



Name: Date:

Worksheet

1. Resistance measurement

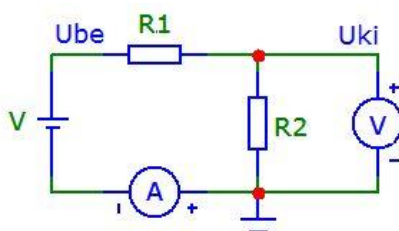


Fig. 1 Voltage divider

1.1. Introducing with the NIK eLab panel

Set the R4 resistor and the Uref voltage values to different values and measure it with the assistance of the teacher.

1.2. Determine the value of the resistor with Ohm's law and Ohmmeter

Measure the flowing current and dropped voltage on the resistor accordingly the (4.1) measuring composition and calculate the resistor's value. Set the generator's voltage 1-2 V.

Finally, measure the resistor's value with ohmmeter.

	U_R [V]	I_R [mA]	R [Ω] Ohm's law	$R_{\text{meas.}}$ [Ω] Ohmmeter
R1				
R2				

Table 1.

1.3. Serial/parallel resulting measurements with Ohmmeter

	R_R [Ω] calculated	R_R [Ω] measured
$R1 + R2$		
$R1 \times R2$ $((R1 \times R2)/(R1 + R2))$		
$(R1 + R2) \times R3$		

Table 2.

1.4. Dividing with resistors (voltage divider)

Accordingly to the previous figure, build up the circuit, then measure the transfer coefficient of the voltage divider which becomes from the values of R1 and R2 resistors.



U _{in} [V]	U _{out} [V]	a _u = U _{out} /U _{in}	a _{u[dB]} = 20logAu [dB]

Table 3.

2. RC (resistor-capacitor) circuit measurement

Measure the strengthening (or weakening) coefficient of the RC filter on different frequencies as on the figure below. Set up the low-pass filter measuring circuit as (4.2). Change the frequency between 5 Hz and 2 kHz as listed in the table.

Set the input signal in the following way: sinusoidal function with maximum 8V_{pp} peak-to-peak amplitude and 0V (without) offset voltage.

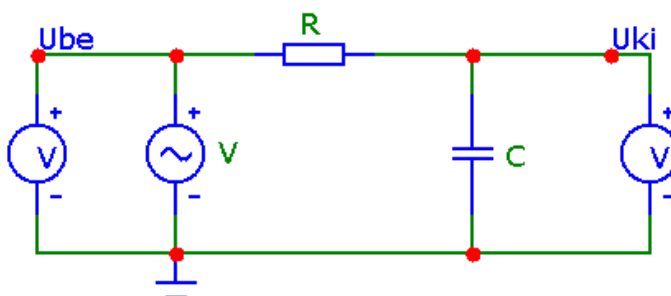


Fig. 2. RC circuit (Passive Low-Pass filter)

R=15 kΩ	U _{out} [V]	U _{in} [V]	a _u = U _{out} /U _{in}	a _{u[dB]} = 20logAu [dB]
5 Hz				
50 Hz				
100 Hz				
250 Hz				
750 Hz				
2 kHz				

Table 4.

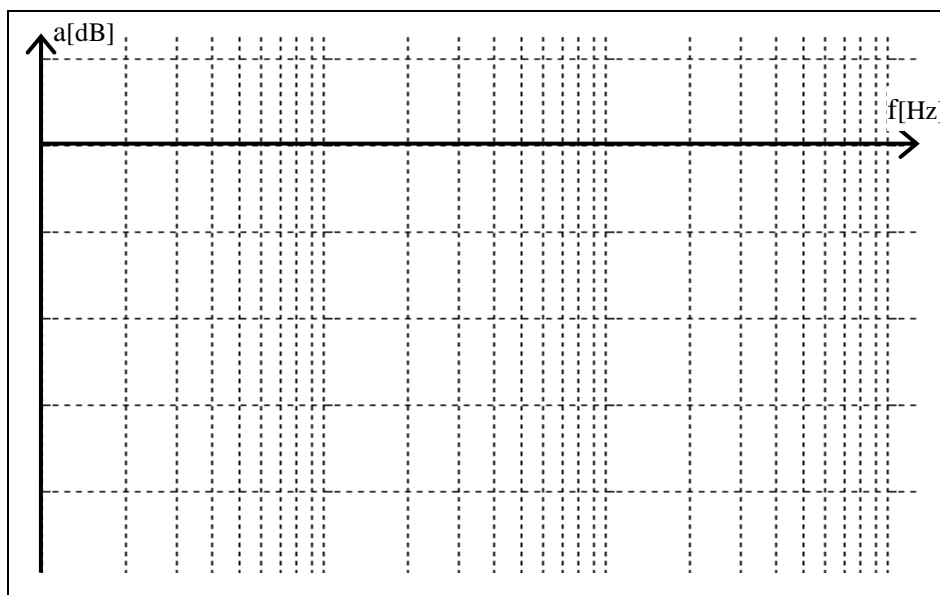


Fig. 3. Logarithmic plotting of Amplitude-frequency

3. RL (resistor-inductor) circuit measurement

Measure the strengthening (or weakening) coefficient of the RL filter on different frequencies as on the figure below. Set up the low-pass filter measuring circuit as (4.3). Change the frequency between 2 kHz and 100 kHz (0.1 MHz) as listed in the table.

