Started on	Monday, 11 October 2021, 10:23 PM
State	Finished
Completed on	Monday, 11 October 2021, 10:54 PM
Time taken	31 mins 13 secs
Grade	**20.00** out of 20.00 (**100**%)

Question **1**

Correct

Mark 1.00 out of 1.00

What would the result of the following operation be?

~01101010

Select one:

- a. 10010101 ✔ Correct! ~ is a bitwise NOT operation. Every bit should be inverted, ~0 is equal to 1 (~1 = 0).
- b. 1111
- c. 11100010
- d. 0010

Your answer is correct.

Correct

Marks for this submission: 1.00/1.00.

Question **2**

Correct

Mark 1.00 out of 1.00

Select the correct truth table for the bitwise XOR operation
Format: (two inputs X1 and X2, output Y)
X1 X2 | Y

Select one:

a.

0 0 | 0
0 1 | 0
1 0 | 0
1 1 | 1

b.

0 0 | 0
0 1 | 0
1 0 | 0
1 1 | 0

c.

0 0 | 0
0 1 | 1
1 0 | 1
1 1 | 0

✔ Correct! It is the truth table for bitwise XOR: The output is 1 when the inputs are not the same pair. With the pairs (1,0), (0,1), output is 1.

d.

0 0 | 0
0 1 | 1
1 0 | 1
1 1 | 1

Your answer is correct.

Correct

Marks for this submission: 1.00/1.00.

Question **3**

Correct

Mark 1.00 out of 1.00

Select the correct truth table for the bitwise AND operation
Format: (two inputs X1 and X2, output Y)
X1 X2 | Y

Select one:

a.
0 0 | 0
0 1 | 0
1 0 | 0
1 1 | 0

b.
0 0 | 0
0 1 | 1
1 0 | 1
1 1 | 1

c.
0 0 | 0
0 1 | 1
1 0 | 1
1 1 | 0

d.
0 0 | 0
0 1 | 0
1 0 | 0
1 1 | 1

✔ Correct!

It is possible to get 1 in the output if both inputs are HIGH.

Your answer is correct.

Correct

Marks for this submission: 1.00/1.00.

Question **4**

Correct

Mark 1.00 out of 1.00

Which abbreviation describes a volatile memory type (will be erased without supply voltage)?

Select one:

- a. EEPROM
- b. ROM
- c. POM
- d. RAM ✔

✔ Correct! RAM = random access memory, ROM = read only memory, EEPROM = electrically erasable programmable read only memory.
RAM (Random-access memory) = the data is erased when the power is off.
ROM (Read-only memory) stores the data permanently.

Your answer is correct.

Correct

Marks for this submission: 1.00/1.00.

Question **5**

Correct

Mark 1.00 out of 1.00

Where can you find all necessary information of the Atmel ATmega88PA microcontroller? What is the best source for such information?

Select one:

- a. Device description in web-shops.
- b. Internet Search Engine
- c. The datasheet for the Atmel ATmega 88 PA ✔
- d. The manual of the MyAVR board

✔ You can find all necessary information, such as pin configurations, I/O ports, ADC, timers/counters in the Atmel Mega 88 PA Datasheet which you can access in moodle page (hopefully correct link): Atmel Mega 88 PA Datasheet File

Your answer is correct.

Correct

Marks for this submission: 1.00/1.00.

Question **6**

Correct

Mark 1.00 out of 1.00

A program contains the following statements in its 'init' section:

```
PORTD |= (1 << PD2);
```

What does it mean?

Select one:

- a. Pin D2 is disabled.
- b. Pin D2 is set to output.
- c. Enable pullups for port D2. ✔

Correct answer!
As this code is written in the 'init' file (or inside of the 'init' function), it is possible to say that PD2 is input and this statement enable pull-up resistor.

- d. Set port D2 to input.

Your answer is correct.

Correct

Marks for this submission: 1.00/1.00.

Question **7**

Correct

Mark 1.00 out of 1.00

Which of the following are NOT the general purpose input / output (GPIO) pins?

Select one:

- a. PC6, PD0, PD1
- b. GND, VCC, AREF ✔

Correct!
General purpose input/output pins mean that these pins can be used as inputs or outputs. They are PB0-PB7, PC0-PC7, PD0-PD7 (please note that NOT all of them are available as pins in hardware, as e.g. PB6!).

- c. PC4, PC5, PD2
- d. PB6, PB7, GND, VCC, AREF

Your answer is correct.

Correct

Marks for this submission: 1.00/1.00.

Question **8**

Correct

Mark 1.00 out of 1.00

To which two pins of the ATmega88PA is the quartz crystal (8 MHz) connected?

Select one:

- a. 1, 2
- b. 15, 16
- c. 105, 106
- d. 9, 10 ✔ Correct!PINs 9 and 10

Your answer is correct.

Correct

Marks for this submission: 1.00/1.00.

Question **9**

Correct

Mark 1.00 out of 1.00

Provide the minimum and maximum values of one **signed** 8bit variable (standard datatype for the ATmega88PA)

Select one:

- a. min: -127, max: 127
- b. min: -128, max: 128
- c. min: -128, max: 127 ✔ Correct!
  Signed variables can represent both positive and negative numbers. Generally, 2^8 (256) numbers can be represented by 8 bits. The biggest number is 127 and the smallest number is -128. The general equation is $(2^{n-1}-1)$ for the maximum number and $(-(2^{n-1}))$ for the minimum number.
- d. min: 0, max: 255

Your answer is correct.

Correct

Marks for this submission: 1.00/1.00.

Question **10**

Correct

Mark 1.00 out of 1.00

How many different values can an ASCII symbol have?

Select one:

a. 1

b. 256 = 2^8

c. 128 =2^7

d. 0

✔ Correct answer.
ASCII is a 7-bit code, there are 2^7 (128) different values.

