



ИСПИТ ИЗ ОСНОВА ЕЛЕКТРОТЕХНИКЕ 1

02. 12. 2014. - Рјешења

1.

a) Прва област ($0 \leq r \leq b$):

$$E_1 = \frac{\rho_0 r}{\epsilon_0} \left(\frac{1}{3} - \frac{r^2}{5b^2} \right),$$

Друга област ($b \leq r \leq R_1$):

$$E_2 = \frac{2\rho_0 b^3}{15\epsilon_0 r^2},$$

Трећа област ($R_1 \leq r \leq R_2$):

$$E_3 = 0, \text{ (метал!)}, \quad Q'_{ind} = -Q_{uS_2} = -4\pi\rho_0 \left(\frac{2b^3}{15} \right).$$

$$\sigma_1 = \frac{Q'_{ind}}{4\pi R_1^2} = -\frac{\rho_0}{R_1^2} \left(\frac{2b^3}{15} \right).$$

Четврта област ($r \geq R_2$):

$$E_4 = \frac{2\rho_0 b^3}{15\epsilon_0 r^2}, \quad r \geq R_2.$$

$$Q''_{ind} = -Q'_{ind} = 4\pi\rho_0 \left(\frac{2b^3}{15} \right) \Rightarrow \sigma_2 = \frac{Q''_{ind}}{4\pi R_2^2} = \frac{\rho_0}{R_2^2} \left(\frac{2b^3}{15} \right).$$

б)
$$V = \frac{2\rho_0 b^3}{15\epsilon_0 R_2},$$

2.

$$a \approx 3 \text{ mm.}$$

3.

a)
$$C = \frac{a\epsilon_0 [a + (\epsilon_r - 1)x]}{d}.$$

б)
$$F = \frac{\epsilon_0 a (\epsilon_r - 1) U^2}{2d}.$$