Centre Number						Candidate Number				
Surname										
Other Names										
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For Examiner's Use	
Examiner's Initials	
Question	Mark
1	
2	
3	
4	
5	
6	
7	
8	
TOTAL	

General Certificate of Education
Advanced Subsidiary Examination
June 2013

Computing COMP2

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

Thursday 6 June 2013 1.30 pm to 2.30 pm

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

Time allowed
- 1 hour

A

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 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 For each problem in the table below, place a tick in the appropriate box to indicate the generation of programming language best suited to developing a solution to the problem.

Do **not** tick more than one box in each row.

	Generation		
Problem	**1st**	**2nd**	**4th**
Developing a diagnosis program for medical symptoms			
Developing a program for an embedded microprocessor for a washing machine			

(2 marks)

2

2 (a) State the full names of **two** of the special purpose registers that are used in the fetch part of the fetch-execute cycle.

Register 1 .....

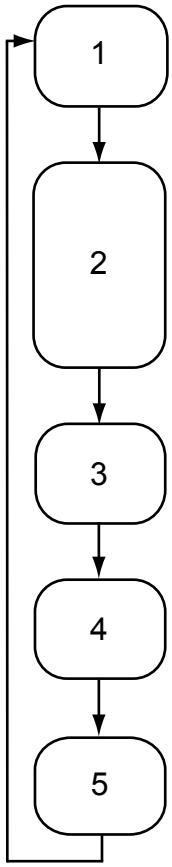
Register 2 .....

(2 marks)

2 (b) **Figure 1** below is an incomplete diagram of the fetch-execute cycle.

Describe the missing steps 1, 2b and 4 using either register transfer notation or a written description. Steps 2a and 2b occur at the same time.

Figure 1



Step 1 .....

.....

Step 2a: PC ← [PC] + 1

Step 2b .....

Step 3: CIR ← [MBR]

Step 4 .....

Step 5: Execute Instruction

(3 marks)

5

Turn over for the next question

3 Secondary storage devices include:

Fixed internal hard disk drives, Magnetic tape drives, DVD-R drives and USB flash drives.

For each of the scenarios below, identify the **most appropriate** device from the list above and also explain why this device is appropriate.

You should **not** use the same device more than once.
You should **not** give the same reason more than once.

To transfer a 100 KB word processed document from one computer to another.

Device .....

Reason.....

.....

To store a backup of the 700 GB of user data stored on a school server.

Device .....

Reason.....

.....

To produce copies of a software executable for distribution to customers.

Device .....

Reason.....

.....

(6 marks)

6

4 A school robotics club has recently purchased a robotics kit after the teacher in charge saw an advert in a magazine. The advert is reproduced below.

RoboEddy - a new educational robot

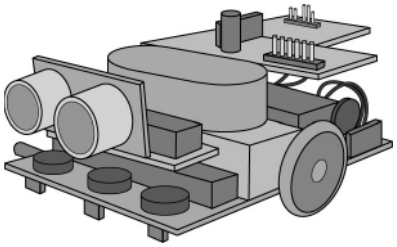
Specification

Hardware

500 Mhz processor
32 MB RAM
4 timers
Wi-Fi communications via WLAN 802.11g radio
Dual H-bridge motor driver

Software

Built in interpreter for the high level language RobotC
Directly run assembly code
XMODEM protocol for reliable file transfer
Support for various analogue and digital sensors



Available NOW!

Only £199

4 (a) Using the XMODEM protocol, students at the robotics club can copy a RobotC program prepared on a desktop computer to the robot.

What is meant by the term *protocol*?

.....

.....

(1 mark)

4 (b) The RobotC program that has been copied to the robot can be executed by the built-in interpreter.

How does a high level language interpreter work?

.....

.....

.....

.....

(2 marks)

Turn over ▶

4 (c) The robot processor is different in some ways from a processor in a desktop computer, but it still follows the stored program concept.

What is meant by the term *stored program concept*?

.....

.....

.....

.....

(3 marks)

4 (d) As well as using RobotC, it is also possible to program the robot using assembly language.

The motor driver uses memory locations to store the current speed of each motor. The left motor speed is stored in memory location `21` and the right motor speed is stored in memory location `22`.

The following set of three assembly language instructions can be used to take basic control of the motors:

```
LOAD  XX    - load a value from memory location XX into the accumulator
ADD   XX    - add the value stored in memory location XX to the accumulator
STORE XX    - store the value in the accumulator in memory location XX
```

Selecting from the set of three instructions above, write a sequence of instructions that will swap the current left motor speed with the current right motor speed. Your program may use memory location `23` for temporary storage.

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.....

(3 marks)

4 (e) The students develop a program that can sort coloured balls into piles but it is found that the program is not very effective.

With regards to touch and vision, state **three** factors why a robot may find a task, such as sorting coloured balls, a hard task whereas for a 4-year-old child it is a relatively easy one.

Factor 1.....

.....

Factor 2.....

.....

Factor 3.....

.....

