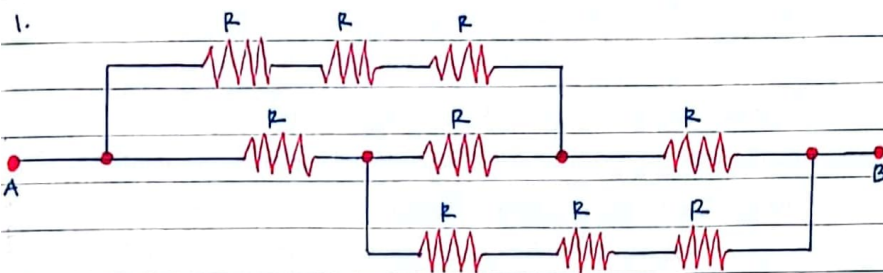


Nama : Intan Khasana

NPM : 2323022006

UAS ELEKTRODINAMIKA (Sabtu, 08 Juni 2024)



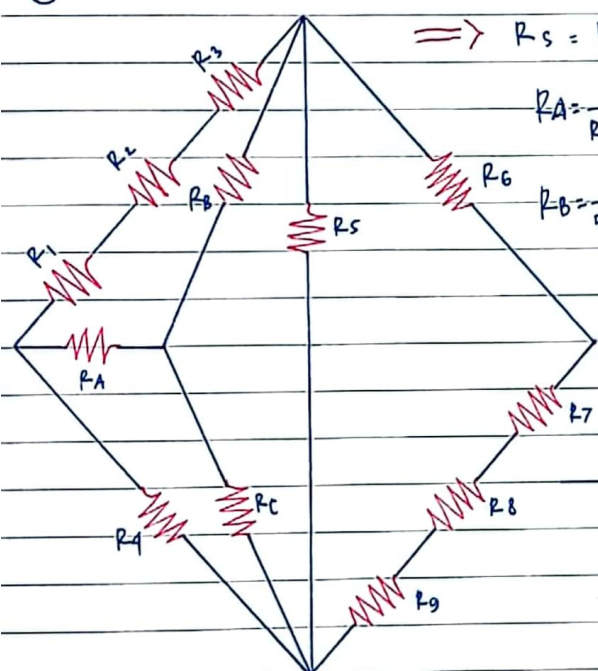
Jika $R = 5$ Ohm dan terpasang seperti pada gambar di atas, hitung

a. Hambatan Pengganti

b. Jika $V_{AB} = 10$ Volt, bagaimana arus pada setiap hambatan pada rangkaian di atas ?

Penyelesaian :

(a) Hambatan Pengganti = ... ?

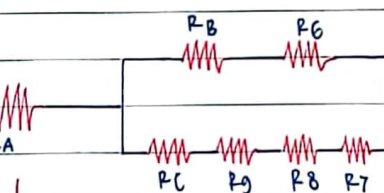


$$\Rightarrow R_s = R_1 + R_2 + R_3 = 5 + 5 + 5 = 15 \Omega$$

$$R_A = \frac{R_s \cdot R_A}{R_1 + R_2 + R_3 + R_4} = \frac{15 \cdot 5}{5 + 5 + 5 + 5} = \frac{75}{20} = 3,75 \Omega$$

$$R_B = \frac{15 \cdot 5}{5 + 5 + 5 + 5} = \frac{75}{20} = 3,75 \Omega$$

$$R_C = \frac{5 \cdot 5}{5 + 5} = \frac{25}{10} = 2,5 \Omega$$



$$R_{S1} = R_B + R_C = 3,75 + 5 = 8,75 \Omega$$

$$R_{S2} = R_C + R_D + R_E + R_F = 2,5 + 5 + 5 + 5 = 17,5 \Omega$$

$$\frac{1}{R_P} = \frac{1}{R_{S1}} + \frac{1}{R_{S2}}$$

$$\frac{1}{R_P} = \frac{1}{8,75} + \frac{1}{17,5}$$

$$\frac{1}{R_P} = \frac{17,5 + 8,75}{153,125} = \frac{26,25}{153,125}$$

$$R_P = \frac{153,125}{26,25}$$

$$R_P = 5,83 \Omega$$

$$R_{total} = R_A + R_P$$

$$= 3,75 + 5,83$$

$$R_{total} = 9,58 \Omega //$$

(b) Arus = ... ?

