

# lab reports

*by* John Croft

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|                |                                                                 |                 |      |
|----------------|-----------------------------------------------------------------|-----------------|------|
| FILE           | 17846_JOHN_CROFT_LAB_REPORTS_108763_752560684.DOCX<br>(117.64K) |                 |      |
| TIME SUBMITTED | 11-DEC-2019 12:54PM (UTC+0000)                                  | WORD COUNT      | 1004 |
| SUBMISSION ID  | 115892838                                                       | CHARACTER COUNT | 3993 |

### Examination of Capacitive discharge curve

1. Use the circuit in Lab "Capacitive discharge curve"
2. Close the switch and run the circuit for 1 sec by accessing the debug menu and clicking on run simulation (timed breakpoint) and enter 1 sec in the box and press ok.
3. Take a reading and fill in the box below.
4. Open the switch
5. Access the debug menu and click on run simulation (timed breakpoint) and enter 10 sec in the box and press ok.
6. Take a reading and fill in the box below.
7. Repeat actions 5 and 6 until the reading is below 0.05V
8. Transfer the numbers to a spread sheet and graph the values.

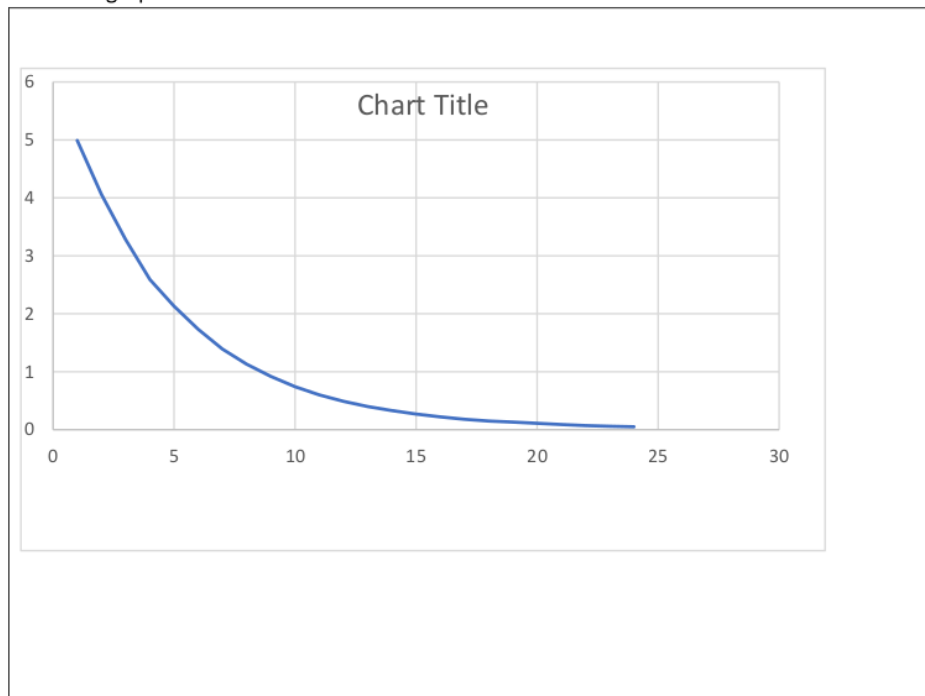
|      |      |      |      |      |      |      |      |      |      |
|------|------|------|------|------|------|------|------|------|------|
| 1    | 11   | 21   | 31   | 41   | 51   | 61   | 71   | 81   | 91   |
| 4.99 | 4.06 | 3.28 | 2.59 | 2.13 | 1.73 | 1.39 | 1.13 | 0.92 | 0.74 |

|     |      |     |      |     |     |     |     |     |     |
|-----|------|-----|------|-----|-----|-----|-----|-----|-----|
| 101 | 111  | 121 | 131  | 141 | 151 | 161 | 171 | 181 | 191 |
| 0.6 | 0.49 | 0.4 | 0.33 |     |     |     |     |     |     |

|     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 201 | 211 | 221 | 231 | 241 | 251 | 261 | 271 | 281 | 291 |
|     |     |     |     |     |     |     |     |     |     |

|     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 301 | 311 | 321 | 331 | 341 | 351 | 361 | 371 | 381 | 391 |
|     |     |     |     |     |     |     |     |     |     |

