

3Y Electronics

2018-

Please do the following exercises from the book only, with the modifications below:

Exercise 5: In addition, compare the decay constant of the measured exponential curve with what is expected from theory.

Exercise 7: Make sure to compare the measurements with theory (calculation)

Exercise 12: Use a 1N 4148 diode and a $470\ \Omega$ resistor. **Modification:** you do not have to use the potentiometer but instead can use a variable voltage source (power supply).

New additional exercise (12b): Drive the above (exercise 12) circuit with a sinusoidal waveform of frequency 500 Hz, amplitude 3V and compare the input to the output. Next add a $10\ \mu\text{F}$ capacitor in parallel across the resistor and repeat the measurement with the sinusoidal waveform. Explain what is happening in the circuit.

Exercise 19: Simulate only – do not build the circuit.

Exercise 20: do as in book.

Exercise 21: Do not guess at values – please explain the reasoning in your report for the values you have used. **Additional Question:** Assuming an average of 12 hours brightness and 12 hours darkness per day, how much would the electricity cost to power your circuit over the course of a year given that one unit (kWh) of electricity costs €0.18? (show the steps in your calculation)

Exercise 25: Use a 741 operational amplifier (e.g. LM 741 or uA 741: whichever are in the components tray in the lab.) in place of the CA3140. Note that the resistor ratio calculated from the information given in the problem is not practical so you may use a slightly different ratio, based on the resistors present in the components cabinet – please still to the calculation correctly.

Exercise 27: Do not include the plot of input-vs-output as requested in the exercise.

Report:

For circuits that you build, please include all measurements (voltage readings, oscilloscope traces, graphs etc.) in your report.

Every circuit should have a brief discussion to demonstrate that you understand how it works and that the results obtained were as expected (or, if not, why not).

Do not split the report in to theory, circuit, results sections so that each exercise is spread over multiple sections. Instead, organise the report by exercise.