

Detector Building C - Sample Detector Test 01 - Region 7 January Workshop - 01-16-2021

This is a sample test, just to get used to what a real one is like. The real test will likely have more questions, but in similar areas (LEDs, sensors, calibration, micro-computers and programming).

1. (1.00 pts) The color a basic (single color) LED emits is caused by:

- A) The color of the semiconductors used in construction
- B) The amount of voltage applied
- C) The type of semiconductor used in construction
- D) The color of the outer shell of the LED

2. (1.00 pts) 1. Which of the following is NOT true of LED's:

- A) They only emit visible light
- B) They can be turned on and off very quickly
- C) Material components are cheap
- D) They have a long service life

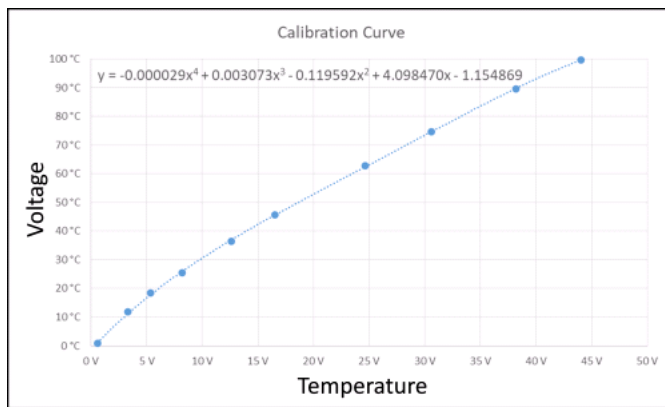
3. (1.00 pts) 1. Modern typical remote controls use LEDs that emit light in the Ultraviolet range

- True
- False

4. (1.00 pts) An LED takes 20 mA of current and the voltage drop across the LED is 2 V. How much resistance does the LED provide?

- A) a. 200 ohms
- B) b. 100 ohms
- C) c. 40 ohms
- D) d. 10 ohms

5. (1.00 pts) In the calibration curve below, are the axes labeled correctly?



- A) YES
- B) NO

6. (1.00 pts) The single line of code shown below is supposed to convert from voltage to temperature using the equation shown in the question above. What's wrong?

$$\text{Temp} = -0.000029*\text{Volt}^4 + 0.003073^\wedge\text{Volt}^3 - 0.119592*\text{Volt}^2 + 4.09847*\text{Volt} - 1.154869$$

- A) One of the coefficients is wrong
- B) Too many coefficients
- C) Uses a power operator (^) instead of multiply operator (*)
- D) Doesn't have a zero intercept
- E) Nothing's wrong – it's fine

7. (1.00 pts) What is the slope of the calibration curve if only the following two points are used?

Voltage: 5 V Temperature: 20° C

Voltage: 8 V Temperature: 41° C

- A) 3 °C/V
- B) 21 °C/V
- C) 7 °C/V
- D) 3 V/°C

8. (3.00 pts) Which of the following devices can you use for measuring temperature in this competition? (Note: May be more than one)

(Mark **ALL** correct answers)

- A) Mercury thermometer
- B) Thermistor
- C) Digital Thermometer
- D) Thermocouple
- E) Integrated Circuit (IC) Temperature Sensor

9. (1.00 pts) When using a thermocouple to measure water temperature, as the water temperature increases, the magnitude of the measured voltage always increases as we

- True
- False

10. (1.00 pts) A thermocouple device can identify temperatures because of:

- A) A voltage difference caused by dissimilar metals in a circuit
- B) A change in the resistance of the substance being measured
- C) The varying speed of the current flow
- D) The changing magnetic field

11. (1.00 pts) The ability to light up different LEDs based on temperature / voltage is driven by:

- A) Hardware switches
- B) Software programming
- C) Dissimilar metals
- D) All of the above

12. (1.00 pts)

Your thermocouple uses a room temperature reference junction, but the temperature in the room goes up while you're measuring the temperature of a hot water bath. What happens to the voltage produced by the thermocouple?

- A) It becomes larger in magnitude
- B) It doesn't change
- C) It becomes zero
- D) It becomes smaller in magnitude

13. (1.00 pts) Which device works on resistance changes with temperature?

- A) Thermocouple
- B) IC Temperature Sensor
- C) Mercury Thermometer
- D) None of the above

14. (1.00 pts) If an LED is set to operate with an applied voltage of 5 V, what is likely to happen if it is hooked up with 500 volts?

- A) It will glow steadily brighter
- B) It will glow steadily with a different color
- C) It will burn out
- D) It will glow steadily with the same color

15. (1.00 pts) What does PTC stand for?

- A) Parametric Temperature Change
- B) Positive Temperature Coefficient
- C) Positive Thermo-Couple
- D) Pre-Temperature Correction

DON'T WORRY ABOUT YOUR SCORE!!! Like I said, it's just a practice test. Focus on getting the project right, and learning a bit about LEDs, thermocouples, thermistors, IC temperature sensors, calibration curves, Arduino's or Pi's, and programming.