Soluzioni

(1) $E_t = E_{ot} = E_o \cos\beta$

$\varepsilon_2 E_n = E_{on} \rightarrow E_n = \frac{E_o}{\varepsilon_2} \sin\beta$

$\sigma_p = P_n = \varepsilon_o \chi E_n = \varepsilon_o \frac{\varepsilon_2 - 1}{\varepsilon_2} E_o \sin\beta$

(2) $d\vec{B} = \frac{\mu_o}{4\pi} I \frac{d\vec{l} \times \Delta\vec{r}}{|\Delta\vec{r}|^3}$

$B_{AB} = B_{CD} = 0$

$B_{DA} = \frac{\mu_o}{4\pi}\left(I/b^2\right) \int_0^{\pi b} dl = \frac{\mu_o I}{4b}$

$B_{BC} = -\frac{\mu_o}{4\pi} \frac{I}{a^2} \int_0^{\pi a} dl = -\frac{\mu_o I}{4a}$

$B_{TOT} = \frac{\mu_o I}{4}\left(\frac{1}{b} - \frac{1}{a}\right) = -2.1 \cdot 10^{-5}\ T$

(3) $I_L(t=0) = \dfrac{f}{R+R_0} = \dfrac{f}{2R}$

$\Delta V_c(t=0) = I_L(t=0) \cdot R_0$

$$\begin{cases} U_L^i = \frac{1}{2} L I_L^2(t=0) \\ U_c^i = \frac{1}{2} C \Delta V_c^2(t=0) \end{cases}$$

$$\boxed{U_J^f = U_L^i + U_c^1}$$

$$C = 2 \frac{U_J^f - U_L^i}{\Delta V_c^2(t=0)} = 10^{-7} F$$

(4) Faraday: $E\,2\pi r = -\frac{dB}{dt}\,\pi a^2$

$$E = -\frac{d}{dt}\left[\mu_0 n I_0 \sin(\omega t)\right]\frac{a^2}{2r} \doteq$$

$$\doteq -\mu_0 n I_0 \omega \frac{a^2}{2r}\cos(\omega t)$$

$\hat{t}$ versore tang. alla circonferenza.

$$\vec{P} = \varepsilon_0 \chi \vec{E} = -\hat{t}\,\mu_0 \varepsilon_0 (\varepsilon_r - 1) n I_0 \omega \frac{a^2}{2r}\cos(\omega$$

(5) $$\bar{I} = \frac{6}{10^{-4}\cdot 60} = 1\ \frac{kW}{m^2}$$

$$E_0 = \sqrt{2 Z_0 \bar{I}} = 868\ \frac{V}{m}$$

$$B_0 = \frac{E_0}{c} \doteq 2.9\cdot 10^{-6}\ \frac{Wb}{m^2}$$