1.2 Memory and Primary Storage: 30-minute Pack

Total Marks

OCR J277 · Calculators not allowed · about 30 minutes

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 Table 1 shows four statements about memory in a desktop computer. For each statement, state whether it describes RAM, ROM, or Both.

Table 1

Statement	Answer
(a) Its contents are lost when the power supply is switched off.	
(b) It stores the start-up instructions (bootstrap program) needed when the computer is first switched on.	
(c) It can be read from and written to while applications are running.	
(d) It is a type of primary storage that the CPU can access directly.	

(a) Its contents are lost when the power supply is switched off. **(1)**

(b) It stores the start-up instructions (bootstrap program) needed when the computer is first switched on. **(1)**

(c) It can be read from and written to while applications are running. **(1)**

(d) It is a type of primary storage that the CPU can access directly. **(1)**

(Total for Question 1 is 4 marks)

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2 This question is about the contents of ROM.

(a) State what type of program is typically stored in ROM in a computer system. **(1)**

(b) Explain why it is essential that this data is not lost when the computer's power is switched off. **(2)**

(Total for Question 2 is 3 marks)

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3 A tablet computer has 4 GB of RAM installed. While several apps are open, 3.2 GB of this RAM is in use. Calculate the percentage of the tablet's RAM currently in use.

(Total for Question 3 is 2 marks)

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4 Explain why closing applications that are not being used can improve the performance of a computer that has a limited amount of RAM.

(Total for Question 4 is 2 marks)

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5 Order these four memory types from fastest access speed to slowest access speed: RAM, Registers, Cache, Secondary storage (SSD).

(Total for Question 5 is 2 marks)

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6 Describe the purpose of cache memory in a computer system.

(Total for Question 6 is 2 marks)

7 This question is about converting between binary, denary and hexadecimal, as used to represent memory contents and addresses. Show your working for each conversion.

(a) Convert the 8-bit binary number 01011010 to denary. **(2)**

(b) Convert the same binary number, 01011010, to hexadecimal. **(2)**

(c) Convert the hexadecimal value 3F into an 8-bit binary number. **(2)**

(d) Convert the denary number 200 into hexadecimal. **(2)**

(Total for Question 7 is 8 marks)

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8 A programmer writes the following algorithm to check whether some file sizes (in bytes) count as 'Large' or 'Small'.

```
fileSizes = [500000, 2000000, 15000000]
FOR i = 0 TO 2
    sizeInMB = fileSizes[i] / 1000000
    IF sizeInMB >= 1 THEN
        OUTPUT "Large"
    ELSE
        OUTPUT "Small"
    ENDIF
NEXT i
```

Complete the trace table to show the values of i, fileSizes[i] and sizeInMB, and the output produced, as the algorithm executes.

i	fileSizes[i]	sizeInMB	Output

(Total for Question 8 is 4 marks)

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Mark scheme · 1.2 Memory and Primary Storage: 30-minute Pack

Question 1

(a) RAM **B1**

(a) Answer: RAM

(b) ROM **B1**

(b) Answer: ROM

(c) RAM **B1**

(c) Answer: RAM

(d) Both **B1**

(d) Answer: Both

Question 2

(a) the BIOS / bootstrap program / start-up instructions / firmware oe **B1**

(a) Answer: The BIOS/bootstrap program (start-up instructions/firmware).

(b) this program must run every time the computer starts, before the operating system has been loaded from secondary storage **B1**

(b) if it was lost, the computer would not be able to begin starting up / load the operating system at all **B1**

(b) Answer: The start-up program is needed at every boot, before the OS is available; without it stored permanently, the computer could never start.

Question 3

3.2 / 4 shown (or equivalent method) **M1**

80% cao **A1**

Answer: 80%

Question 4

closing unused applications frees up space in RAM **B1**

so there is more room for the apps/data that are actually being used, meaning the operating system needs to use (slower) virtual memory less often, improving performance **B1**

Answer: Closing unused apps frees RAM space, reducing the need for the OS to use slower virtual memory, which improves performance.

Question 5

Registers placed first (fastest) and Secondary storage (SSD) placed last (slowest) **B1**

Cache placed between Registers and RAM, giving the full order: Registers, Cache, RAM, Secondary storage (SSD) **B1**

Answer: Registers, Cache, RAM, Secondary storage (SSD)

Question 6

stores instructions/data that the CPU has recently used or is likely to need again soon **B1**

so the CPU can access this data much faster than fetching it from (the slower) RAM each time, improving performance oe **B1**

Answer: Cache stores frequently/recently used instructions and data close to the CPU, so the CPU can retrieve it faster than from RAM, improving overall speed.

Question 7

(a) correct place values identified/summed, e.g. 64 + 16 + 8 + 2 **M1**

(a) 90 cao **A1**

(a) Answer: 90

(b) binary split correctly into nibbles: 0101 and 1010 **M1**

(b) 5A cao **A1**

(b) Answer: 5A

(c) each hex digit correctly converted to a 4-bit nibble: 3 = 0011, F = 1111 **M1**

(c) 00111111 cao **A1**

(c) Answer: 00111111

(d) 200 divided by 16 giving quotient 12 and remainder 8 (or equivalent method) **M1**

(d) C8 cao **A1**

(d) Answer: C8

Question 8

row i = 0: fileSizes[i] = 500000, sizeInMB = 0.5, Output = Small, all correct **B1**

row i = 1: fileSizes[i] = 2000000, sizeInMB = 2, Output = Large, all correct **B1**

row i = 2: fileSizes[i] = 15000000, sizeInMB = 15, Output = Large, all correct **B1**

the loop counter i shown correctly incrementing 0, 1, 2 across the three rows **B1**

Answer: i=0: fileSizes[i]=500000, sizeInMB=0.5, Output=Small | i=1: fileSizes[i]=2000000, sizeInMB=2, Output=Large | i=2: fileSizes[i]=15000000, sizeInMB=15, Output=Large

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