1. List your five measurements of pushbutton press duration from Laboratory Task 1 and the average of these measurements. Show your calculations.

101.2ms, 232ms, 188ms, 120ms, 166ms. (101.2ms + 232ms + 188ms + 120ms + 166ms)/5 = 161.44ms is the average pushbutton press duration.

2. Calculate the current through the pull-up resistor in Laboratory Task 2 when the pushbutton is pressed and when it is not pressed. Show your calculations.

When the pushbutton is pressed, the voltage is 0.075V. I = V/R = 0.075V/10k = 7.5*10^-6A.

When the pushbutton is not pressed, the voltage is 3.3V. I = V/R = 3.3/10k = 3.3*10^-4A.

3. Compute the current through the LED for Task 2 first using the 1kohm current liming resistor and the measured VF of the red LED. Repeat the calculation for the current through the LED assuming a current limiting resistor of 330 ohms was used. Show your calculations.

For current limiting resistor the voltage is 1.77V. I = V/R = 1.77/1k = 1.77 mA. The measured VF of the red Led is 3.2V. I = V/R = 3.3/10k = 3.3*10^-4A. Assuming the current limiting resistor of 330 ohms was used, 1.77/330 = 3.26A.

4. Calculate the value of the current limiting resistor you would need to use if you wanted 6mA to

flow through the red LED in Task 2 when the LED is ON.

V = IR, R = V/I + 3.3V/6mA = 550ohm. Therefore 550 ohm resistor will be needed if you want 6mA to flow through the red LED.

5. Compute the current through the yellow, green and blue LEDs for Task 2 using the 1kohm current liming resistor and the measured VF of the respective LEDs. Show your calculations.

Yellow = I = V/R = 3.3/1k = 3.3mA.

Green = I = V/R = 3.3/1k = 3.3mA.

Blue = I = V/R = 3.3/1k = 3.3mA.

6. For Task 4, does the LED turn ON or OFF when the pushbutton is pressed? Briefly explain why the circuit performs in the way that you stated.

The LED turned on when the pushbutton is pressed. This is because both logics are inverted so they end up showing the same result.

7. Calculate the current through the pull-down resistor in Laboratory Task 4 when the pushbutton is pressed and when it is not pressed. Show your calculations.

When the pushbutton is not pressed, I = V/R = 0.9V/10k = 9*10^-5A.

When the pushbutton is pressed, I = V/R = 3.3V/10k = 3.3*10^-4A.

8. Compute the current through the LED for Task 4 using the 1kohm current liming resistor and the measured VF of the red LED. Show your calculations.

I = V/R = 3.3V/1k = 3.3mA

9. For the program of Task 1, what is the difference, if any, of the system's operation without and with the pull-up resistor enabled.

The difference was the without the pull-up resistor enable, the delay was way longer for LED to turn off even though the pushbutton is not pressed. When the resistor is enable, the delay was much smaller the LED turns on and off quickly with the pushbutton pressed and not pressed.

10. What is the required value of current limiting resistor for an LED with a VF of 1.2V if we want 5mA to flow through the LED when it is ON and VDD equals 3.3V? Show your calculations.

R = V/I + 1.2V/5mA = 240ohm. The required value of resistor will be 240 ohm.