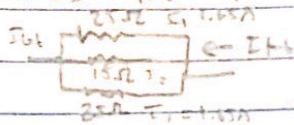


# Physics 1B HW #10

26.6)  $A_{\text{tot}} = 1.65 \text{ A}$



$$I_{\text{tot}} = 2I_1 + I_2$$

$$V = IR$$

a)  $V = (1.65 \text{ A}) 25 \Omega$

$$V = 41.25 \text{ V}$$

$$41.25 \text{ V} = I_2 (15 \Omega)$$

$$I_2 = 2.75 \text{ A}$$

$$I_{\text{tot}} = 6.05 \text{ A}$$

$$V = IR = 6.05 \text{ A} (45 \Omega)$$

$$V = 272.25 \text{ V}$$

b)  $\mathcal{E} = V_1 + V_2 + V_3$

$$V_3 = 35 \Omega (6.05 \text{ A})$$

$$= 211.75 \text{ V}$$

$$V_1 = I (R_{\text{eq}})$$

$$1/R_{\text{eq}} = \frac{1}{25 \Omega} + \frac{1}{25 \Omega} + \frac{1}{15 \Omega}$$

$$R_{\text{eq}} = 6.82 \Omega$$

$$V_1 = 6.05 \text{ A} (6.82 \Omega) = 41.25 \text{ V}$$

$$\mathcal{E} = 525.25 \text{ V}$$

26.11)  $R_1 = 3 \Omega, R_2 = 8 \Omega, R_3 = 4 \Omega$

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

a)  $V = IR$

$$V = 5 \text{ A} (8 \Omega) = 40 \text{ V}$$

$$40 \text{ V} = I_1 (3 \Omega) = 13.33 \text{ A}$$

b)  $I_3 = I_{\text{tot}} = I_1 + I_2$

$$I_3 = 18.33 \text{ A}$$

c)  $\mathcal{E} = V_1 + V_2$

$$V_1 = I R_{\text{eq}}$$

$$1/R_{\text{eq}} = \frac{1}{3 \Omega} + \frac{1}{8 \Omega} = 2.18 \Omega$$

$$V_1 = 40 \text{ V}$$

$$V_2 = I (4 \Omega) = 73.3 \text{ V}$$

$$\mathcal{E} = 113.31 \text{ V}$$

26.18)  $\mathcal{E} = 71 \text{ V}, R_1 = 4 \Omega, R_2 = 6 \Omega, R_3 = 3 \Omega$

a)  $V_{ab} = IR_2$

$$\mathcal{E} = I (R_2 + R_3)$$

$$71 \text{ V} = I (7 \Omega)$$

$$I_0 = 7.89 \text{ A}$$

$$V_{ab} = 47.33 \text{ V}$$

b)  $\frac{1}{R_{\text{eq}}} = \frac{1}{R_1} + \frac{1}{R_2} = \frac{1}{4 \Omega} + \frac{1}{6 \Omega}$

$$R_{\text{eq}} = 2.4 \Omega$$

$$\mathcal{E} = I (R_{\text{eq}} + R_3)$$

$$I_0 = 12.15 \text{ A}$$

$$V_{ab} = I (R_{\text{eq}})$$

$$V_{ab} = 31.56 \text{ V}$$

c)  $0 \text{ A}$

d)  $V = IR$

$$31.56 = I (4 \Omega)$$

$$I = 7.89 \text{ A}$$

e)  $I_0 = 7.89 \text{ A}$

f)  $I_0 = 12.15 \text{ A}$

$$I_0 - I_1 = I_2$$

$$I_2 = 5.26 \text{ A}$$

g)  $I = 7.89 \text{ A}$

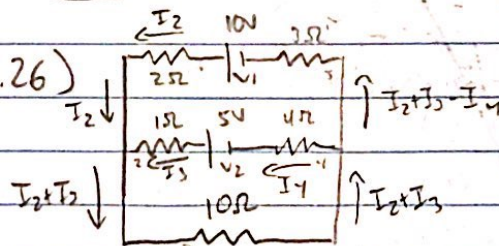
h)  $I_0 = 12.15 \text{ A}$

i)  $R_1 \rightarrow \text{inc.}$

$$R_2 \rightarrow \text{dec.}$$

$$R_3 \rightarrow \text{inc.}$$

26.26)



a)  $V = 0 = I (R_2 + R_3 + R_4)$

$$R_{\text{eq}} = 3.33 \Omega + 8.33 \Omega$$

$$V = IR, I = 0.6 \text{ A}$$

$$V = 4 \text{ V}, R = 5$$

$$I = 0.8 \text{ A}$$



b)  $V = IR, R = 5\Omega$

$I = 0.2A$

c)  $I = 0.6A$

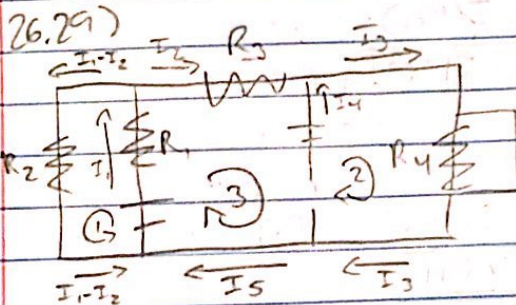
d)  $V_A = 0.8A(3\Omega)$

$V_A = 2.4V$

$V_B = 0.2A(4\Omega)$

$V_B = 0.8V$

$-3.2V$



a)  $I_1 = I_2 = I_5$

$I_3 = 0.4A = I_2$

$E = I_1 R_{eq}$

$E = (I_1 - I_2)(R_1 + R_2)$

$E = I_2(R_1 + R_2 + R_4)$

$48.5V(I_1 - 0.4A) = 0.4A(100\Omega)$

$95\Omega I_1 - 38V = 40V$

$95\Omega I_1 = 78V$

$I_1 = 0.82A$

$I_1, I_2 = 0.42A$

$V_1 = 0.82A(20\Omega) = 16.4V$

$V_2 = 0.42A(75\Omega) = 31.5V$

$V_3 = 0.4A(30\Omega) = 12V$

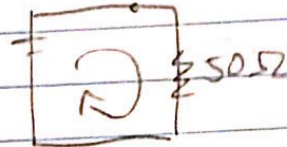
$V_4 = 0.4A(50\Omega) = 20V$

$E =$

b)  $E = 48.5V$

$I = 0.827A$

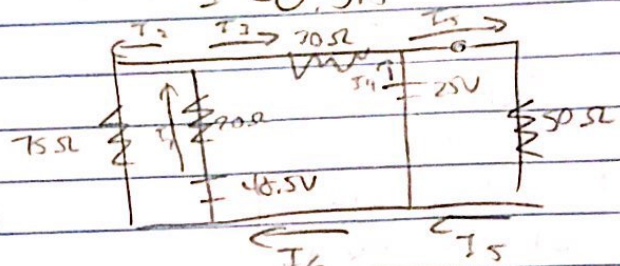
$E_2 = 25V$



$V = IR$

$25V = (I)(50\Omega)$

$I = 0.5A$



$I_4 = 0.5A$

$I_5 = I_3 + I_4$

$I_3 = I_1 - I_2$

$I_1 = 0.827A$

$48.5V - I_1 R_1 - I_2 R_2 = 0$

$48.5V - 16.54V + I_2(75\Omega) = 0$

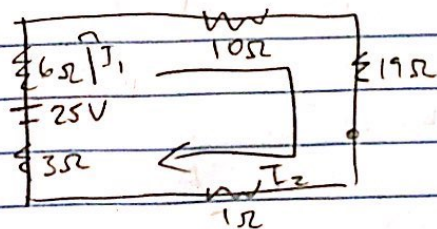
$I_2 = 0.426A$

$I_3 = 0.4A$

$I_5 = 0.9A$

$I_5 = 0.5A$

26.32)



