AQA

General Certificate of Education
Advanced Subsidiary Examination
January 2012

Computing   COMP2

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

Monday 16 January 2012   1.30 pm to 2.30 pm

You will need no other materials
You must **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 5(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.

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

1   **Figure 1** below shows program code developed using different generations of programming languages.

Figure 1

Program 1 (with comments)

```
//Calculate
FirstVar := 47;
SecondVar := FirstVar + 2;
FourthVar := ThirdVar;
```

Program 2 (with comments)

```
AB2F ; Load value 2F into accumulator
BC5D ; Store contents of accumulator at address 5D
E402 ; Add value 2 to accumulator
BCFF ; Store contents of accumulator at address FF
AC61 ; Load accumulator with contents of address 61
BC4A ; Store contents of accumulator at address 4A
```

1 (a)   What generation of programming language was used to write **Program 1**?

....
(1 mark)

1 (b)   Machine code can be represented in different numeric formats.

1 (b) (i)   Which numeric format is used by the machine code program in **Program 2**?

....
(1 mark)

1 (b) (ii)   State **one** reason for using this format.

....
(1 mark)

1 (b) (iii)   The machine for which **Program 2** has been written has limited addressing capability.

What are the lowest and highest memory addresses that can be addressed by this machine?

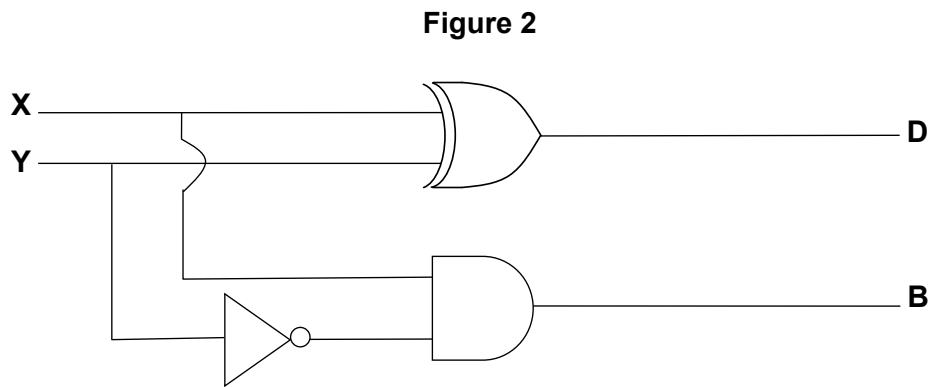Lowest address: ....

Highest address: ....
(1 mark)

1 (c) Give an example of a situation for which it would be appropriate to write a program in a low level language (ie machine code or assembly language).

....

....

(1 mark)

1 (d) Explain the differences between a compiler and an interpreter.

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(4 marks)

9

Turn over for the next question

Turn over ▶

2   **Figure 2** below shows a logic circuit.

Figure 2

2 (a)   Write a Boolean expression for **D**.

....
(1 mark)

2 (b)   Write a Boolean expression for **B**.

....
(1 mark)

2 (c)   **Figure 3** below shows a different logic circuit.
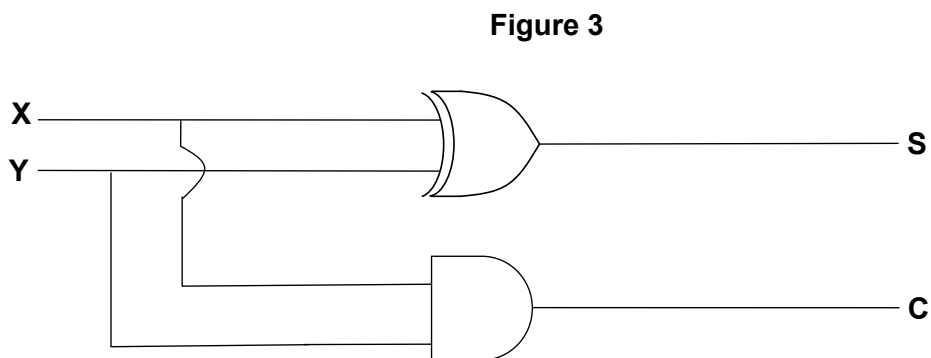
Figure 3

2 (c) (i)   Complete the truth table below for the logic circuit in **Figure 3**.

