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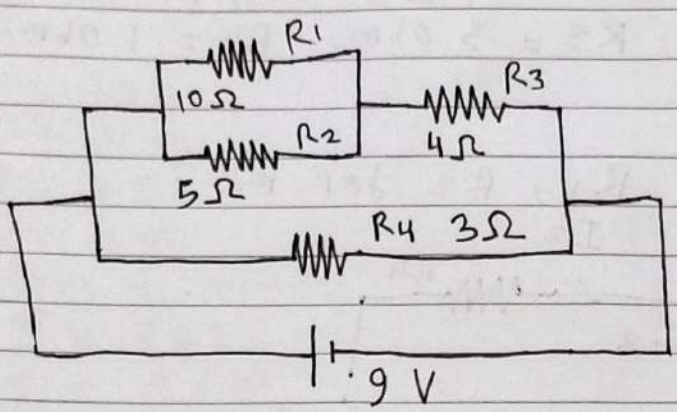
Fisika Dasar II

UAS semester 2

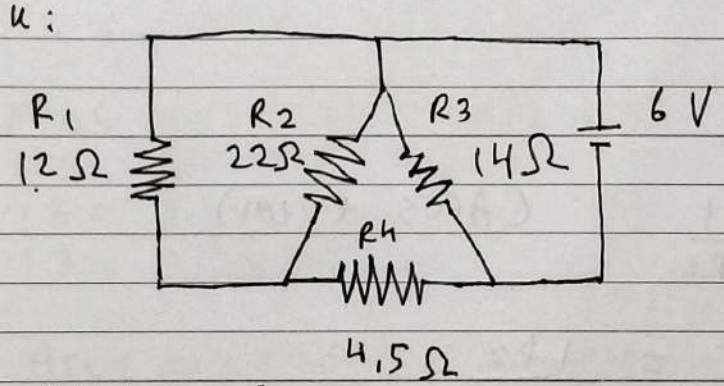
No
Date

1. Diket :



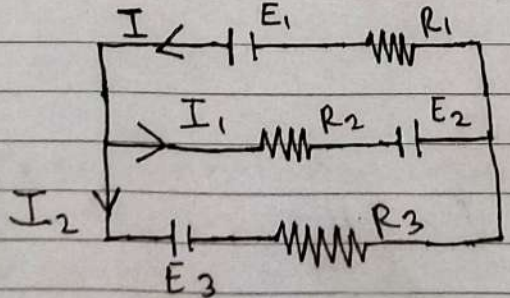
a. Berapakah arus total yg mengalir dalam rangkaian?
b. Berapakah arus yg mengalir pada masing2 resistor?
c. Berapakah tegangan yg mengalir pada masing2 resistor?

2. Diket :



Dit : a. Berapakah R total?
b. Berapakah arus pada masing2 resistor?

3. Diket : E1 = 16 V, E2 = 8 V, E3 = 10 V
R1 = 12 ohm, R2 = 6 ohm, R3 = 6 ohm
Dit : Berapakah arus pada R1, R2, dan R3?



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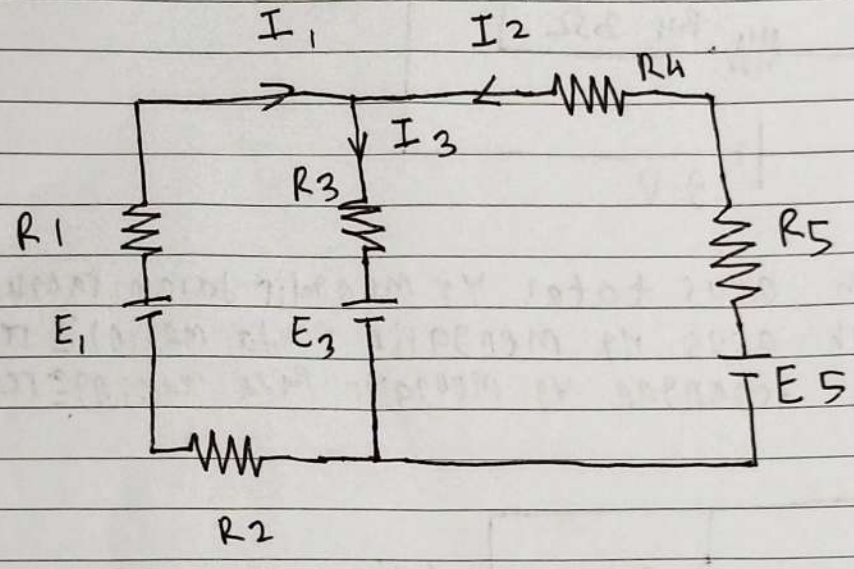
4. Dik: $E_1 = 10V$, $E_2 = 10V$, $E_3 = 4V$, $R1 = 5$ ohm, $R2 = 1$ ohm, $R3 = 3$ ohm, $R4 = 1$ ohm, $R5 = 5$ ohm.

Dit: Daya pada R_1, R_2 dan $R3$?



