Answer on Question #47639-Physics-Electromagnetism

It is restrict to conduct a parallel plate capacitor with thin foil and mia with dielectric constant $\varepsilon = 6$ so that when conducted to the potential of $V = 1000\ volt$. The capacitor may store $E = 0.1\ joule$. If the area of each tin foli is $S = 100\ sq.cm = 0.01\ m^2$ and if the thickness of the mica is $d = 0.15mm = 15 \cdot 10^{-5}m$. Calculate the no.of tin folis required.

Solution

The energy stored in capacitor is

$$E = \frac{1}{2}CV^2.$$

The capacitance of a parallel plate capacitor is

$$C = \frac{n\varepsilon\varepsilon_0 S}{d}.$$

Then

$$n = \frac{2Ed}{\varepsilon\varepsilon_0 SV^2} = \frac{2 \cdot 0.1 \cdot 15 \cdot 10^{-5}}{6 \cdot 8.854 \cdot 10^{-12} \cdot 0.01(1000)^2} = 57.$$

Answer: 57.