Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

COMPUTER SCIENCE **0478/13**

Paper 1 Theory **May/June 2015**

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.

1 **(a)** State what is meant by the terms:

Parallel data transmission .....

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Serial data transmission .....

.....

.....

[2]

(b) Give **one** benefit of each type of data transmission.

Parallel data transmission

Benefit .....

.....

Serial data transmission

Benefit .....

.....

[2]

(c) Give **one** application of each type of data transmission. Each application must be different.

Parallel data transmission

Application .....

.....

Serial data transmission

Application .....

.....

[2]

2 **(a)** State what is meant by the term USB.

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[1]

(b) Describe **two** benefits of using USB connections between a computer and a device.

1 .....

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2 .....

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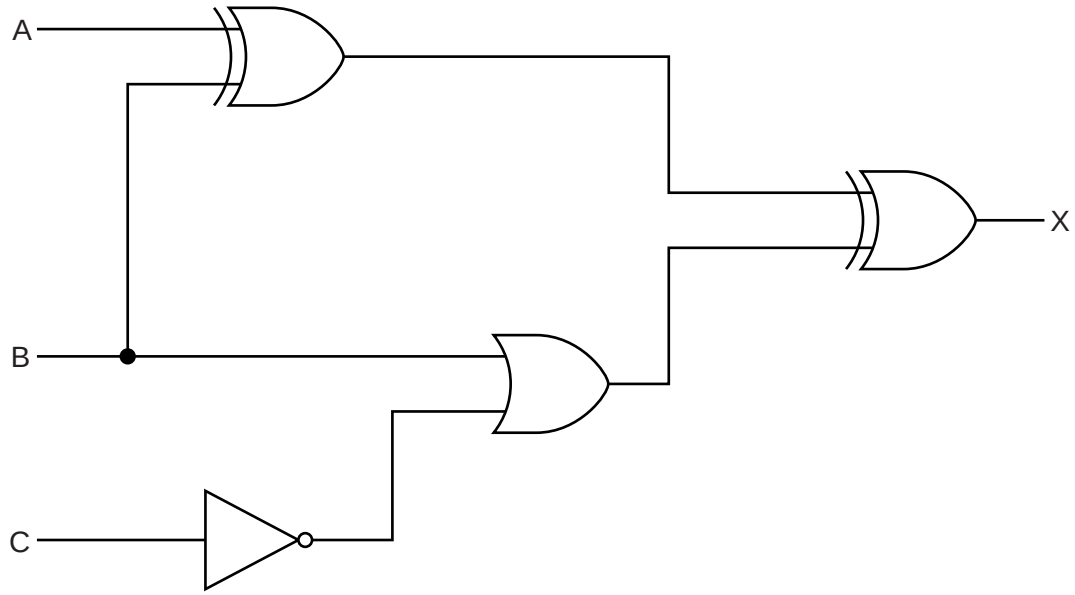
[2]

3 **(a)** Complete the truth table for the following logic circuit:

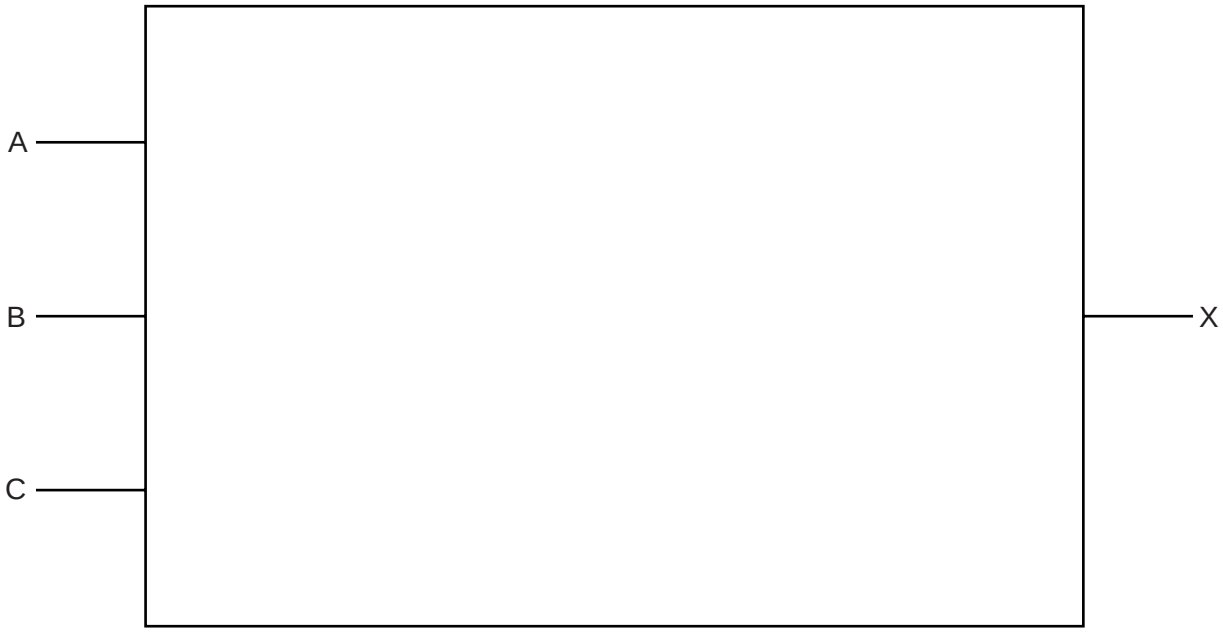


A	B	C	Workspace	X
0	**0**	**0**		
0	**0**	**1**		
0	**1**	**0**		
0	**1**	**1**		
1	**0**	**0**		
1	**0**	**1**		
1	**1**	**0**		
1	**1**	**1**		

