

Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										



General Certificate of Education
Advanced Subsidiary Examination
June 2015

Computing

COMP2

Unit 2 Computer Components, The Stored Program Concept and the Internet

Wednesday 3 June 2015 1.30 pm to 2.30 pm

You will need no other materials.
You may **not** use a calculator.

Time allowed

- 1 hour

Instructions

- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 60.
- The use of brand names will **not** gain credit.
- Question 2(c) should be answered in continuous prose. In this question you will be marked on your ability to:
 - use good English
 - organise information clearly
 - use specialist vocabulary where appropriate.

For Examiner's Use	
Examiner's Initials	
Question	Mark
1	
2	
3	
4	
5	
6	
7	
TOTAL	

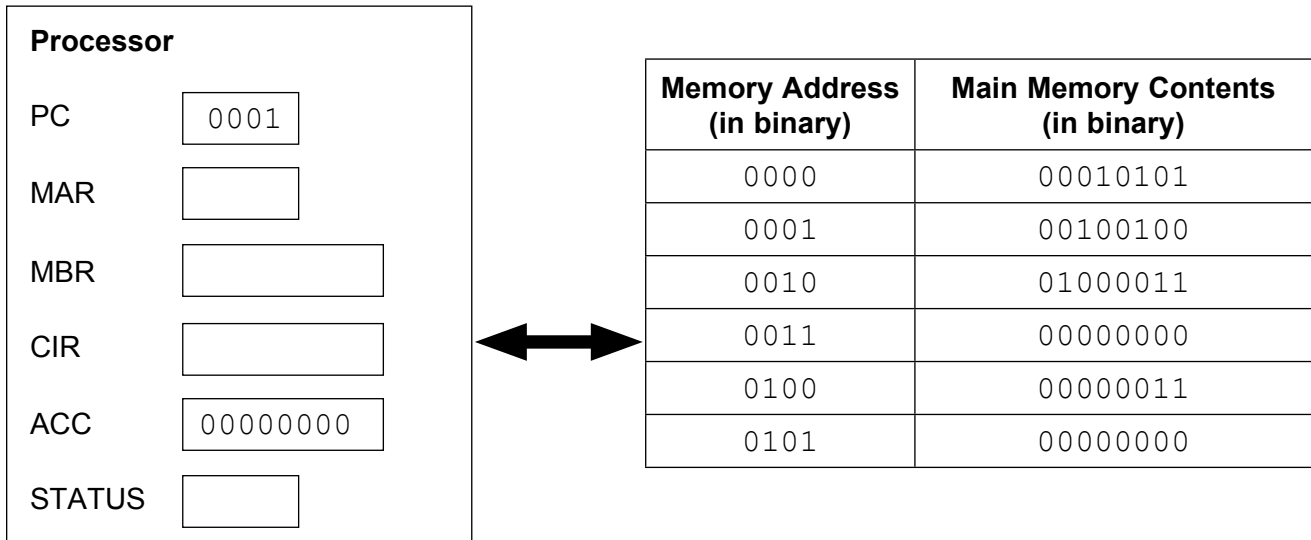


J U N 1 5 C O M P 2 0 1

Answer **all** questions in the spaces provided.

- 1 **Figure 1** below shows some of the registers used in the fetch-execute cycle of a simple processor and the contents of a small section of main memory that it is connected to by the system bus (\longleftrightarrow).

Figure 1



OPCODE	INSTRUCTION	DESCRIPTION
0001	LOAD	Load the contents of the provided memory location into the accumulator
0010	ADD	Add the contents of the provided memory location to the current contents of the accumulator, storing the result in the accumulator
0100	STORE	Copy the contents of the accumulator into the provided memory location

- 1 (a) In **Figure 1** the first 4 bits of an instruction represent the opcode and give the type of instruction to be executed.

What name is given to the second 4 bits of an instruction?

[1 mark]

.....



1 (b) (i) Currently the value in the Program Counter (PC) is 0001.

Complete the table below by writing the values, expressed in binary, in the following registers after completing the fetch part of the fetch-execute cycle.

