Oxford Cambridge and RSA

Tuesday 21 May 2019 – 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.
- Answer **all** the questions.
- Write your answer to each question in the space provided.
- Additional paper may be used if required but you must clearly show your candidate number, centre number and question number(s).

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

No calculator can be used for this paper

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1 Open source software has grown in popularity over the last few decades.

(a) Explain the difference between open source and closed source software.

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

(b) Explain why all closed source software is most likely to be compiled rather than run on an interpreter.

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

(c) State the name of a type of translator software other than a compiler or interpreter.

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

Linux is a popular open source operating system and Windows is a popular closed source operating system.

(d) Give **three** functions of an operating system.

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3 .....

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[3]

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2 Variables in programs contain specific types of data.

(a) Complete the table below to suggest a suitable data type for each piece of data.

Data	**Data Type**
‘H’	Character
“Hello”	
35	
−2.625	Real
True	

[3]

(b) Show the denary number 35 as an 8-bit (unsigned) binary number.

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

(c) The character ‘A’ in the ASCII character set is represented by the denary value 65. Write the binary representation for the ASCII character ‘H’. Show your working.

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

(d) Show the denary number −2⅝ as a floating-point binary number with a 6-bit mantissa and 4-bit exponent, both stored using two’s complement representation.

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..... **[3]**

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3* "The Megahertz Myth" is the name given to the argument that clock speed alone is an insufficient method to compare the performance of processors.

Discuss the extent to which you agree with this argument. You should include any other factors that might affect a processor's performance.

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

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4 Stacks and queues are both data structures.

(a) State which of a stack or queue would be considered as a 'First In First Out' data structure.

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

A stack is shown in Fig. 4.1 before a set of operations are carried out on it.

(b) Draw what the stack shown in Fig. 4.1 would look like after the following operations:

```
push("A"), push("B"), pop(), push("C"), pop(), push("D")
```

Fig. 4.1

[2]

Fig. 4.2 shows a stack in two states: State One and State Two.

Fig. 4.2

(c) List the operations needed to get the stack from State One to State Two.

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..... **[3]**

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A queue is shown in Fig. 4.3.

(d) Draw what the queue shown in Fig 4.3 would look like after the following operations:

```
enqueue("A"), enqueue("B"), dequeue(), enqueue("C"), dequeue(),
enqueue("D")
```

Fig. 4.3

[2]

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5* *"It's like the Wild West, the Internet. There are no rules." – Steven Wright.*

The quote above suggests that the Internet is a lawless place.

Discuss the extent to which you agree with this statement and how important you feel that the regulation of the internet is.

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

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6 A programmer has written the following code designed to take in ten names then print them in a numbered list.

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name1 = input("Enter a name: ")
name2 = input("Enter a name: ")
name3 = input("Enter a name: ")
name4 = input("Enter a name: ")
name5 = input("Enter a name: ")
name6 = input("Enter a name: ")
name7 = input("Enter a name: ")
name8 = input("Enter a name: ")
name9 = input("Enter a name: ")
name10 = input("Enter a name: ")

print("1. " + name1)
print("2. " + name2)
print("3. " + name3)
print("4. " + name4)
print("5. " + name5)
print("6. " + name6)
print("7. " + name7)
print("8. " + name8)
print("9. " + name9)
print("10. " + name10)
```

It has been suggested that this code could be made more efficient and easier to maintain using an array or a list.

(a) Define the term ‘array’.

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

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(b) Write a more efficient version of the programmer's code using an array or a list.

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..... **[5]**

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7 A number of laws govern the use of computers.

(a) For each of the following scenarios tick **one** law that is being broken.

Scenario	**Computer Misuse Act**	**Copyright Design and Patents Act**	**Data Protection Act**
A bank accidentally publishes customers' account details on its website.			
Someone downloads a pirated version of a piece of software that users would ordinarily have to pay for.			
Someone writes and distributes a virus.			

[3]

(b) Describe the purpose of the Regulation of Investigatory Powers Act.

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..... **[3]**

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8 A theatre has a website showing its productions and allowing people to make bookings.

Part of the site is shown below. The words 'Book tickets' link to the page 'bookings.html'.

Upcoming productions:
1. Macbeth
2. Blood Brothers
3. An Inspector Calls

Book tickets

(a) Write the HTML code for the extract above.

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..... **[3]**

The theatre website also uses CSS.

(b) Give an example of why the theatre website might use CSS.

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

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The theatre offers price reductions on Tuesdays and Wednesdays.

The theatre manager wants some text on the website to display “Midweek Special – tickets £15 tonight” on Tuesdays and Wednesdays, and “Tickets £20 tonight” on all other nights.

The website coders will use a div tag with the id ‘`prices`’ to do this. The Javascript code to change the contents of the div tag has been started below. The variable `dayCode` holds a number representing the current day of the week (0 for Sunday, 1 for Monday, 2 for Tuesday and so on).

(c) Complete the Javascript code below so the correct message is displayed in a div tag with the id ‘`prices`’.

```
var date = new Date();
var dayCode = date.getDay();
//0 is Sunday, 1 Monday, 2 Tuesday etc
var priceText="";
```

```
= priceText;
```

[4]

When a booking is made on the website it is stored in a database.

(d) Describe **one** of the tables you might expect to see in this database.

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

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9 Complete the truth table to represent the following Boolean expression.

$Q \equiv \neg (A \wedge B) \vee C$

A	B	C	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	

[2]

END OF QUESTION PAPER

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