1.1 Systems Architecture: 10-minute Pack

OCR J277 · Calculators not allowed · about 10 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 Which of these is an example of an embedded system?

(a) Identify the example of an embedded system. **(1)**

- ☐ A) A laptop running multiple applications
- ☐ B) A smart thermostat that controls central heating
- ☐ C) A desktop PC used for gaming
- ☐ D) A web server hosting multiple websites

(Total for Question 1 is 1 mark)

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2 State, in the correct order, the three stages of the fetch, decode, execute cycle.

(a) State the three stages of the cycle in the order they occur. **(3)**

(Total for Question 2 is 3 marks)

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3 Convert the denary number 173 to an 8 bit binary number.

(a) Show your working and give your final answer as an 8 bit binary number. **(2)**

(Total for Question 3 is 2 marks)

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4 Many modern CPUs contain more than one core.

(a) Explain how having more than one core can improve the performance of a CPU. **(3)**

(Total for Question 4 is 3 marks)

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Mark scheme · 1.1 Systems Architecture: 10-minute Pack

Question 1

(a) B, a smart thermostat that controls central heating **B1**

(a) Answer: B

Question 2

(a) Fetch **B1**

(a) Decode **B1**

(a) Execute (oe, must be given in this order for all 3 marks; if order is wrong, award a maximum of 1 mark for the correct set of names) **B1**

(a) Answer: Fetch, decode, execute

Question 3

(a) Correct method shown, e.g. correct place values identified: 128, 64, 32, 16, 8, 4, 2, 1 with correct subset selected to total 173, oe **M1**

(a) 10101101, cao **A1**

(a) Answer: 10101101

Question 4

(a) each core can carry out its own fetch, decode, execute cycle independently, oe **B1**

(a) so multiple instructions, tasks or threads can be processed at the same time (in parallel), oe **B1**

(a) this increases the overall number of instructions completed per second, improving performance/throughput, oe **B1**

(a) Answer: Multiple cores allow multiple instructions/threads to be processed in parallel, increasing overall throughput.

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