Set the input signal in the following way: sinusoidal function with maximum $4V_{pp}$ peak-to-peak amplitude and 0V (without) offset voltage.

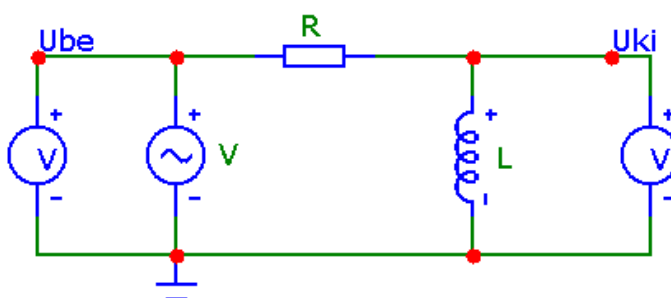


Fig. 4. RL circuit (Passive High-Pass filter)



$R=7\text{ k}\Omega$	$U_{\text{out}}\text{ [V]}$	$U_{\text{in}}\text{ [V]}$	$a_u = U_{\text{out}}/U_{\text{in}}$	$a_{u[\text{dB}]}=20\log A_u\text{ [dB]}$
2 KHz				
6 KHz				
10 KHz				
20 KHz				
50 KHz				
100 KHz				

Table 5.

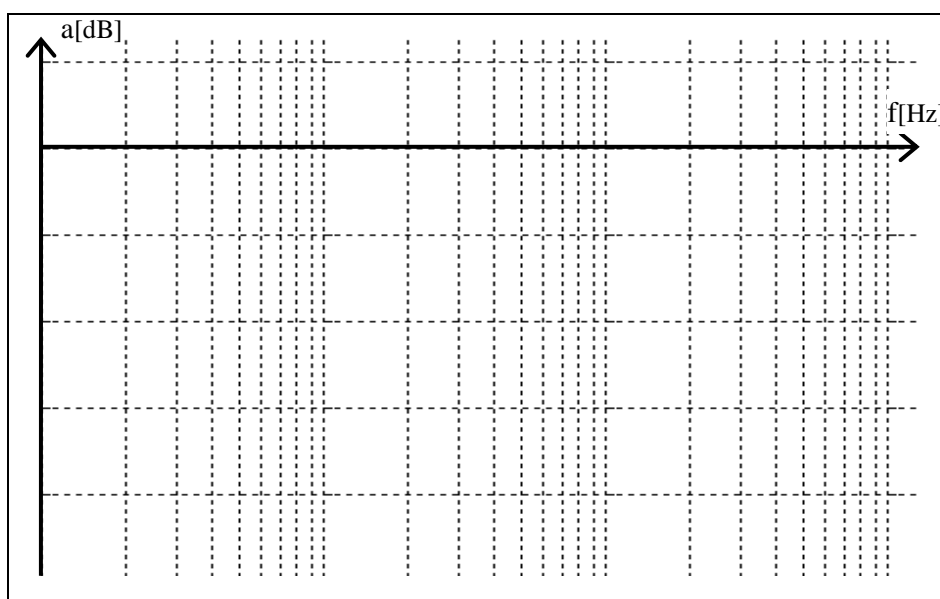


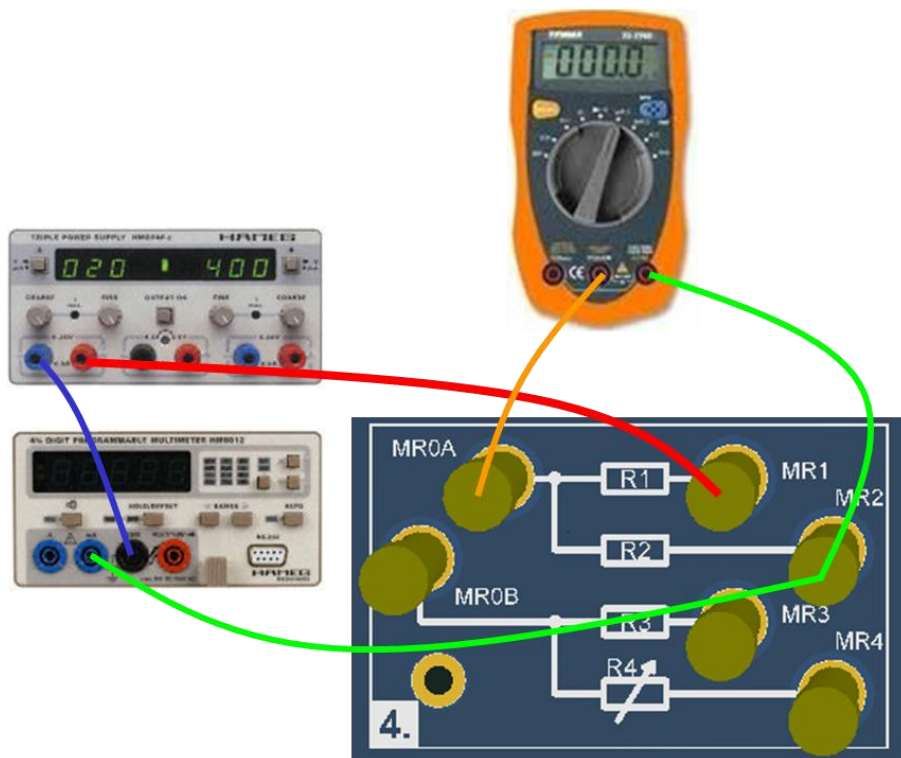