[4]

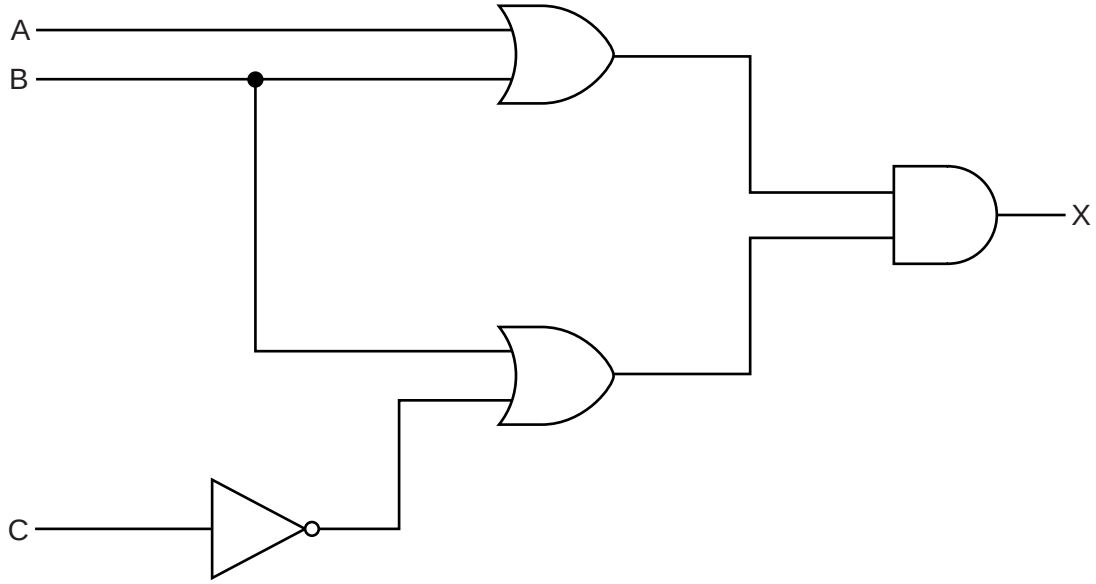
(b) Draw a logic circuit which corresponds to the following logic statement:

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



[3]

(c) Write a logic statement which corresponds to the following logic circuit:



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[3]

4 Choose **six** correct terms from the following list to complete the spaces in the paragraphs below:

- encryption
- file name
- firewall
- HTML tags/text
- IP address
- protocol
- proxy server
- SSL certificate
- web server name

A user enters a URL. The web browser breaks up the URL into **three** components:

1 .....

2 .....

3 .....

The web server returns the selected web page.

The web browser reads the ..... from the selected page and shows the correctly formatted page on the user's screen.

A ..... is used between the user's computer and the network to examine the data traffic to make sure it meets certain criteria.

To speed up the access to the web pages next time, a ..... is used between the computer and web server; this device uses a cache to store the website home page after it has been accessed for the first time.

[6]

5 Five storage devices are described in the table below.

In column 2, name the storage device being described.

In columns 3, 4, or 5, tick (✓) to show the appropriate category of storage.

1	2	3	4	5
Description of storage device	**Name of storage device**	**Category of storage**		
		Primary	**Secondary**	**Off-line**
optical media which use one spiral track; red lasers are used to read and write data on the media surface; makes use of dual-layering technology to increase the storage capacity				
non-volatile memory chip; contents of the chip cannot be altered; it is often used to store the start up routines in a computer (e.g. the BIOS)				
optical media which use concentric tracks to store the data; this allows read and write operations to be carried out at the same time				
non-volatile memory device which uses NAND flash memories (which consist of millions of transistors wired in series on single circuit boards)				
optical media which use blue laser technology to read and write data on the media surface; it uses a single 1.1 mm polycarbonate disc				

[10]

6 **(a)** Viruses, pharming and phishing are all examples of potential Internet security issues.

Explain what is meant by each of these **three** terms.

Virus .....

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Pharming .....

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Phishing .....

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[6]

(b) An online bank requires a client to supply an 8-digit code each time they wish to access their account on the bank's website.

Rather than ask the client to use a keyboard, they are requested to use an on-screen keypad (shown on the right) to input the 8-digit code.

