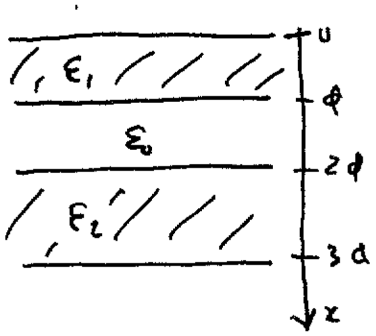
EeO Teste A 2005/2006 : Soluções

a)



$\vec{D} = \vec{E} = \vec{P} = 0 \qquad x < 0 \text{ e } x > d$

$\sigma = \dfrac{Q}{A} > 0$

$\vec{D} = \sigma \, \vec{e}_x \qquad 0 < x < 3d$

$0 < x < d \qquad \vec{E} = \dfrac{\sigma}{\varepsilon_1} \vec{e}_x \; ; \; \vec{P} = \dfrac{\varepsilon_1 - \varepsilon_0}{\varepsilon_1} \sigma \vec{e}_x$

$d < x < 2d \qquad \vec{E} = \dfrac{\sigma}{\varepsilon_0} \vec{e}_x \; ; \; \vec{P} = 0$

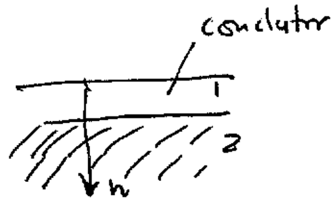
$2d < x < 3d \qquad \vec{E} = \dfrac{\sigma}{\varepsilon_2} \vec{e}_x \; ; \; \vec{P} = \dfrac{\varepsilon_2 - \varepsilon_0}{\varepsilon_2} \sigma \vec{e}_x$

b) $V = \dfrac{Q}{A} \, \dfrac{\varepsilon_0\varepsilon_1 + \varepsilon_0\varepsilon_2 + \varepsilon_1\varepsilon_2}{\varepsilon_0\varepsilon_1\varepsilon_2} \, d$

c) $C = \dfrac{A}{d} \, \dfrac{\varepsilon_0\varepsilon_1\varepsilon_2}{\varepsilon_0\varepsilon_1 + \varepsilon_0\varepsilon_2 + \varepsilon_1\varepsilon_2}$

d) $\sigma' = -\dfrac{\varepsilon_1 - \varepsilon_0}{\varepsilon_1} \sigma < 0$

$E_{n_2} = \dfrac{\sigma}{\varepsilon_1} \qquad E_{n_1} = 0$



$\Rightarrow E_{n_2} - E_{n_1} = \dfrac{\sigma}{\varepsilon_1}$

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$\dfrac{1}{\varepsilon_0}(\sigma + \sigma') = \dfrac{\sigma}{\varepsilon_1} \Rightarrow \boxed{E_{n_2} - E_{n_1} = \dfrac{1}{\varepsilon_0}(\sigma + \sigma')}$