OCR
Oxford Cambridge and RSA

Monday 13 May 2019 – Morning

GCSE (9–1) Computer Science

J276/01 Computer systems

Time allowed: 1 hour 30 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. If additional space is required, use the lined page(s) at the end of this booklet. The question number(s) must be clearly shown.

INFORMATION
- The total mark for this paper is **80**.
- The marks for each question are shown in brackets **[ ]**.
- Quality of written communication will be assessed in this paper in questions marked with an asterisk (*).
- This document consists of **20** pages.

No calculator can be used for this paper

Answer **all** the questions.

1 Kerry wants to buy a new computer, but she does not understand what the different parts of a computer do.

(a) Kerry has heard of a CPU but does not know what it is.

(i) The following sentences describe the purpose of a CPU.

Complete the sentences by filling in the missing words.

CPU stands for ..... .

It is the part of the computer that fetches and executes the .....

that are stored in ..... .

The CPU contains the Arithmetic ..... Unit (ALU) and

the ..... Unit (CU).

[5]

(ii) Kerry is looking at two computers; one has a single core processor and the other has a dual core processor.

Explain why having a dual core processor might improve the performance of the computer.

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

(iii) One computer has 64 kilobytes of cache and the other has 512 kilobytes of cache.

Explain how the cache size can affect the performance of the CPU.

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

(b) Both computers have RAM and ROM.

(i) The table has **five** statements describing RAM and/or ROM.

Tick (✓) **one or more** boxes in each row to identify if that statement describes RAM and/or ROM.

	RAM	**ROM**
Stores data		
The memory is volatile		
Data will not be lost when the computer is turned off		
Data is read-only, cannot be changed		
Stores currently running data and instructions		

[5]

(ii) Give **one** difference between RAM and flash memory.

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

(c) Kerry has 5GB of files to transfer from her laptop at work to her new computer. She has been told to buy an external solid state device to do this.

(i) Give **one** example of a solid state device.

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

(ii) Identify whether the device given in **part (c)(i)** is an example of primary or secondary memory.

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

(iii)* Kerry was originally going to use an optical storage device to transfer her files.

Discuss whether an optical or solid state device is the most appropriate media to transfer these files.

You may want to consider the following characteristics in your answer:

- portability
- robustness
- capacity
- cost

[8]

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(iv) The filesizes of Kerry's files are usually displayed in megabytes (MB) or gigabytes (GB).

Calculate how many MB are in 5GB. Show your working.

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

2 Xander's tablet computer comes with system software, including an operating system and utility system software.

(a) The operating system provides file management.

Identify **three** ways that Xander can make use of the file management facility.

1 .....

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2 .....

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3 .....

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

(b) The utility system software provides compression software. Xander uses this to compress an image.

(i) Explain how the compression software will compress the image file.

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

(ii) Give the name of **two** other types of utility system software.

1 .....

2 .....
[2]

(c) Xander also has a smart watch.

(i) Tick (✓) **one** box to show whether the smart watch or the laptop is an example of an embedded system.

	Is an example of an embedded system
Smart watch	
Laptop	

[1]

(ii) Justify your choice to **part (i)**.

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

3 Hamish stores confidential documents on his laptop.

(a) Hamish needs his computer to be secure from unauthorised access when connected to a network.

(i) Describe the problems that can arise from unauthorised access to his laptop and confidential documents.

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

(ii) Describe **two** ways Hamish can help prevent unauthorised access to his laptop.

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[4]

(b) If unauthorised access does occur, Hamish would like to use encryption to add another layer of protection to his documents.

(i) Explain how encryption helps to protect Hamish's documents.

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

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(ii) One encryption method is a Caesar cipher.

This Caesar cipher moves each letter of the alphabet **one** place to the right.

The following table shows the original letters in the first row, and the new letters in the second row.

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A

For example, if the message read: `HELLO`

This would be stored as: `IFMMP`

The following pseudocode algorithm takes a string of uppercase letters as input and uses the Caesar cipher to encrypt them.

The functions used in the algorithm are described in the table:

Function	Description
`ASC(`*`character`*`)`	Returns the ASCII value for *character* e.g. `ASC("A")` returns `65`
`CHR(`*`ASCIIvalue`*`)`	Returns the single character for *ASCIIvalue* e.g. `CHR(65)` returns `"A"`
`subString(`*`Value, Number`*`)`	Returns the *Number* of characters starting at position *Value* (where 0 is the first character)

Complete the pseudocode algorithm to perform a Caesar cipher.

```
01 message = input("Please enter your string")
02 newMessage = ""
03 messageLength = message.length
04 for count = 0 to ..........
05     ASCIIValue = ASC(message.subString(..........,1))
06     ASCIIValue = ASCIIValue + ..........
07     if ASCIIValue >90 then
08       ASCIIValue = .......... - 26
09     endif
10     newMessage = .......... + CHR(ASCIIValue)
11 next count
```

[5]

(iii) The algorithm needs adapting. An extra line (line 12) is needed to output the encrypted message.

Write line 12 to output the encrypted message in pseudocode or programming code.

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

4 An office has a LAN (Local Area Network). The office has four employees who each have a laptop. The office also has one server and one networked printer.

(a) The office is set up as a star network with a switch at the centre. All devices are connected to the network using cables.

(i) Draw the devices and connections in the office star network. All devices must be clearly labelled.

[3]

(ii) Describe the role of the switch in the office network.

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

(b) The office introduces a WAP (Wireless Access Point) to allow network access to wireless devices.

The office manager has noticed that the performance of the network has recently decreased.

(i) Describe how introducing wireless access could have slowed down the network.

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

(ii) Identify **two** other factors that can affect the performance of a network.

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2 .....

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[2]

(c) Explain what is meant by a Virtual Network.

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

5 The IP address 192.149.119.226 is linked to the website with a URL of https://www.ocr.org.uk

(a) When https://www.ocr.org.uk is entered into a browser, the website homepage is loaded.

Describe the relationship between the website URL (https://www.ocr.org.uk), the IP address and the webserver.

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

(b) Computers access the Internet using the TCP/IP model.

(i) The TCP/IP model uses layers including the application layer and transport layer.

Explain why the TCP/IP model uses layers.

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(ii) TCP/IP is one example of a protocol.

Give the name of **one** appropriate protocol for each task in the table.

Task	Protocol for this task
Sending an email from one mail server to another	
Transmitting a file from a client to a server	
Viewing a website using a web browser	
Downloading an email to your computer	

[4]

6 Fiona is a software engineer. She is creating a new version of a computer game she released three years ago.

Fiona is considering selling the game online and not making it available physically in shops.

(a) Describe the environmental impact of Fiona's decision.

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(b) Fiona releases her game under a proprietary licence.

Explain why a proprietary licence is a more appropriate choice than open source.

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END OF QUESTION PAPER

ADDITIONAL ANSWER SPACE

If additional space is required, you should use the following lined page(s). The question number(s) must be clearly shown in the margin(s).