Lab #6 – Pre-lab Assignment

Forced Response of a Series RLC Circuit

Name ____________________    Grade _____/10

Introduction
This lab exercise investigates a series RLC circuit driven by a sinusoidal source. When driven with an AC voltage, the circuit exhibits the characteristics of a band-pass filter. This exercise explores the frequency response (magnitude and phase) of the series RLC circuit.

1. Use phasors to derive an expression for the voltage ratio \(V_Q/V_P\) as a function of frequency, where \(V_P\) is the sinusoidal voltage source and \(V_Q\) is the voltage across the resistor.

\[
3 \cos(\omega t) + \frac{1}{20 \text{mH}} + 0.1 \mu\text{F} + \frac{1}{300 \Omega}
\]

2. Using your expression from part 1, divide it into two parts, magnitude and phase. Both of these expressions will be functions of \(\omega\).

3. Using Excel or another program, make two separate plots: one of magnitude vs. frequency, and one of phase vs. frequency. Plot frequencies in the range of 1kHz – 7kHz in increments of 100Hz.