EE 205 Circuit Theory

Lab 5

LC-Matching Circuit Analysis

The aim of this lab is to use LC matching circuit for maximum power transfer.

Consider the example circuit given in Fig.1. We have already solved this question in the previous lecture. Here, we want to verify the calculated results with the Proteus simulations.

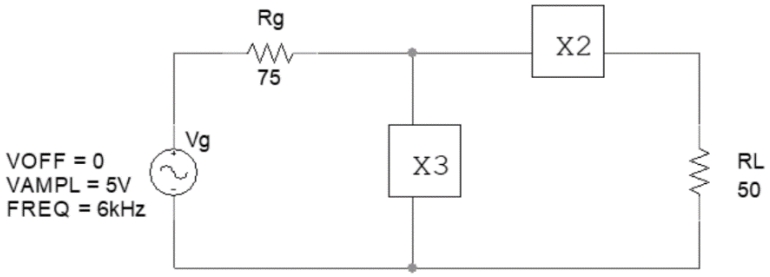

Fig.1. Matching Circuit

The reactance

$$X_2 = \pm\sqrt{R_L(R_g - R_L)}\ \Omega,$$

and

$$X_3 = \mp R_g\sqrt{R_L/(R_g - R_L)}\ \Omega.$$

If we substitute the values for R_L and R_g,

$$X_2 = -35.35\ \Omega$$

And

$$X_3 = 106.06\ \Omega.$$

Since we set negative sign for X2, we use a capacitor whose capacitance is

$$X_2 = \frac{1}{\omega C} = 35.35\ \Omega$$

$$X_3 = \omega L = 106.06\ \Omega.$$

Then, C=750.4nF, L=2.8mH.

Procedure:

1. Draw the following circuit in Fig.2.

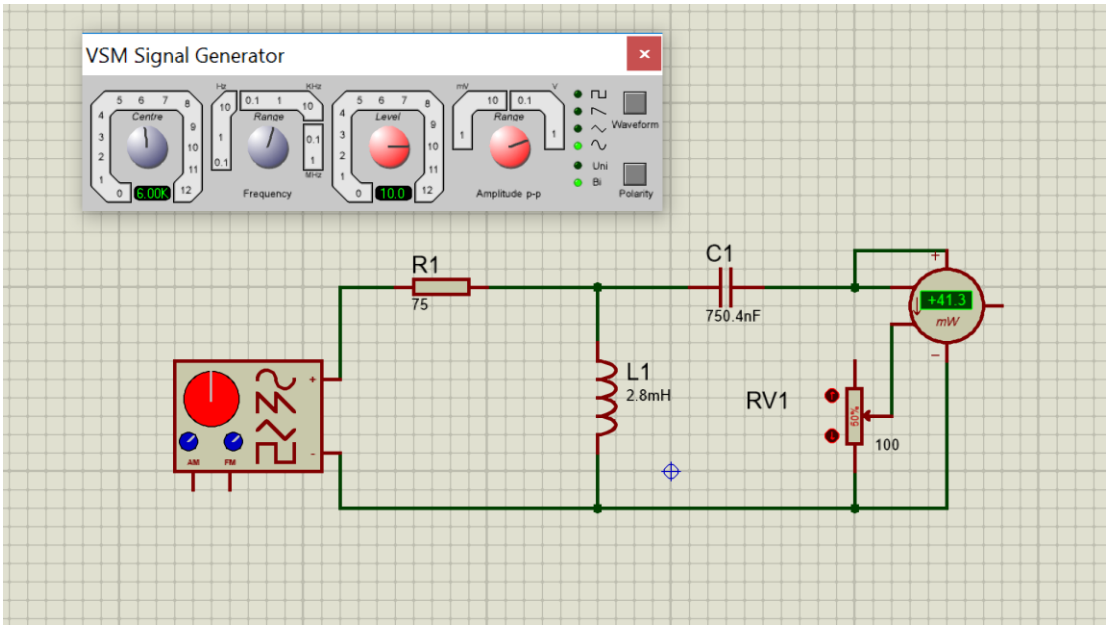

Fig.2. Proteus Schematic

2. Place an active POT (HPOT) from resistor library.
3. Set the value of the POT to 100 Ω.
4. Place a wattmeter across the load resistor (the POT). You may set its time constant to be 5ms.
5. Set the values for the inductor and the capacitor as obtained before.
6. Connect a 10Vp-p, 6kHz signal through signal generator.
7. Run the simulation.
8. Observe the average power as you change the POT value. Record the into Table 1.

Table 1. Average Power across RL

R_L (Ω)	Power (mW)
10	
20	
30	
40	
50	
60	
70	
80	
90	

Comments: