MODULE A SYSTEMS ARCHITECTURE · A5

CPU performance

Original practice questions · ~25 minutes · 20 marks · J277 spec 1.1.2

Name _____ Date _____

Instructions. Answer all questions in the spaces provided. The marks for each part are shown in brackets [ ]. The total for this worksheet is **20 marks**.

1

Total: 7 marks

An architecture firm buys new desktop computers for drawing building plans. Each computer has a CPU with a clock speed of 3.2 GHz.

(a) Tick (✓) one box in each row to show which CPU characteristic is being described. **[3]**

Description	Clock speed	Cache size	Number of cores
How many fetch-execute cycles the CPU can carry out each second			
How many processing units in the CPU can each fetch and execute instructions			
How much fast memory in the CPU is available for frequently used data and instructions			

(b) State how many cycles per second a clock speed of 3.2 GHz represents. **[1]**

(c) Explain how increasing the clock speed of the CPU can affect the performance of the computer. **[2]**

(d) A different CPU has a clock speed of 2.5 GHz. State how many fetch-execute cycles it can carry out each second. **[1]**

2 **Total: 3 marks**

The firm's IT technician says the new CPUs have a larger cache than the old ones.

(a) State what is stored in cache. **[1]**

(b) Explain why a larger cache can improve the performance of a CPU. **[2]**

3 **Total: 6 marks**

The technician is choosing between two CPUs. All other parts of the computers are the same.

CPU	Clock speed	Cache size	Number of cores
CPU P	2.0 GHz	6 MB	4
CPU Q	3.5 GHz	6 MB	2

(a) The firm's older drawing program can only use one core at a time. Identify which CPU is likely to run this program faster. Justify your choice. **[3]**

(b) The firm also uses a rendering program that splits its work into many tasks that can run at the same time. Explain why CPU P might run this program faster than CPU Q, even though CPU P has a lower clock speed. **[3]**

4 **Total: 4 marks**

(a) Tick (✓) one box in each row to show whether each statement is true or false. **[4]**

Statement	True	False
Doubling the number of cores always doubles the speed of every program.		
Cache memory is faster to access than RAM.		
A CPU with a clock speed of 4 GHz can carry out more cycles per second than one with 2.5 GHz.		
Increasing the cache size means data must be fetched from RAM more often.		

Total for this worksheet: 20 marks