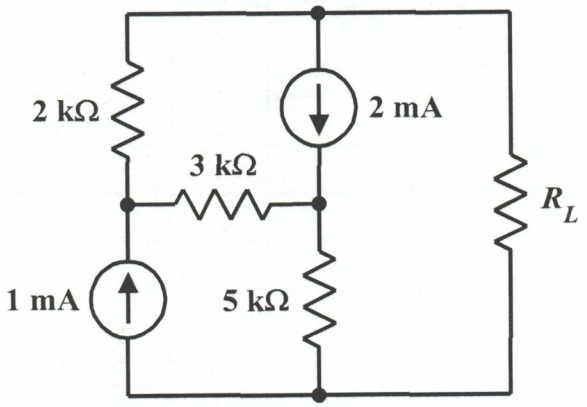
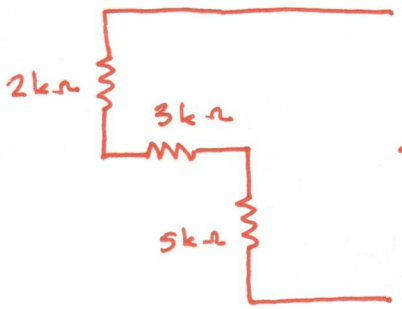
EE 2240

Problem #02

a. Find the value of R_L for maximum power transfer.

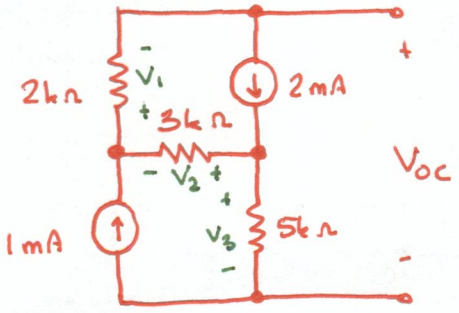




$\Leftarrow R_{eq} = 2k\Omega + 3k\Omega + 5k\Omega = 10k\Omega$

$\therefore$ Choose $R_L = 10k\Omega$ for maximum power transfer

b. What is the maximum power that can be transferred?



$V_1 = (2k\Omega)(2mA) = 4V$

$V_2 = (3k\Omega)(2mA - 1mA) = 3V$

$V_3 = (5k\Omega)(1mA) = 5V$

$V_{oc} = -V_1 - V_2 + V_3 = -4V - 3V + 5V = -2V$

$$P_{max.} = \frac{\left(\frac{1}{2}V_T\right)^2}{R_L} = \frac{\left(\frac{1}{2}V_{oc}\right)^2}{R_L} = \frac{(1V)^2}{10k\Omega} = 100\mu W$$