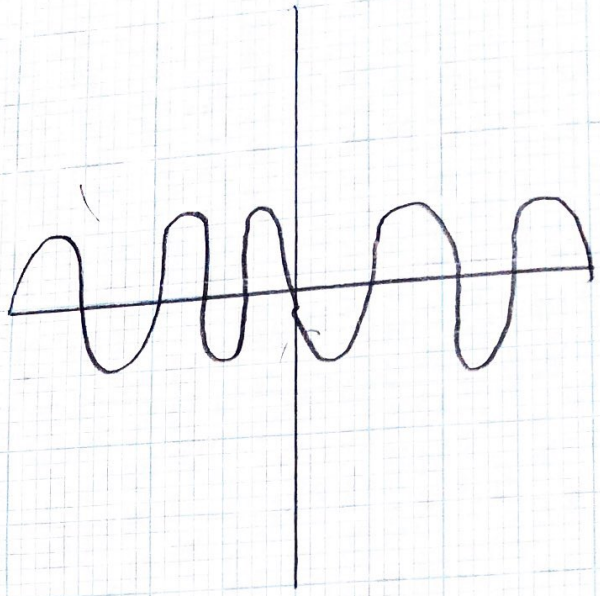
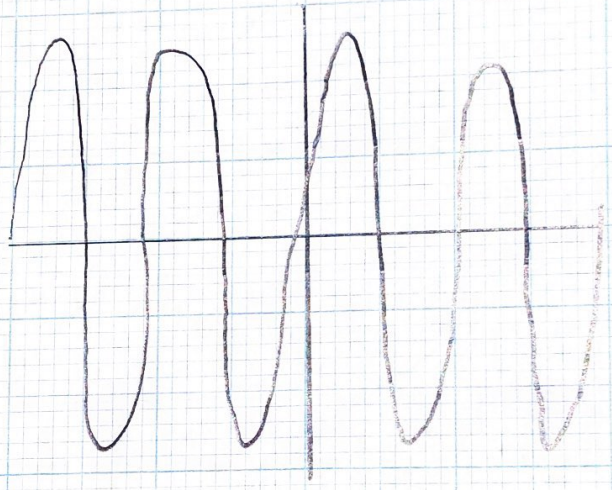
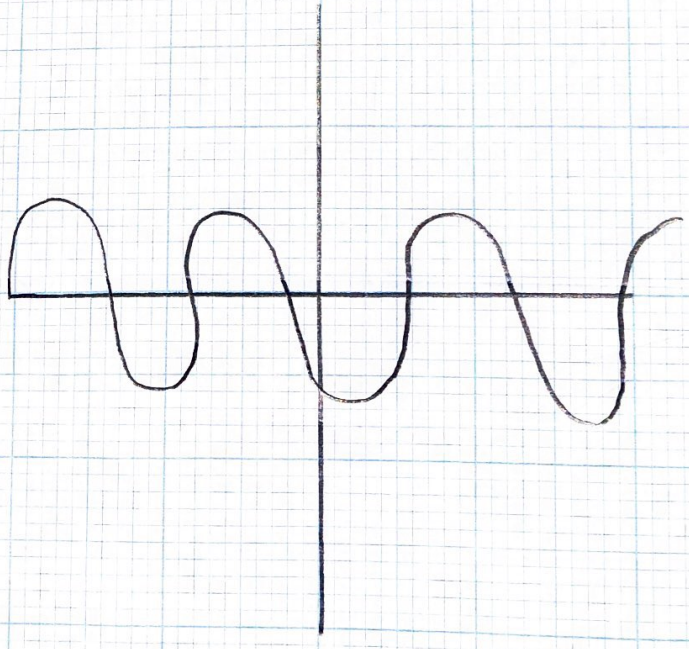
Voltage across C1
(waveform)
time/D = 0.5 ms
Volt/D = 5V
(1kHz)



note: voltage across resistor = current ~~through~~ w. capacitor



Voltage across R1
(waveform)
time/div = 0.5ms
Volt/div = 20 mV

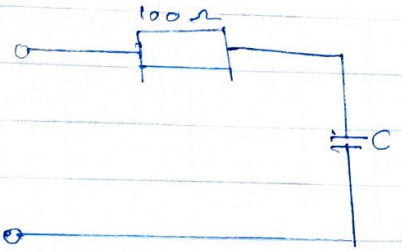


Voltage across the inductor at 100Hz

measuring voltage at R1 and C1 and current

Frequency	Vc	VR	Ic
1kHz	7.54V	0.45 V	4.5×10^{-3}
2kHz	7.50V	0.91 V	9.1×10^{-3}
3kHz	7.48V	1.221 V	0.1224
4kHz	7.25V	1.676V	0.1676
5kHz	7.03V	1.978 V	0.1978
6kHz	6.93V	2.294V	0.2294
7kHz	6.79V	2.586V	0.2586
8kHz	6.21V	2.893V	0.2893
9kHz	5.93V	3.014	0.3014
10kHz	5.66V	3.328	0.3328

$$I_C = \frac{V_R}{R} = \frac{V_R}{100}$$



we have used an oscilloscope to draw waveforms

②

then we replaced the ~~capacitor~~ resistor with the inductor and the capacitor with resistor

