Name_____

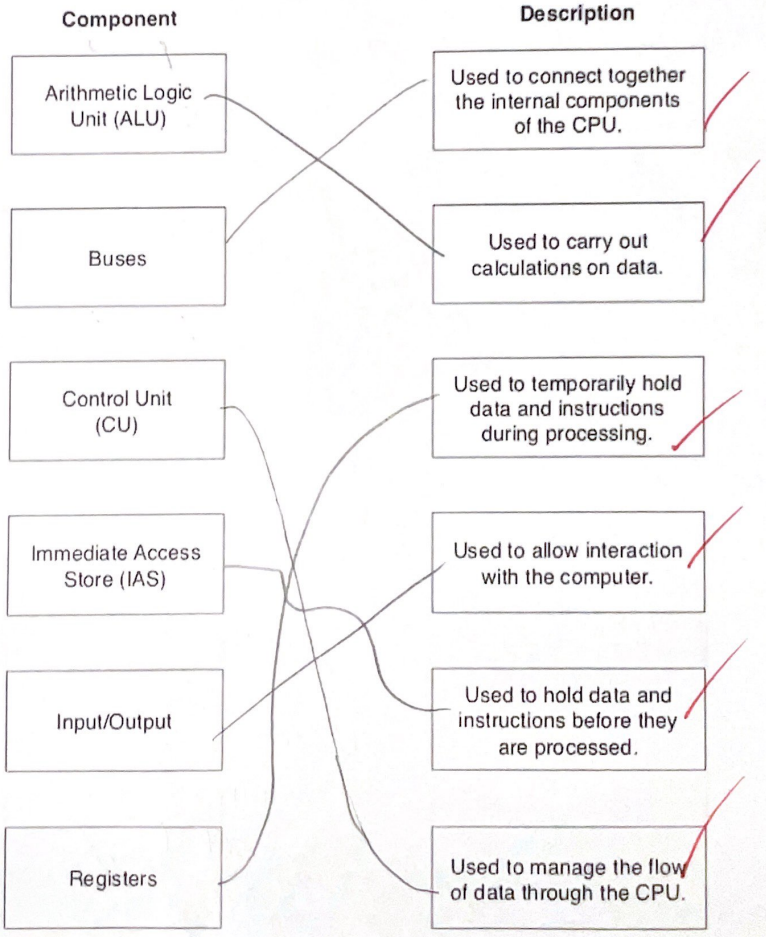
CIE Computer Science

CHAPTER 3 – Hardware

1)

Six components of a computer system and **six** descriptions are shown.

Draw a line to match each component with the most suitable description.



[5]

2)

Kelvin correctly answers an examination question about the Von Neumann model.

Eight different terms have been removed from his answer.

Complete the sentences in Kelvin's answer, using the list given.

Not all items in the list need to be used.

- ~~accumulator (ACC)~~
- address bus
- ~~arithmetic logic unit (ALU)~~
- control unit (CU)
- data bus
- ~~executed~~
- ~~fetches~~
- immediate access store (IAS)
- ~~memory address register (MAR)~~
- ~~memory data register (MDR)~~
- ~~program counter (PC)~~
- saved
- transmits

The central processing unit (CPU) ..... fetches .....

the data and instructions needed and stores them in the

..... IAS ..... to wait to be processed.

The ..... PC ..... holds the address of the next

instruction. This address is sent to the ..... MAR ..... .

The data from this address is sent to the ..... MDR ..... .

The instruction can then be decoded and ..... executed ..... .

Any calculations that are carried out on the data are done by the

..... ALU ..... . During calculations, the data is temporarily

held in a register called the ..... ACC ..... .

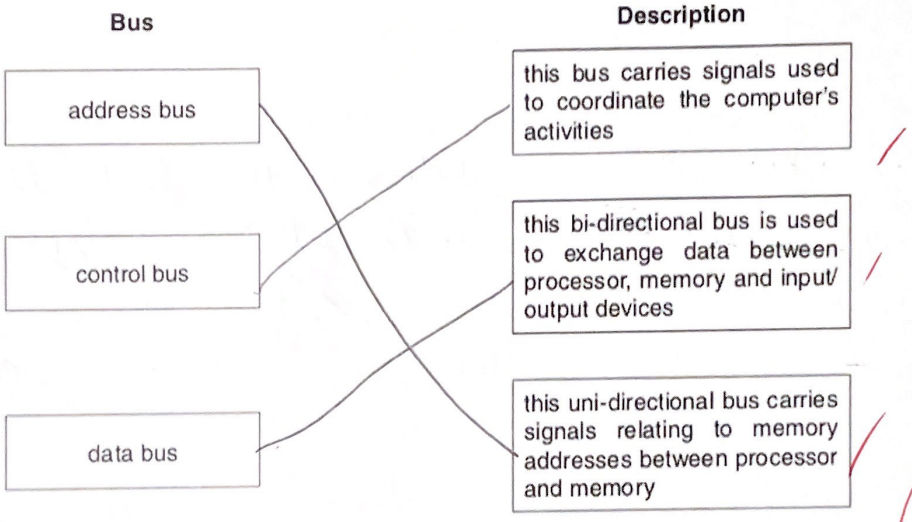
8

[8]

3) One of the key features of von Neumann computer architecture is the use of buses.

