MODULE A SYSTEMS ARCHITECTURE · A2

Inside the CPU: mark scheme

~25 minutes · 20 marks · OCR spec 1.1.1

How to use. 1 mark per bullet up to the maximum shown. **/** separates alternative words; **//** separates alternative answers for the same mark. Words in (brackets) are not needed for the mark.

QUESTION	ANSWER	MARKS	GUIDANCE
1(a) J277 1.1.1	Arithmetic Logic Unit	**1**	Accept Arithmetic and Logic Unit. Correct answer only.
1(b) J277 1.1.1	Arithmetic / calculations, e.g. adding up the price of two tickets // subtracting a discount Logic / comparisons, e.g. checking whether the money paid is greater than / equal to the price	**2**	1 mark per type with a suitable example. Mark first two answers. Do not accept "calculations" for both. Do not accept "processing" (NE). Also accept a Boolean logic operation (AND / OR / NOT) for the logic mark.
2(a) J277 1.1.1	Decodes an instruction: Control unit Greater than check: ALU Frequently used instructions and data: Cache Small fast locations: Registers	**4**	1 mark per row. 2+ ticks in a row = 0 marks for that row.
3(a) J277 1.1.1	PC: holds the address of the next instruction (to be fetched) MAR: holds the address of the memory location that is to be read from / written to // the address of the data/instruction to be fetched MDR: holds the data/instruction fetched from memory // the data to be written to memory Accumulator: holds the result of calculations (done by the ALU)	**4**	1 mark per row. Do not accept PC "counts the number of programs" / "counts instructions". MAR and PC must refer to an address. Do not accept MDR "holds an address".
3(b) J277 1.1.1	Program counter / PC Memory address register / MAR	**2**	Either order. If more than two given, mark the first two.
4(a) J277 1.1.1	In the MAR, 12 is an address // the location in memory to be read from / written to In the MDR, 12 is data // a value that came from / is going to memory	**2**	Accept MDR value described as an instruction (an instruction is held as data). Do not accept "12 is the same in both".

QUESTION	ANSWER	MARKS	GUIDANCE
5(a) J277 1.1.1	Decodes instructions // works out what an instruction means Sends (control) signals to coordinate / control the other components / the flow of data Controls the fetch-execute cycle	**2**	Max 2. Do not accept "does the calculations" (that is the ALU). "Controls the computer" alone is NE.
6(a) J277 1.1.1	Cache is (small, very fast) memory inside / close to the CPU It stores frequently used instructions / data // the instructions run on every scan Cache is faster to access than RAM // the CPU does not have to fetch them from (slower) RAM each time So less time is spent waiting for instructions / data // instructions are fetched more quickly	**3**	Max 3. "Faster" must be compared with RAM / main memory. Do not accept cache as secondary storage. Do not accept "stores the whole program permanently".

Total: 20 marks