

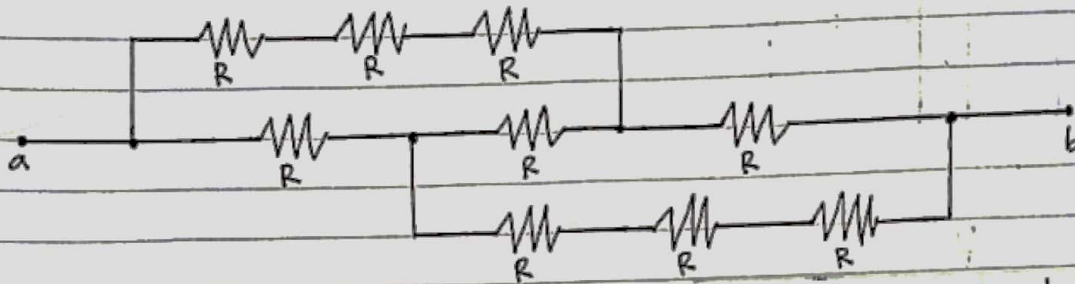
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Kelas B

Ujian Akhir Semester

1. Perhatikan Gambar

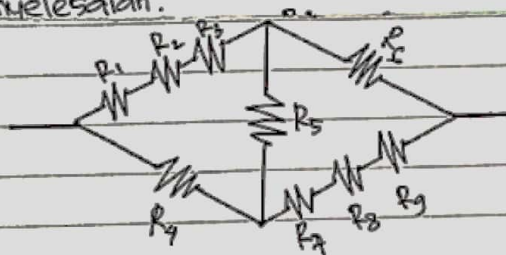


Jika $R = 5 \text{ ohm}$ dan terpasang seperti pada gambar diatas, hitunglah

a. Hambatan Pengantunya.

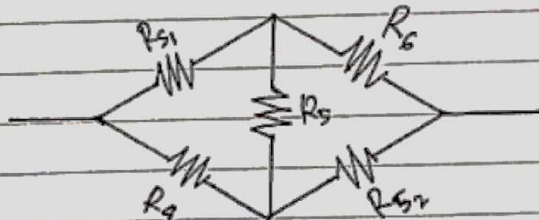
b. Jika $V_{ab} = 10 \text{ volt}$ bagaimana arus pada setiap hambatan

Penyelesaian.



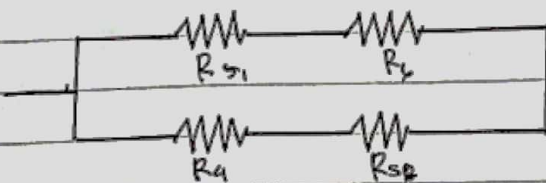
$$\begin{aligned} \Rightarrow R_{s1} &= R_1 + R_2 + R_3 \\ &= 5 + 5 + 5 \\ &= 15 \Omega \end{aligned}$$

$$\begin{aligned} \Rightarrow R_{s2} &= R_7 + R_8 + R_9 \\ &= 5 + 5 + 5 \\ &= 15 \Omega \end{aligned}$$

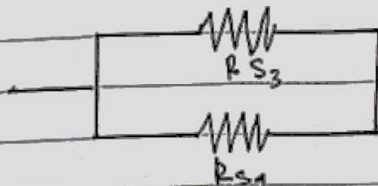


$$\begin{aligned} \Rightarrow R_{s1} \cdot R_6 &= R_4 \cdot R_{s2} \\ 15 \cdot 5 &= 5 \cdot 15 \\ 75 &= 75 \end{aligned}$$

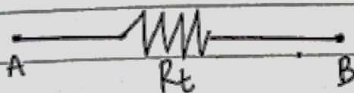
Sehingga R_5 tidak dialiri arus



$$\begin{aligned} \Rightarrow R_{s3} &= R_{s1} + R_6 \\ &= 15 + 5 \\ &= 20 \end{aligned}$$



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



$$\Rightarrow \frac{1}{R_t} = \frac{1}{R_{s3}} + \frac{1}{R_{s4}}$$

$$= \frac{1}{20} + \frac{1}{20} = \frac{2}{20}$$

$$R_t = 10 \Omega$$

$$b). V_{ab} = 10 \text{ Volt}$$

$$\Rightarrow I_t = \frac{V_{ab}}{R_t}$$

$$= \frac{10}{10}$$

$$= 1 \text{ A}$$

$$\Rightarrow I_{R3} = \frac{R_{S3}}{R_{S3} + R_{S4}} \cdot 1$$

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

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

$$\Rightarrow I_{R4} = 1 - 0,5 \text{ A}$$

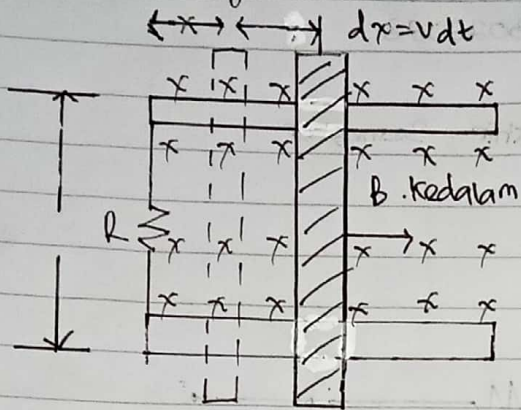
$$= 0,5 \text{ A}$$

$$\Rightarrow I_1 = I_2 = I_3 = I_6 = I_{R3} = 0,5 \text{ A}$$

$$\Rightarrow I_4 = I_7 = I_8 = I_9 = I_{R4} = 0,5 \text{ A}$$

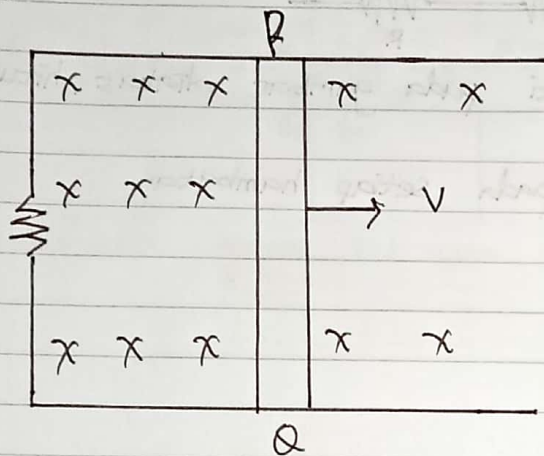
$$\Rightarrow I_5 = 0 \text{ A}$$

2. Perhatikan gambar berikut! Bagaimana arus mengalir



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

Penyelesaian:



$$\Rightarrow \mathcal{E} = B l v \cdot \sin \theta$$

$$= 20 \times 15 \times 10 \times \sin 90^\circ$$

$$= 20 \times 150 \times 1$$

$$= 3.000 \text{ V}$$

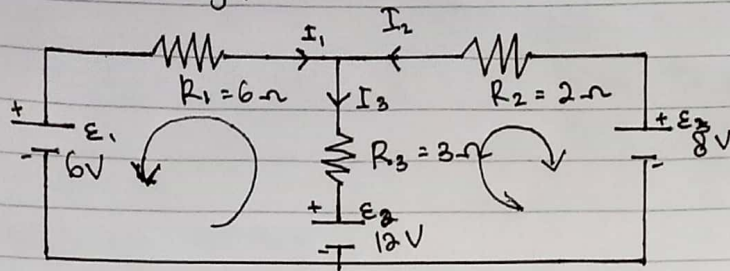
$$\Rightarrow I = \frac{\mathcal{E}}{R}$$

$$= \frac{3.000}{10}$$

$$= 300 \text{ A}$$

Jadi I mengalir dari Q ke P sesuai kardah tangan kanan.

3. Perhatikan gambar



Loop I

$$E_1 - E_3 + I_1 \cdot R_1 + I_3 \cdot R_3 = 0$$

$$6 - 12 + 6I_1 + 3I_3 = 0$$

$$-6 + 6I_1 + 3(I_1 + I_2) = 0$$

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

$$-6 + 9I_1 + 3I_2 = \dots (1)$$

Loop II

$$E_2 - E_3 + I_2 \cdot R_2 + I_3 \cdot R_3 = 0$$

$$8 - 12 + 2I_2 + 3I_3 = 0$$

$$-4 + 2I_2 + 3(I_1 + I_2) = 0$$

$$-4 + 5I_2 + 3I_1 = 0 \dots (2)$$

⇒ Eliminasi Pers 1 dan Pers 2

$$\begin{array}{rcl} 9I_1 + 3I_2 = 6 & | \times 1 | \\ 3I_1 + 5I_2 = 4 & | \times 3 | \end{array}$$

$$9I_1 + 3I_2 = 6$$

$$9I_1 + 15I_2 = 12$$

$$-12I_2 = -6$$

$$I_2 = \frac{-6}{-12}$$

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

⇒ Substitusikan $I_2 = 0,5 \text{ A}$ ke Pers 1

$$9I_1 + 3I_2 = 6$$

$$9I_1 + 3(0,5) = 6$$

$$9I_1 = 6 - 1,5$$

$$9I_1 = 4,5$$

$$I_1 = \frac{4,5}{9}$$

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

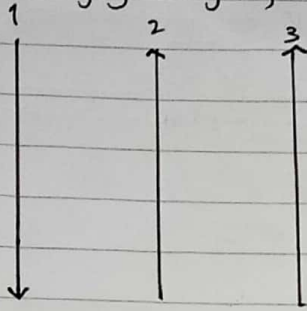
$$\Rightarrow I_3 = I_1 + I_2$$

$$= 0,5 + 0,5$$

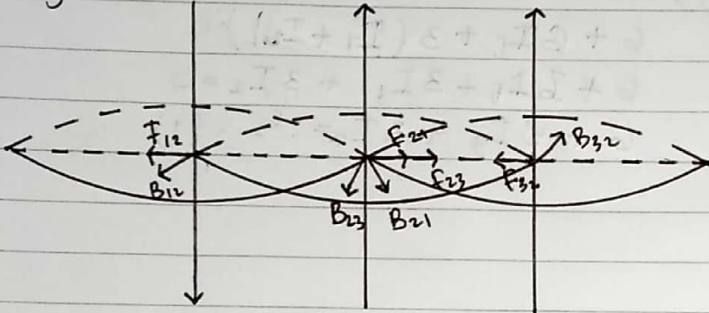
$$= 1 \text{ A}$$

$$\text{Jadi } \begin{array}{l} I_1 = 0,5 \text{ A} \\ I_2 = 0,5 \text{ A} \\ I_3 = 1 \text{ A} \end{array}$$

4. Gambar gaya² yang diarusi oleh masing² kawat



Penyelesaian:



→ arah gaya kawat (1) yang dipengaruhi kawat (2) → F_{12} adalah kekiri
 arah gaya kawat (2) yg dipengaruhi kawat (1) → F_{21} adalah kekanan
 arah gaya kawat (2) yg dipengaruhi kawat (3) → F_{23} adalah kekanan
 arah gaya kawat (3) yg dipengaruhi kawat (2) → F_{32} adalah kekiri
 arah gerakan sama dengan arah gayanya.