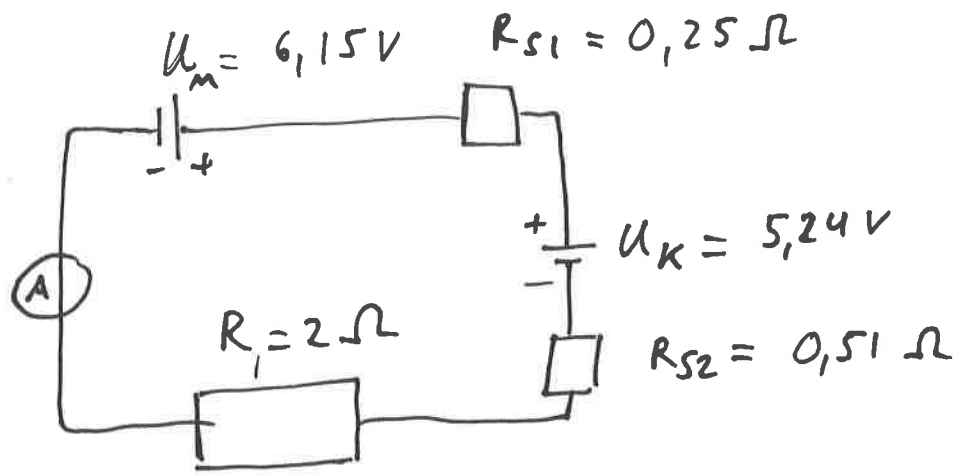


2.39 a)



b)  $U = U_m - U_K = 0,91 \text{ V}$

$R = R_{s1} + R_{s2} + R_1 = 2,76 \Omega$

$I = \frac{U}{R} = \frac{0,91}{2,76} = 0,3297 \text{ A} = \underline{\underline{0,33 \text{ A}}}$

c)  $P = U I = U_m I = 6,15 \cdot 0,3297$   
 $= 2,0276 \text{ W} = \underline{\underline{2,03 \text{ W}}}$

d)  $P = U I = U_K I = 5,24 \cdot 0,3297$   
 $= 1,728 \text{ W} = \underline{\underline{1,73 \text{ W}}}$

e) VASTWIKSFASSA

$P = U I$

$= R I^2$

$= \frac{U^2}{R}$

$U = R I \rightarrow I = \frac{U}{R}$   
 $\rightarrow R = \frac{U}{I}$

~~$P_m = \frac{U^2}{R} = \frac{6,15^2}{0,25} = \frac{38}{0,25} = 152 \text{ W} = 151,29 \text{ W}$~~   
 ~~$= 150 \text{ W}$~~

~~$P_m =$~~   $R_{s1} I^2 = 0,25 \cdot 0,3297^2 = 0,02717 \text{ W}$   
 $= \underline{\underline{27 \text{ mW}}}$

$P_K = R_{s2} I^2 = 0,51 \cdot 0,3297^2 = \underline{\underline{54 \text{ mW}}}$

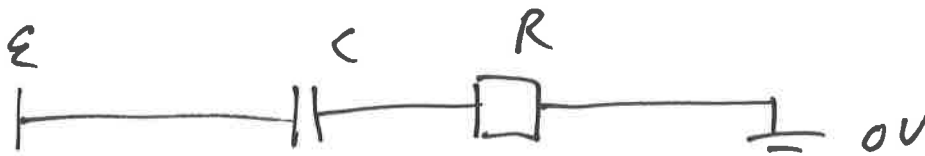
2.41 AIKAVARKU  $\tau = RC$

JOS KONDENSATORIA LAADTAAN,  
VARUUS ON

$$Q(t) = C U_L (1 -$$

$$Q(t) = C \varepsilon (1 - e^{-\frac{t}{\tau}})$$

MISSÄ  $\varepsilon =$  LÄHDEJÄNNI  $\varepsilon$



$U = R I$

NYT

$$\varepsilon = 1,5V$$

$$C = 350 \mu C$$

$$R = 22 M \Omega$$

$$C = AD$$

$$V = \Omega A$$

a)  $\tau = 350 \mu C \cdot 22 M \Omega$

$$= 7700 \text{ ms} = \underline{\underline{7,7 \text{ s}}}$$

b)  $Q = C \varepsilon (1 - e^{-\frac{t}{\tau}}) = 0,95 C \varepsilon$

$$\Rightarrow e^{-\frac{t}{\tau}} = 0,05$$

$$\ln e^{-\frac{t}{\tau}} = \ln 0,05$$

$$-\frac{t}{\tau} = \ln 0,05$$

$$t = -\tau \ln 0,05 = \tau \ln \frac{1}{0,05}$$

$$= \tau \ln 20$$

✓✓✓

V: KULNEU AIKAVARKU = 2,995

PÄÄS-GI

$$2.41 \text{ c) } Q(t) = C\varepsilon \left(1 - e^{-\frac{t}{\tau}}\right)$$

$$I(t) = \dot{Q}(t) = \frac{C\varepsilon e^{-\frac{t}{\tau}}}{\tau}$$

$$\tau = C\varepsilon$$

$$\tau = RC$$

$$= \frac{\varepsilon}{R} e^{-\frac{t}{\tau}}$$

$$\frac{3,5}{7} = \frac{1}{2} = 0,5$$

$$\frac{3,5}{7,7} = 0,45$$

$$I(3,5 \text{ s}) = \frac{1,5 \text{ V}}{22 \text{ M}\Omega} e^{-\frac{3,5}{7,7}}$$

