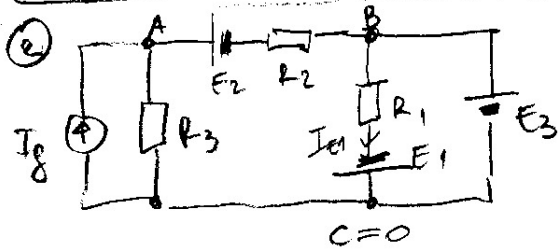


a) $\vec{K}_A = \vec{K}_{A1} + \vec{K}_{A2}$
 $\vec{K}_{A1} = \frac{Q_1}{2\epsilon_0 \epsilon_1} \vec{i} = \frac{Q}{2\epsilon_0 \epsilon_1} \vec{i}$
 $\vec{K}_{A2} = \frac{Q_2}{4\pi \epsilon_0 \epsilon_2 (2a)^2} (-\vec{j}) = \frac{Q}{16\pi \epsilon_0 \epsilon_2 a^2} (-\vec{j})$
 $\vec{K}_A = \frac{Q}{2\epsilon_0 \epsilon_1} \vec{i} + \frac{Q}{16\pi \epsilon_0 \epsilon_2 a^2} (-\vec{j})$

b) $\vec{F}_{12} = \vec{K}_A \cdot Q_2 = \frac{Q}{2\epsilon_0 \epsilon_1} \vec{i} \cdot (-Q) = -\frac{2Q^2}{2\epsilon_0 \epsilon_1} \vec{i}$



$U_{AC} = U_{AD} = 25V$

$P_{I8} = U_{AC} \cdot I_8 = 25W$

$U_{BD} = -E_1 + R_1 I_{E1}$

$I_{E1} = \frac{E_1 + U_{BD}}{R_1} = 3,5A$

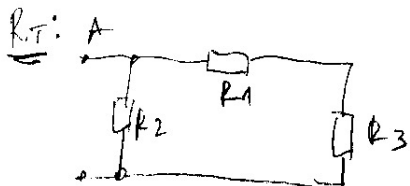
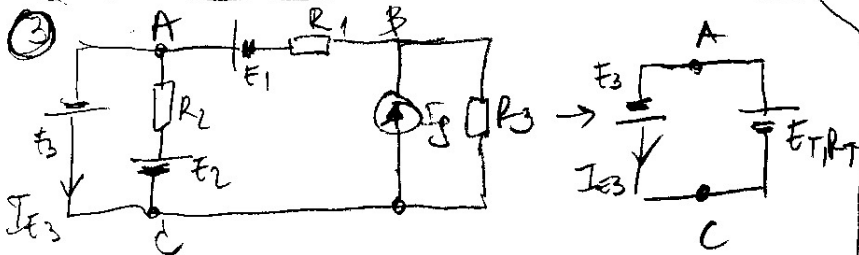
$P_{E1} = E_1 \cdot I_{E1} = 52,5W$

MH4: $C=0$

⊙ $(\frac{1}{R_3} + \frac{1}{R_1}) U_{AD} - \frac{1}{R_2} U_{BD} = I_8 + E_2/R_2$

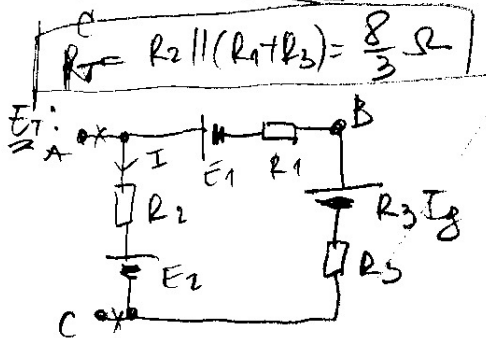
⊙ $U_{BD} = E_3 = 20V$

$U_{AD} = \frac{I_8 + E_2/R_2 + E_3/R_2}{1/R_3 + 1/R_1} = \frac{2 + 1 + 2}{0,2} = 25V$



$I_{E3} = \frac{E_3}{R_T}$

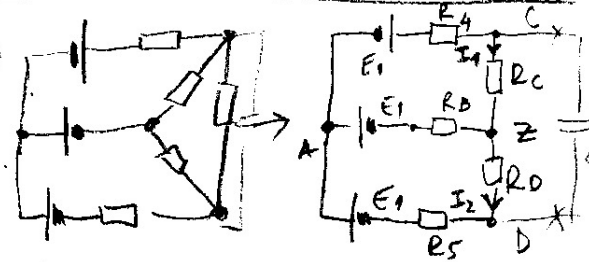
$I_{E3} = 6A$



$E_T = U_{AC} = E_2 + R_2 I = E_2 + R_2 \cdot \frac{R_3 I_3 + E_1 - E_2}{R_1 + R_2 + R_3}$

$E_T = 6V$

④



a) $R_B = \frac{R_1 R_2}{R_1 + R_2 + R_3} = 9\Omega$

$R_C = \frac{R_1 R_3}{R_1 + R_2 + R_3} = 3\Omega$

$R_D = \frac{R_2 R_3}{R_1 + R_2 + R_3} = 3\Omega$

$(\frac{1}{R_4 + R_C} + \frac{1}{R_D} + \frac{1}{R_5 + R_D}) U_{AZ} = \frac{-E_1 + E_1 + E_1}{R_4 + R_C} + \frac{E_1}{R_5 + R_D}$

$U_{AZ} = 9V$

$I_1 = \frac{U_{AZ} + E_1}{R_4 + R_C} = 4A$

$I_2 = \frac{-U_{AZ} + E_1}{R_5 + R_D} = 2A$

$U_{CD} = 3 \cdot 4 + 3 \cdot 2 = 18V$

$Q_c = C \cdot U_{CD} = 1,8 \mu C$

b) $W_c = \frac{1}{2} Q_c U_{CD} = 16,2 \mu J$

$K = \frac{U_{CD}}{d} = 180 \cdot 10^3 \frac{V}{m}$