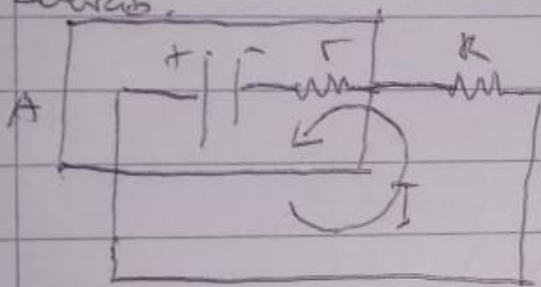1. Resistor 11 Ω dihubungkan baterai 6 volt dengan resistansi dalam r = 1 Ω

a. arus di rangkaian

b. tegangan kedua ujung baterai

c. daya dari baterai

d. daya untuk resistor luar

e. daya yang hilang oleh resistansi dalam

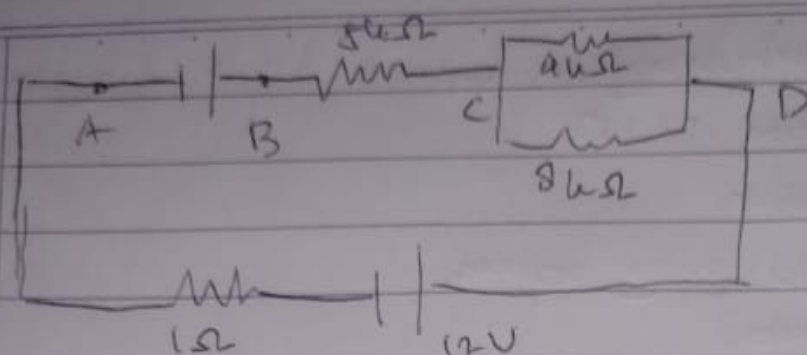f. jumlah energi baterai bila berkemampuan 150 A/jam

Jawab.

a) $I = \dfrac{\varepsilon}{r+R} = \dfrac{6}{1+11} = 0,5\ A$

b) $V_A - V_B = IR = (0,5\ A)(11\ \Omega) = 5,5\ V$

c) $P = I\varepsilon = 0,3(6)\ V_A$

$\qquad = 5\ V_A$

$\qquad = 3\ Joule/sec$

$\qquad = 3\ watt$

d) $P = RI^2 = 11(0,5)^2 = 2,75\ W$

e) $P = rI^2 = 1(0,5)^2 = 0,25\ W$

f) $150\ A/jam = (150 \div 3600)\ A/s = (50 \times 3600)\ C$

$w = q\varepsilon = (15\ A) \cdot \left(\dfrac{3600\ C}{14}\right)(6V) = 3,2\ A_4$

2.

$V_{BA} = ?$

$$\frac{1}{R_{CD}} = \frac{1}{4} + \frac{1}{8} = \frac{3}{8}$$

$V_{CD} = I_{CD} \cdot R_{CD}$
   $= I_{4k} R_{4k}$
   $= (3.5 \cdot 10^{-3} A)(4 \cdot 10^3 \Omega)$
   $= 14 V$

$V_{CD} = I_{4k\Omega} = V_{8k\Omega}$
$V_{CD} = I_{8k\Omega} R_{8k\Omega} = 14 V$
                                   $= I_{8k\Omega}(8 \cdot 10^3 \Omega)$
$I_{8k\Omega} = \dfrac{14 V}{(8 \cdot 10^3 \Omega)} = 1.75 mA$

$I = I_{tot} = I_{4k} + I_{8k}$
         $= 3.5 mA + 1.75 mA$
         $= 5.25 mA$

$V_{ABCDEA} = \Sigma IR_s - \Sigma \varepsilon_s$

$0 = I(R_{BC} + R_{CD} + R_{EA}) - (-12 + V_{BA})$

$-12 + V_{BA} = (5{,}75 . 10^{-3} A)(8{,}67 . 10^{3} \Omega)$

$-12 + V_{BA} = 45{,}5$

$V_{BA} = 57{,}5 \ V$

5.