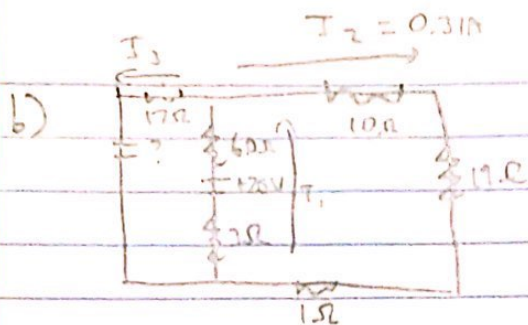
a)  $P = I^2 R$

$18W = I^2(6\Omega), I = 1.73A$

$25V = 9\Omega(1.73A) + 30\Omega(I)$

$I = 0.314A$





$$I_1 = I_2 + I_3$$

$$I_1 = 1.73A, I_2 = 0.31A$$

$$I_3 = 1.42A$$

$$\mathcal{E} = IR$$

$$\mathcal{E} = (1.42A)(30\Omega) + 25 - 9\Omega(1.73A)$$

$$\mathcal{E} = -33.06V$$

$$\mathcal{E} = 7\Omega I_3 + 2\Omega I_2$$

$$24V = 3\Omega I_1 + 7\Omega I_2$$

$$I_1 + I_2 = 1.75A$$

$$I_3 = 1.75A$$

$$\mathcal{E} = 12.25V + 2\Omega I_2$$

$$24V = 3\Omega I_1 + 12.25V$$

$$I_2 = 1.75A - I_1$$

$$24V - 12.25V = 3\Omega(1.75A - I_2)$$

$$I_2 = -2.24A$$

$$I_1 = 3.99A$$

$$\mathcal{E} = 7.77V$$

26.41) a)  $C_2 = 35\mu F$

$$R_2 = 80\Omega$$

$$q = Q_0 e^{-t/RC}$$

$$15V = 50V \cdot e^{-t/0.0028}$$

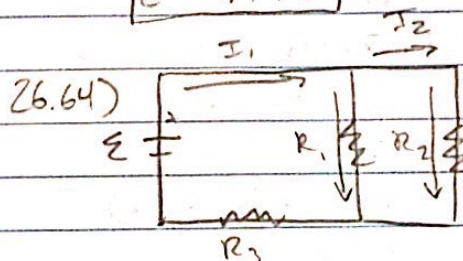
$$t = 0.0024s$$

b)  $I = \frac{-Q_0}{RC} e^{-t/RC}$

$$I = \frac{-50V}{RC} e^{-t/RC}$$

$$I = \frac{-15V}{RC}$$

$$I = \frac{15V}{80\Omega} = 0.1875A$$



a)  $\mathcal{E} = 27V, R_1 = 6\Omega, R_2 = 12\Omega$

$$P = I^2 R = IV$$

$$\mathcal{E} = I_1 R_3 + I_2 R_2 + I_3 R_1$$

$$I_1 = I_2 + I_3$$

$$I_2 R_2 = -I_3 R_1$$

$$\frac{1}{R_2} = \frac{1}{R_1} + \frac{1}{R_2}$$

Max parallel

$$29\Omega$$

b)  $P = I^2 R$

$$P = \frac{V^2}{R}$$

$$\mathcal{E} = I_3 R_1 + I_1 R_3$$

$$\mathcal{E} = I_2 R_2 + I_1 R_3$$

$$I_3 R_1 = I_2 R_2$$

$$I_1 = I_2 + I_3$$

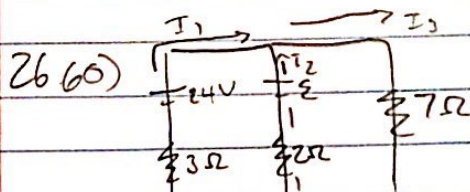
$$I_2 = I_1 - I_3$$

$$I_3 R_1 = (I_1 - I_3) R_2$$

$$I_3 R_1 + I_3 R_2 = I_1 R_2$$

$$I_3 = \frac{I_1 R_2}{R_1 + R_2}$$

$$I_3 =$$



$$I_3 = 1.75A$$

$$\mathcal{E} = 7\Omega(I_3) + 2\Omega(I_2)$$

$$24V = -\mathcal{E} - 2\Omega(I_2) + 3\Omega(I_1)$$

$$I_1 + I_2 = I_3$$

$$24V = -12.25V - 2I_2 - 2I_2 + 3I_1$$

$$24V = -12.25V - 4I_2 + 3I_1$$

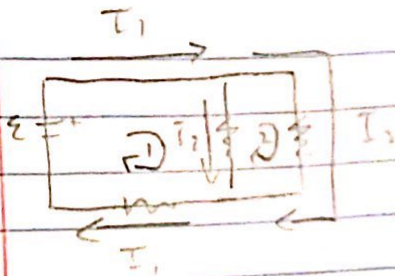
$$I_1 = I_3 - I_2$$

$$24V = -12.25V - 4I_2 + 3I_3 - 3I_2$$

$$24V = -7V - 7I_2$$

$$I_2 = -4.43A$$





$$\varepsilon = I_1 R_2 + I_2 R_1$$

$$I_1 R_2 - I_2 R_1 = 0$$

$$P = I_2^2 R_1$$

$$27V = I_1(12\Omega) + I_2(6\Omega)$$

$$I_1(29\Omega) = I_2(6\Omega)$$

$$I_1 = I_2 + I_3$$

$$27V = (I_2 + I_3)(12\Omega) + I_2(6\Omega)$$

$$27V = I_2(12\Omega) + I_3(12\Omega) + I_2(6\Omega)$$

$$27V = I_2(18\Omega) + I_3(12\Omega)$$

$$I_3 = \frac{1}{2} I_2(6)$$

$$27V = I_2(18\Omega) + \frac{6}{20} I_2(12\Omega)$$

$$I_2 = 1.32A$$

$$P = 10.4W$$

$$26.66) P = I^2 R$$

Max R  $\Rightarrow$  1st to burn up (400)

$$R_0 = 126.38\Omega$$

$$1.40W = I^2(126.38\Omega)$$

$$I = 0.105A$$

$$\varepsilon = IR$$

$$P = I^2 R$$

$$1.40W = I^2(50\Omega)$$

$$I = 0.167A$$

$$I_{tot} = 0.335A$$

$$\varepsilon = (0.335A)(126.38\Omega)$$

$$I = \sqrt{\frac{P}{R}} = \sqrt{\frac{1.40W}{50}}$$

$$I = 0.167A$$

$$\varepsilon = (0.167A)(126.38)$$

$$\varepsilon = 23.63V$$