Lab 13 – RL Lab

Names: ­­­­­­­­­­­­­­­­Nathaniel Paulus, Seth Wills

Date: 2017-12-07

The purpose of this lab is to:

Experiment with RL (Resistor & Inductor) circuits.

The following inductors are needed (1 each of the following): 1mH, 2.2mH and 4.7mH

Measure and record the resistor value using the DMM and measure and record the inductor values using the LCR meter in Table 1. Connect the resistor and inductor as shown in Figure 1. Connect the Function Generator to the input at V1 and connect Channel 1 of the Oscilloscope to the input and Channel 2 to the output. Adjust the voltage of the Function Generator to 1Vpp at the frequencies shown in Table 2. Measure the input and output voltages using the Oscilloscope. Record the results in Table 2.

Change the inductor and retest.

Equipment needed:



Figure 1

**RL Circuit**

1 – Digital Multimeter

1 – LCR Meter

1 – Oscilloscope

1 – Function Generator

1 – Elvis II

3 – inductors

1 – resistor, 100 ohm

|  |  |  |
| --- | --- | --- |
|  | Inductance or Resistance | |
|  | Expected | Measured |
| L1 = | 1mH | 1.0194mH |
| L2 = | 2.2mH | 2.1732mH |
| L3 = | 4.7mH | 4.3352mH |
| R1 = | 100Ω | 99.48Ω |

Table 1 – Resistance and Inductances

Expected = value you expect it to be

Measured = using LCR Meter or DMM

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Output Voltage L = 1mH | | | Output Voltage L = 2.2mH | | | Output Voltage L = 4.7mH | | |
|  | Expected | Measured | | Expected | Measured | | Expected | Measured | |
| Frequency | Output Voltage | Input Voltage | Output Voltage | Output Voltage | Input Voltage | Output Voltage | Output Voltage | Input Voltage | Output Voltage |
| 10 |  |  |  |  |  |  |  |  |  |
| 50 |  | 1.00V | 23mV |  | 1.00V | 40.8mV |  | 1.00V | 76mV |
| 100 |  |  |  |  |  |  |  |  |  |
| 200 |  | 1.00V | 26mV |  | 1.00V | 52mV |  | 1.00V | 88mV |
| 300 |  |  |  |  |  |  |  |  |  |
| 400 |  | 1.00V | 34mV |  | 1.00V | 68mV |  | 1.00V | 120Mv |
| 500 |  |  |  |  |  |  |  |  |  |
| 600 |  | 1.00V | 44mV |  | 1.00V | 84mV |  | 1.00V | 162mV |
| 700 |  |  |  |  |  |  |  |  |  |
| 800 |  | 1.00V | 56mV |  | 1.00V | 112mV |  | 1.00V | 204mV |
| 900 |  |  |  |  |  |  |  |  |  |
| 1,000 |  | 1.00V | 68mV |  | 1.00V | 132mV |  | 1.00V | 256mV |
| 2,000 |  |  |  |  |  |  |  |  |  |
| 3,000 |  | 1.00V | 182mV |  | 1.00V | 348mV |  | 1.00V | 648mV |
| 4,000 |  |  |  |  |  |  |  |  |  |
| 5,000 |  | 1.00V | 296mV |  | 1.00V | 456mV |  | 1.00V | 728mV |
| 6,000 |  |  |  |  |  |  |  |  |  |
| 7,000 |  | 1.00V | 416mV |  | 1.00V | 576mV |  | 1.00V | 848mV |
| 8,000 |  |  |  |  |  |  |  |  |  |
| 9,000 |  | 1.00V | 512mV |  | 1.00V | 688mV |  | 1.00V | 900mV |
| 10,000 |  | 1.00V | 544mV |  | 1.00V | 728mV |  | 1.00V | 940mV |

RL Frequency Response

Expected = value you expect it to be

Measured = Using Oscilloscope

Observations: The values we recorded in the lab (up to 10kHz) were sufficient to show the first half of the graph produced by Multisim, but the data was just beginning to flatten out at 10kHz (or not even started to flatten), so the second part was nearly invisible.