

ECE 109L - TRANSFER FUNCTIONS - LAB 24

MAXIMUM POWER TRANSFER

FALL 2006

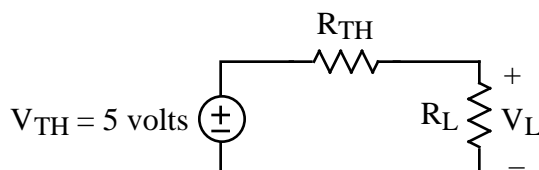
A.P. FELZER

OBJECTIVE

The objective of this Lab is to demonstrate that maximum power will be delivered to the load in resistor circuits when the load resistor is equal to the Thevenin Equivalent Resistance of the rest of the circuit

LAB

- Given the following circuit

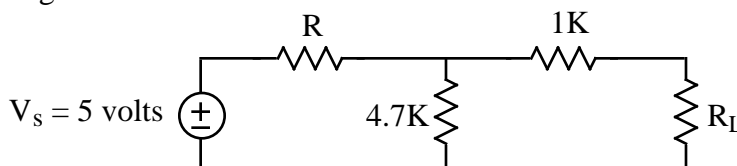


PARTNER 1: $R_{TH} = 2K$ PARTNER 2: $R_{TH} = 4.7K$

with load resistor R_L shown connected to the Thevenin Equivalent of the rest of a given circuit

- Measure the value of your R_{TH} . Compare with its nominal value
- PreLab** - Come up with an equation for P_L as a function of R_L
- PreLab** - Use Mathcad to graph your P_L as a function of R_L
- Measure V_L for a bunch of different values of R_L . Then make use of your results to calculate corresponding values of the power P_L
- Put your data points on your Mathcad graph
- Make use the data on your graph to find the value of R_L when the most power is delivered to the load. What is this power
- PreLab** - Calculate R_L for maximum power transfer to the load
- Compare your calculated and measured values of R_L for maximum power transfer

- Given the following circuit



PARTNER 1: $R = 2K$ PARTNER 2: $R = 4.7K$

- Measure the values of your resistors. Compare with nominal values
 - Take measurements to find the value of R_L for maximum power transfer. Include a sketch of P_L versus R_L to show what's going on
 - Calculate the value of R_L for maximum power transfer
 - Compare your theoretical and measured values of R_L for maximum power transfer
- Sketch each of the following signals as functions of time
 - $x_1(t) = 2\cos(2000t)$
 - $x_2(t) = 2\cos(2000t - 1)$
 - $x_2(t) = 2\cos(2000t + 1)$