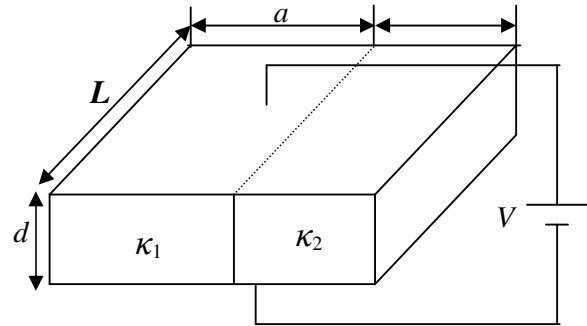




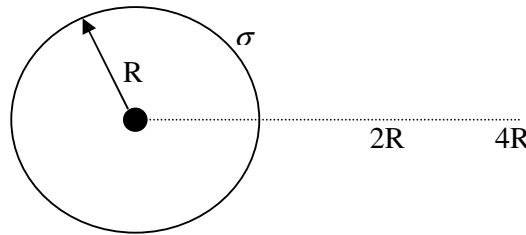
[1]. A parallel plate capacitor is filled with two dielectrics as in Figure. In terms of given parameters find:

- (a) capacitance of the capacitor
- (b) energy stored on each dielectrics.



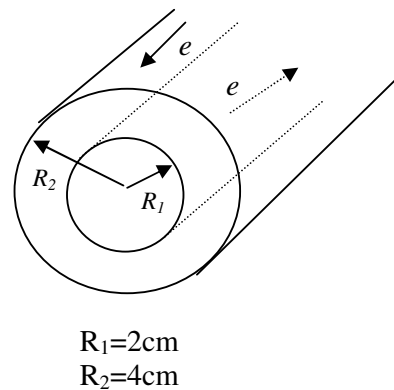
[2]. The ions with mass 10^{-26} kg and charge of 3.2×10^{-19} C are accelerated by an applied potential difference of $V=64$ volt. Then they enter a region in which a magnetic field of magnitude $B=10^{-2}$ T exists. What is the orbit radius of ions in the magnetic field?

[3]. A spherical shell of radius $R=4$ cm has a surface charge distribution of $\sigma = 2 \times 10^{-4}$ C/m². If a point charge $q_1=2 \times 10^{-6}$ C is placed at the center of the spherical shell, determine the electric field at; (a) $r=2$ cm (b) $r=6$ cm from the center of the sphere and (c) the electric potential difference between $4R$ and $2R$.



[4]. A long cable consisting of two concentric conductors isolated from each other as shown in Figure. Both wires have equal and uniform current density of $J=1.59 \times 10^3$ A/m², but the direction of the electron, are opposite (see Figure). Find the magnitude and the direction of the magnetic field at the given points:

- (a) $r = R_1/2$
- (b) $r = R_1$
- (c) $r = R_2/2$
- (d) $r = R_2$



Useful constants:

$g = 9.8 \text{ m/s}^2$, $e = 1.6 \times 10^{-19} \text{ C}$, $\epsilon_0 = 8.85 \times 10^{-12} \text{ C}^2/\text{N.m}^2$, $\mu_0 = 4\pi \times 10^{-7} \text{ T.m/A}$, $\pi = 3.14$