Cálculos Circuitos

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19 de julio de 2020

Determinación de la corriente y el voltaje en el resistor RL con cada valor pedido

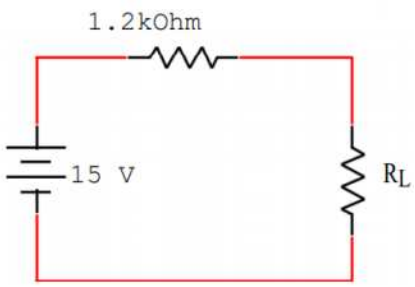

Figura 1: Circuito para comprobar el Teorema de la MTP

Resistor de 220 Ω
Resistor de 470 Ω
Resistor de 680 Ω
Resistor de 820 Ω
Resistor de 1 kΩ
Resistor de 1.5 kΩ
Resistor de 1.8 kΩ
Resistor de 2.2 kΩ
Resistor de 3.9 kΩ
Resistor de 4.7 kΩ

Figura 2: Parámetros Eléctricos del circuito eléctrico

Formulas que se van a emplear:

$$V = I * R \tag{1}$$

$$V_{R_L} = \frac{R_L}{R_{TH} + R_L} V \tag{2}$$

$$P = \frac{(V_{R_L})^2}{R_L} \tag{3}$$

$$P_{max} = \frac{(V_{TH})^2}{4R_{TH}} \tag{4}$$

Empleando (1), (2) y (3):
RL=220Ω

$$V_{R_L} = \frac{220}{220 + 1200} 15 \qquad I_{R_L} = \frac{2{,}32}{220} \qquad P = \frac{(2{,}32)^2}{220}$$
$$V_{R_L} = 2{,}32\ V \qquad I_{R_L} = 0{,}011\ A \qquad P = 0{,}024\ W$$

RL=470Ω

$$V_{R_L} = \frac{470}{470 + 1200} 15 \qquad I_{R_L} = \frac{4{,}22}{470} \qquad P = \frac{(4{,}22)^2}{220}$$
$$V_{R_L} = 4{,}32\ V \qquad I_{R_L} = 8.98 \times 10^{-3}\ A \qquad P = 0{,}0389\ W$$

RL=680Ω

$$V_{R_L} = \frac{680}{680 + 1200} 15 \qquad I_{R_L} = \frac{5{,}43}{680} \qquad P = \frac{(5{,}43)^2}{680}$$
$$V_{R_L} = 5{,}43\ V \qquad I_{R_L} = 8 \times 10^{-3}\ A \qquad P = 0{,}04347$$

RL=820Ω

$$V_{R_L} = \frac{820}{820 + 1200} 15 \qquad I_{R_L} = \frac{6{,}09}{820} \qquad P = \frac{(6{,}09)^2}{820}$$
$$V_{R_L} = 6{,}09\ V \qquad I_{R_L} = 7.43 \times 10^{-3}\ A \qquad P = 0{,}0452\ W$$

RL=1000Ω

$$V_{R_L} = \frac{1000}{1000 + 1200} 15 \qquad I_{R_L} = \frac{6{,}82}{1000} \qquad P = \frac{(6{,}82)^2}{1000}$$
$$V_{R_L} = 6{,}82\ V \qquad I_{R_L} = 6.82 \times 10^{-3}\ A \qquad P = 0{,}0465\ W$$

RL=1500Ω

$$V_{R_L} = \frac{1500}{1500+1200}15 \qquad I_{R_L} = \frac{8{,}33}{1500} \qquad P = \frac{(8{,}33)^2}{1500}$$
$$V_{R_L} = 8{,}33\,V \qquad I_{R_L} = 5.56 \times 10^{-3}\,A \qquad P = 0{,}0463\,W$$

RL=1800Ω

$$V_{R_L} = \frac{1800}{1800+1200}15 \qquad I_{R_L} = \frac{9}{1800} \qquad P = \frac{(9)^2}{1800}$$
$$V_{R_L} = 9\,V \qquad I_{R_L} = 5 \times 10^{-3}\,A \qquad P = 0{,}045\,W$$

RL=2200Ω

$$V_{R_L} = \frac{2200}{2200+1200}15 \qquad I_{R_L} = \frac{9{,}71}{2200} \qquad P = \frac{(9{,}71)^2}{2200}$$
$$V_{R_L} = 9{,}71\,V \qquad I_{R_L} = 4.41 \times 10^{-3}\,A \qquad P = 0{,}0428\,W$$

RL=3900Ω

$$V_{R_L} = \frac{3900}{3900+1200}15 \qquad I_{R_L} = \frac{11{,}47}{3900} \qquad P = \frac{(11{,}47)^2}{3900}$$
$$V_{R_L} = 11{,}47\,V \qquad I_{R_L} = 2.94 \times 10^{-3}\,A \qquad P = 0{,}0337\,W$$

RL=4700Ω

$$V_{R_L} = \frac{4700}{4700+1200}15 \qquad I_{R_L} = \frac{11{,}95}{4700} \qquad P = \frac{(11{,}95)^2}{4700}$$
$$V_{R_L} = 11{,}95\,V \qquad I_{R_L} = 2.54 \times 10^{-3}\,A \qquad P = 0{,}0304\,W$$

Finalmente encontramos la potencia máxima transferida para ello
$R_L = 1200\Omega = R_{TH}$
Aplicando (4):

$$P_{max} = \frac{15^2}{4(1200)}$$
$$\boxed{P_{max} = 0{,}0469}$$