Inputs		Outputs	
X	**Y**	**C**	**S**
0	0		
0	1		
1	0		
1	1		

(2 marks)

2 (c) (ii)   What arithmetic function does the logic circuit in **Figure 3** perform?

....
(1 mark)

2 (d)   **Without** using a truth table, simplify the Boolean expression below.

$(X + Y) . (X + \overline{Y})$

Show the stages of your working.

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(3 marks)

Final answer ....
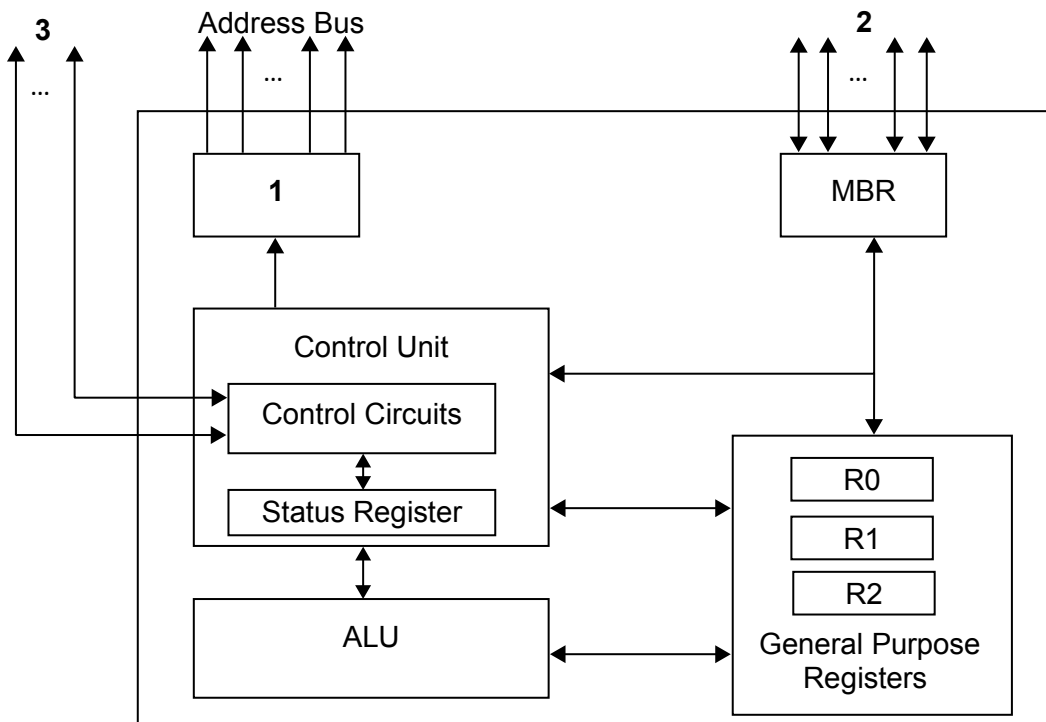
(1 mark)

9

Turn over for the next question

Turn over ▶

3 **Figure 4** below shows an incomplete diagram of the components of a processor.

Figure 4

3 (a) Provide the full names for the components numbered **1** to **3** in **Figure 4** by completing **Table 1** below.

Table 1

Component Number	Component Name
1	
2	
3	

(3 marks)

3 (b) What is the role of the Control Unit?

....

....

(1 mark)

3 (c) State the full name of the processor component that would perform subtraction and comparison operations.

....

....
(1 mark)

3 (d) What is meant by the term *register*?

....

....
(1 mark)

3 (e) State **one** example of when the status register might have a bit set.

....

....
(1 mark)

7

Turn over for the next question

Turn over ▶

4 There are various formats of optical storage media currently available.

4 (a) Choose the most appropriate medium from the list below that would be best suited to the purpose given. Write your answer in the Medium column in **Table 2**. You must **not** use the same medium more than once.

