Chhetri Academy

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GCSE COMPUTER SCIENCE

1.1

OCR J277 | Specification point 1.1.1

Architecture of the CPU

Untiered

Past paper question booklet

6	2018-2024	Untiered
question groups	available papers	tier

Before you begin

1. Show working and use units where appropriate.
2. Use extra paper if you need more space.
3. Print at actual size (100%) for measurement questions.

Name _____ **Date** _____

Whole questions are retained for context; some parts cover other points. Legacy sources are labelled.

4 Alicia has designed a computer using Von Neumann architecture.

(a) Describe the purpose of **two** registers that are used by Von Neumann architecture.

1 .....

.....

.....

2 .....

.....

.....

[4]

(b) The CPU has a clock speed of 3.8 GHz.

Describe what is meant by a clock speed of 3.8 GHz.

.....

.....

.....

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

(c) Alicia says:
"My computer has a quad-core processor, so it will run twice as fast as a computer with a dual-core processor."

Explain why this statement is not always true.

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.....

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.....

.....

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

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Turn over

(d) The computer will only have 2GB of RAM, but Alicia says that virtual memory can be used instead of adding more RAM.

(i) Explain how virtual memory can compensate for the lack of RAM in Alicia's computer.

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

(ii) Explain why it would be beneficial for Alicia to get more RAM instead of relying on virtual memory.

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

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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]**

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(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.

.....

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

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(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.

.....

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

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

.....

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

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(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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Turn over

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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]**

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3 Draw **one** line from each part of the processor to its correct definition.

Part of the processor	Definition
Control Unit (CU)	Performs mathematical operations
Cache	Sends signals to direct the operations
Arithmetic Logic Unit (ALU)	Keeps the clock in sync
Register	A small piece of memory inside the processor that can hold one instruction or address
	High speed memory inside the processor that stores recently used instructions

[4]

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1 A computer system has a 2.5 GHz processor and 5 GB of RAM.

(a) Complete the paragraph about memory by writing the missing terms in the spaces, using the words provided.

cache	data	hard drive	instructions	changed	closing
operator	primary	random	read	secondary	start-up
translator	memory stick	virtual	write		

ROM stands for ..... only memory. This stores the ..... instructions for a computer and cannot be ..... .

RAM stands for ..... access memory. This stores the instructions and ..... that are currently being used. If the computer does not have enough RAM to run a process it can make use of ..... memory.

RAM and ROM are both examples of ..... memory. Memory located close to the processor that allows faster access than from RAM is called ..... memory. **[8]**

(b) **(i)** State the purpose of a CPU.

.....

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

(ii) State what is meant by a single core 2.5 GHz processor.

.....

.....

.....

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

(c) Von Neumann architecture includes registers.

Identify **two** registers used in Von Neumann architecture.

1 .....

2 .....
[2]

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2 Complete the table by writing the missing definition or name of each of the common CPU components and registers.

CPU component or register	Definition
	Stores the address of the next instruction to be fetched from memory. Increments during each fetch-execute cycle.
CU (Control Unit)	
	Stores the address of the data to be fetched from or the address where the data is to be stored.
	Performs mathematical calculations and logical operations.

[4]

6 A computer has a Central Processing Unit (CPU).

(a) Describe what happens during the fetch-execute cycle.

.....

.....

.....

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

(b) Complete the table by writing the name of **two** registers used in the fetch-execute cycle **and** the purpose of each register.

Register	Purpose

[4]

(c) Give **three** characteristics of a CPU that can affect its performance.

1 .....

2 .....

3 .....

[3]

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