Started on	Sunday, 21 November 2021, 2:14 PM
State	Finished
Completed on	Sunday, 21 November 2021, 4:08 PM
Time taken	1 hour 53 mins
Grade	**20.00** out of 20.00 (**100**%)

Question **1**

Correct

Mark 1.00 out of 1.00

Is there any sort of limit as to how far away two devices on an I2C bus should be?

Select one:

a. Yes, independent of the speed, the protocol is generally limited to 1m

b. Theoretically no, but in practice it is limited to about 20m.

c. Yes, but it depends on your clock frequency ✔

Correct!

At slower frequencies, you can use longer cables, but for our frequencies you will be lucky if you can get the parts 1m apart before getting errors.

d. No, as long as your wires are long enough.

Your answer is correct.

Correct

Marks for this submission: 1.00/1.00.

Question **2**

Correct

Mark 1.00 out of 1.00

What will happen with the data inside an EEPROM if the power is turned off / interrupted?

Select one:

a. The data will be lost.

b. All bits of the data will be inverted.

c. Nothing. The data is stored without power. ✔ Correct.
EEPROM is Electrically Erasable Programmable Read-only Memory. The data is retained when the power is turned off.

d. The data are slowly decaying. After the next power up, the microcontroller has to send the restore data command to the EEPROM.

Your answer is correct.

Correct

Marks for this submission: 1.00/1.00.

Question **3**

Correct

Mark 1.00 out of 1.00

What are the segments of the 7 segment device (used in our lab)?

Select one:

a. Light emitting diodes ✔ Correct.

In the lab, the Kingbright SA39 (common anode) and SC 39 (common cathode) are used, and their segments are LEDs.

b. Capacitors

c. Resistors

d. BJT elements

Your answer is correct.

Correct

Marks for this submission: 1.00/1.00.

Question **4**

Correct

Mark 1.00 out of 1.00

Is there any effect of the I2C communication to the ADC?

Select one:

- a. Yes, they use the same pins, so the ADC cannot be used at all together with I2C communication.
- b. Yes, they both use two same pins, so ADC5 and ADC4 cannot be used together with I2C communication. ✔

Correct.
Yes, both use PC4 and PC5 pins, I2C communication and ADC (ADC4 and ADC5) cannot be used together.

- c. No.
- d. Yes, the internal power supply can only handle I2C or ADC, not both together.

Your answer is correct.

Correct

Marks for this submission: 1.00/1.00.

Question **5**

Correct

Mark 1.00 out of 1.00

In order to access the memory module over I2C, you need to address it.
The first four bits are the same for the manufacturer of this memory device.
But how do you select the last bit?

Select one:

- a. According to the datasheet, it must always be set to 0
- b. This bit selects the number of used memory modules (just one or many memory modules are connected)
- c. This bit is not relevant for our lab
- d. This bit selects the operation: write or read ✔

Correct.
The last bit is the I2C 'Read' or 'Write' bit. If it is 1, it is READ operation or if it is 0, it is WRITE operation.

Your answer is correct.

Correct

Marks for this submission: 1.00/1.00.

Question **6**

Correct

Mark 1.00 out of 1.00

When are the data transmitted over the I2C bus valid?

Select one:

a. When SCL is low

b. When SDA is low

c. When SCL is high ✔ Correct answer!

d. When SDA is high

Your answer is correct.

Correct

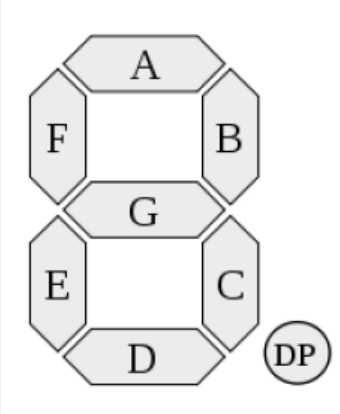
Marks for this submission: 1.00/1.00.

Question **7**

Correct

Mark 1.00 out of 1.00

Which number is shown on the 7-segment display when all the LEDs are turned off?



Select one:

- a. 8.
- b. -
- c. 0
- d. Nothing

Correct.

As all the LEDs are off, no number will be displayed.

Your answer is correct.

Correct

Marks for this submission: 1.00/1.00.

Question **8**

Correct

Mark 1.00 out of 1.00

Is a short circuit possible if more than one device tries to use the I2C bus at the same time?

Select one:

- a. Yes, this can happen if you try to connect 2 master devices, and it can badly damage the ICs.
- b. No, since the I2C protocol has fuses that will stop a very high current from flowing.
- c. Yes, this can happen if you try to read/write from two devices at the same time.
- d. No, since the devices can only pull the lines low and not actually supply voltage. ✔ Correct! I2C is designed so that errors in one place won't risk damaging everything connected to the wires.

Your answer is correct.

Correct

Marks for this submission: 1.00/1.00.

Question **9**

Correct

Mark 1.00 out of 1.00

What number is shown if all LEDs are enabled of a seven segment display?

Select one:

- a. 8 ✔ Correct.
  The LEDs have been arranged in the form of digital number. When all the LEDs are enabled, it displays 8 (evtl. with a dot/decimal point).
- b. 0
- c. Not a valid number, this is only a LED test.
- d. 10

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 difference between SA39 and SC39?

Select one:

a. There is no difference

b. SA has the same anode, SC the same cathode ✔

Correct.
SA39 is common anode and SC39 is common cathode displays. In SA39, anodes of all the LEDs are connected to the common voltage source. In SC39, the cathodes of all the LEDs are connected to the common ground (GND).

c. The size of the device. The SC is bigger than the SA

d. The voltage of the LEDs is different

Your answer is correct.

