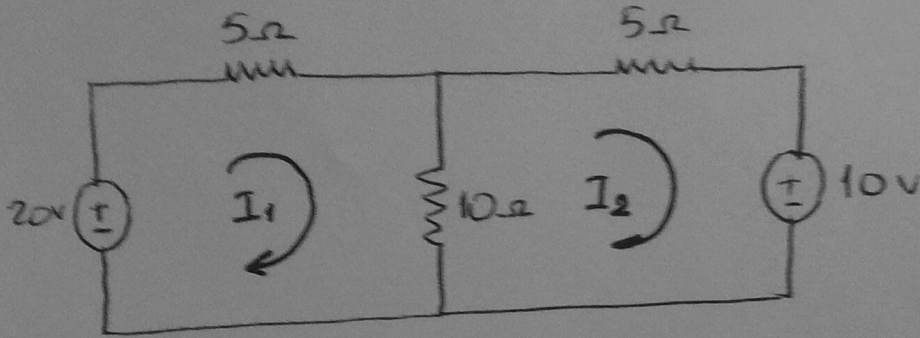


SORU 9: Şekildeki devrede bulunan 10Ω direncin gücünü devre akımları yöntemiyle hesaplayınız



1. devre KKK

$$-20 + 5I_1 + 10(I_1 - I_2) = 0$$

$$\Rightarrow 15I_1 - 10I_2 = 20$$

2. devre KKK

$$10(I_2 - I_1) + 5I_2 + 10 = 0$$

$$\Rightarrow 15I_2 - 5I_1 = -10$$

$$\Rightarrow \begin{bmatrix} 15 & -10 \\ -5 & 15 \end{bmatrix} \cdot \begin{bmatrix} I_1 \\ I_2 \end{bmatrix} = \begin{bmatrix} 20 \\ -10 \end{bmatrix}$$

$$\Rightarrow \begin{bmatrix} I_1 \\ I_2 \end{bmatrix} = \begin{bmatrix} 15 & -10 \\ -5 & 15 \end{bmatrix}^{-1} \cdot \begin{bmatrix} 20 \\ -10 \end{bmatrix}$$

$$= \frac{1}{15 \cdot 15 - [(-10) \cdot (-5)]} \cdot \begin{bmatrix} 15 & 10 \\ 10 & 15 \end{bmatrix} \cdot \begin{bmatrix} 20 \\ -10 \end{bmatrix}$$

$$= \frac{1}{125} \cdot \begin{bmatrix} 200 \\ 150 \end{bmatrix} = \begin{bmatrix} 1.6 \\ 1.2 \end{bmatrix}$$

$$\Rightarrow I_1 = 1.6 \text{ A} \quad \& \quad I_2 = 1.2 \text{ A}$$

$$I_{10\Omega} = I_1 - I_2 = 0.4 \text{ A}$$

$$P_{10\Omega} = (I_{10\Omega})^2 \times (10\Omega)$$

$$= (0.4)^2 \times (10\Omega)$$

$$= 1.6 \text{ W}$$