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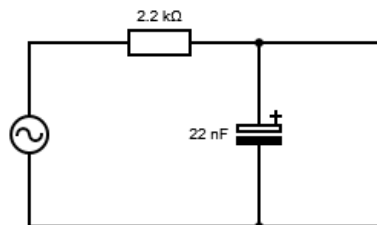
Electrotechnology lab 4 report:

Objective:

For the fourth lab, we want to see the effect of frequency on the V_{out}/V_{in} ratio

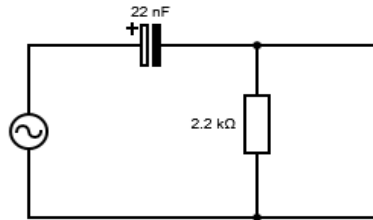
Method:

We made the following circuit:



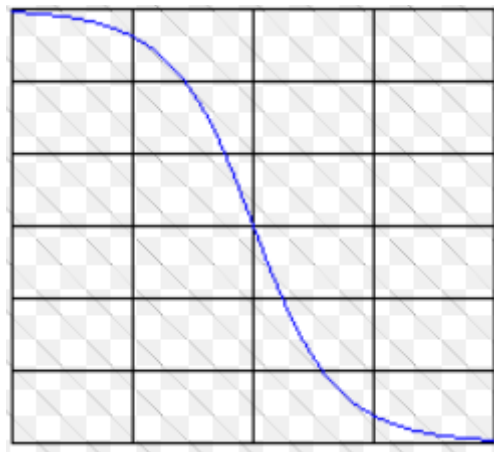
We measured the values on the oscilloscope, with the AC power supply starting at 100Hz, we incremented the frequency up to 20KHz, by increments of 500Hz. And then we we'll graph those value in function of the frequency. So we have frequency on the x-axis and the Voltage on the y-axis.

Afterwards we swapped the resistor and the capacitor like such:



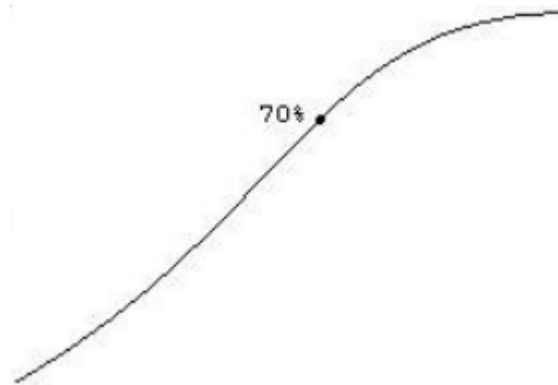
And graph again the voltage in function to the frequency.

Data:



We get this curve for the first circuit, it's a low pass filter. At lower frequencies the current goes through the current and the oscilloscope reads the voltage out. On this graph on the x-axis we have frequencies in Hertz starting at 100Hz and going to

20KHz. On the y-axis we have the voltages starting at 0 Volts and going all the way up to 5Volts.



This is a high pass filter, only high frequencies let the current pass.

Data Analysis:

In the low pass filter, only current goes through when the frequency is low, that is because in this set-up with the capacitor in parallel. At low frequencies, the capacitor has time to charge up and let the current through. But at higher frequencies that is not the case anymore. The capacitor can not fully charge, therefore when input switch direction and the capacitor discharge, there is just a small output.

In the high pass filter, the capacitor is in series with the AC power supply. Capacitor have this property of having different resistance to different frequencies. At a low frequency, the capacitor has a high resistance and vice-versa. So at low frequencies, only a small part of the current get through which then goes through the 2.2K resistance and in the end almost not current goes through. Where as at high frequencies, the resistance of the capacitor is much smaller so a lot more current can get through and the oscilloscope is able to read the voltage.

Conclusion:

RC low / high pass filter are useful tools which are find everywhere in today's electronics. They are used a lot for audio to filter out higher frequencies or filter bass signals.