9. Draw the graph in the box below



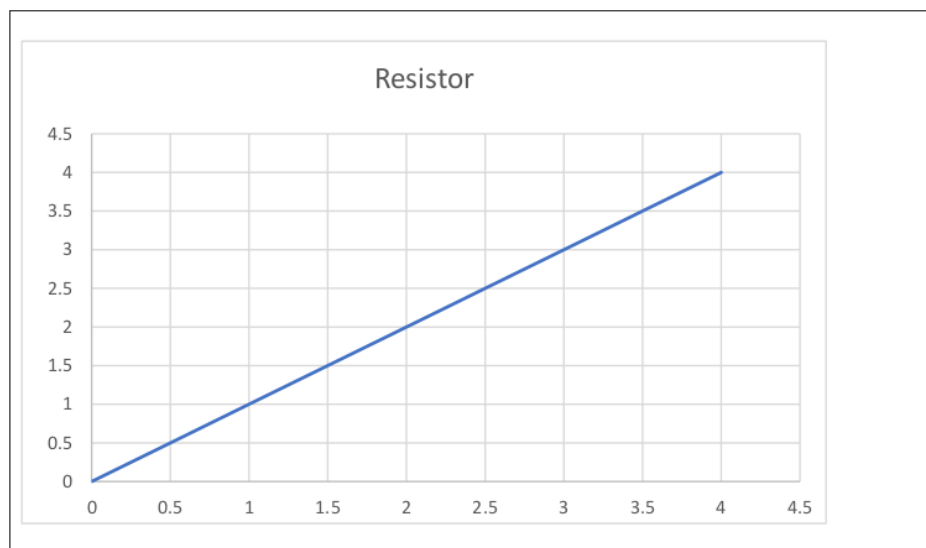
### Lab 1

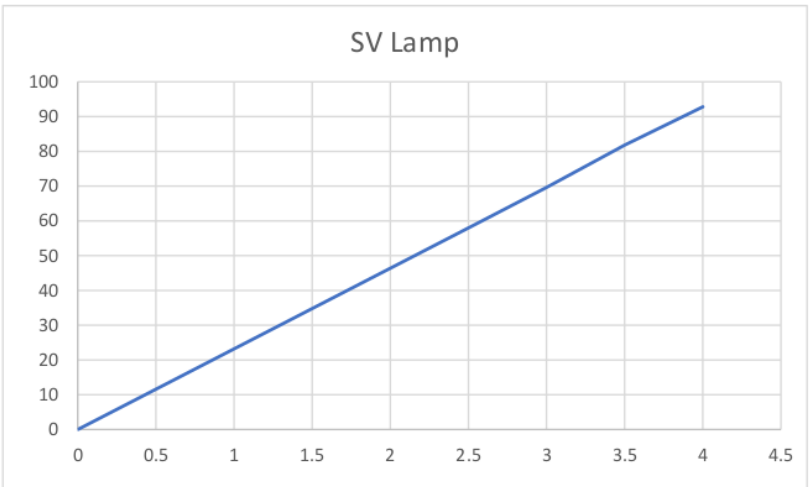
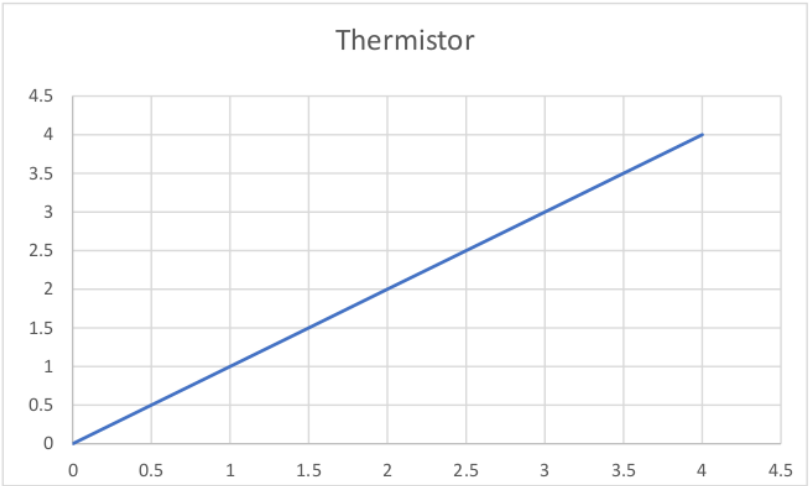
1. Ensure that the k resistor is connected in the circuit.
2. Modify the battery voltage to give 0.5V
3. Read the voltage and current in mA and record it in the table below
4. Stop the simulation and modify the voltage of the battery to match the table voltage.
5. Run the simulation
6. Repeat steps 3 to 5 until the table is completed.
7. Stop the simulation
8. Disconnect the resistor and connect the lamp.
9. Repeat steps 2 to 6
10. Disconnect the lamp and connect the thermistor.
11. Repeat steps 2 to 6

|     | 1K Resistor | 5V Lamp | Thermistor |
|-----|-------------|---------|------------|
| 0   | 0           | 0       | 0          |
| 0.5 | 0.5         | 11.6    | 0.5        |
| 1.0 | 1           | 23.2    | 1          |
| 1.5 | 1.5         | 34.8    | 1.5        |
| 2.0 | 2           | 46.6    | 2          |
| 2.5 | 2.5         | 58      | 2.5        |
| 3.0 | 3           | 69.6    | 3          |
| 3.5 | 3.5         | 81.2    | 3.5        |
| 4.0 | 4           | 92.8    | 4          |

### Questions

- a. Draw graphs of these results, clearly identifying which graph relates to which component.





- b. Using the graph calculate the resistance of the 1K resistor. Explain your calculation

$$4\text{ V} = 4\text{ mA} \quad R = V/I$$

- c. Comment on the shape of the graph for the lamp. Calculate its minimum and maximum resistances.

