1   A smart television allows the user to search the Internet and watch videos online.

A smart television has both RAM and ROM.

  i. State the difference between RAM and ROM.

    -- [1]

  ii. Give **two** examples of data that a smart television could store in RAM.

1 --

2 --

[2]

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

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]

3   Ali's tablet computer has an operating system.

Ali's tablet computer also has ROM (read only memory).

Describe the purpose of ROM in Ali's tablet computer.

--- **[2]**

4   A satellite navigation system (Sat Nav) uses RAM and ROM.

Tick (✓) **one** box in each row to show whether each of the statements is **true** for the RAM or ROM in a Sat Nav.

	RAM	ROM
Stores the boot up sequence of the Sat Nav.		
The contents are lost when the Sat Nav is turned off.		
Holds copies of open maps and routes.		

[3]

5   Kerry wants to buy two computers. 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]

6   A computer only has 2GB of RAM. Alicia says that virtual memory can be used instead of adding more RAM. etc.

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

   --**[3]**

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

   --**[2]**

7   Gareth has a satellite navigation system (Sat Nav) in his car that uses RAM and ROM.

Fig. 2 lists some characteristics of computer memory. Tick (✓) **one** box in each row to show whether each of the statements is **true** for the RAM or ROM in Gareth's Sat Nav.

Fig. 2

	RAM	ROM
Stores the boot up sequence of the Sat Nav.		
The contents are lost when the Sat Nav is turned off.		
Holds copies of open maps and routes.		

[3]

END OF QUESTION PAPER

Mark Scheme

Question			Answer/Indicative content	Marks	Guidance
1		i	1 mark for • ROM is non-volatile, RAM is volatile // by description • Content of ROM cannot (usually) be changed, content of RAM can be changed	1	Read whole answer **Examiner's Comments** This question was answered well with many candidates correctly identifying that RAM is volatile and ROM is not-volatile. When a difference is required candidates must make sure they are giving both sides of the difference. For example RAM is volatile is not enough on its own. Some candidates gave the purpose of RAM and ROM. This is a difference in the use and not a fundamental difference between the two.
1		i	1 mark for	1	

Question			Answer/Indicative content	Marks	Guidance
		ii	1 mark each to max 2 e.g. • Web browser/application that is **running** • (Parts of the) operating system currently **running** • Current video/film/tv program being watched • Data being downloaded/buffered • Button pressed by the user • Current volume • Current channel being watched • Source being watched (e.g. HDMI1)	2	Allow anything reasonable but must be clearly RAM e.g. not just stores the software/OS (this is secondary storage). Do not award brand names without exemplification. <u>Examiner's Comments</u> Some candidates found this question challenging. Many responses were generic applications such as a streaming service, a tv programme, etc. A TV programme will not be stored in RAM, but the parts of it currently/about to be watched would be stored in RAM. Likewise, an application in its entirety will not be stored in RAM, but the parts that are being used will be. The most commonly correct responses were the recording currently being watched, the data received from the remote control and the websites being accessed. Exemplar 5 1. Open applications or software. 2. ~~Websites~~ Webpages that are being used. This candidate has identified two suitable examples of data and has given more than just identifying, e.g. applications. They have stated that it is the open applications, and webpages being used, which both demonstrate their understanding of when RAM is used.
			Total	3	

Question			Answer/Indicative content	Marks	Guidance
2			1 mark for each completed space ROM stands for **read** only memory. This stores the **start-up** instructions for a computer and cannot be **changed**. RAM stands for **random** access memory. This stores the instructions and **data** that are currently being used. If the computer does not have enough RAM to run a process it can makes use of **virtual** memory. RAM and ROM are both examples of **primary** memory. Memory located close to the processor that allows faster access than from RAM is called **cache** memory.	8	read start-up changed random data virtual primary cache
			Total	8	
3			1 mark per bullet to max 2 e.g. • Store BIOS • … the boot-up instructions • Stores data that should not be changed • Stores data that must be retained when the computer turns off • Store firmware/OS fundamentals	2	BOD non-volatile BOD cannot be changed
			Total	2	