The position of the digits on the keypad can change each time the website is visited.

The client uses a mouse or touch screen to select each of the 8 digits.

2	**5**	**1**
6	**8**	**3**
9	**0**	**4**
	7	

(i) Explain why the bank has chosen to use this method of entering the 8 digits.

.....

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.....

.....

[2]

(ii) Name and describe **another** measure that the bank could introduce to improve the security of their website.

Name .....

Description .....

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.....

.....

[2]

7 **(a)** One of the key features of von Neumann computer architecture is the use of buses.

Three buses and three descriptions are shown below.

Draw a line to connect each bus to its correct description.

Bus	Description
address bus	this bus carries signals used to coordinate the computer's activities
control bus	this bi-directional bus is used to exchange data between processor, memory and input/ output devices
data bus	this uni-directional bus carries signals relating to memory addresses between processor and memory

[2]

(b) The seven stages in a von Neumann fetch-execute cycle are shown in the table below.

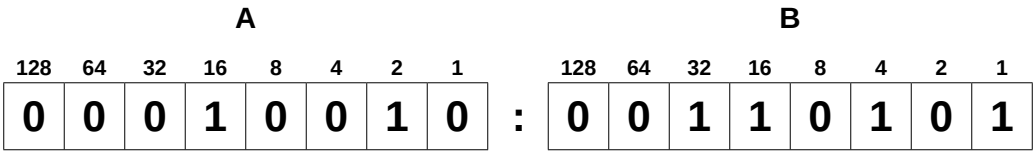
Put each stage in the correct sequence by writing the numbers 1 to 7 in the right hand column. The first one has been done for you.

Stage	Sequence number
the instruction is then copied from the memory location contained in the MAR (memory address register) and is placed in the MDR (memory data register)	
the instruction is finally decoded and is then executed	
the PC (program counter) contains the address of the next instruction to be fetched	**1**
the entire instruction is then copied from the MDR (memory data register) and placed in the CIR (current instruction register)	
the address contained in the PC (program counter) is copied to the MAR (memory address register) via the address bus	
the address part of the instruction, if any, is placed in the MAR (memory address register)	
the value in the PC (program counter) is then incremented so that it points to the next instruction to be fetched	

[6]

8 An alarm clock is controlled by a microprocessor. It uses the 24 hour clock. The hour is represented by an 8-bit register, **A**, and the number of minutes is represented by another 8-bit register, **B**.

(a) Identify what time is represented by the following two 8-bit registers.

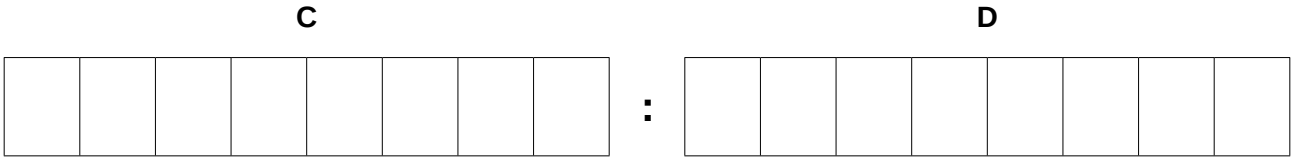


Hours ..... Minutes .....

[2]

(b) An alarm has been set for 07:30. Two 8-bit registers, **C** and **D**, are used to represent the hours and minutes of the alarm time.

Show how 07:30 would be represented by these two registers:



[2]

(c) Describe how the microprocessor can determine when to sound the clock alarm.

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.....[3]

(d) The LCD (liquid crystal display) on the clock face is back-lit using blue LEDs (light emitting diodes). The brightness of the clock face is determined by the level of light in the room. The amount of light given out by the LEDs is controlled by a control circuit.

Describe how the sensor, microprocessor and LEDs are used to maintain the correct brightness of the clock face.

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.....[3]

(e) Modern LCD monitors and televisions use LED back-lit technology.

Give **two** advantages of using this new technology compared to the older cold cathode fluorescent lamp (CCFL) method.

1 .....

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2 .....

.....

.....
[2]

9 Draw a line to connect each question to the correct answer.

Question	Answer
What is the denary (base 10) equivalent to the hexadecimal digit **E**?	**8**
If 1 GB = 2^X then what is the value of X?	**12**
How many bits are there in one byte?	**14**
If the broadband data download rate is 40 megabits per second, how many seconds will it take to download a 60 MB file?	**19**
What is the denary (base 10) value of the binary number 0 0 1 0 0 1 0 0 ?	**30**
What hexadecimal value is obtained when the two hexadecimal digits **C** and **D** are added together?	**36**

[5]

10 Five statements about interpreters and compilers are shown in the table below.

Study each statement.

Tick (✓) to show whether the statement refers to an interpreter or to a compiler.

Statement	Interpreter	Compiler
takes one statement at a time and executes it		
generates an error report at the end of translation of the whole program		
stops the translation process as soon as the first error is encountered		
slow speed of execution of program loops		
translates the entire program in one go		

[5]

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