

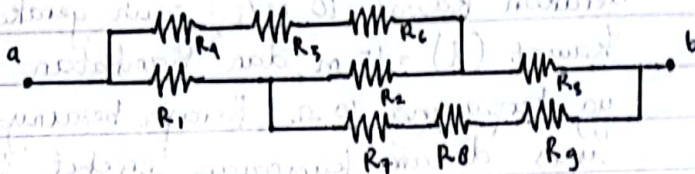
UAS Kelistrikan dan Kemagnetan.

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Utari

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Kelas : B

1) Perhatikan gambar



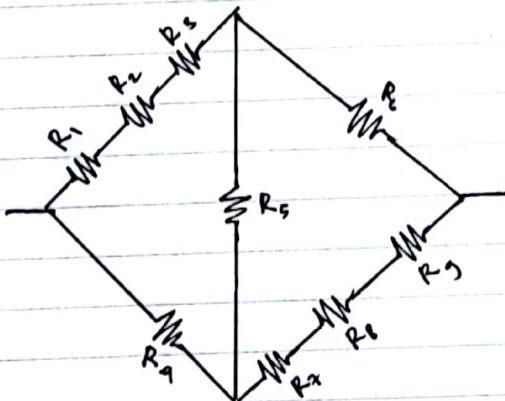
Jika $R = 5 \Omega$, hitung :

(a) Hambatan pengganti

(b) Jika $V_{ab} = 10 \text{ V}$. Bagaimana arus pada setiap hambatan pada rangkaian diatas ?

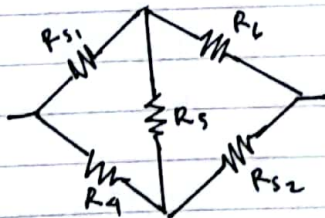
penyelesaian

(a)



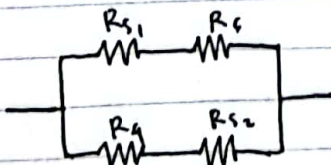
$$\begin{aligned} R_{s1} &= R_1 + R_2 + R_3 \\ &= 5 + 5 + 5 \\ &= 15 \Omega \end{aligned}$$

$$\begin{aligned} R_{s2} &= R_4 + R_5 + R_6 \\ &= 5 + 5 + 5 \\ &= 15 \Omega \end{aligned}$$



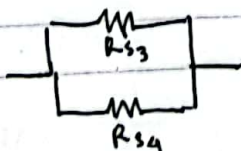
$$\begin{aligned} R_{s1} \cdot R_6 &= R_4 \cdot R_{s2} \\ 15 \cdot 5 &= 5 \cdot 15 \\ 75 &= 75 \end{aligned}$$

Sehingga R_5 tidak dialiri arus.

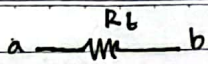


$$\begin{aligned} R_{s3} &= R_1 + R_2 \\ &= 15 + 5 \\ &= 20 \Omega \end{aligned}$$

$$\begin{aligned} R_{s4} &= R_4 + R_{s2} \\ &= 5 + 15 \\ &= 20 \Omega \end{aligned}$$



PAPERLINE
PAPERLINE



$$\frac{1}{R_L} = \frac{1}{R_{S3}} + \frac{1}{R_{S4}}$$

$$\frac{1}{R_L} = \frac{1}{20} + \frac{1}{20}$$

$$\frac{1}{R_L} = \frac{2}{20} = \frac{1}{10} \Rightarrow R_L = 10 \Omega$$

$$R_L = 10 \Omega$$

(b) $V_{ab} = 10 \text{ V}$

$$I_L = \frac{V_{ab}}{R_L} = \frac{10}{10} = 1 \text{ A}$$

$$I_{R_{S3}} = \frac{R_{S4}}{R_{S3} + R_{S4}} \cdot I = \frac{20}{20 + 20} \cdot 1 = 0,5 \text{ A}$$

$$I_{R_{S4}} = 1 - 0,5 \text{ A}$$

$$= 0,5 \text{ A}$$

$$0 - 3 - 3 = 0$$

$$I^2 = -1$$

$$I^2 = -0,2 - 0,2$$

$$I^2 = I' + I''$$

$$0 + 3 +$$

$$I' = -0,2$$

$$0 + (0,2) + 3(-1)$$

$$I' = -0,2$$

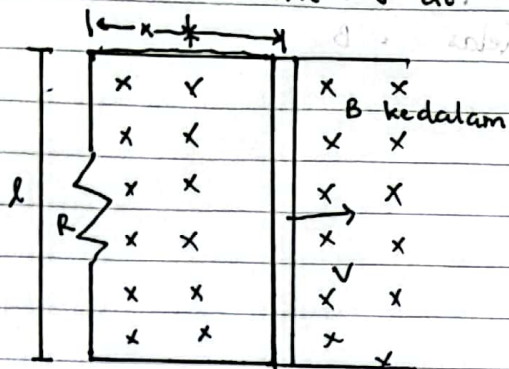
$$I'' = -1,2$$

$$I' + I'' = -1,4$$

$$I' + I'' = -1,4$$

$$I' = -0,2 + 1 = 0,8$$

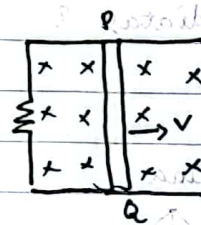
- 2) Perhatikan gambar rangkaian multisimpal di bawah ini! Bagaimana arus mengalir pada setiap simpal?



