

ECE 3041 Spring 2012

Homework Problem Set 8 for Experiment No 10

Due Week of March 26

1. For the circuit shown below, use SPICE to plot the magnitude (log) and phase (linear) of the complex transfer function $\bar{T}(j\omega) = \bar{V}_o(j\omega)/\bar{V}_i(j\omega)$ as a function of frequency (log) as the frequency of the sinusoidal source, $v_i(t)$, varies from 1 kHz to 10 MHz. Use the cursors to obtain the half-power or -3 dB frequencies from the SPICE simulation. Use SPICE to plot the power (log) supplied by the source and dissipated in the load as functions of frequency. Compare the simulation results with the theoretical results, i. e. peak gain and half-power frequencies. Assume that the voltage source $v_i(t)$ is a sine wave with an rms value of 1 V. The component values are $R_S = 800 \Omega$, $R_L = 15 \text{ k}\Omega$, $n = 5$, $L = 3 \text{ mH}$, and $C = 3 \text{ nF}$.
2. Use MathCad to plot the same circuit variables that were plotted in Problem 1 with SPICE over the same frequency range. Compare the solutions.

