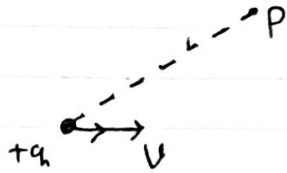


KALISMA

27/5 2024

Medan magnet

1. Medan oleh muatan bergerak

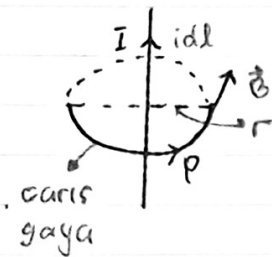


$$\vec{B} = \frac{\mu_0}{4\pi} \frac{q_h \vec{v} \times \vec{r}_0}{r^2}$$

$$= \frac{\mu_0 q_h v}{4\pi r^2} \sin \theta$$

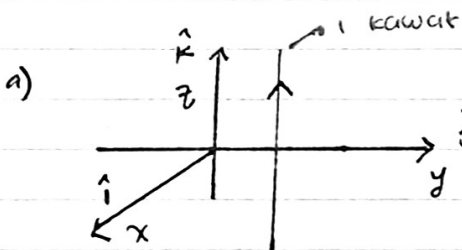
$\vec{B}$ = medan magnet

2. Medan magnet ($\vec{B}$) oleh arus listrik



$$\vec{B} = \frac{\mu_0}{4\pi} \frac{idl \times \vec{r}_0}{r^2}$$

Contoh:

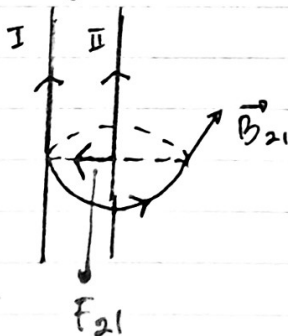


$$\vec{B} = \frac{\mu_0}{4\pi} \frac{idl \hat{k} \times \hat{j}}{r^2}$$

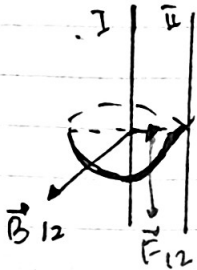
$$= \frac{\mu_0}{4\pi} \frac{idl}{r^2} \sin \theta (-\hat{i})$$

$\hat{k} \times \hat{j}$ hasilnya $(-\hat{i})$
 $\hat{j} \times \hat{k}$ hasilnya $(\hat{i})$

b) Medan magnet kawat 2 terhadap kawat 1

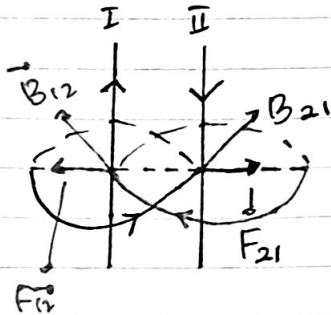


c) Medan magnet kawat 1 terhadap kawat 2

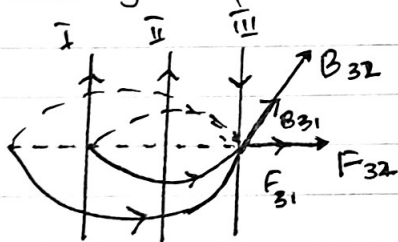


Contoh soal!

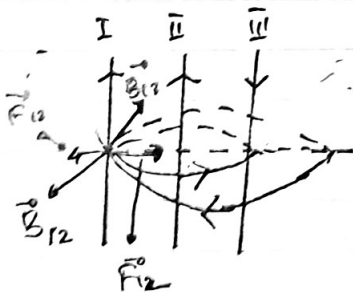
1)



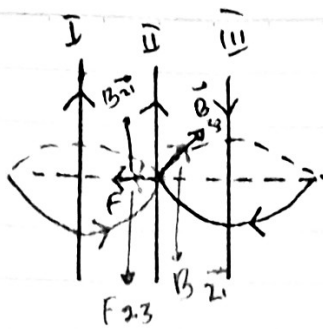
2) Medan magnet pada kawat berjumlah 3.



} kawat 1 dan 2 terhadap kawat 3

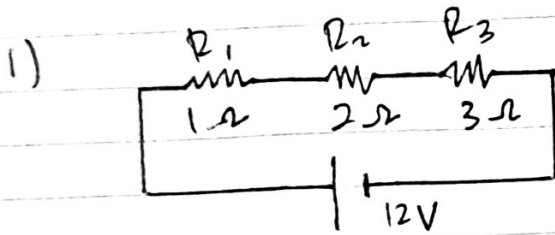


} kawat 2 dan 3 terhadap kawat 1



} kawat 1 dan 3 terhadap kawat 2

Kuis !