$$= \frac{1500}{22} \text{ nA} e^{-0,4545}$$

$$= 68,18 \cdot 0,6347 \text{ nA}$$

$$= \underline{\underline{43,3 \text{ nA}}}$$

d) L. PUSSA

$$U = \varepsilon = \underline{\underline{1,5 \text{ V}}}$$

$$Q = CU = 350 \text{ nF} \cdot 1,5 \text{ V}$$

$$= 350 + 175$$

$$= \underline{\underline{525 \text{ nC}}}$$

$$2.42 \quad C = 76 \mu\text{F}$$

$$U = 65 \text{ V}$$

$$T = RC$$

PURKAMINEN  $Q(t) = C \varepsilon e^{-\frac{t}{T}}$

AIKURAKIO  $= T = RC$

$$I(t) = \dot{Q}(t) = C \varepsilon e^{-\frac{t}{T}} \cdot \frac{1}{T}$$

$$I_{\max} = \frac{C \varepsilon}{T} = \frac{\varepsilon}{R} \quad \text{SVURW ARVO}$$

a)  $R = 500 \text{ k}\Omega$

$$T = RC = 76 \mu\text{F} \cdot 500 \text{ k}\Omega$$

$$= 7,6 \cdot 5 \text{ s}$$

$$= \underline{\underline{38 \text{ s}}}$$

$$I = \frac{65 \text{ V}}{500 \text{ k}\Omega} = \frac{65}{500} \text{ mA}$$

$$= \underline{\underline{0,13 \text{ mA}}}$$

b)  $R = 1500 \Omega$

$$T = RC = 76 \mu\text{F} \cdot 1500 \Omega$$

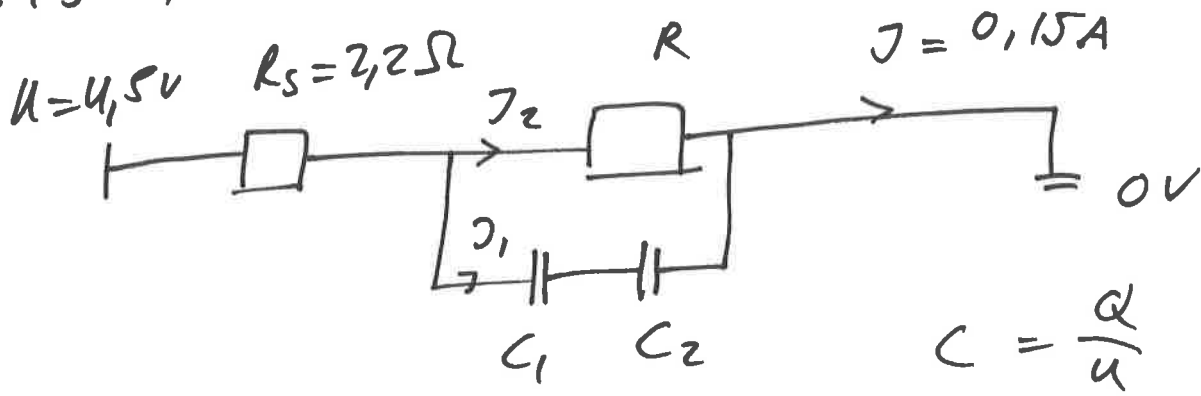
$$= 76 \cdot 1,5 \text{ ms}$$

$$= \underline{\underline{114 \text{ ms}}}$$

$$I = \frac{65 \text{ V}}{1500 \Omega} = \frac{65000}{1500} \text{ mA}$$

$$= \underline{\underline{43 \text{ mA}}}$$

2.43 a)



b) CASAPAINO :  $J_2 = J$

$$U = R_{\text{KOK}} J \rightarrow R_{\text{KOK}} = \frac{U}{J} = \frac{4,5V}{0,15A} = 30 \Omega$$

$$R_{\text{KOK}} = 30 \Omega = R + 2,2 \Omega \rightarrow R = \underline{\underline{27,8 \Omega}}$$

c)  $U_R = R J = 27,8 \cdot 0,15A = 4,17V$

d)  $U_R = U_{C_1} + U_{C_2} = \frac{Q}{C_1} + \frac{Q}{C_2}$

$$= Q \frac{C_1 + C_2}{C_1 C_2}$$

$$\rightarrow Q = U_R \frac{C_1 C_2}{C_1 + C_2}$$

$$= 4,17 \cdot \frac{0,2 \cdot 0,48}{0,2 + 0,48} \mu C$$

$$= \frac{4,17 \cdot 0,2 \cdot 0,48}{0,68} \mu C$$

$$= \frac{0,40032}{0,68} \mu C = 0,5887 \mu C$$

$$= \underline{\underline{0,59 \mu C}}$$