OCR
Oxford Cambridge and RSA

Wednesday 07 October 2020 – Morning

AS Level Computer Science

H046/01 Computing Principles

Time allowed: 1 hour 15 minutes

Do not use:
- a calculator

Please write clearly in black ink. **Do not write in the barcodes.**

Centre number | | | | | | Candidate number | | | | |

First name(s) _____

Last name _____

INSTRUCTIONS
- Use black ink.
- Write your answer to each question in the space provided. You can use extra paper if you need to, but you must clearly show your candidate number, the centre number and the question numbers.
- Answer **all** the questions.

INFORMATION
- The total mark for this paper is **70**.
- The marks for each question are shown in brackets **[ ]**.
- Quality of extended response will be assessed in questions marked with an asterisk (*).
- This document has **16** pages.

ADVICE
- Read each question carefully before you start your answer.

Answer **all** the questions.

1 A company produces CPUs for desktop and laptop computers. Each CPU is designed around the Von Neumann Architecture.

(a) Describe what is meant by the term 'Von Neumann Architecture'.

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..... **[2]**

(b) A CPU will repeatedly run the Fetch-Decode-Execute-cycle shown in **Fig. 1**.

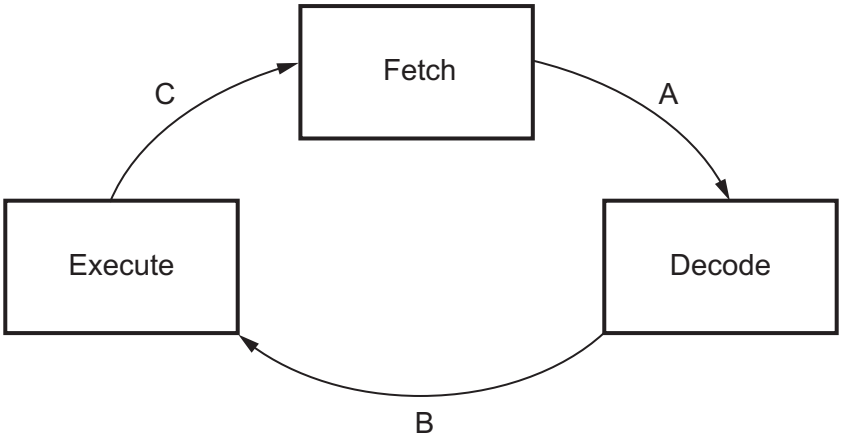

Fig. 1

(i) Describe what happens during the 'Fetch' stage shown in **Fig. 1**.

You should refer to the use of specific registers in your answer.

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..... **[4]**

(ii) A CPU may need to stop running the Fetch-Decode-Execute-cycle in order to handle an interrupt.

Tick **one** box to indicate where in **Fig. 1** an interrupt would be handled.

A ☐

B ☐

C ☐

[1]

2 Julie is a university student. She is considering buying a laptop to help with her studies both at home and university. Her friend has told her she will need to choose an operating system to run on her laptop.

(a) Two functions of an operating system are memory management and scheduling.

State **two** other functions of an operating system.

1 .....

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2 .....

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[2]

(b) The operating system Julie is considering makes use of paging to manage the laptop's memory.

Explain **one** benefit of using paging for this purpose.

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..... **[2]**

(c) Julie's friend has told her she should buy a laptop with a solid-state drive that uses flash technology rather than a magnetic hard drive.

Explain **two** reasons why Julie would use flash technology to store her files.

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2 .....

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[4]

(d) State the name of **one** utility that Julie could install on her laptop.

..... **[1]**

3* OCR Car Park would like to calculate the parking charges when a car leaves their car park.

They will need to record the time that a car enters and leaves their car park in order to calculate the parking charge.

Discuss the different methods that could be used to collect this data.

In your answer you should include:

- The benefits and drawbacks of each method
- Ethical implications
- Legal implications

.... [9]

4 Shreya is a web developer who creates webpages for a variety of different companies.

(a) Photographs on a webpage are usually compressed.

(i) State which method of compression is most likely to be used for this purpose.

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..... **[1]**

(ii) Explain the need to compress photographs in this situation.

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..... **[2]**

(b) In order to view a website, a user enters a website address into their web browser such as http://www.ocr.org.uk. The website will then be displayed onto the user's screen.

Explain how the Domain Name System (DNS) plays a role in websites being loaded.

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..... **[4]**

(c) Shreya has received a webpage written in HTML shown in **Fig. 2.1**.

```
<html>
      <head>
            <title>BBC Computer</title>
            <link rel="stylesheet" type="text/css" href="BBC.css">

      </head>
      <body>
            <h1 id="Beeb">History of the BBC Micro Computer</h1>

            <h2>BBC Micro Models</h2>
            <ul>
                  <li class="model">Model A</li>
                  <li class="model">Model B</li>
            </ul>

      </body>
</html>
```

Fig. 2.1

Some of the formatting requirements for this webpage are shown in **Fig. 2.2**.

Class/ID	Text	Formatting Requirements	
		font-family	colour
Beeb	History of the BBC Micro Computer	times	green
model	Model A Model B	arial	red

Fig. 2.2

Write the CSS Shreya needs to display the webpage so that it meets the formatting requirements stated in **Fig 2.2**.

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..... **[6]**

5 **(a)** Convert the binary number 11101100 into a denary number.