Register	Value
PC	
MAR	
MBR	

[3 marks]

1 (b) (ii) Describe what will happen during the decode and execute part of the cycle.

[3 marks]

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1 (c) What would be the outcome of executing the instruction 01000011?

[1 mark]

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Turn over for the next question

Turn over ▶



2 (a) First and second generation languages are known as low-level languages. What is meant by the term low-level language? **[1 mark]**

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2 (b) Programs written using a high-level language are easier to maintain and understand than programs written in a low-level language. Describe **two** ways in which high-level languages can make this possible. **[2 marks]**

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2 (c) A student new to programming has heard that some languages are compiled and others are interpreted, and that compilers and interpreters are both known as types of translator.

Describe to this student:

- the role of a translator
- the differences between a compiler and an interpreter
- a situation where you would use a compiler
- a situation where you would use an interpreter.

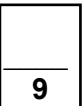
In your answer, you will be assessed on your ability to use good English and to organise your answer clearly in complete sentences, using specialist vocabulary where appropriate.

Use the space provided on **page 5** to write your answer to this question. **[6 marks]**



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Turn over ▶



3 (a) Complete the truth table below for a NAND gate.

NAND gate		
Input A	Input B	Output
0	0	
0	1	
1	0	
1	1	

[1 mark]

3 (b) Multiplexors are used in electronic switching.

A 2-to-1 multiplexor has a Boolean equation where A and B are two inputs, S is the selector input, and Q is the output.

$$Q = (A.\bar{S}) + (B.S)$$

3 (b) (i) Complete the truth table for the above Boolean equation.

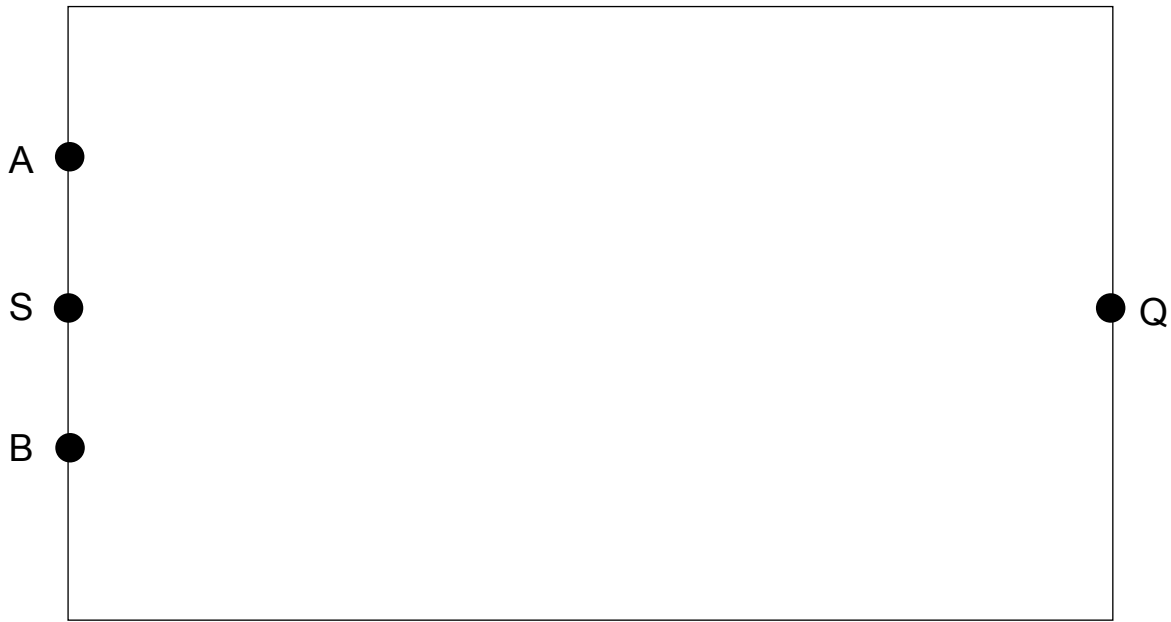
[3 marks]

S	A	B	\bar{S}	$A.\bar{S}$	$B.S$	Q
0	0	0				
0	0	1				
0	1	0				
0	1	1				
1	0	0				
1	0	1				
1	1	0				
1	1	1				



3 (b) (ii) Draw a circuit for the Boolean equation in the rectangle below.