Jelaskan bagaimana arus bisa mengalir pada kumparan? Gambarkan arah arus pada kumparan tersebut!
Jika medan magnet 20 tesla, kecepatan gerakan kawat 10 m/s, jauh gerakan kawat (l) = 15 m, dan hambatan yg terpasang 10 Ω . Berapa besarnya arus dalam kumparan tersebut?

penyelesaian

$$\begin{aligned}\mathcal{E} &= Blv \sin \theta \\ &= 20 \cdot 15 \cdot 10 \sin 90^\circ \\ &= 3000 \text{ V}\end{aligned}$$



$$I = \frac{\mathcal{E}}{R} = \frac{3000}{10} = 300 \text{ A}$$

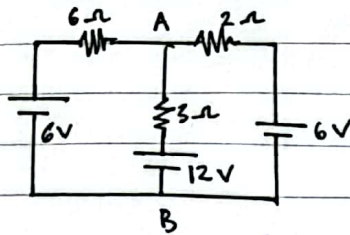
Arus mengalir dari A ke P sesuai kaidah tangan kanan.

$$I = \frac{\mathcal{E}}{R} = \frac{3000}{10} = 300 \text{ A}$$

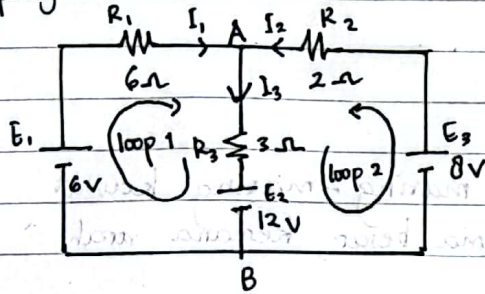
$$I = \frac{\mathcal{E}}{R} = \frac{3000}{10} = 300 \text{ A}$$

3) Perhatikan gambar!

Hitung arus listrik pada setiap hambatan



penyelesaian



$$I_3 = I_1 + I_2$$

loop 1

$$-E_1 + E_2 + 6I_1 + 3I_3 = 0$$

$$-6 + 12 + 6I_1 + 3I_1 + 3I_2 = 0$$

$$9I_1 + 3I_2 + 6 = 0 \quad \dots \text{pers (1)}$$

loop 2

$$-E_3 + E_2 + 2I_2 + 3I_3 = 0$$

$$-8 + 12 + 2I_2 + 3I_1 + 3I_2 = 0$$

$$4 + 5I_2 + 3I_1 = 0 \quad \dots \text{pers (2)}$$

• eliminasi pers (1) dan pers (2)

$$\begin{array}{rcl} 9I_1 + 3I_2 + 6 = 0 & \times 1 & 9I_1 + 3I_2 + 6 = 0 \\ 3I_1 + 5I_2 + 4 = 0 & \times 3 & 9I_1 + 15I_2 + 12 = 0 \\ \hline & & -12I_2 - 6 = 0 \\ & & -12I_2 = 6 \\ & & I_2 = \frac{6}{-12} \end{array}$$

$$I_2 = -0,5 \text{ A}$$

• substitusi

$$3I_1 + 5I_2 + 4 = 0$$

$$3I_1 + 5(-0,5) + 4 = 0$$

$$3I_1 - 2,5 + 4 = 0$$

$$3I_1 + 1,5 = 0$$

$$3I_1 = -1,5$$

$$I_1 = -0,5 \text{ A}$$

$$I_3 = I_1 + I_2$$

$$I_3 = -0,5 + (-0,5)$$

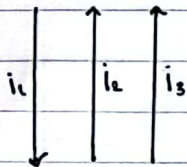
$$I_3 = -1 \text{ A}$$

jadi, $I_1 = 0,5 \text{ A}$

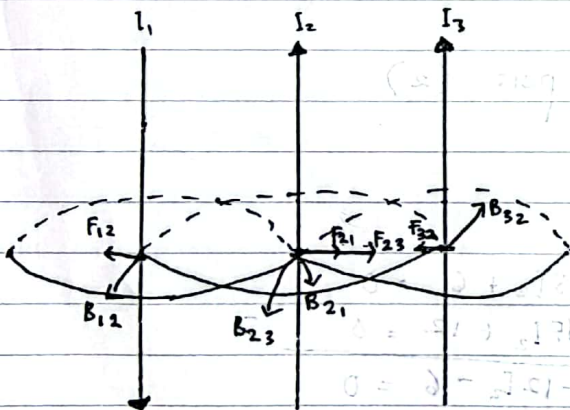
$$I_2 = 0,5 \text{ A}$$

$$I_3 = 1 \text{ A}$$

4) Gambar gaya-gaya yg dialami oleh masing-masing kawat berikut ini, jika arus 1 dan jarak sama besar, kemana arah gerakan kawat 1, 2 dan 3?



penyelesaian



- Arah gaya kawat (1) yg dipengaruhi kawat (2) $\rightarrow F_{12}$ ke kiri

- arah gaya kawat (2) yg dipengaruhi kawat (1) $\rightarrow F_{21}$ adalah ke kanan

- arah gaya kawat (2) yg dipengaruhi kawat (3) $\rightarrow F_{23}$ ke kanan

- arah gaya kawat (3) dipengaruhi kawat (2) $\rightarrow F_{32}$ ke kiri

- arah gerakan = arah gayanya.