Mark Scheme

Question	Answer/Indicative content	Marks	Guidance
4	<table><tr><td></td><td>RAM</td><td>ROM</td></tr><tr><td>Stores the boot up sequence of the Sat Nav.</td><td></td><td>✓</td></tr><tr><td>The contents are lost when the Sat Nav is turned off.</td><td>✓</td><td></td></tr><tr><td>Holds copies of open maps and routes.</td><td>✓</td><td></td></tr></table>	3 (AO2 1a)	Award 1 mark for each correct tick. No marks should be awarded if ticks are in both boxes in a given row.
	Total	3	

Mark Scheme

Question			Answer/Indicative content	Marks	Guidance
5		i	1 mark for each row <table><tr><td></td><td>RAM</td><td>ROM</td></tr><tr><td>Stores data</td><td>✓</td><td>✓</td></tr><tr><td>The memory is volatile</td><td>✓</td><td></td></tr><tr><td>Data will not be lost when the computer is turned off</td><td></td><td>✓</td></tr><tr><td>Data is read-only, cannot be changed</td><td></td><td>✓</td></tr><tr><td>Stores currently running data and instructions</td><td>✓</td><td></td></tr></table>	5 AO1 1a (5)	<u>Examiner's Comments</u> This question required an understanding of the purposes and characteristics of RAM and ROM. This question was answered well by many candidates. The most common error was the first box where some candidates only ticked one box i.e. stating that RAM stores data, but ROM does not.
		ii	1 mark • RAM is volatile // Flash memory is non-volatile • RAM is faster to access/store data than Flash memory // Flash memory is slower to access/store data than RAM • RAM stores currently running programs/instructions/data/OS // Flash memory stores files and software • RAM can be directly accessed by CPU // Flash data has to go to RAM before CPU	1 AO2 1a (1)	• Accept description of volatile/non-volatile • Bod - RAM is primary // Flash is secondary <u>Examiner's Comments</u> Candidates tackled this question well, and many were able to give an appropriate differences, with some candidates making use of the table in Question 1bi to determine a difference.
			Total	**6**	

Mark Scheme

Question			Answer/Indicative content	Marks	Guidance
6		i	1 mark per bullet to max 3 • VM is used when RAM is full • …part of the secondary storage used as (temporary) RAM/VM • Data from RAM is moved to the secondary storage/VM (to make space in RAM) • RAM can then be filled with new data • When data in VM is needed it is moved back to RAM	3 AO2 1a (1) AO2 1b (2)	Many candidates are giving disadvantages of VM, or that the computer can now run more programs, which are NAQ Examiner's Comments This question required candidates to explain how virtual memory works to make up for a lack of RAM. The most common responses included a description of the use of secondary storage as temporary RAM. Fewer candidates were able to explain the actual use of it, i.e. how data is transferred from RAM to VM to create more space in RAM, and how this is then moved back when required. Common misconceptions included candidates describing whole software being moved to VM.

Question			Answer/Indicative content	Marks	Guidance
		ii	1 mark per bullet to max 2 • More RAM will improve the performance of the computer // More RAM will speed up the access to data • Excessive use can cause disk thrashing … • …which decreases performance • VM is slower to access than RAM direct (because it has to go back to RAM first) • Moving data between RAM and VM takes processor time	2 AO2 1b (2)	Do not award: VM is slower, without quantifying slower at what Examiner's Comments This question required an understanding of the benefits of RAM over VM. The less able often described RAM as being faster than VM, without any context as to what it is faster at, or why, often referring to it as making the computer faster. The more able were able to identify that data in VM needs to first be transferred to RAM before it can be accessed by the processor, and that this takes more time than accessing it directly from RAM. A common misconception was that it was slower access simply because it is further away. The VM could be closer to the processor, but the data would still need to be moved to RAM before it could be accessed, and this is what slows down the access speed.
			Total	5	

Question			Answer/Indicative content	Marks	Guidance
7			<table><tr><td></td><td>RAM</td><td>ROM</td></tr><tr><td>Stores the boot up sequence of the Sat Nav.</td><td></td><td>✓</td></tr><tr><td>The contents are lost when the Sat Nav is turned off.</td><td>✓</td><td></td></tr><tr><td>Holds copies of open maps and routes.</td><td>✓</td><td></td></tr></table>	3	Award 1 mark for each correct tick. No marks should be awarded if ticks are in both boxes in a given row.
			Total	3	