



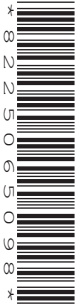
Oxford Cambridge and RSA

# 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'.

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

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

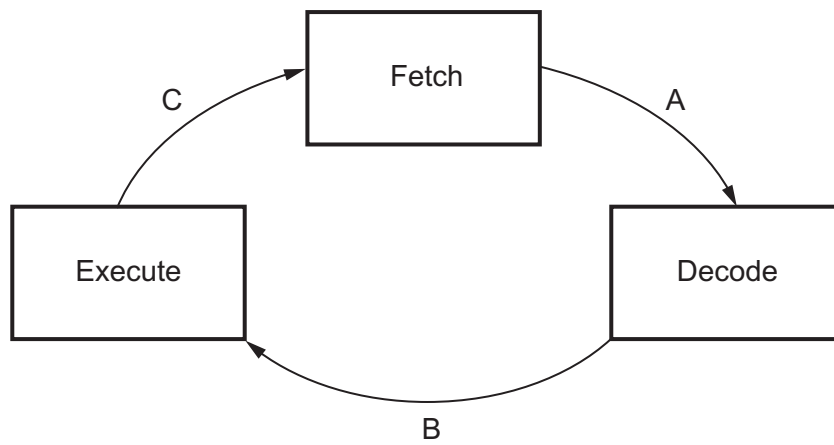


Fig. 1

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

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

.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....  
..... [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 .....

.....

2 .....

.....

[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.

.....

.....

.....

.....

[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.

1 .....

.....

.....

.....

2 .....

.....

.....

.....

[4]

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

..... [1]



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.

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

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

.....  
.....  
.....  
..... [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.

.....  
.....  
.....  
.....  
.....  
.....  
.....  
..... [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**.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... [6]

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

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

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

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

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

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

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

You must show your working.

$$\begin{array}{r} 11010011 \\ \underline{01111001} \end{array} -$$

[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.

.....  
 ..... [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]

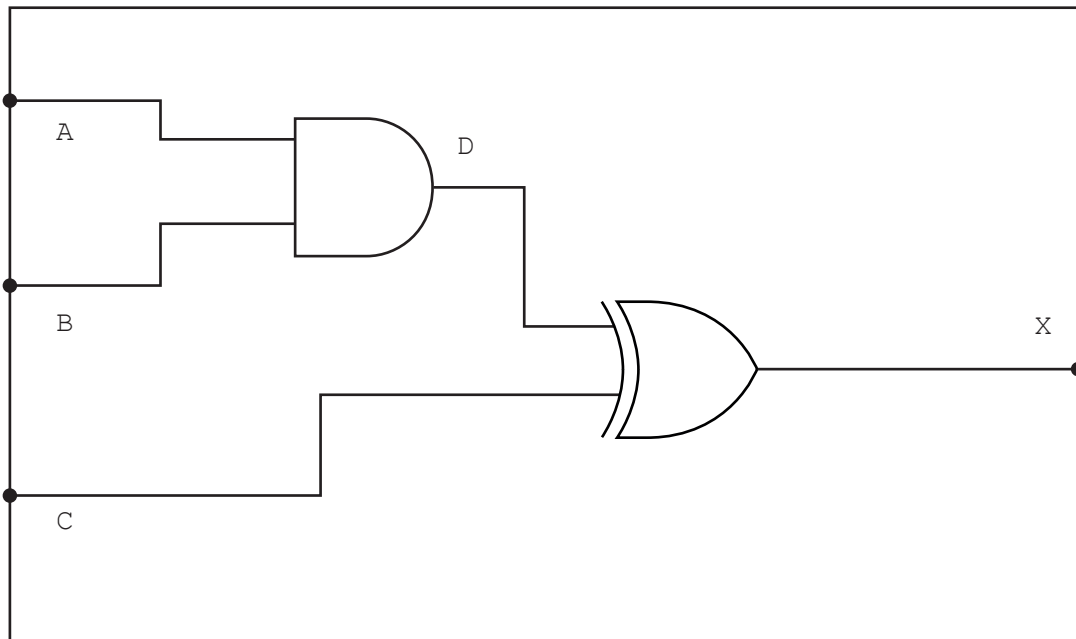
(ii) When the program is run, 7 is input by the user.

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

..... [1]



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]





.....  
..... [9]

**END OF QUESTION PAPER**

**PLEASE DO NOT WRITE ON THIS PAGE**

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