LAB # 06

AC SUPERPOSITION

SUBMITTED BY: **Awais Saddiqui**

REG NO: **21PWCSE1993**

SECTION: **“A”**

SUMITTED TO: **Engineer Faiz Ullah Sir**

UNIVERSITY OF ENGINEERING AND TECHNOLOGY PESHAWAR

COMPUTER SYSTEM ENGINEERING

ASSESSMENT RUBRICS

LAB REPORT ASSESSMENT				
Criteria	Excellent	Average	Nil	Marks Obtained
1. Objectives of Lab	All objectives of lab are properly covered [Marks 1]	Objectives of lab are partially covered [Marks 0.5]	Objectives of lab are not shown [Marks 0]	
2. Procedure	All experimental steps are shown. [Marks 2]	Some of the experimental steps are shown. [Marks 1]	Experimental steps not shown [Marks 0]	
3. Demonstration of Concepts	The student demonstrated a clear understanding of the assignment concepts [Marks 2]	The student demonstrated a clear understanding of some of the assignment concepts [Marks 1]	The student failed to demonstrate a clear understanding of the assignment concepts [Marks 0]	
4. Experimental Results	All experimental results are completely shown in form of table [Marks 3]	Experimental results are partially shown and some of the observations are missing [Marks 1.5]	No experimental results are shown [Marks 0]	
5. conclusion	Conclusion of the lab is properly written [Marks 2]	Conclusion of the lab is partially written [Marks 1]	Conclusion of lab is not written [Marks 0]	

Total Marks Obtained: __________

Instructor Signature: ______________________

Experiment # 06

AC SUPERPOSITION

Objective:

- This exercise examines the analysis of multi-source AC circuits using the Superposition Theorem.
- In particular, sources with different frequencies will be used to illustrate the contributions of each source to the combined result.

Theory Overview:

The Superposition Theorem can be used to analyze multi-source AC linear bilateral networks. Each source is considered in turn, with the remaining sources replaced by their internal impedance, and appropriate series-parallel analysis techniques employed. The resulting signals are then summed to produce the combined output signal. To see this process more clearly, the exercise will utilize two sources operating at different frequencies. Note that as each source has a different frequency, the inductor and capacitor appear as different reactance to the two sources.

Equipment:

1. AC Function Generators
2. Oscilloscope

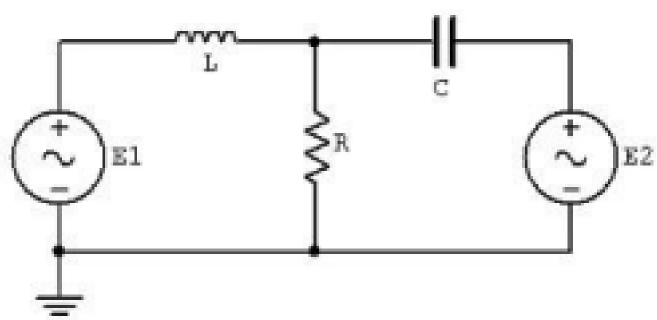


Figure:1

Components:

- 0 .1 µF Capacitor
- 10mH Inductor
- 1kΩ Capacitor

Procedure:

To test the Superposition Theorem, sources E1 and E2 will be examined separately and then together.

Source One Only:

- Consider the circuit of Figure 1 with C=0.1 μF, L=10mH, R=1kΩ, using only source E1=2 V p-p at 1 kHz and with source E2 replaced by a 0-V voltage source represented as a short circuit. Using standard series parallel techniques; calculate the voltages across R. Record the results in Table 1.

- Build the circuit of Figure 1 using C=0.1 μF, L=10mH, and R=1kΩ. Replace E2 with 0-V voltage source represented as a short circuit. Set E1 to 2V p-p at 1 kHz, unloaded. Place probe one across E1 and probe two across R. Measure the voltages across R, and record in Table 1.

Source Two Only:

- 3. Consider the circuit of Figure 1 using only source E2=2 V p-p at 10 kHz and with source E1 replaced by 0-V voltage source represented as a short circuit. Using standard series-parallel techniques; calculate the voltages across R. Record the results in Table 2.

- 4. Replace the short circuit with source E2 and set it to 2Vp-p at 10 kHz, unloaded. Replace E1 with 0-V voltage source represented as a short circuit. Place probe one across E2 and probe two across R. Measure the voltages across R and record in Table 2.

