

Name: KEY

1. [5] Give five basic differences between a uP and a uC?.

lack cache memory	different, \neq CISC instruction set	and others...
low clock rates	flash instruction memory	
harvard architecture	internal EEPROM memory	
limited stack depth	built-in peripherals in uC	

2. [1] Name one way in which the AVR architecture is "RISC-like".

✓ single clock cycle execution	harvard architecture
orthogonal instruction set	large register file

3. [1] Name the architectural feature that helps the AVR efficiently access RAM data space using "C".

Special addressing modes using 16-bit registers + two word instructions

4. [1] What I/O instruction might you find in a microcontroller but not in a microprocessor?

set bit (SBI) clear bit (CBI) watchdog reset (WDR)

5. [1] How many cycles does it take for the AVR to respond to an interrupt?

Four

6. [3] Three serial interfaces on the mega128 are:

SPI, USART, TWI

7. [3] Name three characteristics of ESD diodes.

small size	very fast
little current handling ability	
can handle only a few ESD events in their lifetime	

8. [4] Using nothing but an ohmmeter, how could you check the ESD diodes on the input to an mega128?

"+" lead to input pin, "-" lead to VDD should show continuity, but not in reverse
 "+" lead to ground, "-" lead to input pin should show continuity, but not in reverse

9. [3] What does a makefile (Makefile) do?

controls the compilation of your source file usually, it can do pretty much anything a scripting language can

10. [2] How does humidity effect ESD?

less humidity, more ESD

11. [2] What purpose do the synchronizers on the mega128 input pins serve?

synchronize external signals to uC internal clock to prevent metastability

12. [3] Other than size, what distinguishes TCNT0 from the other timers/counters?

it can run off a 32 kHz asynchronous clock

13. Port B is to be configured as follows:

bit0	output	driven low
bit1	input	pullup off
bit2	output	driven low
bit3	output	driven low
bit4	output	driven high
bit5	output	driven high
bit6	input	pullup on
bit7	input	pullup on

[8] Fill in the bit values to configure DDRB and PORTB as described above:

	7	6	5	4	3	2	1	0									

DDRb:		0		0		1		1		1		1		0		1	

	7	6	5	4	3	2	1	0									

PORTB:		1		1		1		1		0		0		0		0	

14.[16] The connections to PORTB are shown below. Indicate by filling in each bit position of PINB the value that would be read after 1.5 clock cycles. Possible PINB values are '0'(logic zero), '1' (logic 1), and 'U' (unknown).

	7	6	5	4	3	2	1	0									

PINB:		U		0		1		1		0		0		U		0	

Notes: (1) Vf of the LEDs is 2.0V, (2) NC=no connect; (3) NO=normally open; (4) PNP is able to be saturated by the uC port; (5) Vin low and high are as stated in the datasheet at Vdd=5.0V

15.[2] (circle one) LED1 is on/off; LED2 is on/off

