A 1.

geg: Abstand $r_{1,2} = 0{,}6\,m$.
Gesamtladg $q = 200\,\mu C$
Kraft $F = 200\,N$.

a) Abstoßen $\Rightarrow$ beide Ladungen sind gleich (+ + oder - -)

$$\vec{F}_{12}(\vec{r_1}) = \frac{1}{4\pi \cdot \varepsilon_0} \cdot \frac{q_1 \cdot q_2}{(r_1 - r_2)^2} \cdot \frac{(r_1 - r_2)}{(r_1 - r_2)}$$

$$F_{el} = \frac{1}{4\pi \cdot \varepsilon_0} \cdot \frac{q_1 \cdot q_2}{r_{1,2}^2}$$

Gesladg $q = q_1 + q_2$

$$q_2 = q - q_1$$

$$F_{el} = \frac{1}{4\pi \cdot \varepsilon_0} \cdot \frac{q_1 \cdot (q - q_1)}{r_{1,2}^2}$$ } Einsetzen.

$$80N = \frac{(8{,}988 \cdot 10^9 N \cdot m^2 \cdot C^{-2}) \cdot ((200\,\mu C) \cdot q_1 - q_1^2}{(0{,}60\,m)^2}$$ } auf Quadr. Form bringen.

$$\underset{a}{1}\, q_1^2 + \underbrace{(-0{,}200\,mC)}_{b} \cdot q_1 + \underbrace{3{,}20 \cdot 10^{-3}\,(mC)^2}_{c} = 0$$

$q_{1,2}$ = Mitternformel ... $q_1 = 1{,}8 \cdot 10^{-5} C$
$q_2 = 1{,}8 \cdot 10^{-4} C$.

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b)

$$F_{el} = -\frac{1}{4\pi \cdot \varepsilon_0} \cdot \frac{q_1 \cdot q_2}{r_{1,2}^2}$$

$$q_1^2 + (-0{,}200\,mC) \cdot q_1 - 3{,}20 \cdot 10^{-3}\,(mC)^2 = 0$$

$q_1 = -1{,}4 \cdot 10^{-5} C$
$q_2 = 2{,}1 \cdot 10^{-4} C$

AB10

$P = U \cdot I$

(2.) $P = \frac{d}{dt} W = \frac{d}{dt} \cdot (q \cdot \Delta \overset{U}{\varphi})$

$= U \cdot \frac{dq}{dt} = 1{,}25\,MV \; (200\,\mu C\,s^{-1}) = \underline{250\,W}$

(3.) Geg: $C = 2{,}00\,\mu F$ $d = 7{,}6\,mm$

$E_0 = 3{,}00\,\frac{MV}{m}$

a) $U = E \cdot d$: $U_{max} = E_0 \cdot d = 300\,\frac{MV}{m} \cdot 2{,}60\,mm$

$= \underline{4{,}8\,kV}$

b) $C = \frac{Q}{U} \Leftrightarrow Q = C \cdot U = 2\,\mu F \cdot 4{,}8\,kV = \underline{9{,}6\,mC}$

(4.) Geg: $C = 0{,}1\,\mu F$ $U = 1000\,V$ $E_0 = 3{,}00\,\frac{MV}{m}$ (Kondensator)

a) Ges: d_{min}?

$d_{min} = \frac{U}{E_{0max}} = \frac{1000\,V}{3{,}00\,\frac{MV}{m}} = \underline{0{,}333\,mm}$

b) Ges: $A_{Platten}$?

$C = \varepsilon_0 \cdot \frac{A}{d}$

$\varepsilon_0 = 8{,}8542 \cdot 10^{-12}\,\frac{As}{Vm}$

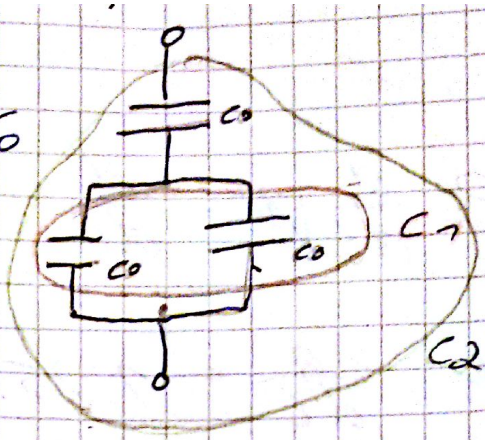
$A = \frac{C \cdot d}{\varepsilon_0} = \frac{(0{,}100\,\mu F) \cdot (0{,}333\,mm)}{8{,}8542 \cdot 10^{-12}\,\frac{As}{Vm}} = \underline{3{,}76\,m^2}$

5. a)

$C_1 = C_0 + C_0 = 2C_0$

$C_2 = \frac{C_1 \cdot C_0}{C_1 + C_0}$

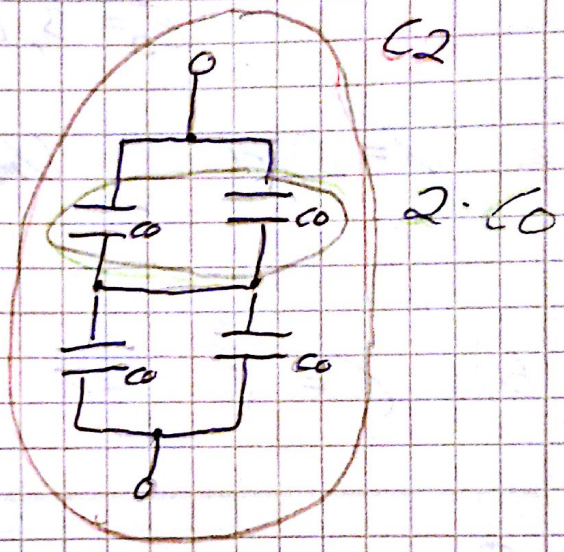
$C_2 = C_0 + C_1$



$C_2 = \frac{C_1 \cdot C_0}{C_1 + C_0} = \frac{(2C_0) \cdot C_0}{2C_0 + C_0} = \frac{2C_0^2}{3C_0} = \frac{2}{3} C_0$

b) $C_2 = \frac{4C_0 \cdot C_0}{4C_0 \cdot}$

$= C_0$



c) $C_2 = C_0 + C_0 + C_0 = 3C_0$