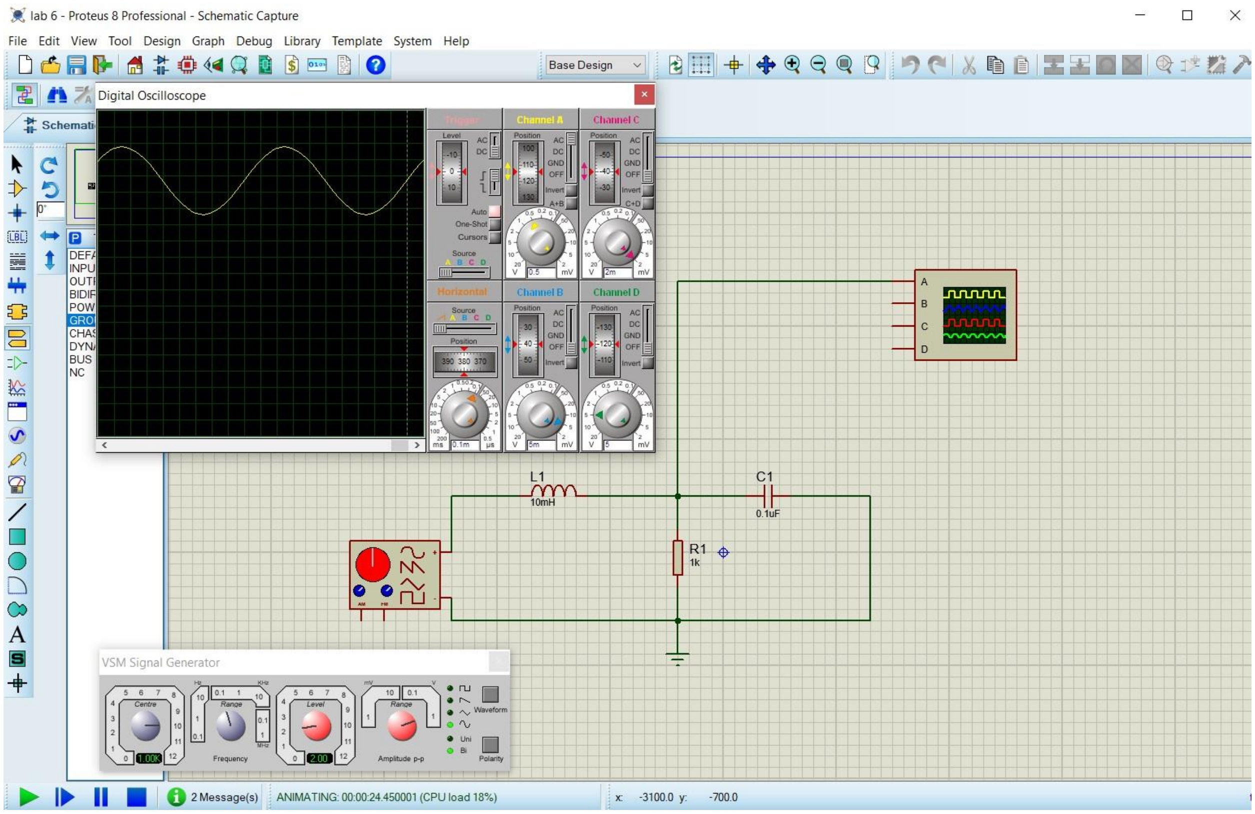
Source One and Two:

- 5. Consider the circuit of Figure 1 using both sources, E1=2Vp-p at 1 kHz and E2=2Vp-p at 10 kHz. Add the calculated voltages across R from Tables 1 and 2. Record the results in Table 3. 6. Replace the short circuit with source E1 and set it to 2Vp-p at 1 kHz, unloaded. Both sources should now be active. Place probe one across R. Measure the voltages across R, and record in Table 3.

- 7. Repeat the experiment for 1uF capacitor, 1mH inductor and 1kΩ.

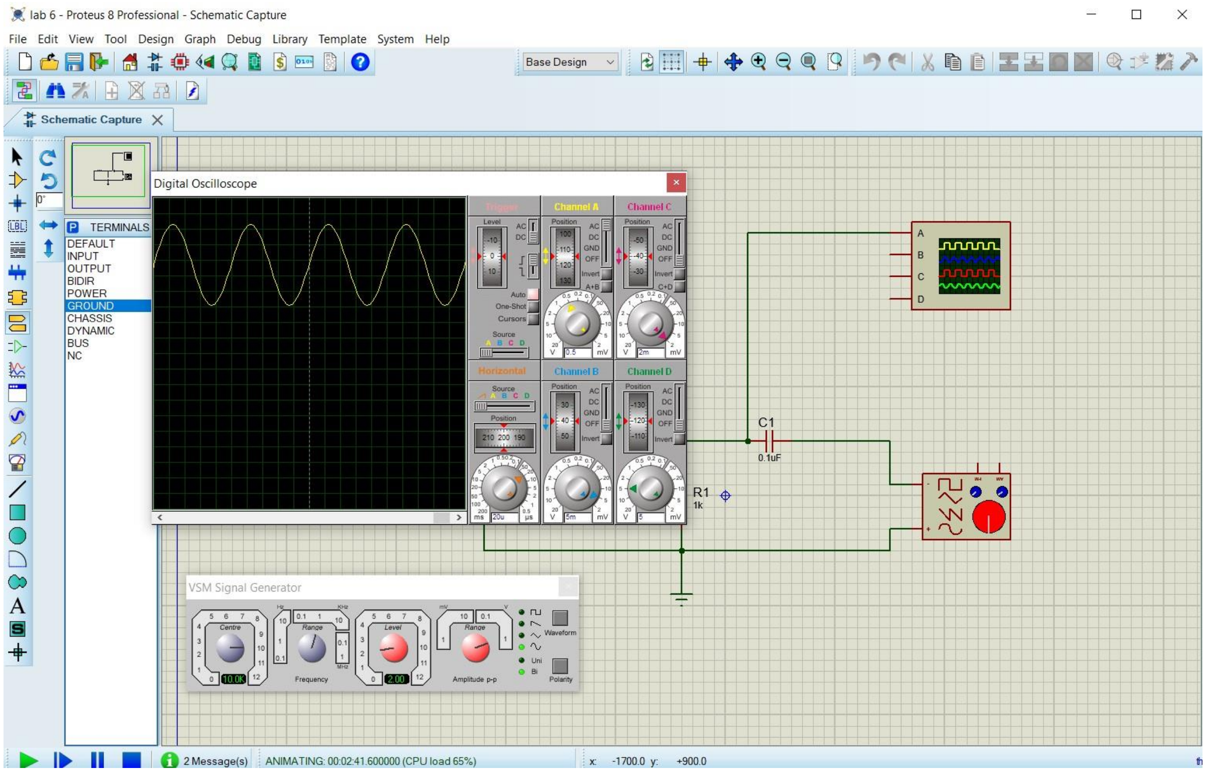
Experimental Results:

