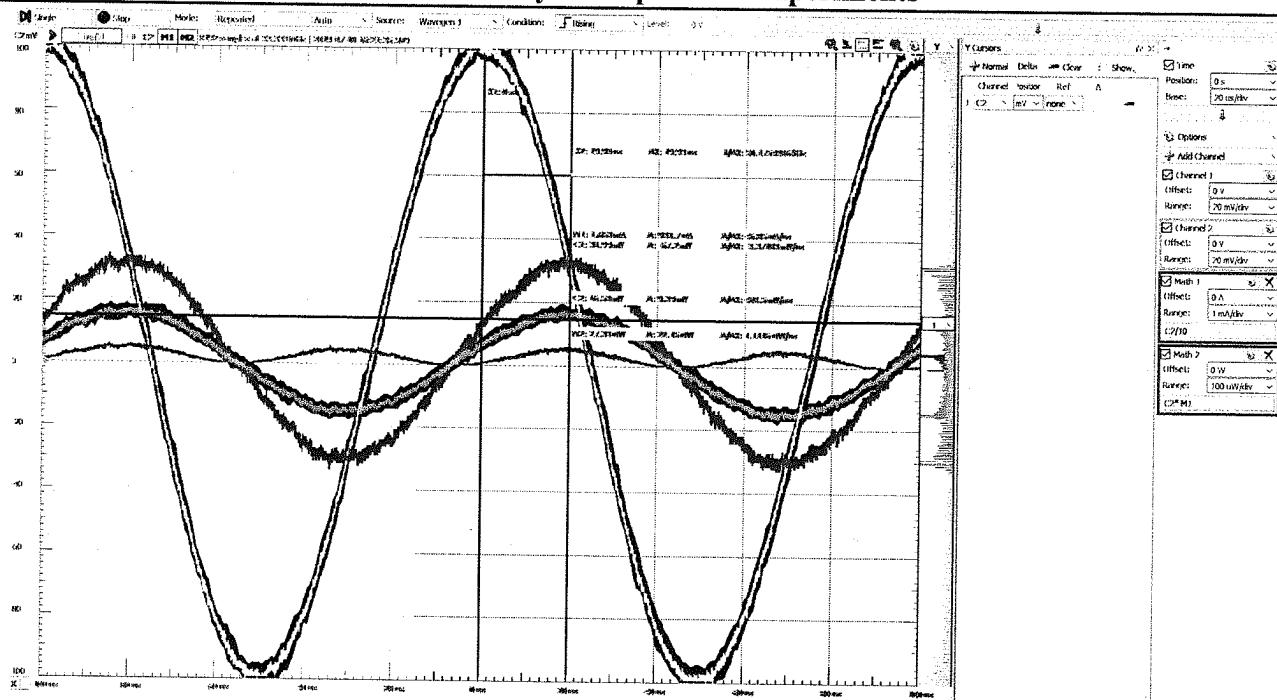


ELEC ENG 2CI5 – Introduction to Electrical Engineering Laboratory Examples and Experiments

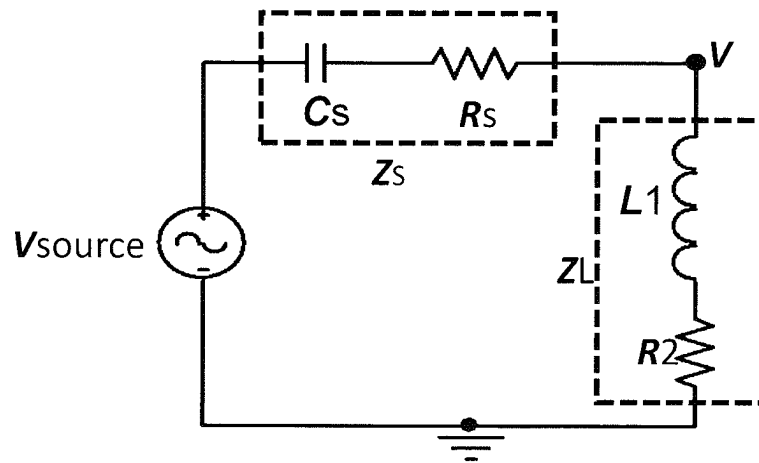
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	Frequency (Hz)	Calculated Average Power(μ W)	Measured Max Power (μ W)	Calculated Power delivered by the voltage source (μ W)	Measured Max Power delivered by the voltage source (μ W)
Case 1	503.3	125	196.56	250	441.07
Case 2	1	0.019736	0.12697	0.039472	1.7315
Case 3	50	35.88575	54.678	71.77151	183.48
Case 4	100	78.90197	117.86	157.8039	295.26
Case 5	750	122.9378	185.91	245.8756	421.63
Case 6	1 K	118.4802	183.48	236.9604	416.77
Case 7	1.5	106.3938	173.75	212.7876	404.62
Case 8	5 K	36.57479	71.689	73.14958	212.64
Case 9	10 K	11.55304	28.87	23.10607	103.28
Case 10	100 K	0.12653	0.34326	0.253059	8.3232

Experiment:

- Find the frequency at which the average real power delivered to the load is maximized in the shown circuit with $R_1 = R_2 = 150\Omega$, $L_1 = 1\text{mH}$, $C_1 = 1\mu\text{F}$, $V_{\text{source}} = 1\cos(\omega t)$ V:



- ii. Calculate the impedance of Z_s , Z_L , \tilde{Z}_{total} , \tilde{V}_L , \tilde{I} , and P_{avg} at each frequency in the table below. Case 1 is for the frequency found part i.

	Frequency (Hz)	$Z_s (\Omega)$	$Z_L (\Omega)$	$\tilde{Z}_{total} (\Omega)$	\tilde{V}_L (mV)	\tilde{I} (mA)	P_{avg} (μ W)	P delivered by the source (μ W)
Case 1								
Case 2	100							
Case 3	500							
Case 4	1 K							
Case 5	2.5 K							
Case 6	10 K							
Case 7	50 K							
Case 8	100 K							
Case 9	500 K							
Case 10	1 Mega							

- iii. Build the circuit from part i, with V_{source} being a cosine wave of amplitude 1V with a 0V offset. Plot the V_{source} and the current of the circuit and measure the phase difference between them in each frequency from the above table. How different are they from the calculated phase difference?
- iv. Plot the real power delivered by the source at each frequency from the above table and measure the maximum power.