ECE 3364 HW 6, Fall 2016 Due 10/06

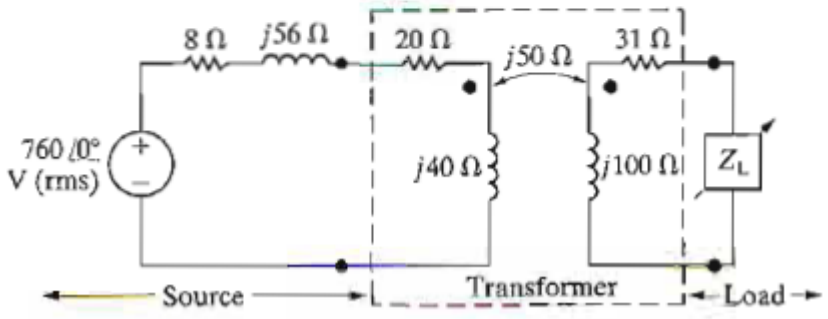
Problem 1. Nilsson, 8th edition Problem 10.55

10.55 The impedance Z_L in the circuit in Fig. P10.55 is adjusted for maximum average power transfer to Z_L. The internal impedance of the sinusoidal voltage source is $8 + j56\ \Omega$.

a) What is the maximum average power delivered to Z_L?

b) What percentage of the average power delivered to the linear transformer is delivered to Z_L?

Figure P10.55



Problem 2. Nilsson, 8th edition Problem 10.56

10.56 PSPICE

a) Find the steady-state expression for the currents i_g and i_L in the circuit in Fig. P10.56 when $v_g = 70\cos 5000t$ V.

b) Find the coefficient of coupling.

c) Find the energy stored in the magnetically coupled coils at $t = 100\pi$ μs and $t = 200\pi$ μs.

d) Find the power delivered to the 30 Ω resistor.

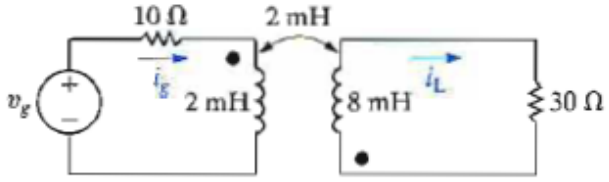
e) If the 30 Ω resistor is replaced by a variable resistor R_L, what value of R_L will yield maximum average power transfer to R_L?

f) What is the maximum average power in (e)?

g) Assume the 30 Ω resistor is replaced by a variable impedance Z_L. What value of Z_L will result in maximum average power transfer to Z_L?

h) What is the maximum average power in (g)?

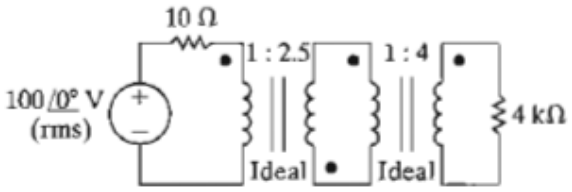
Figure P10.56



Problem 3. Nilsson, 8th edition Problem 10.58

10.58 Find the average power delivered to the 4 kΩ resistor in the circuit of Fig. P10.58.

Figure P10.58



Problem 4. Nilsson, 8th edition Problem 10.64

10.64 The sinusoidal voltage source in the circuit in Fig. P10.64 is operating at a frequency of 50 krad/s. The variable capacitive reactance in the circuit is adjusted until the average power delivered to the 160 Ω resistor is as large as possible.

a) Find the value of C in microfarads.

b) When C has the value found in (a), what is the average power delivered to the 160 Ω resistor?

c) Replace the 160 Ω resistor with a variable resistor R_o. Specify the value of R_o so that maximum average power is delivered to R_o.

d) What is the maximum average power that can be delivered to R_o?

Figure P10.64