(3 marks)

4 (f) The robot identifies the colour of the balls using a digital still camera component.

4 (f) (i) Describe the principles of operation of a digital still camera.

.....

.....

.....

.....

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.....

(3 marks)

4 (f) (ii) The digital still camera component can take high resolution images but the students have chosen to program it to take low resolution images instead.

Give a reason why the students might have only used a low resolution.

.....

.....

.....

(1 mark)

16

5 A company wishes to use the unregistered domain name *learncomputing.co.uk* for a new website. They use a server which has the public IP address 123.45.67.100.

At present, the server only has an operating system and Telnet server software installed. The Telnet server allows the company to connect remotely to and control the server.

The company intends to upload files to the server using FTP (File Transfer Protocol).

Explain the steps the company will need to take so that a customer using the Internet can browse the company's new website *http://www.learncomputing.co.uk*.

You may wish to make reference to the following in your answer:

Website creation, Domain Name Server (DNS), Web server, FTP server, Ports, Telnet, Internet Registrar

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)

6

Turn over for the next question

6 (a) State the names of the logic gates represented by each of the three truth tables below.

Input A	Input B	Output
0	0	0
0	1	0
1	0	0
1	1	1

Logic gate name .....

Input A	Input B	Output
0	0	1
0	1	0
1	0	0
1	1	0

Logic gate name .....

Input A	Input B	Output
0	0	0
0	1	1
1	0	1
1	1	0

Logic gate name .....

(3 marks)

6 (b) Simplify the following Boolean expressions.

6 (b) (i) $B \cdot (A+\overline{A})$

.....

.....

(1 mark)

6 (b) (ii) $A \cdot B + B$

.....

.....

(1 mark)

6 (b) (iii) $\overline{B} \cdot (\overline{\overline{A}+\overline{B}})$

.....

.....

(2 marks)

6 (c) Draw a logic circuit for the following Boolean expression:

$$Q = (A \oplus B) \cdot B$$

You will need to make use of the symbols below when drawing your logic circuit.

(2 marks)

9

Turn over for the next question

7 A school has recently launched a 'Parent Portal' which is a website that provides information from the school. By logging on to the portal a parent can access the information that is stored about their son or daughter. This information includes academic reports, discipline records and other personal data.

7 (a) A parent recently contacted the school because he was concerned that when he logged on to read his daughter's report he could access the reports of all the other students.

The school should immediately look into this concern as a law has been broken.

State the **full name** of the law that has been broken.

.....

(1 mark)

7 (b) Which principle of the law identified in your answer to part (a) has been broken?

.....

.....

(1 mark)

7 (c) State another principle of the law identified in your answer to part (a).

.....

.....

(1 mark)

7 (d) A parent also noted that the website was using HTTP (HyperText Transfer Protocol).

Why should the school be concerned about the use of this protocol and which protocol would you recommend that the school should use instead?

Why concerned .....

.....

Suggested protocol .....

(2 marks)

7 (e) The process of writing reports and then allowing access to these reports via the parent portal involves the use of many different categories of software.

Below is a list of different categories of software:

Operating system, Utility program, Special purpose application software, Bespoke application software, General purpose application software

Complete **Table 1** by writing the correct category from the list above in the **Category** column next to the appropriate **Software**.

You should **not** use a category more than once.

Table 1

Software	Category
Word processor used to write the pupil reports	
The parent portal web application which was programmed for this school	
The web server software run by the school	

(3 marks)

8

Turn over for the next question

8 (a) (i) What does *HTML* stand for?

.....

(1 mark)

8 (a) (ii) What does *CSS* stand for?

.....

(1 mark)

8 (b) **Figure 2** shows a web page that has been displayed in a web browser.

Figure 2

RoboEddy Homepage ☒

Welcome to RoboEddy

RoboEddy is an educational robot with the following features:

- Fast microprocessor
- Two motor channels
- 8 analogue inputs
- 8 digital I/O ports

Figure 3 shows the HTML and CSS code that was used to create the web page shown in **Figure 2**. Some of the code has been replaced with the numbers ❶ to ❽.

Figure 3

```
<❶>
  <head>
    <title> ❷ </title>
    <style>
      #toptitle { text-align: center; font-size: 18pt;
          ❸ : italic; }
      .paratext { font-size: 12pt; font-family: Arial; }
    <❹>
  </head>
  <body>
    <div id="❺">Welcome to RoboEddy</div>
    <p ❻="paratext">RoboEddy is an educational robot with
  the following features:</p>
    <❼>
      <li>Fast microprocessor</li>
      <li>Two motor channels</li>
      <li>8 analogue inputs</li>
      <li>8 digital I/O ports</li>
    <❽>
  </body>
</html>
```

Write the missing code from **Figure 3** in **Table 2** below, next to the number that indicates where it should appear. The first one has been done for you.

Table 2

Number	Code should be
❶	html
❷	
❸	
❹	
❺	
❻	
❼	
❽	

(6 marks)

END OF QUESTIONS

8

There are no questions printed on this page

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED