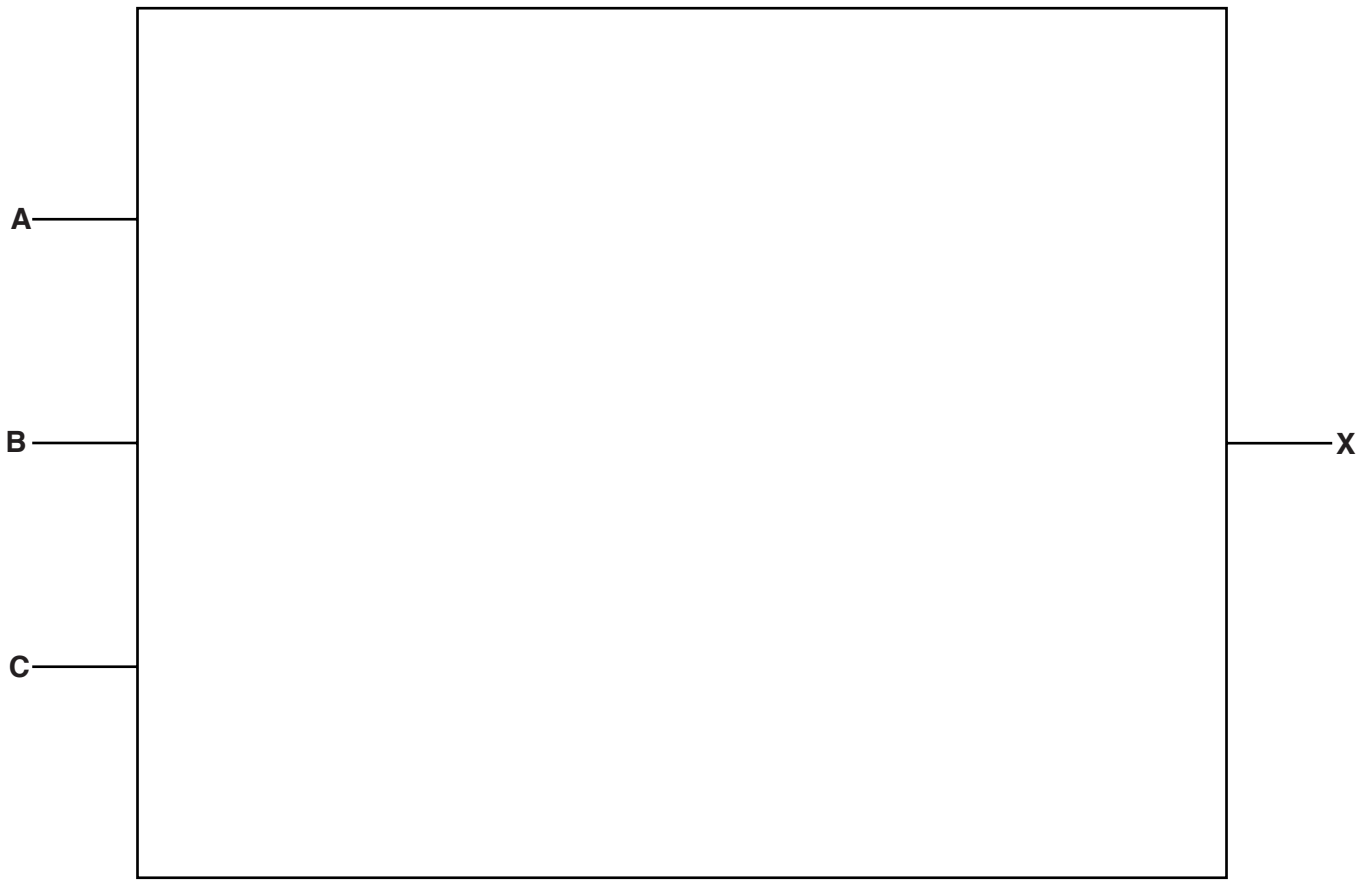
[4]

© UCLES 2016

[Turn over

(b) Draw a logic circuit corresponding to the following logic statement:

