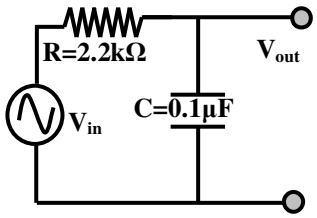
ELECTRONICS LAB REPORT
EXPERIMENT (2)
RC NETWORKS

Date:----------
Name:---------- **Partner's Name:----------**
Registration No:---------- **Registration No:----------**
Physics Section:---------- **Instructor's Name:----------**

DATA AND DATA ANALYSIS

A- Low Pass Filter

1- Connect the circuit shown in *figure 1*. Set up the function generator for maximum sine wave output at a frequency of *20 Hz*.



2- Using the digital multi-meter to measure the input voltage V_{in} and the output voltage V_o for several frequency values from *20 Hz* to *20 kHz*.

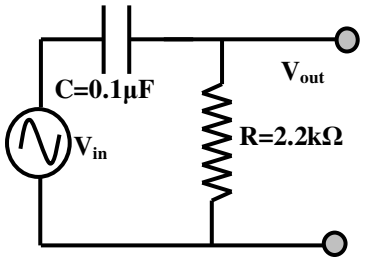
3- Calculate (***log f***) and V_o/V_{in} and enter your data and calculations in *table 2.1*

4- Plot the voltage ratio V_o/V_{in} as a function of frequency (***log f***). From the plot determine the *cut-off* frequency f_c .

5- Compare your result obtained in part (4) with the value of the frequency obtained by the relation: $f_c=1/(2\pi RC)$

B- High Pass Filter

1- Connect the circuit shown in *figure 2*.



2- Repeat the procedure outlined in section A for several frequency values from *20 Hz* to *20 kHz*.

3- Calculate (***log f***) and V_o/V_{in} and enter your data and calculations in table 2.1

4- Plot the voltage ratio V_o/V_{in} as a function of frequency (***log f***).
From the plot determine the cut-off frequency f_c .

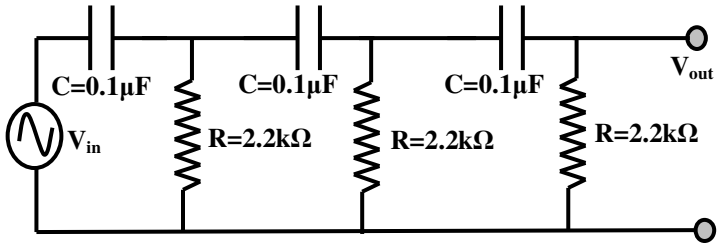
5- Compare your result obtained in part (4) with the value of the frequency obtained by the relation: $f_c=1/(2\pi RC)$

Table 2.1

f (Hz)	*log f*	*Low Pass Filter*			*High Pass Filter*		
		V_i *(Volt)*	V_o *(Volt)*	V_o/V_{in}	V_i *(Volt)*	V_o *(Volt)*	V_o/V_{in}
20							
60							
100							
200							
400							
600							
800							
1000							
2000							
4000							
7000							
10000							
13000							
16000							
20000							

C- Phase Shift Network

1- Connect the circuit as shown in *figure 3*.



2- Set up the controls of the oscilloscope to display a Lissajous pattern. Vary the frequency of the function generator until the phase difference between the input voltage V_i and the output voltage V_o is *180 degrees*. This occurs when the pattern is a straight line with negative slope. Record the frequency f_{exp} **,** and V_i and V_0 at this frequency. Compare this frequency with the theoretically calculated one using the relation: $f_{th} = 1/(2\pi RC\sqrt{6})$.

3- Determine the experimental attenuation factor given as: $K_{exp} = V_0/V_{in}$, and compare it with the theoretical value $K_{th} = 1/29$.

Questions:-

1-The circuits of *figure 1* and *figure 2* are called low pass and high pass filter, respectively. Why is this so? For what purpose can such circuits be employed?

2-Show that the frequency f_c at which the voltage ratio V_o/V_{in} is equal to $(1/\sqrt{2})$ is given by the relation: $f_c=1/(2\pi RC)$. For the low pass filter circuit shown in *figure 1* and for the high pass filter circuit shown in *figure 2*.