Fig. 5. Logarithmic plotting of Amplitude-frequency



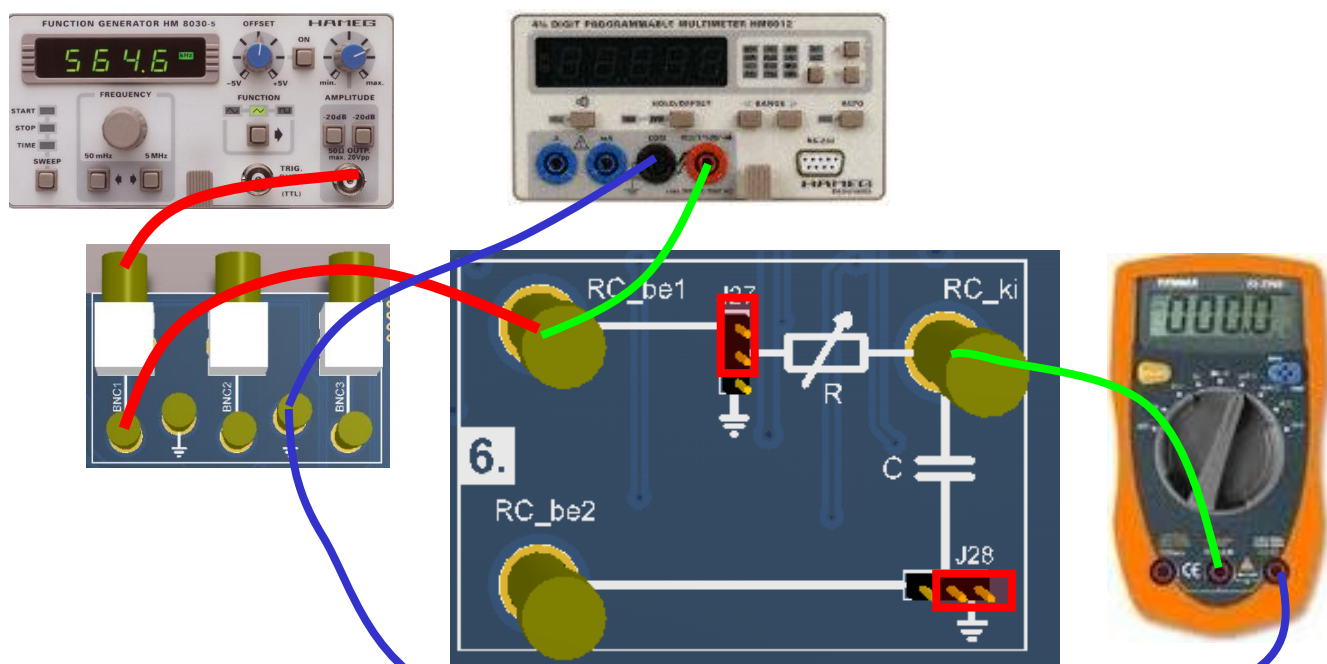
4. Measuring circuits

The settings of the measuring devices below is NOT adjusted to the measurements! Just illustrations. The settings of the measuring devices below is NOT adjusted to the measurements! Just illustrations. The devices should set accordingly to the given measurements.

4.1. Resistance measuring, current-voltage method



4.2. RC circuit measuring (Low-pass filter)





4.3. RL circuit measuring (High-pass filter)