$\varepsilon_1 = 12 V$

$\varepsilon_2 = 5 V$

$R_1 = 4 \Omega$

$R_2 = 2 \Omega$

$R_3 = 3 \Omega$
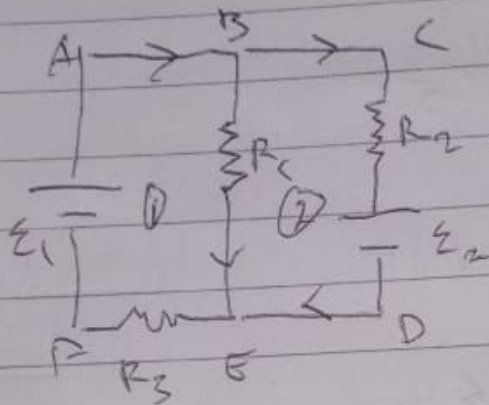
① $I = I_1 + I_2$

② loop $\widehat{I}$

$\varepsilon_1 - I_1 R_1 - I R_3 = 0$

loop $\widehat{II}$

$-I_2 R_2 - \varepsilon_2 + I_1 R_1 = 0$

→ Subs I dgn $I_1 + I_2$

(1)... $12 - 4I_1 - 3(I_1 + I_2) = 0 \quad \begin{vmatrix} \times 2 \\ \times 5 \end{vmatrix}$

(2)... $-2I_2 - 5 + 4I_1 \qquad 7 \ 0$

(3)... $\qquad I_1 + I_2 = I$

$24 - 8I_1 - 6(I_1 + I_2) = 0$

$-6I_2 - 13 + 12 I_1 = 0$

$I_1 = 45 A$

I_1 = I_e (L)

$I_2 = 0,5 A$

pera (s) $I = I_4 + I_2$

$I = 1.5 + 0.5 = 2 A$

$V_{CD} = \xi I_3 R_3 - \xi \varepsilon_3$

$V_{CD} = I_2 R_2 - (-\varepsilon_2)$

$\quad = 0.5 (2) + 5 \varepsilon_2)$

$\quad = 6 V$

$V_{EF} = I R_3 = 6 Volt$

$V_{ABEFA} = \xi I R - \xi \varepsilon$

$\quad 0 = + I_1 (R_1 + R_2) - I_2 R_2 - (-\varepsilon_1 + \varepsilon_2)$

$I_1 (2 + 4) - 4 I_2 = (-20 + 10)$

$\quad 6 I_1 - 4 I_2 = -10$

$\quad 3 I_1 - 2 I_2 = -5 \dots (1)$

$\quad 0 = + I_2 (R_2 + R_3 - I_2 R_2 - (-\varepsilon_3)$

$\quad 0 = + I_2 (4 + 5) - 4 I_1 - (-30)$

$\quad 9 I_2 - 4 I_1 = -30 \dots (2)$

$12 I_1 - 8 I_2 = -20$

$\underline{27 I_2 - 12 I_1 = -90} +$

$\quad 19 I_2 = -110$

$\quad I_2 = -5,79 A \dots (3)$

pers (3) ke pers (1)

$3I_1 - 2I_2 = -5$

$3I_1 - 2(-5,79) = -5$

$$I_1 = \frac{2}{3}(-5,79) - \frac{5}{3}$$

$$= -5,53$$

$V_{AF} = \Sigma IR - \Sigma \xi$

$\quad = -I_1 R_2 = -(-5,53)(2)$

$\quad = 11,06 \ V$

$V_{BE} = \Sigma IR - \Sigma \xi$

$\quad = (+I_1 - I_2) R_2$

$\quad = [-5,53 - (-5,79)] \ 4$

$\quad = 1,05 V$

$V_{BD} = \Sigma IR - \Sigma \xi$

$\quad = I_2 R_3 - (\xi_3)$

$\quad = [4(-5,79A) - (-30V)]$

$\quad = 1,05 \ V$

$V_{BE} = V_{BD}$ dengan arah berbeda