

1.1 PROCESSORS, INPUT/OUTPUT AND STORAGE · 1.1.3

Storage, RAM, ROM & virtual storage — Mark scheme

34 marks · spec 1.1.3(b)(c)(d)

AO key: AO1 = knowledge & understanding · AO2 = application · AO3 = reasoned judgements. Accept any valid alternative; do not award the same point twice.

Q	ANSWER	AO	MARKS
1(a)	Non-volatile storage that retains data without power / not directly accessed by the CPU and used for long-term storage. (1)	AO1	1
1(b)	1 mark per example, max 2: CD / DVD / Blu-ray. (2)	AO1	2
1(c)	Volatile. (1)	AO1	1

Q	ANSWER	AO	MARKS
2(a)	1 mark per point, max 3: <ul style="list-style-type: none"> • data is stored on spinning (rigid) platters coated with magnetic material (1) • areas are magnetised to one of two states to represent 1s and 0s (1) • a moving read/write head accesses tracks and sectors as the platter spins (1) 	AO1	3
2(b)	1 mark per point, max 3: <ul style="list-style-type: none"> • a laser is shone at the surface of the disc (1) • pits and lands reflect the light by different amounts (1) • a sensor detects the reflected light, read as 1s and 0s (1) 	AO1	3

Q	ANSWER	AO	MARKS
3(a)	Up to 4 marks, e.g.: <ul style="list-style-type: none"> • RAM is volatile; ROM is non-volatile (1) • RAM can be read from and written to; ROM is read-only (1) • RAM holds the OS, programs and data currently in use (1) • ROM holds the boot program / BIOS that loads the OS (or firmware) (1) 	AO1	4
3(b)	1 mark per point, max 3: <ul style="list-style-type: none"> • more programs/data can be held in RAM at once (1) • so the OS swaps less data out to slow secondary storage (virtual memory) (1) • less disk swapping means the CPU waits less / the system runs faster (1) 	AO2	3

Q	ANSWER	AO	MARKS
4	<p>2 reasons × (point + why suited to a laptop), max 4, e.g.:</p> <ul style="list-style-type: none"> • no moving parts so more shock-resistant (1) — suits a portable device that gets knocked (1) • lower power use (1) — longer battery life (1) • faster access (1); lighter / runs cooler (1) <p>Award up to two distinct reasons, each developed.</p>	AO2	4

Q	ANSWER	AO	MARKS
5(a)	Using remote / networked (cloud) storage (1) presented to the user as if it were local storage (1). (2)	AO1	2
5(b)	<p>1 mark per point, max 2:</p> <ul style="list-style-type: none"> • copies are kept off-site, safe from local fire/theft/hardware failure (1) • accessible from anywhere / easily scaled to the space needed (1) 	AO2	2

Q	LEVELS-OF-RESPONSE MARK SCHEME	AO	MARKS										
6	<p>Mark using the levels descriptors below. AO1 (knowledge of the storage types), AO2 (application to file servers), AO3 (justified conclusion).</p> <table border="1"> <thead> <tr> <th>LEVEL</th> <th>DESCRIPTOR</th> </tr> </thead> <tbody> <tr> <td>Level 3 (7–9)</td> <td>Balanced discussion of both magnetic and solid-state storage with accurate advantages/disadvantages, clearly applied to file servers (capacity, cost, speed, reliability), leading to a justified conclusion.</td> </tr> <tr> <td>Level 2 (4–6)</td> <td>Both types discussed with some application to the server context. A conclusion is reached but justification may be partial.</td> </tr> <tr> <td>Level 1 (1–3)</td> <td>Basic points about one or both types with little application or justification.</td> </tr> <tr> <td>0</td> <td>Nothing creditworthy.</td> </tr> </tbody> </table> <p>Indicative content (credit any valid point):</p> <ul style="list-style-type: none"> • Magnetic (HDD): much cheaper per GB and very high capacity, suiting large/ growing data; but slower and moving parts can fail. • Solid-state (SSD): faster access for many simultaneous users and more reliable (no moving parts), lower power and cooler; but more expensive per GB. • Application: servers value reliability and concurrent access (favours SSD) but also large cheap capacity (favours HDD); many use a mix or tiered storage. • Justified conclusion either way, e.g. SSDs for performance-critical data and HDDs for bulk/archive, with RAID for reliability. 	LEVEL	DESCRIPTOR	Level 3 (7–9)	Balanced discussion of both magnetic and solid-state storage with accurate advantages/disadvantages, clearly applied to file servers (capacity, cost, speed, reliability), leading to a justified conclusion.	Level 2 (4–6)	Both types discussed with some application to the server context. A conclusion is reached but justification may be partial.	Level 1 (1–3)	Basic points about one or both types with little application or justification.	0	Nothing creditworthy.	AO1 ×3 AO2 ×3 AO3 ×3	9
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Total for paper: 34 marks