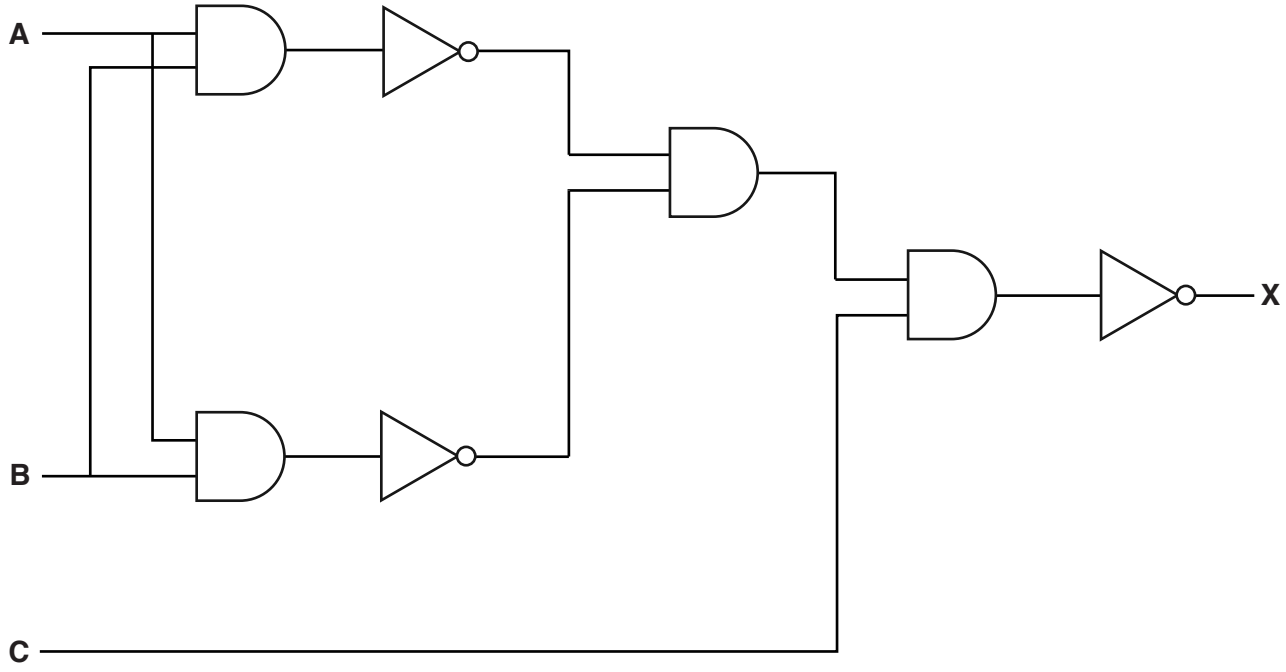
X = 1 if ((A is 1 OR B is 1) AND (A is 1 AND B is 1)) OR (C is NOT 1)



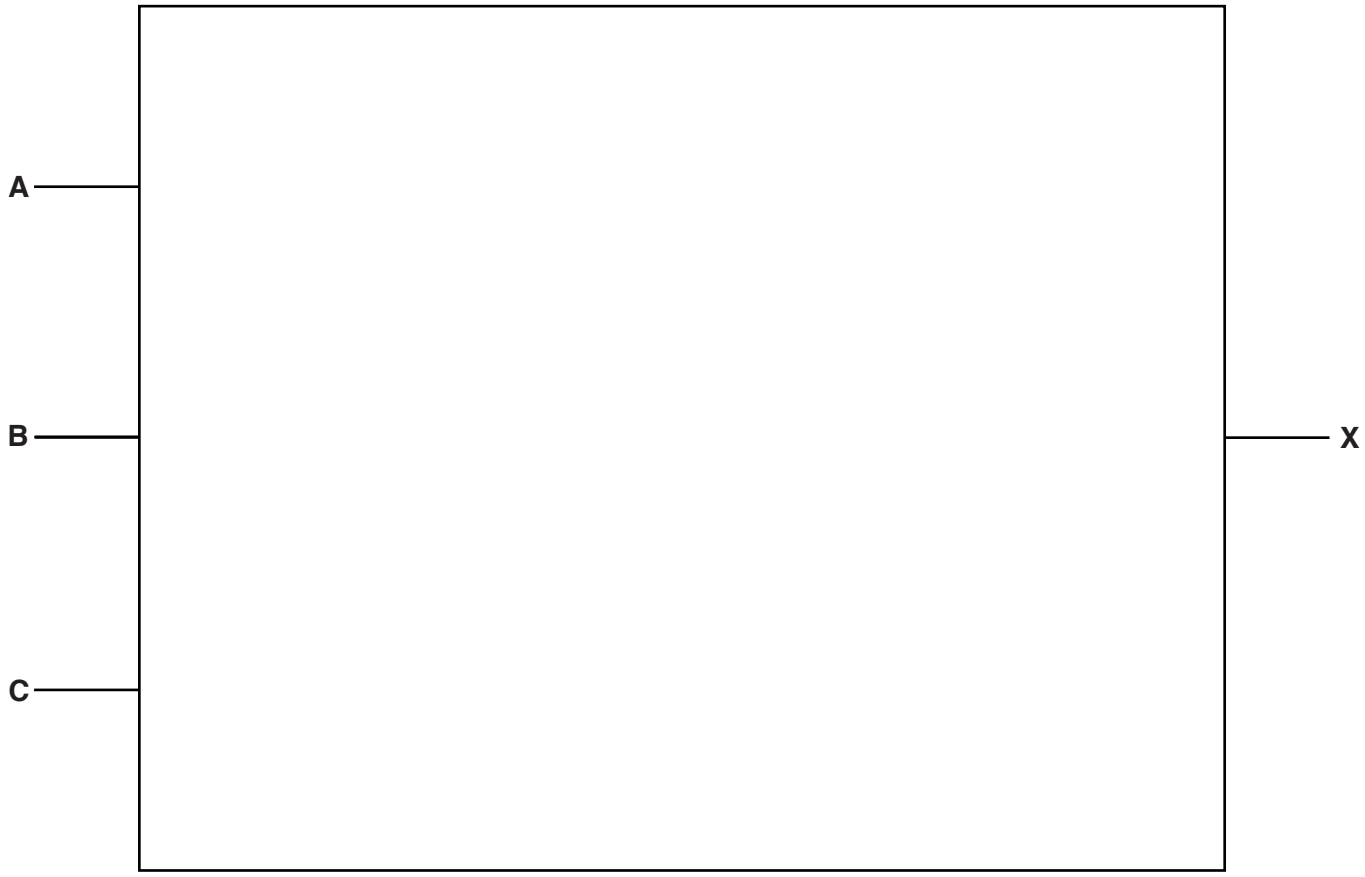
[5]