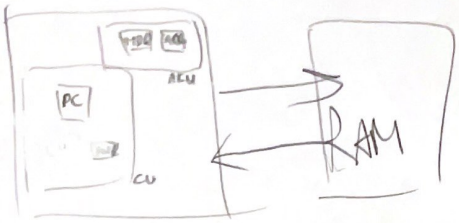
Three buses and three descriptions are shown below.

Draw a line to connect each bus to its correct description.



2/[2]

4)
a)



The Fetch - Decode - Execute cycle takes place in 3 steps. The first step is **Fetching the instruction.** Explain the first step using the words:

- **CPU**
- **Address bus**
- **Register**

The CPU fetches the data from the current address stored in the MAR. It is transmitted from RAM to CPU through the address bus, and stored in a register called the MDR, where it awaits processing. 4 [4]

b) Step 2 is **Decoding the instruction,** explain this step using the words:

- **CPU**
- **CU**
- **Instruction Set**

The instruction stored in the register is in machine code. To decode it, the CU in the CPU applies an instruction set linking each section of machine code to an real-life action, e.g. 006 (ACC) meaning to increment the accumulator. 4 [4]

c) Step 3 is **Executing the instruction,** explain this step using the words:

- **CPU**
- **ALU**

Finally, after the instruction has been decoded, it can be carried out by the ALU. The MDR in the CPU sends data to the ACC, where results from calculations and logic operations (e.g. addition, AND, binary shifts) are temporarily held, and the instruction is executed. 3 [3]

5)

Robert has a mobile device that uses RAM, ROM and an SSD.

(a) State what the RAM, ROM and SSD are used for.

Primary RAM ... Volatile, non-permanent storage used to store read- and-write data being used by current programs/instructions.

Primary ROM ... Non-volatile, permanent, read-only storage that contains features like BIOS and native programs

Secondary SSD ... Non-volatile data, non-permanent, read-and-write secondary storage containing non-native programs and data (like games) [3]

(b) Give **two** reasons why an SSD, rather than a HDD, is used in the mobile device.

Reason 1 ... SSDs are smaller and more portable, so more suitable for a mobile device

Reason 2 ... SSD is more power efficient so has longer battery life [2]

6)

Five descriptions of different input or output devices are given in the table.

Complete the table by stating the **name** of each input or output device.

Description	Name of device
This is an input device that works by shining a light onto the surface of a document. The light source is automatically moved across the document and the reflected light is captured by mirrors and lenses.	2D scanner ✓
This is an input device where a laser or a light source is moved across an object. The width, height and depth of the object are measured to allow a model to be created.	3D scanner ✓
This is a large input device that is usually fixed to a wall. A user can calibrate the device to make sure the sensors align with a projected image. The user can use either their finger or a special pen to make selections.	Touch screen ✓
This is an output device that uses many small mirrors to reflect light towards a lens. This will display an image.	DLP projector ✓
This is an output device that creates an object by building layer upon layer of material.	3D printer ✓

5/ [5]

7)

The law company wants to purchase a new file server.

The company can purchase a server with either solid state storage or magnetic storage. After discussion, it decides to purchase a file server with magnetic storage.

Explain why the company chose magnetic storage rather than solid state storage.

- Magnetic storage can store large amounts of data for less cost than solid state
- Although solid state can be faster, more robust, and more power-efficient, these are unnecessary for a file serve
- Uses iron filings in opposite directions for 0 and 1
- Longer storage

4/[4]

8)

(c) Alessandro also uses off-line storage to store his data.

Three examples of off-line storage are Blu-ray, CD and DVD.

Six statements are given about off-line storage.

Tick (✓) to show if each statement applies to **Blu-ray**, **CD**, or **DVD**.

Some statements apply to more than one example of off-line storage.

Statement	Blu-ray (✓)	CD (✓)	DVD (✓)
A type of optical storage	✓	✓	?
Has the largest storage capacity	✓		✓
Can be dual layer	/		✓
Read using a red laser	✓	✓	
Has the smallest storage capacity	✓	✓	/
Stores data in a spiral track	✓	✓	✓

[6]

9)

Tammy is buying a new computer that has an LED display.

(a) **Five** statements about LED displays are given.

Tick (✓) to show if each statement is **True** or **False**.

Statement	True (✓)	False (✓)
It is a flat panel display	✓	
It creates images using red, green and blue diodes	✓	
It is not very energy efficient and gives off heat		✓
It can be used in mobile devices such as smartphones and tablets	✓	
It is a front-lit display		✓

[5]