1. When the electric field in a certain dielectric exceeds $10^6\, V/m$ it experiences dielectric breakdown (gets destroyed). What is the breakdown voltage of a $10 \times 10\, cm^2$, $1\, \mu F$ capacitor if $\kappa = 3.7$?

2. In the circuit below $V = 12\, volt$, $C_1 = C_2 = 1\, nF$.

\begin{figure}[h]
\centering
\includegraphics[width=0.5\textwidth]{circuit1.png}
\end{figure}

(a) Find $C_{eq}$, $V_1$, $V_2$, $q_1$, $q_2$ and charge taken from the battery

(b) the same, if the space between the plates of $C_2$ (lower) is filled with $\kappa = 2$.

3. In the circuit below $V = 12\, volt$, $C_1 = C_2 = 1\, nF$.

\begin{figure}[h]
\centering
\includegraphics[width=0.5\textwidth]{circuit2.png}
\end{figure}

(a) Find $C_{eq}$, $V_1$, $V_2$, $q_1$, $q_2$ and charge taken from the battery

(b) the same, if the space between the plates of $C_2$ (right) is filled with $\kappa = 2$. 
4. In the circuit below $V = 10 \text{ volt}$, $C_1 = C_2 = C_3 = 1 \mu F$.

(a) Find $C_{eq}$ and charge taken from the battery
(b) Find $V_1$, $V_2$, $V_3$, $q_1$, $q_2$, $q_3$

5. In the circuit below $V = 10 \text{ volt}$, $C_1 = C_2 = C_3 = 1 \mu F$.

(a) Find $C_{eq}$ and charge taken from the battery
(b) Find $V_1$, $V_2$, $V_3$, $q_1$, $q_2$, $q_3$