© UCLES 2016

(c) Re-draw the following logic circuit using NAND gates only.



Logic circuit re-drawn:



[4]

8 (a) **Five** statements and **three** types of software are shown below.

Draw lines to connect each statement with the correct type of software.

Statement	Type of software
Users have the freedom to pass on the software to friends and family as they wish.	Free software
Users can download this software free of charge, but they cannot modify the source code in any way.	
Users are allowed to try out the software for a trial period only before being charged.	Freeware
Users can study the software source code and modify it, where necessary, to meet their own needs, without breaking copyright laws.	Shareware
Users can obtain a free trial version of the software, but this often does not contain all the features of the full version.	

[3]

(b) Describe **three** ethical issues that should be considered when using computers.

1 .....

.....

.....

2 .....

.....

.....

3 .....

.....

.....

[3]

(c) Security of data is very important.

Three security issues are viruses, pharming and spyware.

Explain what is meant by each issue.

Viruses: .....

.....

.....

.....

Pharming: .....

.....

.....

.....

Spyware: .....

.....

.....

.....

[6]

(d) Describe **three** tasks carried out by a firewall.

1 .....

.....

.....

2 .....

.....

.....

3 .....

.....

.....

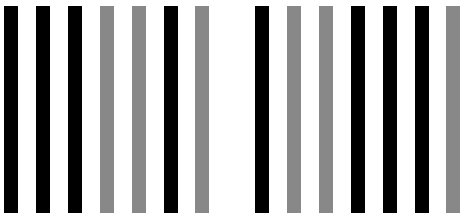
[3]

9 In the following barcode, each binary number is made up of seven bars.

Each bar is black or grey.

A black bar is interpreted as a "1" and a grey bar is interpreted as a "0".

(a) Write the binary numbers that would be produced from this barcode:



Binary number A **Binary number B**

Binary number A:

Binary number B:

[2]

(b) This barcode system uses odd parity.

Write the parity bit for each of the binary numbers in **part (a)**:

	Parity bit
Binary number A:	
Binary number B:	

[2]

10 There are **six** descriptions in the table below.

Complete the table below by writing the correct storage device or media in the box next to each description.

Description	Storage device or media
Non-volatile memory that can only be read from and not written to.	
Optical storage media that allows very high storage capacity by using blue/violet laser technology.	
Volatile memory that stores data, programs and the parts of the operating system that are currently in use.	
Optical storage media that uses a single spiral track and uses dual layer technology, allowing high data storage capacity.	
Device that stores data by controlling the movement of electrons within a microchip; there are no moving parts.	
Optical storage media that uses concentric tracks allowing writing and reading to take place at the same time.	

[6]

© UCLES 2016

[Turn over

11 Describe the use of structure and presentation in a HTML document.

.....

.....

.....

.....

.....

.....

.....

.....[4]

© UCLES 2016

BLANK PAGE

© UCLES 2016

BLANK PAGE

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (UCLES) to trace copyright holders, but if any items requiring clearance have unwittingly been included, the publisher will be pleased to make amends at the earliest possible opportunity.

To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced online in the Cambridge International Examinations Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download at www.cie.org.uk after the live examination series.

Cambridge International Examinations is part of the Cambridge Assessment Group. Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.

© UCLES 2016