Your answer is correct.

Correct

Marks for this submission: 1.00/1.00.

Question **11**

Correct

Mark 1.00 out of 1.00

When will the following code (/*CODE*/) be executed?

Both buttons are connected to pins PD2 and PD3 (and correctly initialized)

Code:

```
if ((~PIND & (1 < < PD2)) && (~PIND & (1 << PD3)))
{
    /*CODE*/
}
```

Select one:

- a. If button PD2 pressed but PD3 is not pressed
- b. If button PD3 is pressed but button PD2 is not pressed
- c. If both buttons PD2 and PD3 are pressed ✔

Correct!

(~PIND & (1 < < PD2)) and (~PIND & (1 << PD3)) check the states of PD3 and PD2. If the buttons are pressed, they are connected to ground, therefore negation, ~.

&& is logical AND operation and the output of A&&B will be true, when both A and B are true. In this example, when both buttons are pressed (i.e. when PD2 and PD3 are connected to ground), /*CODE*/ will be executed.

- d. If none of the buttons are pressed
- e. If either one of the buttons, PD2 or PD3 is pressed

Your answer is correct.

Correct

Marks for this submission: 1.00/1.00.

Question **12**

Correct

Mark 1.00 out of 1.00

Which of the following statements can be used for compiling main.c to an object file?

Select one:

a. avr-objcopy -j .text -j .data -O ihex main.elf main.hex

b. avr-gcc -g -Os -mmcu=atmega88pa -c init.c

c. avr-gcc -g -mmcu=atmega88pa -o main.elf main.o

d. avr-gcc -g -Os -mmcu=atmega88pa -c main.c ✔

Correct answer.
avr-gcc -g -Os -mmcu=atmega88pa -c main.c. With this command, the .c file is compiled and object file is created.

Your answer is correct.

Correct

Marks for this submission: 1.00/1.00.

Question **13**

Correct

Mark 1.00 out of 1.00

Which symbol do you use for the comment line in your makefile?

Select one:

a. # ✔

Correct.

In makefiles, # sign is used in order to write comments. It is not the same as the comments sections in C programming where /* .... */ or // signs are used.

This symbol is also used in the comment line in the other makefile question in this quiz

b. "

c. %

d. Makefiles do not allow any comments

Your answer is correct.

Correct

Marks for this submission: 1.00/1.00.

Question **14**

Correct

Mark 1.00 out of 1.00

Which file extension (e.g. *.exe, *.txt) does makefile have?

Select one:

- a. *.txt
- b. *.bat
- c. *.exe
- d. No extension

✔ Correct!
Makefile is used by the make utility and does not have any file extension!

Your answer is correct.

Correct

Marks for this submission: 1.00/1.00.

Question **15**

Correct

Mark 1.00 out of 1.00

What technique for analog to digital conversion is used in the ATmega88PA?

Select one:

- a. Successive approximation

✔ Correct answer.
There are various techniques for ADC, ATmega88PA uses successive approximation techniques.

- b. DAC
- c. Dual-slope converter
- d. Successful approximation
- e. Flash Converter

Your answer is correct.

Correct

Marks for this submission: 1.00/1.00.

Question **16**

Correct

Mark 1.00 out of 1.00

What is the correct order in which you should read the two ADC value registers in your program?

Select one:

- a.
  1) ADCL
  2) ADCH

  ✔ Correct! If not done in this order, ADCL will lock up both registers until ADCH is read again.
  When ADCL is read, the ADC Data Register is not updated until ADCH is read. ADCL must be read first, then ADCH.
- b. There is no particular order required, since they are both updated simultaneously.
- c.
  1) ADCH
  2) ADCL
- d. You are actually not allowed to read them individually, only at the same time through ADCW.

Your answer is correct.

Correct

Marks for this submission: 1.00/1.00.

Question **17**

Correct

Mark 1.00 out of 1.00

What electronic circuit is necessary to change a PWM signal into an analog signal?

Select one:

- a. Low pass filter circuit, e.g. consisting of resistor and capacitor.

  ✔ Correct answer.
  In order to convert PWM output to an analog voltage level, a low-pass filter is used. Low-pass filter usually consists of a resistor and a capacitor.
- b. No additional circuit
- c. LED.
- d. Series resistor.

Your answer is correct.

Correct

Marks for this submission: 1.00/1.00.

Question **18**

Correct

Mark 1.00 out of 1.00

What is the resolution of the ADC on the ATmega88PA?

Select one:

- a. 10 bits ✔ Correct answer. 10 bits => values in the range 0..1023
- b. 15 kSPS
- c. 16 bits
- d. 6 input channels

Your answer is correct.

Correct

Marks for this submission: 1.00/1.00.

Question **19**

Correct

Mark 1.00 out of 1.00

There is an alternating signal given to one of the LEDs: ON, OFF, ON, OFF, ... For a very slow signal you will see an LED flashing. For a very fast signal, it looks like a constantly enabled LED. What is the maximum flashing speed a normal human eye can percept as flickering?

Select one:

- a. 20 MHz
- b. 20 kHz
- c. Around 20 Hz ✔ Correct, it is only around 20 Hz.
- d. 5 Hz

Your answer is correct.

Correct

Marks for this submission: 1.00/1.00.

Question **20**

Correct

Mark 1.00 out of 1.00

The connection PB1 can be an input or an output. What register contains the selection for that?

Select one:

a. DDRC

b. DDRB ✔ Yes, this is right. It stands for "Data Direction Register B":
DDRX register is used in order to set as input or input. For PB1, it is DDR**B**.

c. PORTB

d. PINB

Your answer is correct.

Correct

Marks for this submission: 1.00/1.00.

◄ Lab 1

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Lab 1 ►