Correct

Marks for this submission: 1.00/1.00.

Question **11**

Correct

Mark 1.00 out of 1.00

Which external components are necessary in order to start working with the memory module ST24C02 (chip used in our lab)?

Select one:

a. At least two external pull-up resistors

b. An external quartz crystal

c. A protecting diode (to protect from higher currents)

d. No external electronic components are necessary ✔

Correct.

No external components are needed, but it would be better to use some capacitors (e.g. 100nF) to protect from electroic noise.

Your answer is correct.

Correct

Marks for this submission: 1.00/1.00.

Question **12**

Correct

Mark 1.00 out of 1.00

What is the voltage required by the LEDs on the 7-segment display we're using?

Select one:

- a. Around 2V ✔ Correct! It depends on the color actually, the green ones are 2.2V. Diodes have a threshold voltage must be present between the anode and cathode in order to have current flow. Depending on the colour of the LED, the voltage range is usually 1.85-2V.
- b. It depends on the power source
- c. It depends on the resistors we put in series with them
- d. It depends on how bright you want the light to be

Your answer is correct.

Correct

Marks for this submission: 1.00/1.00.

Question **13**

Correct

Mark 1.00 out of 1.00

What type of hardware can be connected to the I2C interface?

Select one:

- a. Only other controllers (I2C = Interface 2 Controller)
- b. The I2C interface is only for program debugging.
- c. Memory, Counters, Sensors, ... ✔ Correct.
  Devices, such as memories, sensors, ADCs, DACs, etc. can be connected to I2C and data can be transmitted to and from the microcontroller.
- d. It is only to append the memory of the microcontroller

Your answer is correct.

Correct

Marks for this submission: 1.00/1.00.

Question **14**

Correct

Mark 1.00 out of 1.00

What is the maximum LED forward current for the 7-segment display with the green LEDs?

Select one:

- a. 10mA-20mA
- b. 25mA ✔ Correct. It is about 25mA (for more details please check the datasheet of seven segment display)
- c. 1A
- d. 105 mW

Your answer is correct.

Correct

Marks for this submission: 1.00/1.00.

Question **15**

Correct

Mark 1.00 out of 1.00

It is suggested for the current through the LEDs to be about 6mA, but what happens if the current is much lower (too high of a resistance inbetween the LED and the board)?

Select one:

- a. The LED will not light up ✔ Correct.
  There is a small range where it will just be a bit dimmer, but generally it will not work unless the specified voltage and current are met.
- b. The LED will shine a different color because the light energy will be different
- c. The LED will be damaged and possibly broken
- d. The LED will be brighter

Your answer is correct.

Correct

Marks for this submission: 1.00/1.00.

Question **16**

Correct

Mark 1.00 out of 1.00

Can a broken slave device on the I2C bus affect other devices?

Select one:

a. Yes, since there is no error checking, if a device is broken it will transmit corrupted information and it can damage other devices on the bus.

b. Yes, a broken device can overload the bus and fry other chips on it, because voltages will be too high.

c. No, since the I2C protocol has a very robust error checking system, broken devices will be disconnected from the master automatically.

d. No, since communication is initiated by the master, it doesn't matter if one of the slaves is not operational. Please pay attention that if one of the slaves is physically broken (shortcut of SDA or SCL to ground), no communication would be possible.

✔ Correct.

No, the master device controls the communication. If one of the slave devices is broken (disconnected, e.g. due to the broken SDA line), the communication with other slave devices may continue as usual.

Your answer is correct.

Correct

Marks for this submission: 1.00/1.00.

Question **17**

Correct

Mark 1.00 out of 1.00

How many single LEDs would one need to build his/her own seven segment display from scratch (similar to the one used in the lab)?

Select one:

a. 1

b. 7

c. 8

✔ Correct.
8 LEDs. 7 LEDs are used to display numbers and the other one is for the dot.

d. 6

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 theoretical maximum number of I2C slave devices if the master uses 8-bit addresses?

Select one:

a. 8 because each memory module has a 3-bit individual address.

b. There is theoretically no limit to how many devices can be connected

c. 256 ✔ Correct!

There are (in theory) 2^8 possible addresses.

d. It depends on how strong the power supply for the master IC is

Your answer is correct.

Correct

Marks for this submission: 1.00/1.00.

Question **19**

Correct

Mark 1.00 out of 1.00

How will the display get the power to turn on the LEDs?

Select one:

a. The power will flow from +VCC to whatever pins are turned off

b. They need an external power supply, since there are no +VCC and GND pins on the MCU.

c. Depending on your specific model, the power will flow from +VCC to the pins connected to the display, or from the pins to GND. ✔ Correct!

SA39 is common anode and SC39 is common cathode displays. In the first display, the current will flow from +VCC to the individual pins, but in the second display the current will flow from the pins to ground.

d. The power will flow from whatever pins are turned on to GND

Your answer is correct.

Correct

Marks for this submission: 1.00/1.00.

Question **20**

Correct

Mark 1.00 out of 1.00

What is the voltage at port B1 after running the following code (everything has been initialized properly):

```
PORTB |= (1 << PB1);
```

Select one:

- a. 1V
- b. 0V
- c. 5V ✔ Correct!

  If PB1 is activated (logical HIGH), it is internally connected to the Vcc and the voltage is almost the Vcc voltage (around 5V).
- d. Around 2V

Your answer is correct.

Correct

Marks for this submission: 1.00/1.00.

◄ Lab 3

Jump to...

Lab 3 ►