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..... **[1]**

(b) Convert the binary number 10110011 into a hexadecimal number.

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..... **[1]**

(c) Convert the two's complement binary number 10011011 into a denary number.

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..... **[1]**

(d) Calculate the subtraction of the following two 8-bit binary numbers.

You must show your working.

11010011
01111001 –

[2]

6 The Little Man Computer (LMC) instruction set can be used to write programs using assembly language.

(a) State the type of translator that is used to convert assembly language into machine readable code.

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..... **[1]**

(b) **Fig. 3** shows assembly code written using the LMC instruction set.

```
          INP
          STA X
          SUB Y
          BRP jump
          LDA X
          STA Z
          HLT
jump      LDA Y
          STA Z
          HLT
X         DAT 0
Y         DAT 5
Z         DAT 0
```

Fig. 3

(i) Tick **one** box to indicate the programming construct that is **not** used in **Fig. 3**.

Sequence ☐

Selection ☐

Iteration ☐

[1]

(ii) When the program is run, 7 is input by the user.

State the value that will be in the memory location `Z` when the program has run with this input.

..... **[1]**

(iii) Write an equivalent version of the LMC assembly code shown in **Fig. 3** for a procedural programming language.

You should write your code using pseudocode or program code.

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..... **[4]**

(c) CPUs can be designed to take a Complex Instruction Set Computer (CISC) or a Reduced Instruction Set Computer (RISC) approach.

Describe **one** difference between CISC and RISC.

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..... **[2]**

7 Daniel is an engineer. He has created the following logic circuit shown in **Fig. 4**.

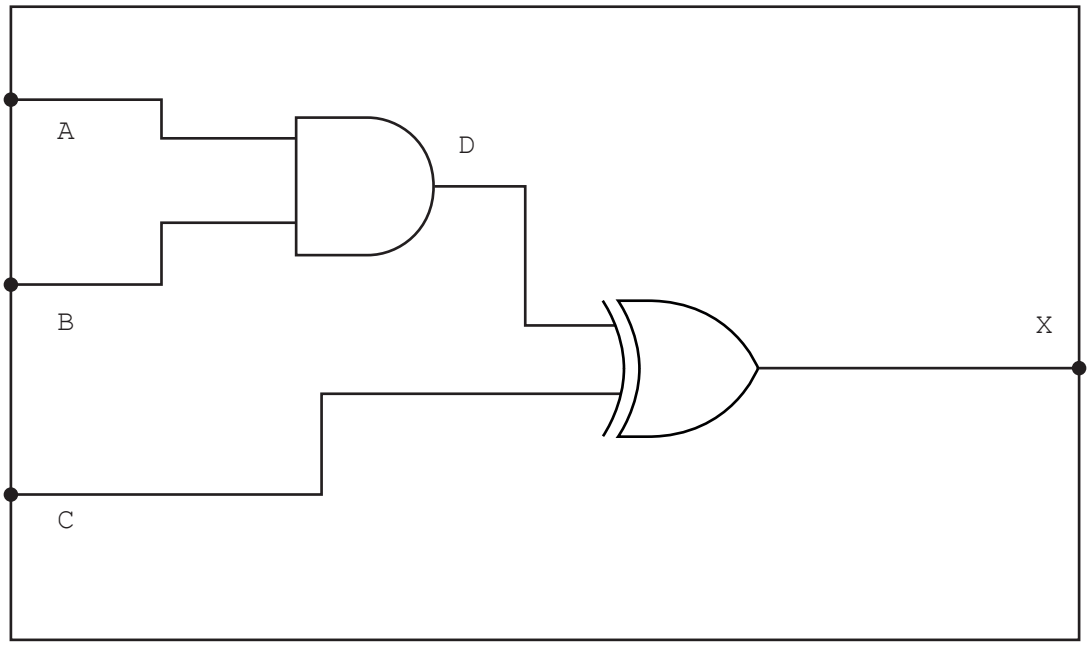

Fig. 4

Complete the truth table below for the logic circuit shown in **Fig. 4**.

A	B	C	D	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]

8 Albert runs a competition each week in his local village hall. So that Albert can contact the winner he would like a program for the winner to enter their telephone number which is then checked and written into a text file.

The rules for Albert's program are as follows:

1. The telephone number is entered. This is checked to ensure that the first digit is a 0
2. If the first digit is not a 0 then a message saying "Needs To Start With 0" is printed
3. If the first digit is a 0 then the telephone number is passed into a pre-existing function called `checkLength` as a parameter. This will return `true` if the length of the telephone number is long enough
4. If the telephone number is long enough then it is written into a text file called `"winner.txt"`
5. If the telephone number is not long enough then a message saying "Not Long Enough" is printed.

Complete the procedure `competitionWinner` so that it meets the rules of Albert's program.

You should write your procedure using pseudocode or program code.

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procedure competitionWinner()

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endprocedure
```

[5]

9* A company has six solicitors working in two offices in different locations. They work with the general public and help them solve any sensitive legal issues they may be facing.

The solicitors would like to set up a computer network to allow them to work together more effectively.

Discuss the benefits and drawbacks of computer networking to the company.

You should refer to the following in your answer:
- Different networking methods
- Cost implications
- Security implications

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END OF QUESTION PAPER

PLEASE DO NOT WRITE ON THIS PAGE