CD-ROM, CD-R, CD-RW, DVD-R, DVD-RW, Blu-Ray

Table 2

Purpose	Medium
To distribute 300MB of commercial software	
To store a 20GB high definition movie file	
To use for a 3GB archive of the data on a school server	
To create a copy of a 60 minute audio music album	

(4 marks)

4 (b) Describe how data is written to and read from a CD-R disk.

....

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(3 marks)

4 (c) A series of word-processed documents have been archived onto CD-R.

State **two** reasons why in 20 years' time it might be impossible to open up these documents.
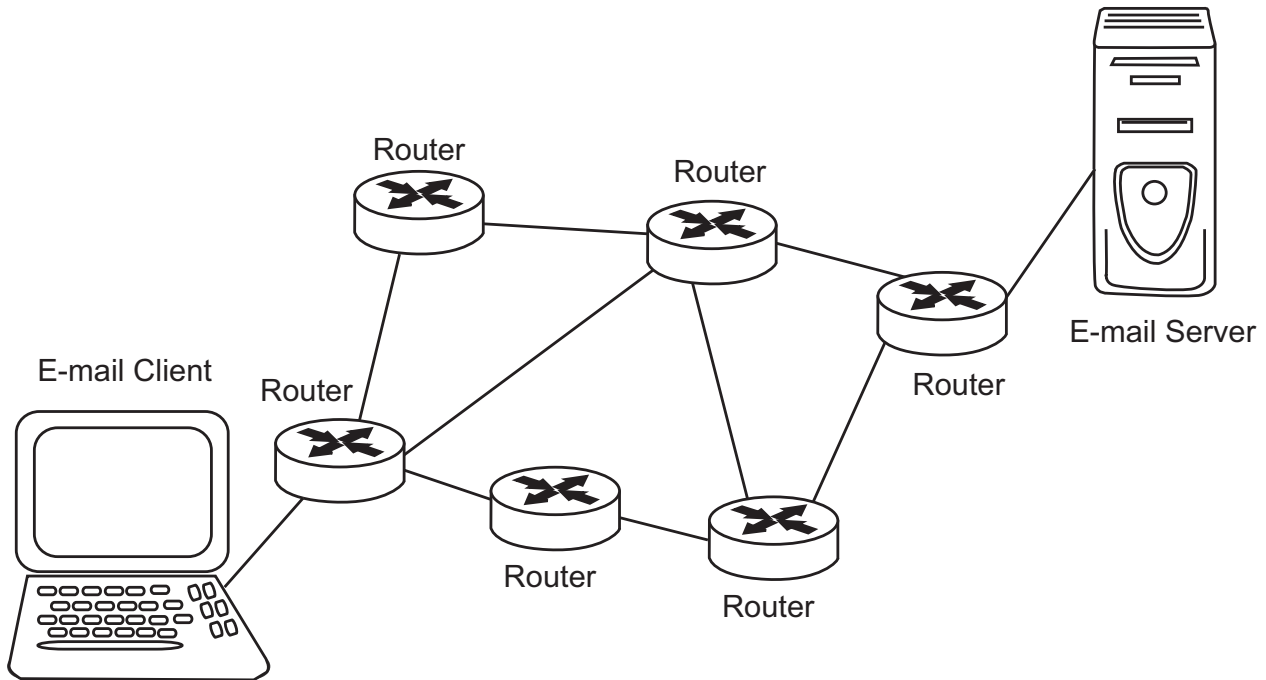
Reason 1: ....

....

Reason 2: ....

....

(2 marks)

5   **Figure 5** below is a partial view of a router network connecting an e-mail client to an e-mail server.

Figure 5

5 (a)   Describe **two** roles of the routers shown in **Figure 5** above.

Role 1: ....

....

Role 2: ....

....
(2 marks)

5 (b)   Name **one** of the application protocols associated with e-mail.

....
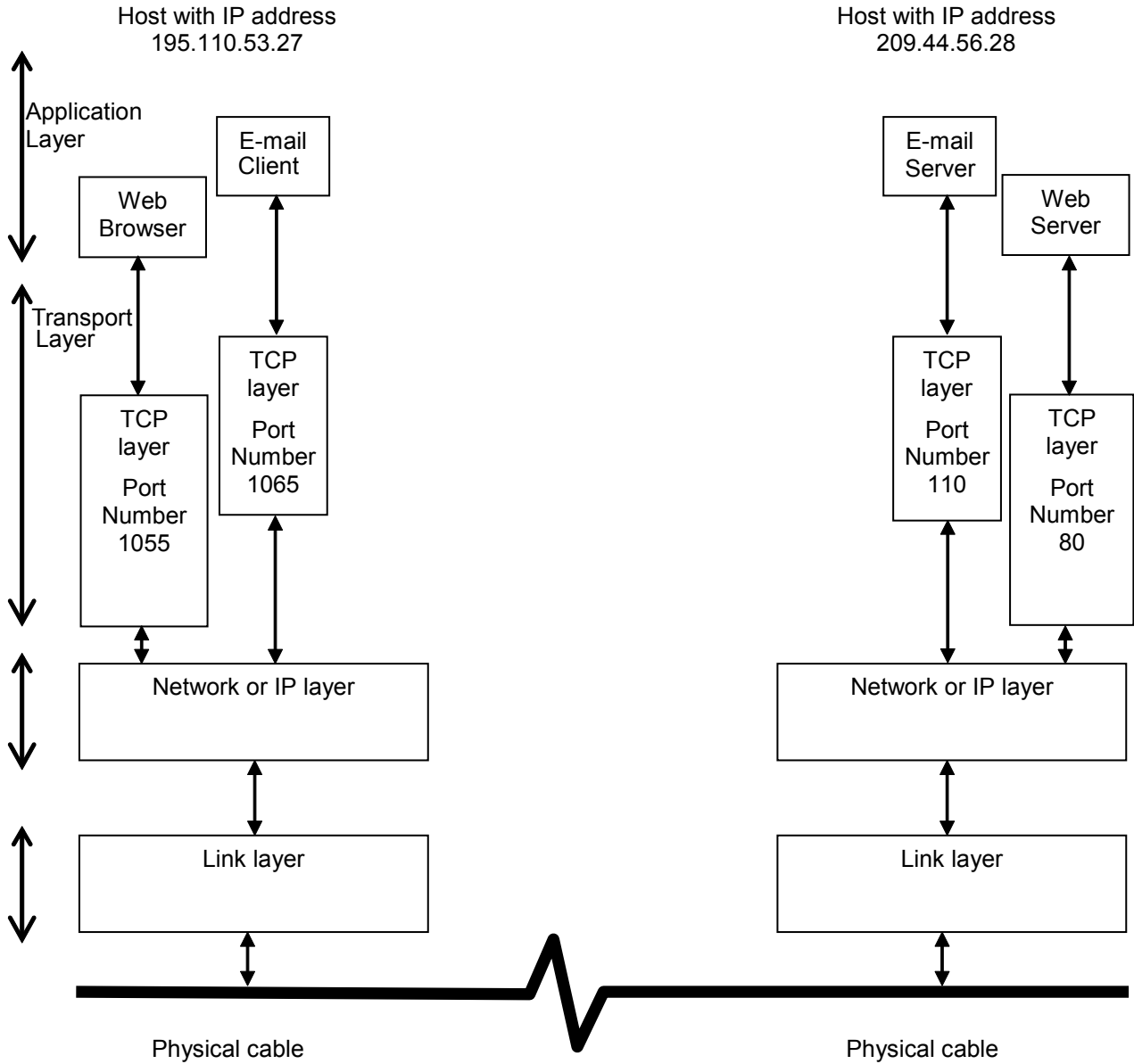*(1 mark)*

Question 5 continues on the next page

Turn over ▶

5 (c)   **Figure 6** below shows the TCP/IP stack for two computers (hosts) connected via a network.

