ELECTROMAGNETISMO (2010/11)

Exame da época especial - 14/Set/2011

SOLUÇÕES

1. Resposta C
2. Resposta B
3. Resposta C
4. Respostas B e E
5. b) $\vec{E}(r,\theta) = \frac{P}{4\pi\varepsilon_0 r^3}(2\cos\theta\,\vec{u}_r + \sin\theta\,\vec{u}_\theta)$
6. a) $r < R'$: $\vec{E} = \frac{Q}{4\pi\varepsilon_0 r^2}\vec{u}_r$, $\vec{D} = \frac{Q}{4\pi r^2}\vec{u}_r$, $\vec{P} = 0$

   $R' < r < R$: $\vec{E} = \frac{Q}{4\pi\varepsilon_r\varepsilon_0 r^2}\vec{u}_r$, $\vec{D} = \frac{Q}{4\pi r^2}\vec{u}_r$

   $\vec{P} = \left(1 - \frac{1}{\varepsilon_r}\right)\frac{Q}{4\pi r^2}\vec{u}_r$

   $r > R$: $\vec{E} = \frac{Q}{4\pi\varepsilon_0 r^2}\vec{u}_r$, $\vec{D} = \frac{Q}{4\pi r^2}\vec{u}_r$, $\vec{P} = 0$

   c) $\sigma_p(R) = (\varepsilon_r - 1)\frac{Q}{4\pi\varepsilon_r R^2}$ (tem o mesmo sinal que Q)

   $\sigma_p(R') = -\sigma_p(R)$

   d) $q_{total} = Q/\varepsilon_r$
7. b) $\vec{F} = 0$
8. a) $E = 50$ KV , $B = 2\times10^{-7}$ T

   b) $B = [0{,}2 - 0{,}14\sin(1\times10^6\, t)]\times10^{-6}$ T