Jawaban

1. a. $\frac{1}{r_1} = \frac{1}{R_1} + \frac{1}{R_2}$ (Arus total)

$\frac{1}{r_1} = \frac{1}{10} + \frac{1}{5} = \frac{1+2}{10} = \frac{3}{10}$

$r_1 = \frac{10}{3} + 4 = \frac{10+12}{3} = \frac{22}{3}$ ohm $= 7,334$ ohm

$\frac{1}{r_2} = \frac{1}{7,334} + \frac{1}{3} = 0,334$ ohm

$I = \frac{V}{r} = \frac{9}{0,334}$

$= 26,946$ A //

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b. Berapakah arus yg mengalir pada masing² resistor?

$R_1 = 10\,\Omega$ $V = 9\,V$
$R_2 = 5\,\Omega$
$R_3 = 4\,\Omega$
$R_4 = 3\,\Omega$

* Arus yg mengalir pada R1
$I_1 = V_{R1} / R_1$
$I_1 = 9 / 10$
$I_1 = 0,9\,A$ //

* Arus yg mengalir pada R2
$I_2 = V_{R2} / R_2$
$I_2 = 9 / 5$
$I_2 = 1,8\,A$ //

C.* Arus yg mengalir pada R3
$I_3 = V_{R3} / R_3$
$I_3 = 9 / 4$
$I_3 = 2,25\,A$ //

* Arus yg mengalir pada R4
$I_4 = V_{R4} / R_4$
$I_4 = 9 / 3$
$I_4 = 3\,A$ //

÷ Tegangan yg mengalir pada R1
$V = I . R$
$V = 0,9 . 10$
$V = 9$ volt //

÷ Tegangan yg mengalir pada R2
$V = I . R$
$V = 1,8 . 5$
$V = 9$ volt //

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∴ Tegangan yg mengalir pada R3
V = I . R
V = 2,25 A . 4
V = 9 Volt //

* Tegangan yg mengalir pada R4
V = I . R
V = 3 . 3
V = 9 volt //

2. a. Rt = R1 + R2 + R3 + R4
= 12 + 22 + 14 + 4,5
= 52,5 ohm

b. * Arus pada R1
I1 = VR1 / R1
I1 = 6 / 12
I1 = 0,5 A

* Arus pada R2
I2 = VR2 / R2
I2 = 6 / 22
I2 = 0,272 A

* Arus Pada R3
I3 = VR3 / R3
I3 = 6 / 14
I3 = 0,428 A

* Arus Pada R4
I4 = VR4 / R4
I4 = 6 / 4,5
I4 = 1,33 A

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3. $I_1 + I_2 + I_3 = 0$

$(V - \varepsilon 1)/R1 + (V - \varepsilon 2)/R2 + (V - \varepsilon 3)/R3 = 0$

$(V - 16)/12 + (V - 8)/6 + (V - 10)/6 = 0$

semua ruas dikalikan 12, menjadi:

$(V - 16) + 2.(V - 8) + 2.(V - 10) = 0$

$V - 16 + 2V - 16 + 2V - 20 = 0$

$5V - 52 = 0$

$5V = 52$

$V = \frac{52}{5}$

$V = 10,4$ Volt

* ARUS 1

$I1 = (V - 16)/12$

$I1 = (10,4 - 16)/12$

$I1 = -5,6/12$

$I1 = -0,4667$ A

* ARUS 2

$I2 = (V - 8)/6$

$I2 = (10,4 - 8)/6$

$I2 = 2,4/6$

$I2 = 0,4$ A

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* Arus 3

$I_3 = (V - (0)) / 6$

$I_3 = (10,4 - 10) / 6$

$I_3 = 0,4 / 6$

$I_3 = 0,067\ A$

4. Dik :

$E_1 = 10\ V$ $\quad R_1 = 5\ ohm$

$E_2 = 10\ V$ $\quad R_2 = 1\ ohm$

$E_3 = 4\ V$ $\quad R_3 = 3\ ohm$

$R_4 = 1\ ohm$

$R_5 = 5\ ohm$

Step 1

$I_3 = I_1 + I_2$

$E_3 + E_1 R = 0$

$E_1 + E_3 + (R_1 + R_3) I_1 + R_3 . I_3 = 0$

$10 + 4 + (5+1) I_1 + 3 I_3 = 0$

$14 + 9 I + 3 + 2 = 0$

$9 I + 3 I_2 = 14$

step 2

$E_2 + E_3 + (R_4 + R_3) I_2 + R_3 . I_3 = 0$

$10 + 4 + (1+5) I_2 + 3 . I_3 = 0$

$14 + 9 I_2 - 3 I_1 = 0$

$-3 I_1 + 9 I_2 = -14$

$9 I_1 + 3 I_2 = 14 \quad |\times 3|$

$-3 I_1 + 9 I_2 = 14 \quad |\times 9|$

$-27 I_1 - 9 I_2 = 42$

$-27 I_1 + 81 I_2 = 126$ $-$

$-90 I_2 = -84$

$I_2 = \frac{-84}{-90} = \frac{28}{30} = \frac{14}{15}$

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$$81I_1 + 27I_2 = 126$$
$$-9I + 27I_2 = 42$$

$$90I_1 = 84$$
$$I_1 = \frac{14}{15}$$

$$I_3 = I_1 + I_2 = \frac{14}{15} + \frac{14}{15}$$
$$= \frac{28}{15} \text{ A}$$

$$P = I_3 \cdot 2 \cdot R_3$$
$$= \frac{28}{15} \cdot 2 \cdot 3$$
$$= 11{,}2 \text{ watt}$$

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