Figure 6

Host with IP address
195.110.53.27

Host with IP address
209.44.56.28

Application
Layer

E-mail
Client

Web
Browser

Transport
Layer

TCP
layer

Port
Number
1065

TCP
layer

Port
Number
1055

E-mail
Server

Web
Server

TCP
layer

Port
Number
110

TCP
layer

Port
Number
80

Network or IP layer

Network or IP layer

Link layer

Link layer

Physical cable

Physical cable

Explain how the TCP/IP stack in each host supports an e-mail client to e-mail server request at the same time as a web browser to web server request. You should cover in your explanation:

- the steps from the initiation of a request to the receipt of a response
- the role of the different TCP/IP layers in the stages of client-server operation
- the use of packets.

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.

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(6 marks)

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Turn over ▶

6 **Figure 7** shows the Hypertext Markup Language (HTML) and Cascading Style Sheet (CSS) for a web page, `HelpLink.html`.

Figure 7

```
<html>
  <head>
    <title>Help Centre</title>
    <style type="text/css">
       #header {color:yellow; font-family:Arial; text-align:center}
       #footer {color:red; font-family:Arial; text-align:center}
       .links {font-family:Tahoma; text-align:center}
    </style>
  </head>
  <body>
    <div id="header">
       <h1>AQA Help Centre</h1>
       <img src="/image/AQALogo.gif" width=248 height=90 />
    </div>
    <div class="links">
       <p><a href="/igcse/english.html">IGCSE English Help</a></p>
       <p><a href="/igcse/maths.html">IGCSE Maths Help</a></p>
       <p><a href="/igcse/science.html">IGCSE Science Help</a></p>
    </div>
    <div>
       <p id="footer">Copyright (C) 2012 AQA and its licensors.</p>
    </div>
  </body>
</html>
```

6 (a) What is the colour of the heading "AQA Help Centre" when the web page, `HelpLink.html`, is viewed in a browser?

....

(1 mark)

6 (b) What font will the browser use to display the hyperlinks for this page?

....

(1 mark)

6 (c) `HelpLink.html` is stored in a folder with path `C:/HTML/Testing/` for testing purposes.

State the full pathname of the image file `AQALogo.gif`.

....

(1 mark)

6 (d) Using the browser window template below, sketch the appearance of the web page when viewed in a web browser.

You must use labels to clarify your alignment, line spacing and font size.

For the image `AQALogo.gif` draw a box to represent where the image would appear.

File:///c:/HTML/Testing/HelpLink.html

(5 marks)

8

7 An Internet Service Provider (ISP) has instructed a firm of solicitors to investigate the download activities of the ISP's clients.

7 (a) What is the primary role of an ISP?

....

....
(1 mark)

7 (b) The clients under investigation are alleged to have downloaded music files from a file-sharing site.

The ISP wishes the firm of solicitors to investigate whether any laws have been broken.

State the **full name** of the law which might have been broken by the clients downloading music files.

....
(1 mark)

7 (c) The ISP stores personal data concerning each of its clients.

What is meant by the term *personal data*?

....

....
(1 mark)

7 (d) The firm of solicitors discovers during their investigation that the same clients have been downloading personal data relating to other clients of the ISP without authorisation.

7 (d) (i) State the **full name** of the law that may have been broken by the ISP.

....
(1 mark)

7 (d) (ii) State the **full name** of the law that may have been broken by the clients.

....
(1 mark)

5

8 A well established use for robots in industry is the spraying of car bodies on a car production line.

A robotics researcher is investigating the feasibility of developing and installing in a car a computer-based control system to take over completely the driving of the car on public highways.

She has identified some of the inputs into the control system already:

- detailed map
- current weather report.

And some of the outputs:

- position of steering wheel (in degrees from the vertical)
- forces on accelerator and brake pedals.

Discuss why automated car control is a harder programming problem to solve than developing programmed control of a robot for spraying car bodies on a car production line.

For full marks your discussion must cover both programming problems.

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(4 marks)

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END OF QUESTIONS

There are no questions printed on this page

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED