

Experiment 4:

RC and RLC Circuits

In-Lab Report

A. Phase Shift Measurements

- Measure the phase shift between the input voltage and output voltage of the circuit in figure 1 using Y-T format and the X-Y format (lissajous)

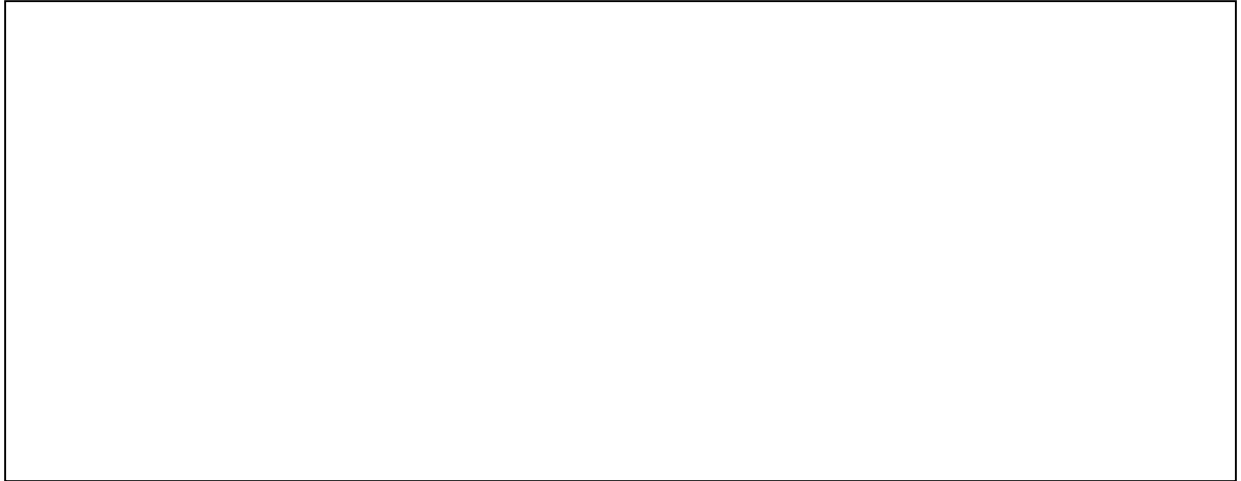
| Calculated Phase Shift | | |
|------------------------|-----|-----|
| Y-T Format Δ | T= | T= |
| Lissajous Figure | 2B= | 2A= |

B. Lead and Lag Networks

- Measure and draw (using Paint) the output voltage of the lag and lead networks in figure 3 and 4 if a $1 V_{pk-pk}$ Square signal is applied to the input. Below are the frequencies.

| Lead Network (Measured) | | |
|-------------------------|---------------|----------------|
| Frequency | Input Voltage | Output Voltage |
| 100Hz | $1 V_{pk-pk}$ | |
| 1KHz | $1 V_{pk-pk}$ | |
| 10KHz | $1 V_{pk-pk}$ | |

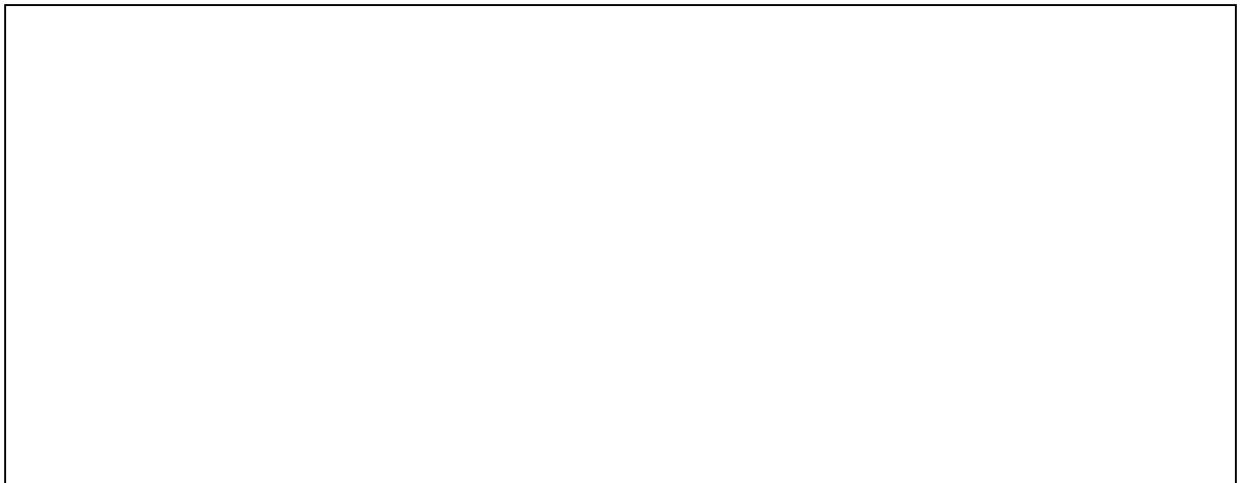
| Lag Network (Measured) | | |
|------------------------|---------------|----------------|
| Frequency | Input Voltage | Output Voltage |
| 100Hz | $1 V_{pk-pk}$ | |
| 1KHz | $1 V_{pk-pk}$ | |
| 10KHz | $1 V_{pk-pk}$ | |



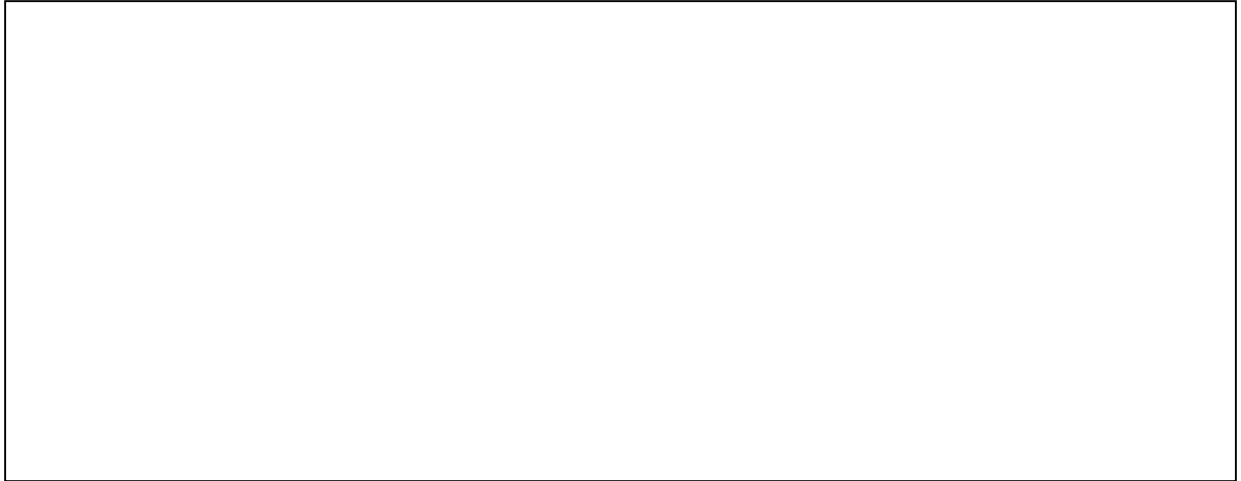
Lead 100Hz



Lead 1KHz



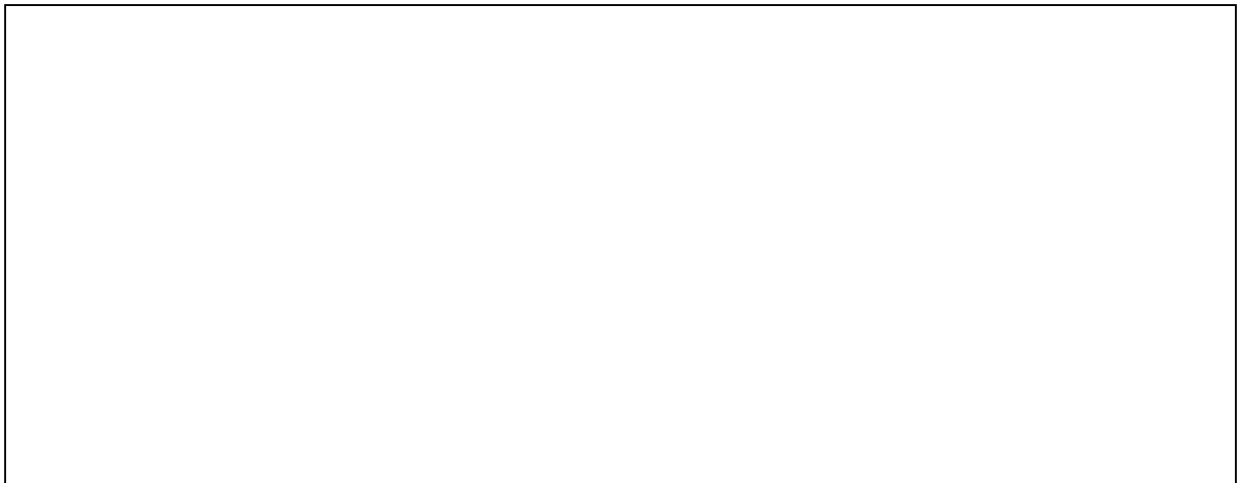
Lead 10KHz



Lag 100Hz



Lag 1KHz



Lag 10KHz

- Measure the output voltage of the lag and lead networks in figure 3 and 4 if a $1 V_{pk-pk}$ Sine signal is applied to the input. Below are the frequencies.

| Lead Network (Measured) | | |
|-------------------------|---------------|----------------|
| Frequency | Input Voltage | Output Voltage |
| 100Hz | $1 V_{pk-pk}$ | |
| 1KHz | $1 V_{pk-pk}$ | |
| 10KHz | $1 V_{pk-pk}$ | |

| Lag Network (Measured) | | |
|------------------------|---------------|----------------|
| Frequency | Input Voltage | Output Voltage |
| 100Hz | $1 V_{pk-pk}$ | |
| 1KHz | $1 V_{pk-pk}$ | |
| 10KHz | $1 V_{pk-pk}$ | |

C. Series RLC circuits

- Measure the magnitude and phase angle of the output voltage for the following RLC circuits (figure 5) for an sinusoidal input voltage of 1 volt P_k-P_k

| R=100Ω L=220μH C=1μF | | | |
|-----------------------------|------------------|---------------|------------|
| Frequency | $V_{IN} P_k-P_k$ | $V_R P_k-P_k$ | ΔT |
| 1KHz | | | |
| 1.4 KHz | | | |
| 2 KHz | | | |
| 2.8 KHz | | | |
| 4 KHz | | | |
| 5.4 KHz | | | |
| 7.5 KHz | | | |
| 10 KHz | | | |
| 14 KHz | | | |

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| | | | |
|---------|--|--|--|
| 20 KHz | | | |
| 28 KHz | | | |
| 40 KHz | | | |
| 54 KHz | | | |
| 75 KHz | | | |
| 100 KHz | | | |