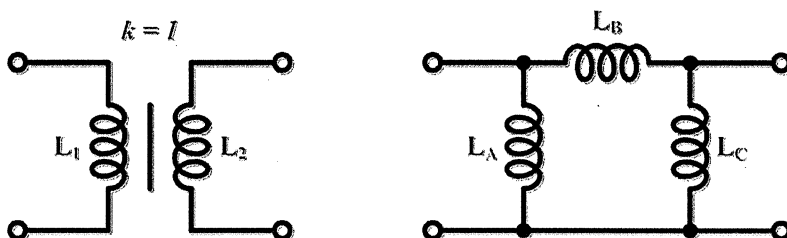


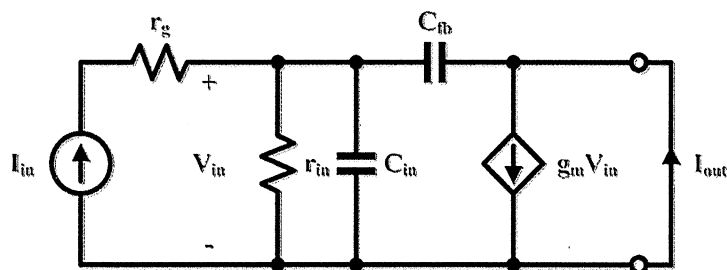
ECE 580
Midterm Examination

October 25, 2010

1. Find the values in the “pi”-equivalent shown of the “physical” transformer for general values of k . What happens to the model if $k=1$ (close coupling)?



2. The circuit shown below is the small-signal model of a semiconductor device. Find
a. the short-circuit current gain $A_I(j\omega) = I_o(j\omega)/I_{in}(j\omega)$, and b. the unit-gain frequency f_T , i.e., the frequency where $|A_I| = 1$.



3. The two two-ports shown below have the same Y , Z , etc. matrices. All resistors have the value R , where $R^2 = L/C$. What are the impedances $Z_1(s)$ and $Z_2(s)$? *Hint:* consider the behavior for very low and very high frequencies!