Diket : $V_{AB} = 10$ Volt

$R = 9,58 \Omega$

Dit : $I = \dots ?$

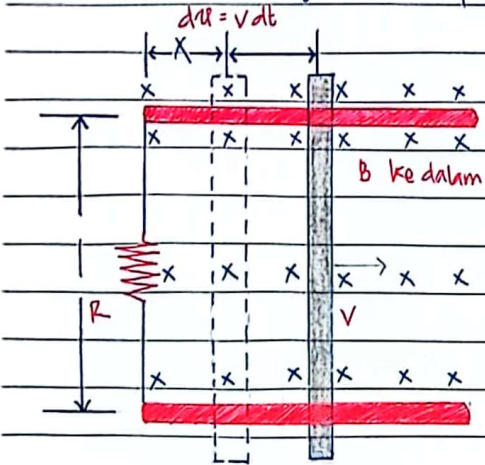
$$\text{Jawab : } I = \frac{V}{R}$$

$$I = \frac{10}{9,58}$$

$$I = 1,04 \text{ A} //$$



2. Perhatikan Gambar rangkaian multisipal 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 yang terpasang 10 ohm. Berapa besarnya arus dalam kumparan tersebut?

Penyelesaian ↓

Diket : $B = 20$ Tesla (Arah arus ke kiri atau berlawanan dengan arah gerakan batang konduktor (v))
 $l = 15$ m
 $v = 10$ m/s
 $R = 10 \Omega$

Dit : $I = \dots ?$

Jawab :

• Tegangan yang diinduksi

$$V = B \cdot l \cdot v$$

$$V = 20 \text{ Tesla} \cdot 15 \text{ m} \cdot 10 \text{ m/s}$$

$$V = 3000 \text{ Volt}$$

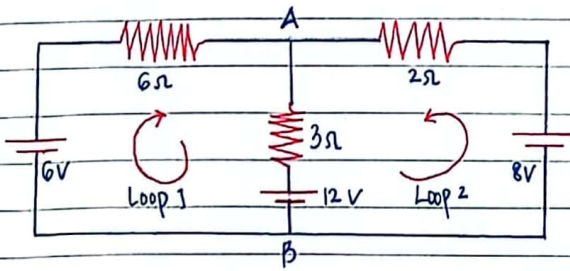
• Besar Arus

$$I = \frac{V}{R}$$

$$I = \frac{3000}{10}$$

$$I = 300 \text{ A}$$

3.



$$I_3 = I_1 + I_2$$

$$I_1 = I_3 - I_2$$

Hitung arus listrik pada setiap hambatan! **Penyelesaian:**

Loop I

$$\sum V + \sum IR = 0$$

$$(-6 + 12) + (I_1 \cdot 6) + (I_3 \cdot 3) = 0$$

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

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

$$6(I_3 - I_2) + 3I_3 = -6$$

$$6I_3 - 6I_2 + 3I_3 = -6$$

$$9I_3 - 6I_2 = -6$$

Loop II

$$\sum V + \sum IR = 0$$

$$(-8 + 12) + (I_2 \cdot 2) + (I_3 \cdot 3) = 0$$

$$4 + 2I_2 + 3I_3 = 0$$

$$2I_2 + 3I_3 = -4$$

$$\begin{array}{l|l} 9I_3 - 6I_2 = -6 & \cdot 1 \\ 3I_3 + 2I_2 = -4 & \cdot 3 \end{array}$$

$$\begin{array}{l|l} 9I_3 - 6I_2 = -6 & \cdot 1 \\ 9I_3 + 6I_2 = -12 \end{array}$$

$$-12I_2 = 6$$

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

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

$$2I_2 + 3I_3 = -4$$

$$2(-0,5) + 3I_3 = -4$$

$$-1 + 3I_3 = -4$$

$$3I_3 = -4 + 1$$

$$I_3 = \frac{-3}{3}$$

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

$$I_3 = I_1 + I_2$$

$$-1 = I_1 + (-0,5)$$

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

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

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

Jadi, arus di setiap hambatan sebesar

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

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

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



4. Menggambar gaya-gaya yang dialami oleh masing-masing kawat dengan arus I dan jarak sama besar.

