Práctica No. 6 TEOREMA DE LA MÁXIMA TRANSFERENCIA DE POTENCIA

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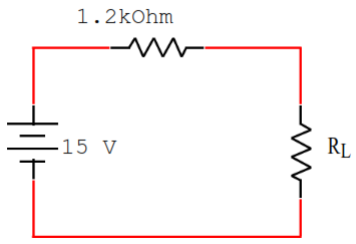

Cálculo de la Potencia para cada valor de R_L
Para calcular la potencia se utilizara la siguiente fórmula:

$$p = (\frac{V_{Th}}{R_{Th} + R_L})^2 \cdot R_L \quad ; \quad R_{Th} = 1200\Omega \quad ; \quad V_{Th} = 15\ V$$

$R_L = 220\Omega$

$$p = (\frac{15\ V}{1200\ \Omega + 220\ \Omega})^2 \cdot 220\ \Omega = 24.548\ mWatts$$

$R_L = 470\Omega$

$$p = (\frac{15\ V}{1200\ \Omega + 470\ \Omega})^2 \cdot 470\ \Omega = 37.918\ mWatts$$

$R_L = 680\Omega$

$$p = (\frac{15\ V}{1200\ \Omega + 680\ \Omega})^2 \cdot 680\ \Omega = 43.288\ mWatts$$

$R_L = 820\Omega$

$$p = (\frac{15\ V}{1200\ \Omega + 820\ \Omega})^2 \cdot 820\ \Omega = 45.216\ mWatts$$

$R_L = 1000\Omega$

$$p = (\frac{15\ V}{1200\ \Omega + 1000\ \Omega})^2 \cdot 1000\ \Omega = 46.487\ mWatts$$

$R_L = 1500$

$$p = (\frac{15\ V}{1200\ \Omega + 1500\ \Omega})^2 \cdot 1500\ \Omega = 46.296\ mWatts$$

$R_L = 1800\Omega$

$$p = (\frac{15\ V}{1200\ \Omega + 1800\ \Omega})^2 \cdot 1800\ \Omega = 45\ mWatts$$

$R_L = 2200\Omega$

$$p = (\frac{15\ V}{1200\ \Omega + 2200\ \Omega})^2 \cdot 2200\ \Omega = 42.82\ mWatts$$

$R_L = 3900\Omega$

$$p = (\frac{15\ V}{1200\ \Omega + 3900\ \Omega})^2 \cdot 3900\ \Omega = 33.737\ mWatts$$

$R_L = 4700\Omega$

$$p = (\frac{15\ V}{1200\ \Omega + 4700\ \Omega})^2 \cdot 4700\ \Omega = 30.379\ mWatts$$

Cálculo de la Potencia Máxima $(R_{Th} = R_L)$

$$p = \frac{V_{Th}^2}{4R_{Th}}$$

$$p = \frac{15^2\ V}{4 \cdot 1200\Omega} = 46.875\ mWatts$$

Cálculo de la Potencia para cada valor de R_L para Tinkercad
Para calcular la potencia se utilizara la siguiente fórmula:

$$p = I * V$$

$R_L = 220\Omega \quad ; \quad V_{RL} = 2.32\ V \quad ; \quad I = 10.6\ mA$

$$p = (10.6\ mA) \cdot (2.32\ V) = 24.592\ mWatts$$

$R_L = 470\Omega \quad ; \quad V_{RL} = 4.22\ V \quad ; \quad I = 8.98\ mA$

$$p = (8.98\ mA) \cdot (4.22\ V) = 37.895\ mWatts$$

$R_L = 680\Omega \quad ; \quad V_{RL} = 5.43\ V \quad ; \quad I = 7.98\ mA$

$$p = (7.98\ mA) \cdot (5.43\ V) = 43.331\ mWatts$$

$R_L = 820\Omega \quad ; \quad V_{RL} = 6.09\ V \quad ; \quad I = 7.43\ mA$

$$p = (7.43\ mA) \cdot (6.09\ V) = 45.248\ mWatts$$

$R_L = 1000\Omega \quad ; \quad V_{RL} = 6.82\ V \quad ; \quad I = 6.82\ mA$

$$p = (6.82\ mA) \cdot (6.82\ V) = 46.512\ mWatts$$

$R_L = 1500\Omega \quad ; \quad V_{RL} = 8.33\ V \quad ; \quad I = 5.56\ mA$

$$p = (5.56\ mA) \cdot (8.33\ V) = 46.314\ mWatts$$

$$R_L = 1800\Omega \quad ; \quad V_{RL} = 9\ V \quad ; \quad I = 5\ mA$$

$$p = (5\ mA) \cdot (9\ V) = 45\ mWatts$$

$$R_L = 2200\Omega \quad ; \quad V_{RL} = 9.71\ V \quad ; \quad I = 4.41\ mA$$

$$p = (4.41\ mA) \cdot (9.71\ V) = 42.821\ mWatts$$

$$R_L = 3900\Omega \quad ; \quad V_{RL} = 11.5\ V \quad ; \quad I = 2.94\ mA$$

$$p = (2.94\ mA) \cdot (11.5\ V) = 33.81\ mWatts$$

$$R_L = 4700\Omega \quad ; \quad V_{RL} = 11.9\ V \quad ; \quad I = 2.54\ mA$$

$$p = (2.54\ mA) \cdot (11.9\ V) = 30.226\ mWatts$$

Cálculo de Errores:

$$Error = \frac{|\text{Valor Teórico} - \text{Valor Medido}|}{\text{Valor Teórico}} \cdot 100$$

$R_L = 220$

$$E = \frac{|24.548\ mWatts - 24.592\ mWatts|}{24.584\ mWatts} \cdot 100 = 0.18\ \%$$

$R_L = 470$

$$E = \frac{|37.895\ mWatts - 37.918\ mWatts|}{37.895\ mWatts} \cdot 100 = 0.06\ \%$$

$R_L = 680$

$$E = \frac{|43.331\ mWatts - 43.288\ mWatts|}{43.331\ mWatts} \cdot 100 = 0.1\ \%$$

$R_L = 820$

$$E = \frac{|45.248\ mWatts - 45.216\ mWatts|}{45.248\ mWatts} \cdot 100 = 0.07\ \%$$

$R_L = 1000$

$$E = \frac{|46.512\ mWatts - 46.487\ mWatts|}{46.512\ mWatts} \cdot 100 = 0.05\ \%$$

$R_L = 1500$

$$E = \frac{|46.314\ mWatts - 46.296\ mWatts|}{46.314\ mWatts} \cdot 100 = 0.04\ \%$$

$R_L = 1800$

$$E = \frac{|45\ mWatts - 45\ mWatts|}{45\ mWatts} \cdot 100 = \ 0\%$$

$R_L = 2200$

$$E = \frac{|42.821\ mWatts - 42.82\ mWatts|}{42.821\ mWatts} \cdot 100 = 0.002\ \%$$

$R_L = 3900$

$$E = \frac{|33.81\ mWatts - 33.737\ mWatts|}{33.81\ mWatts} \cdot 100 = 0.216\ \%$$

$R_L = 4700$

$$E = \frac{|30.226\ mWatts - 30.379\ mWatts|}{30.226\ mWatts} \cdot 100 = 0.5\ \%$$