UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education
Advanced Subsidiary Level and Advanced Level

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER			

5139884711

COMPUTING **9691/13**

Paper 1 **May/June 2013**

1 hour 30 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 on all the work you hand in.
Write in dark blue or black pen.
You may use a soft pencil for any diagrams, graphs or rough working.
Do not use staples, paper clips, highlighters, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.
No marks will be awarded for using brand names for 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.

This document consists of **12** printed pages.

For Examiner's Use

1 **(a)** What is an operating system?

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..... [1]

(b) There are two different types of real-time operating system.

Give an example application for each type. Explain why each application requires a real-time operating system.

Application 1 .....

Explanation .....

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Application 2 .....

Explanation .....

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..... [4]

(c) Many household appliances contain embedded microprocessors.

Explain why most of these microprocessors don't need operating systems.

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..... [2]

For Examiner's Use

2 **(a)** At the end of a word processing session the document is saved to the hard disk.

Describe how a buffer and interrupts are used during this data transfer.

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..... [4]

(b) Describe the functions of each of the following components of a processor.

control unit .....

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memory unit .....

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..... [4]

For Examiner's Use

3 A computer system is being developed to monitor seismic (earthquake) activity in the Antarctic. Sensors are being used to detect ground tremors.

(a) Describe how the sensors and a computer would be used to gather data which is processed to warn scientists of any abnormal seismic readings.

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..... [4]

(b) The information received is processed and then displayed on large output screens in a control room.

(i) Scientists must be able to quickly assess the incoming data.

Describe a suitable interface. Include use of colour, content and layout in your description.

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..... [3]

For Examiner's Use

(ii) Describe the input devices you would expect to see in the control room. Justify your choice of devices.

Input devices .....

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Justification .....

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..... [3]

4 Computer Aided Design (CAD) uses many specialist input and output devices.

Name **three** specialist input or output devices and describe what they are used for in the CAD package.

Device 1 .....

Description .....

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Device 2 .....

Description .....

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Device 3 .....

Description .....

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..... [6]

For Examiner's Use

5 A table contains the values below:

3	4	1	4	5	3
2	1	**6**	-4	0	0
0	0	2	2	1	8

(a) Describe an array `MyTable` which would be suitable to store the above table.

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..... [3]

(b) Using your answer for **(a)** show how the value **6** is referenced.

..... [1]

(c) The table should only contain values greater than 0. How could any values not meeting this criterion be located in the array, `MyTable`, and their position in that array identified?

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..... [3]

For Examiner's Use

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

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

[5]

(b) Complete the truth table for the above logic statement:

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]

For Examiner's Use

7 A company has a number of shops that sell DVDs, CDs and books. Its existing computer system is no longer adequate. It has hired a systems analyst to develop improvements to in-shop customer sales, stock control and marketing.

(a) One part of the design is the file structures. Factors to consider include use of fixed length or variable length records.

Describe **four** more parts that the systems analyst will need to design. Include for each part the factors that need to be considered.

Part 1 .....

Factors .....

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Part 2 .....

Factors .....

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Part 3 .....

Factors .....

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Part 4 .....

Factors .....

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..... [8]

(b) The new system needs to be tested.

Describe how test results are recorded and explain how they affect further development.

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For Examiner's Use

For Examiner's Use

8 The term **L O G I C G A T E S** is to be transmitted as 12 bytes of data.

Each character in the term has an ASCII value. The system is using ***odd parity*** and the left-most bit is used as the parity bit. An additional parity byte is also sent after the term.

The following bytes arrived at their destination:

		1	2	3	4	5	6	7	8
	letters	**bytes received**							
1	**L**	0	1	0	0	1	1	0	0
2	**O**	0	1	0	0	1	1	1	1
3	**G**	1	1	0	0	0	1	1	1
4	**I**	0	1	0	0	1	0	0	1
5	**C**	0	1	0	0	0	0	1	1
6	**<Space>**	0	0	1	1	0	0	1	0
7	**G**	1	1	0	0	0	1	1	1
8	**A**	1	1	0	0	0	1	0	1
9	**T**	0	1	0	1	1	0	0	0
10	**E**	0	1	0	0	0	1	0	1
11	**S**	0	1	0	1	0	1	1	1
12	**parity byte**	0	1	0	0	1	1	1	1

(a) One of the bytes has an error after transmission.

(i) Locate which character contains the error.

..... [1]

(ii) Indicate which bit has been transmitted incorrectly.

column number .....

row number ..... [1]

(iii) Explain how you arrived at your conclusion.

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..... [3]

For Examiner's Use

(b) The following bytes were sent during a data transmission:

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

Explain how a checksum is used to check whether the bytes have been corrupted during data transmission.

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..... [3]

For Examiner's Use

9 A supermarket uses barcodes as part of its item price retrieval and automatic stock control system.

A customer takes items to the point-of-sale (POS) checkout. The barcodes are scanned.

(a) Describe what happens next regarding data retrieval and stock control.

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..... [5]

(b) Name **two** devices needed at the POS checkout.
Give a reason for your choice of device.

Device 1 .....

Reason .....

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Device 2 .....

Reason .....

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..... [4]