[4 marks]



3 (b) (iii) By considering its inputs and outputs, describe what the 2-to-1 multiplexor circuit does.

[1 mark]

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9

4 (a) Describe **two** important properties of a robot.

[2 marks]

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Turn over ▶



4 (b) Do you believe that a computer will ever be as intelligent as a human being?

Tick **one** row in the table below to indicate your opinion, then, in the space underneath the table, give reasons for this. Marks will be awarded for the development of a reasoned justification of your opinion.

Statement	Tick One
A computer will, at some time in the future, be as intelligent as a human being.	
A computer will never be as intelligent as a human being.	

[3 marks]

Reasons

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4 (c) (i) Some people say that a hacker is someone who loves to program or who enjoys playful cleverness, or a combination of the two.

What is the more common definition of a hacker?

[1 mark]

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.....

4 (c) (ii) Which law aims to protect companies against computer hacking?

[1 mark]

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4 (c) (iii) Identify **two** reasons why it is difficult to identify and catch computer hackers.

[2 marks]

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9

5 (a) A school has given RFID (radio frequency identification system) tags to each student as a security measure. At each external door there is a reader device against which the student holds the tag to gain entry.

Describe the principles of operation of both the reader and the RFID tag when reading the tag.

[3 marks]

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5 (b) Four statements are given below that relate to the operation of printers.

- 1** Ink is squirted onto the paper to form characters.
- 2** Pins are fired against a ribbon to form characters.
- 3** Toner is attracted to the paper and then fused onto it.
- 4** A pen is lifted up and down to create the image.

In the table below, write the corresponding number for **one** of the possible statements that best describes a principle of operation for the given device.

Device	Statement Number
Laser Printer	
Inkjet Printer	

[2 marks]

Turn over ▶



5 (c) External hard disk drives and CD-ROMs make possible both storage and transport of data.

A difference between the two is that more data can be stored on a typical hard disk drive than on a CD-ROM.

Identify **three** other differences between CD-ROM and hard disk drive storage.

[3 marks]

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6 **Figure 2** shows a web page detailing how to prepare fairy cakes.

Figure 2

A recipe for fairy cakes
X

Fairy Cakes

1. Ingredients
 - flour, butter and sugar
 - 2 eggs
2. Mix together
3. Bake for 10 minutes

Decorate with ***hundreds and thousands***



6 (a) Complete the HTML and CSS shown below so that when it is rendered in a browser the page as shown in **Figure 2** should appear.

[6 marks]

```
<html>
  <head>
    <title>A recipe for fairy cakes</title>
    <style>
      .toright { text-align: right; }
      .bandw { color: white;
                background-color: black;
                font-style: italic; }
    </style>
```

Turn over ►



6 (b) What is meant by the following terms?

[2 marks]

Analogous colour scheme

.....

Complementary colour scheme

.....

8

7 (a) **Figure 3** and **Figure 4** show two screenshots: identify the protocols being used in each. [2 marks]

Figure 3

```

1) **** NEW CONNECTION (127.0.0.1)
1) C --> HELO tarzan.synametrics.com
1) S <-- 250 localhost. Please to meet you
1) C --> MAIL FROM:<asdf>
1) S <-- 250 OK
1) C --> RCPT TO:<asdf@fas.com>
1) S <-- 250 OK
1) C --> DATA
1) S <-- 250 Message queued for delivery.
1) C --> QUIT
1) S <-- 221 Connection successfully closed
1) **** CONNECTION TERMINATED in 150ms.
    
```

Protocol

Figure 4

```

admin@moodle.someschool.org's password:
Last login: Mon Feb 10 17:04:17 2014 from cpc4-warw15-2-0.cable.virginm.net
[admin@torvalds ~]$ ls
    Desktop
    drupal          test
    httpd.log       xibo-server.tar.gz
    mysqldump.sql
[admin@torvalds ~] unzip xibo-server.tar.gz
[admin@torvalds ~] reboot
    
```