Source One Only



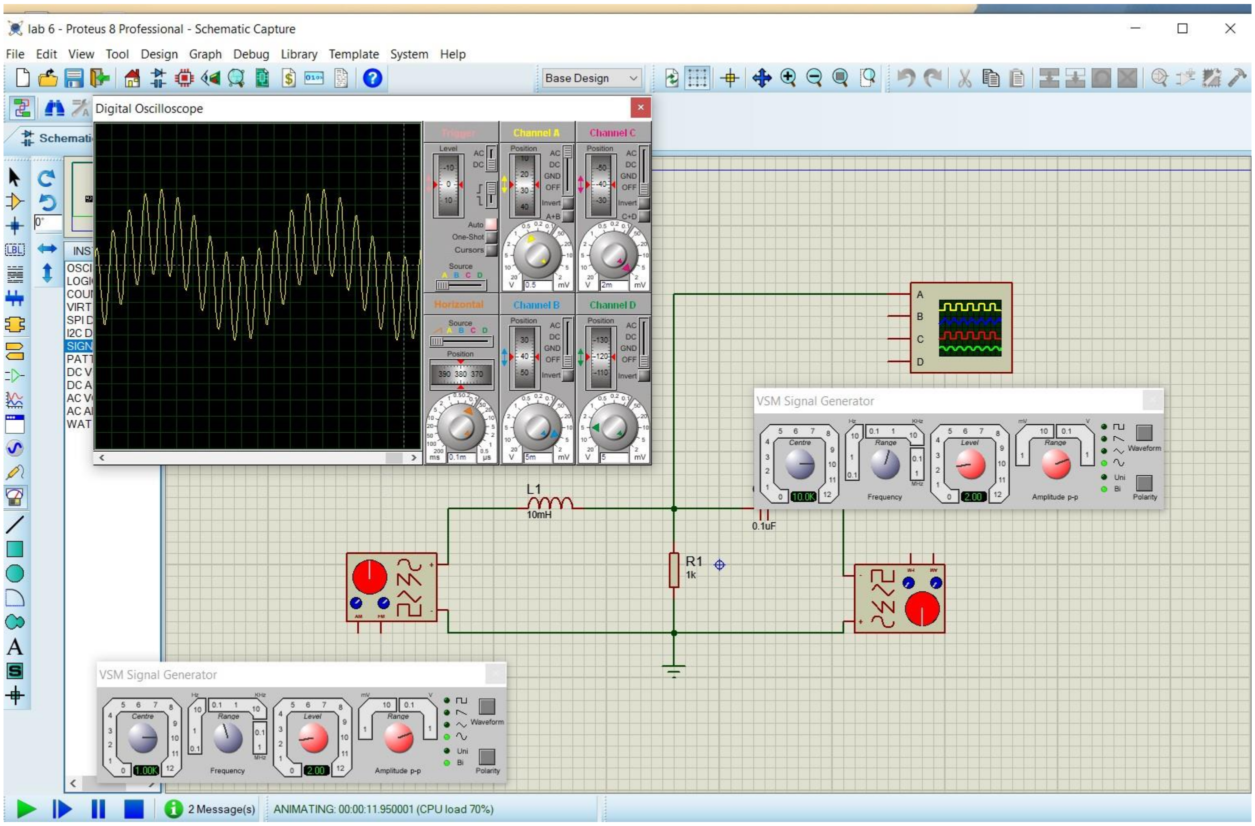
	Theoretical	Experimental	% Deviation
V_R	2.078V	2.1V	1.1%

Source Two Only:



	Theoretical	Experimental	% Deviation
V_R	2.62V	2.6V	0.3%

<u>Sources One and Two:</u>



	Theoretical	Experimental	% Deviation
V_R	4.69V	4.7V	0.1%