As more volts go in the resistor the number of Ma stays the same

Download and run the non-inverting proteus lab from Moodle.

12. Close the switch to the 10K resistor  $R_i$ .
13. Close the switch to the 10K resistor  $R_f$ .
14. Set the signal generator to give a 1kHz sine wave with 1V peak to peak amplitude.

Q1. What do you expect to see on channel A of the oscilloscope?

- a) A 2volt p-p sine wave in phase with channel B ☐
- b) A 1volt p-p sine wave in phase with channel B ☒
- c) A 2volt p-p sine wave inverted (phase shifted by  $180^\circ$ ) ☒
- d) A 1volt p-p sine wave inverted (phase shifted by  $180^\circ$ ) ☐

15. Set  $R_i$ ,  $R_f$  and the input voltage to match the values in the table and measure the input and output voltages on the oscilloscope and fill up the table below.

If the output is in phase with the input enter  $0^\circ$  in the phase change column or enter  $-180^\circ$  if the output is inverted

| $R_i$ k $\Omega$ | $R_f$ k $\Omega$ | Calculated gain | Input V (p-p) | Output V (p-p) | Measured Gain | Phase change |
|------------------|------------------|-----------------|---------------|----------------|---------------|--------------|
| 10               | 10               | 2               | 4V p-p        | 8              | 2             | 0            |
| 10               | 100              | 11              | 0.7 p-p       | 7.8            | 11            | 0            |

|   |     |     |         |    |     |   |
|---|-----|-----|---------|----|-----|---|
| 1 | 100 | 101 | 0.1 p-p | 10 | 100 | 0 |
|---|-----|-----|---------|----|-----|---|

Q2. What do you conclude from this experiment?

- a. The gain changes by the ratio  $1+R_f/R_i$  and the output is inverted relative to the input ☐
- b. The gain changes by the ratio  $1+R_f/R_i$  and the output is inverted relative to the input ☐
- c. The gain changes by the ratio  $1+R_f/R_i$  and the phase is not inverted relative to the input ☒
- d. The gain and phase  $\theta$  both change with the ratio of  $1+R_f/R_i$ .

Q3. Which of the following statements is true?

- a. The phase shift increases as gain is increased. ☒
- b. The phase shift does not change with gain. ☐
- c. The phase shift decreases as gain is increased. ☐

Download and run the inverting proteus lab from Moodle.

16. Close the switch to the 10K resistor  $R_i$ .

17. Close the switch to the 10K resistor  $R_f$ .

18. Set the signal generator to give a 1kHz sine wave with 1V peak to peak amplitude.

Q1. What do you expect to see on channel B of the oscilloscope?

- e) A 2volt p-p sine wave in phase with channel A ☐ ☒
- f) A 1volt p-p sine wave in phase with channel A ☐ ☒
- g) A 2volt p-p sine wave inverted (phase shifted by  $180^\circ$ ) ☐ ☒
- h) A 1volt p-p sine wave inverted (phase shifted by  $180^\circ$ ) ☐ ☒

19. Set  $R_i$ ,  $R_f$  and the input voltage to match the values in the table and measure the input and output voltages on the oscilloscope and fill up the table below.

If the output is in phase with the input enter  $0^\circ$  in the phase change column or enter  $-180^\circ$  if the output is inverted

| $R_i$ k $\Omega$ | $R_f$ k $\Omega$ | Calculated gain | Input V (p-p) | Output V (p-p) | Measured Gain | Phase change |
|------------------|------------------|-----------------|---------------|----------------|---------------|--------------|
| 10               | 10               | 1               | 4V p-p        | 4              | 1             | -180         |
| 10               | 100              | 10              | 0.7 p-p       | 7              | 10            | -180         |
| 1                | 100              | 100             | 0.1 p-p       | 10             | 100           | -180         |

Q2. What do you conclude from this experiment?

- e. The gain changes by the ratio  $R_f/R_i$  and the output is inverted relative to the input ☐
- f. The gain changes by the ratio  $R_f/R_i$  and the output is inverted relative to the input ☐
- g. The gain changes by the ratio  $R_f/R_i$  and the phase is not inverted relative to the input ☒
- h. The gain and phase  $\Theta$  both change with the ratio of  $R_f/R_i$ .

Q3. Which of the following statements is true?

- d. The phase shift increases as gain is increased. ☒
- e. The phase shift does not change with gain. ☐
- f. The phase shift decreases as gain is increased. ☒

# lab reports

## GRADEMARK REPORT

FINAL GRADE

GENERAL COMMENTS

**Instructor**

65/100

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GRADING FORM: SMU GENERIC\_GJ

JOHN  
CROFT

65

RESEARCH-INFORMED LITERATURE

KNOWLEDGE AND UNDERSTANDING

## ANALYSIS



## PRACTICAL APPLICATION AND DEP.



Clear results and good graphical data. Should have had more results. 65%

**65**

## SKILLS FOR PROFESSIONAL PRAC.