Started on	Friday, 7 January 2022, 8:11 PM
State	Finished
Completed on	Friday, 7 January 2022, 8:25 PM
Time taken	13 mins 44 secs
Grade	**10.00** out of 10.00 (**100**%)

Question **1**

Correct

Mark 1.00 out of 1.00

Would the RTC module work if you remove the both jumpers?

Select one:

a. No

b. Yes ✔

Correct!

Yes, these jumpers are used to connect the external pullup resistors and not used in this lab.

Your answer is correct.

Correct

Marks for this submission: 1.00/1.00.

Question **2**

Correct

Mark 1.00 out of 1.00

Provide the speed of the RTC crystal oscillator.

Select one:

- a. 8 MHz
- b. 100 KHz
- c. 1 MHz
- d. 32768 Hz ✔

Correct!
The DS1307 uses an external 32.768kHz crystal.

Your answer is correct.

Correct

Marks for this submission: 1.00/1.00.

Question **3**

Correct

Mark 1.00 out of 1.00

Calculate the following decimal number: **42**
to BCD (Binary Coded Decimal) and binary formats.

Select one:

- a. ✔
  BCD: 0100 0010
  Binary: 0010 1010

Correct answer.

Binary-coded decimal (BCD) format is a binary representation of decimal numbers, where each digit is usually represented by four bits.

Therefore, decimal 42 => two digits: 4, followed by 2:

4 => 0100 (in binary), 2 => 0010 (in binary), altogether: 0100 0010 in BCD representation.
$42 = 2^5 + 2^3 + 2^1$ => 0010 1010 in regular binary representation.

- b.
  Binary: 0100 0010
  BCD: 0010 1010
- c.
  Binary: 0010 1010
  BCD: 0010 1010
- d.
  Binary: 0010 0001
  BCD: 0010 1010

Your answer is correct.

Correct

Marks for this submission: 1.00/1.00.

Question **4**

Correct

Mark 1.00 out of 1.00

What is the I2C address of the DS1307 in hexadecimal form?

Select one:

- a. D0 ✔ Correct answer.

  11010000 in binary, D0 in hex.
- b. A0
- c. 11011101
- d. 1101

Your answer is correct.

Correct

Marks for this submission: 1.00/1.00.

Question **5**

Correct

Mark 1.00 out of 1.00

What is the purpose of the two bridges on the PCB of the RTC module?

Select one:

- a. These are necessary to control the power consumption of the RTC
- b. These are required in order to activate the RTC module
- c. These are required, if more than one RTC module is connected
- d. With these two jumpers, you may activate the pull-up resistors of the TWI interface ✔ Correct answer.
  They are used to activate external pull-up resistors of TWI interface (if this is necessary).

Your answer is correct.

Correct

Marks for this submission: 1.00/1.00.

Question **6**

Correct

Mark 1.00 out of 1.00

What is the number 23 in hex (provide just a hexadecimal number like: **D5** or **5E**)?

Answer: 17 ✔

23/16 – Quotient:1 and Remainder=7, $23_{10}=17_{16}$

Correct

Marks for this submission: 1.00/1.00.

Question **7**

Correct

Mark 1.00 out of 1.00

The new RTC modules have some piece of paper between the battery and the connector. Should this paper be removed prior to use?

Select one:

- a. Of course yes! This is mostly for transport protection to prevent short circuit or something similar. Without the battery the RTC cannot work ✔

  Correct.
  It should be removed as RTC works with the battery.
- b. Yes, but only after the new RTC values are stored and the RTC module is disconnected from the AVR board
- c. No, this paper has a special opening inside for electrical connection, there is for sure an electrical contact.
- d. No. We are working with this RTC in the lab, therefore the battery must be disconnected

Your answer is correct.

Correct

Marks for this submission: 1.00/1.00.

Question **8**

Correct

Mark 1.00 out of 1.00

What is the CH bit (RTC DS1307), and what is the address/position of this bit?

Select one:

a. It is bit 0 at 07h, CH=1: clock running; CH=0: clock stop

b. It is bit 1 at 00h, CH=1: clock running; CH=0: clock stop

c. It is bit 7 at 00h, CH=0: clock running; CH=1: clock stop ✔

Correct answer.
Bit 7 at 00h is the clock halt (CH) bit. When this bit is set to 1, the oscillator is disabled. When cleared to 0, the oscillator is enabled.

d. It is bit 3 at 01h, CH=0: clock running; CH=1: clock stop

Your answer is correct.

Correct

Marks for this submission: 1.00/1.00.

Question **9**

Correct

Mark 1.00 out of 1.00

What is maximum current, when the DS1307 is running only with the backup battery (SQWE/OUT off, OSC ON)?

Select one:

a. approx. 1307mA

b. lower than 500nA ✔ Correct.

c. approx. 1000A

d. approx. 1mA

Your answer is correct.

Correct

Marks for this submission: 1.00/1.00.

Question **10**

Correct

Mark 1.00 out of 1.00

What is the running time with this current, if a CR2032 with 225mAh is used? To calculate that, find the current consumtion in the datasheet (SQWE/OUT off, OSCON).

Select one:

- a. 5 days
- b. 1785 days
- c. 18750 days ✔ Correct answer.
  Current is 500nA. 225mAh=225 000 000nAh.
  Running time=225 000 000nAh/500nA=450 000h=18750 days.
  Please note that the battery is not designed to work properly so long!
- d. 365 days

Your answer is correct.

Correct

Marks for this submission: 1.00/1.00.

◄ Lab 4

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Lab 4 ►