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- a) Hitung arus pada R_3
 b) Hitung tegangan pada R_2

Jawab :

$$\begin{aligned} 1) \quad R_t &= R_1 + R_2 + R_3 \\ &= 1 + 2 + 3 \\ R_t &= 6\Omega \end{aligned}$$

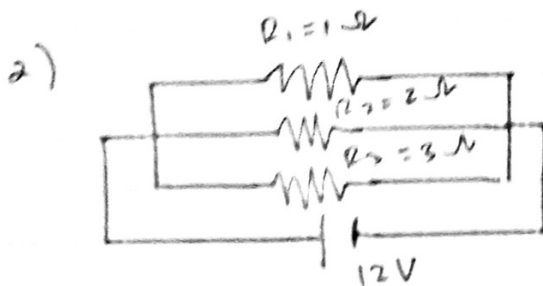
$$\begin{aligned} I_3 &= \frac{V}{R} \\ &= \frac{12}{6} \end{aligned}$$

$$= 2A \quad \checkmark$$

Jadi nilai arus pada R_3 yaitu 2 Ampere

$$\begin{aligned} b) \quad V_2 &= R_2 \cdot I \\ &= 2 \cdot 2 \\ &= 4 \text{ Volt} \quad \checkmark \end{aligned}$$

Jadi nilai tegangan pada R_2 yaitu 4 Volt.



- a) Hitung arus pada R_3
 b) Hitung tegangan pada R_2

Jawab :

$$\begin{aligned} a) \quad I_3 &= \frac{V}{R} \\ &= \frac{12}{3} \\ &= 4 \text{ Ampere} \quad \checkmark \end{aligned}$$

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Jadi arus pada R_3 yaitu 4 Ampere

$$\begin{aligned} b) \quad \frac{1}{R} &= \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} \\ \frac{1}{R} &= \frac{1}{1} + \frac{1}{2} + \frac{1}{3} \\ \frac{1}{R} &= \frac{3}{6} \\ R &= 2 \Omega \end{aligned}$$

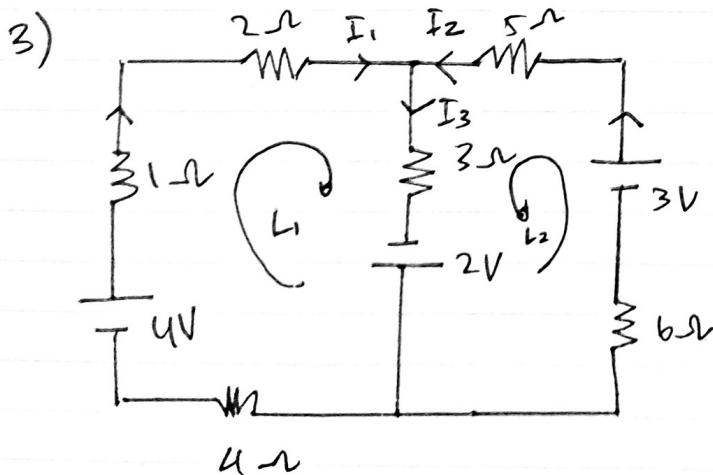
$$V = I \times R$$

$$I_{\text{tot}} = \frac{V}{R_{\text{tot}}}$$

$$I_{\text{tot}} = \frac{12}{2}$$

$$I_{\text{total}} = 6 \text{ Ampere}$$

$$\begin{aligned} V &= I \cdot R \\ &= 6 \cdot 2 \\ &= 12 \text{ Volt} \quad \checkmark \end{aligned}$$



Hitung arus tiap loop
(I_1, I_2, I_3)

Loop I =

$$\sum \mathcal{E} + \sum I R = 0$$

$$-4V - 2V + I_1(1+2+4) + I_3(3) = 0$$

$$-6V + I_1(7) + I_3(3) = 0$$

$$7I_1 + 3I_3 = 6V$$

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Loop II =

$$\sum \mathcal{E} + \sum I R = 0$$

$$-3V - 2V + I_2(5\Omega + 6\Omega) + I_3(3\Omega) = 0$$

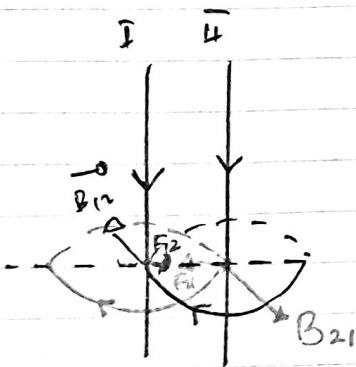
$$-5V + I_2(11\Omega) + I_3(3\Omega) = 0$$

$$11I_2 + 3I_3 = 5V$$

4)



tambarkan medan magnet, garis gaya dan arah arus!



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