Protocol



Figure 5 below shows part of the result of running a traceroute command on the URL <http://www.computingschool.org.uk>

Figure 5

```

traceroute to http://www.computingschool.org.uk (129.12.3.236), 64
hops max
 1  10.0.1.1 (10.0.1.1)  2.352ms 1.572ms 3.359ms
 2  cpc4-warw15-2-0-gw.3-2.cable.virginm.net (81.111.110.1) 12.619ms
   12.300ms 10.466ms
 3  brhm-core-2b.network.virginmedia.net (213.105.114.89) 12.807ms
   11.505ms 16.987ms
 4  brhm-bb-1b.network.virginmedia.net (62.253.174.77) 16.039ms
   11.434ms 11.354ms

```

7 (b) What does URL stand for?

[1 mark]

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7 (c) State an IP address that appears in **Figure 5**.

[1 mark]

.....
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7 (d) The traceroute command shows the 'hops' taken to get from a computer to the requested address. Each hop identifies a router on the Internet.

Explain why traceroute might show different hops when run a second time with the same destination address.

[1 mark]

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Question 7 continues on the next page

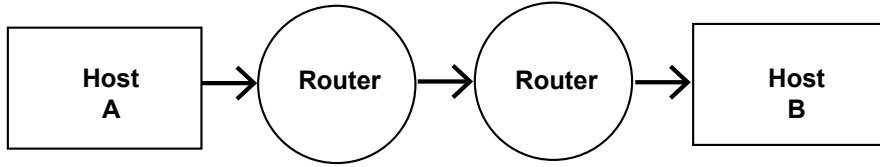
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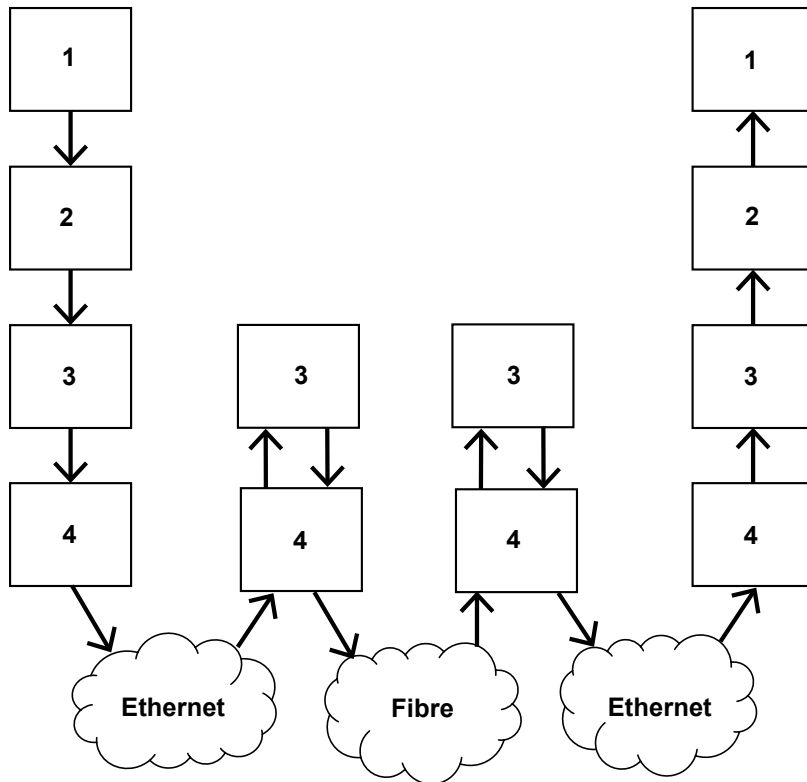
Figure 6 shows the layers in the TCP/IP stack.

Figure 6

Network Topology



Data Flow



7 (e) Complete the table below by naming the TCP/IP layers used in Figure 6 above.

	Layer
1	
2	
3	
4	

[2 marks]



7 (f) **Figure 6** shows how a packet travels from **Host A** to **Host B** through two routers.

Describe, for a packet, the role of the two lower levels of the TCP/IP stack in the router. **[2 marks]**

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END OF QUESTIONS



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**DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED**