F	Vi/p	VR
1k	0.023V	4.986V
2k	0.035V	4.984V
3k	0.043 V	4.962V
4k	0.049V	4.959V
5k	0.07V	4.957V
6k	0.075V	4.956V
7k	0.076V	4.958V
8k	0.079V	4.961
9k	0.080V	~~4.964~~ 4.964
10k	0.086V	4.967
100k	0.02	

R = 1kΩ

Log	Frequency	Vc	VR
$10^{2.1}$	125.8	7.584	0.658
$10^{2.2}$	158.48	7.532	0.068
$10^{2.3}$	199.52	7.537	0.089
$10^{2.4}$	251.188	7.539	0.103
$10^{2.5}$	316.22	7.539	0.130
$10^{2.6}$	398.101	7.542	0.159
$10^{2.7}$	501.187	7.545	0.208
$10^{2.8}$	630.95	7.547	0.258
$10^{2.9}$	794.3	7.549	0.333
$10^{3.0}$	1000	7.54	0.429
$10^{3.1}$	1258.9	7.53	0.689
$10^{3.2}$	1584.8	7.52	0.861
$10^{3.3}$	1995.2	7.50	10.43
$10^{3.4}$	2511.8	7.51	1.286
$10^{3.5}$	3162.2	7.49	1.292

10kΩ

Log	Freguncy	Vc	VR
	125.8	7.48	0.978
	158	7.47	0.724
	199	7.46	0.911
	251	7.44	1.026
	316	7.40	1.363
	398	7.33	1.688
	501	7.24	2.081
	630	7.06	2.587
	794	6.88	3.164
	1000	5.92	4.588
	1258.9	5.40	5.192
	1584	4.8	5.730
	2511	4.27	6.19
	3162	3.51	6.78

④

F	Vc	VR	Vi
1	0.016	0.009	0.017
10	0.053	0.008	0.43
20	0.053	0.008	0.35
30	0.057	0.008	0.17
40	0.058	0.007	0.046
50	0.055	0.007	0.107
60	0.051	0.007	0.198
70	0.49	0.006	0.295
80	0.048	0.007	0.468
90	0.048	0.008	0.708
100	0.045	0.007	1.030

5a) R=100Ω L=10mH C=0.01uF

Frequency	Vin	Vout	gain
1	2.79	0.01	
10	2.87	0.02	
20	2.90	0.02	
30	2.92	0.03	
40	2.93	0.03	
50	2.96	0.04	
60	2.99	0.06	
70	2.98	0.07	
80	2.97	0.14	
90	2.98	0.23	
100	2.99	0.09	

5b) R = 100 Ω L = 25mH C = 0.04μF

Frequency	Vin (V)	Vout (V)	Gain $\frac{V_o}{V_i}$
1	5.472	5.308	
10	4.037	6.672	
20	5.499	2.722	
30	5.526	2.83	
40	5.544	2.900	
50	5.590	2.991	
60	5.569	3.067	
70	5.564	3.111	
80	5.555	3.268	
90	5.541	2.299	
100	5.520	3.298	

5C R = R2 = 100Ω ; C1 = C2 = 0.014F

Frequn	Vin	Vout	Gain
100	2.928	29	
1k	2.927	2.9	
2k	2.925	2.9	
3k	2.927	2.9	
4k	2.925	2.87	
5k	2.926	2.85	
6k	2.927	2.88	
7k	2.99	2.84	
8k	2.89	2.83	
9k	2.88	2.82	
10k	2.87	2.8	

1000Ω R2=100Ω C=C2 0.01uF

Frequency	Vin	Vout	gain
100	2.927	2.91	
1k	2.928	2.92	
2k	2.926	2.9	
3k	2.925	2.91	
4k	2.929	2.9	
5k	2.931	2.89	
6k	2.927	2.89	
7k	2.930	2.86	
8k	2.931	2.83	
9k	2.932	2.84	
10k	2.931	2.84	

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1000Ω R2=100Ω C=C2 0.01μF

Frequency	Vin	Vout	gain
100	2.927	2.91	
1k	2.928	2.92	
2k	2.926	2.9	
3k	2.925	2.91	
4k	2.929	2.9	
5k	2.931	2.89	
6k	2.927	2.89	
7k	2.930	2.86	
8k	2.931	2.83	
9k	2.932	2.84	
10k	2.931	2.84	

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