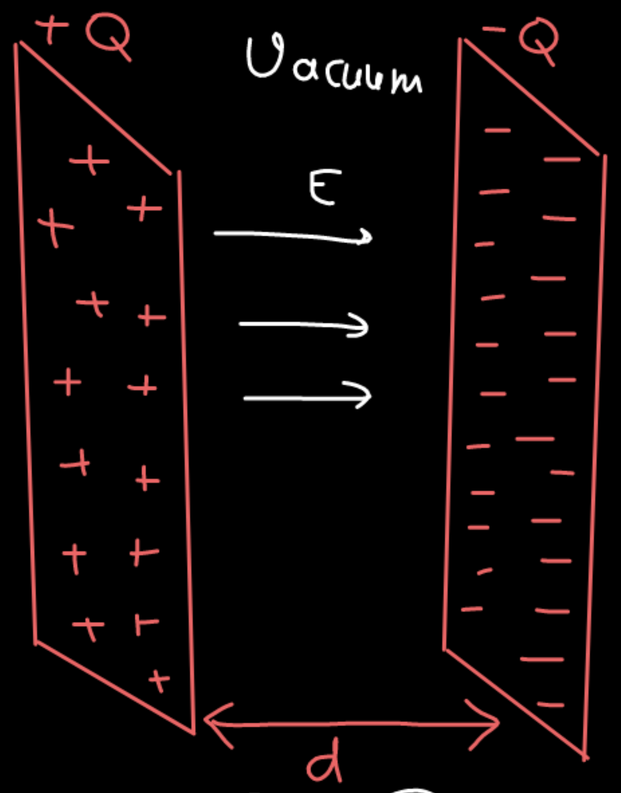
# > परावैद्युत का धारिता पर प्रभाव

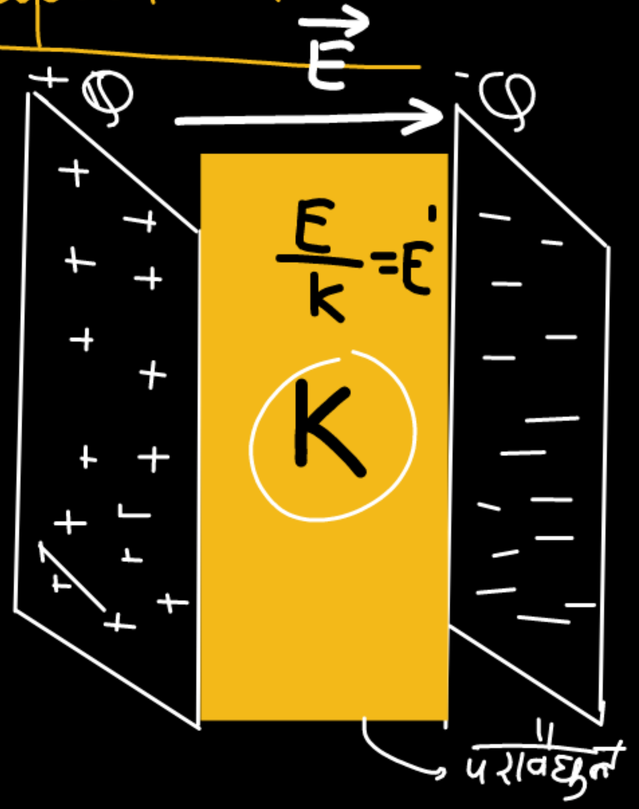
## Effect of dielectric on Capacitance




$$E = \frac{\sigma}{\epsilon_0} = \frac{Q}{A\epsilon_0}$$

$$V = \frac{\sigma d}{\epsilon_0} = \frac{Qd}{A\epsilon_0}$$

$$C = A\epsilon_0/d$$




$$E' = \frac{E}{K}$$

$$E' = \frac{Q}{A\epsilon_0 K}$$

$$V' = E' \cdot d$$

$$V' = \frac{Qd}{A\epsilon_0 K}$$

$$C' = \frac{Q}{V'} = \frac{Q}{\frac{Qd}{A\epsilon_0 K}}$$

$$= K\left(\frac{A\epsilon_0}{d}\right) = KC$$

$$C' = KC$$

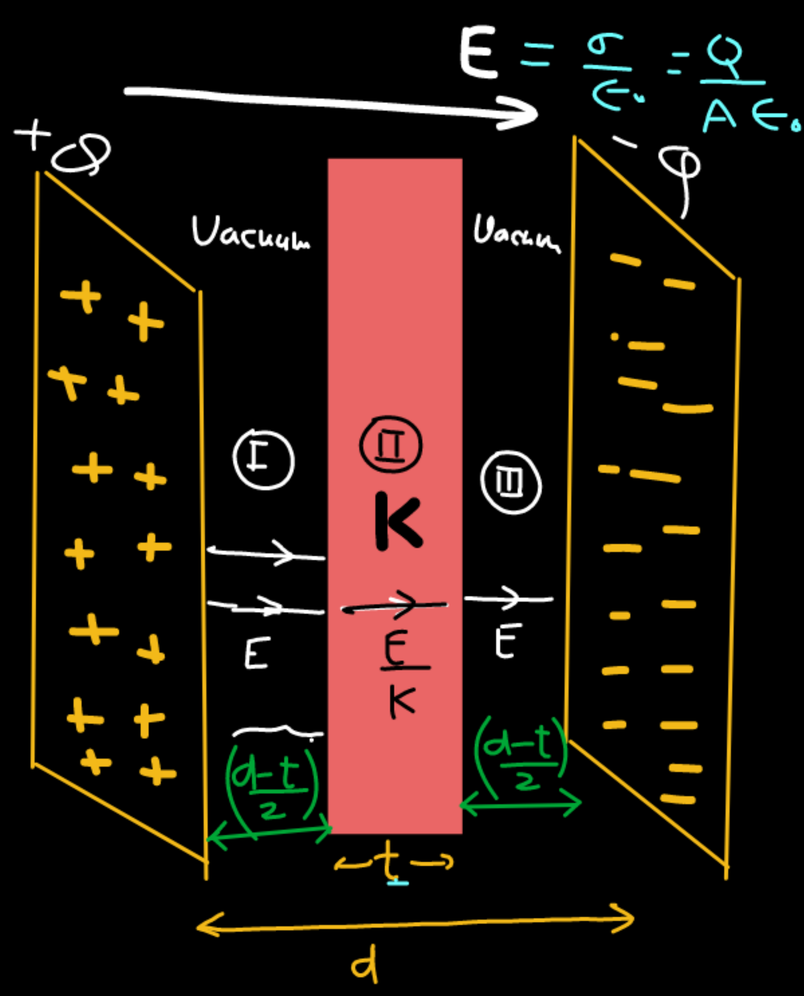
Q यदि संधारित्र में परावैद्युत पदार्थ (K) रख दिया जाए तो

A. विद्युत क्षेत्र का मान K गुना से कम हो जाता है।

B. विभवान्तर K गुणा से कम हो जाता है

C. धारिता K गुणा बढ़ जाती है

D. सभी




① region

$$E = \frac{\sigma}{\epsilon_0} = \frac{Q}{A\epsilon_0}$$

$$\left[V_1 = E\,d = \frac{Q(d-t)}{A\epsilon_0 \cdot 2}\right]$$

② region

$$E' = \frac{E}{K} = \frac{Q}{A\epsilon_0 K}$$

$$\left[V_2' = E'd = \frac{Qt}{A\epsilon_0 K}\right]$$

③ region :

$$E = \frac{Q}{A\epsilon_0}$$

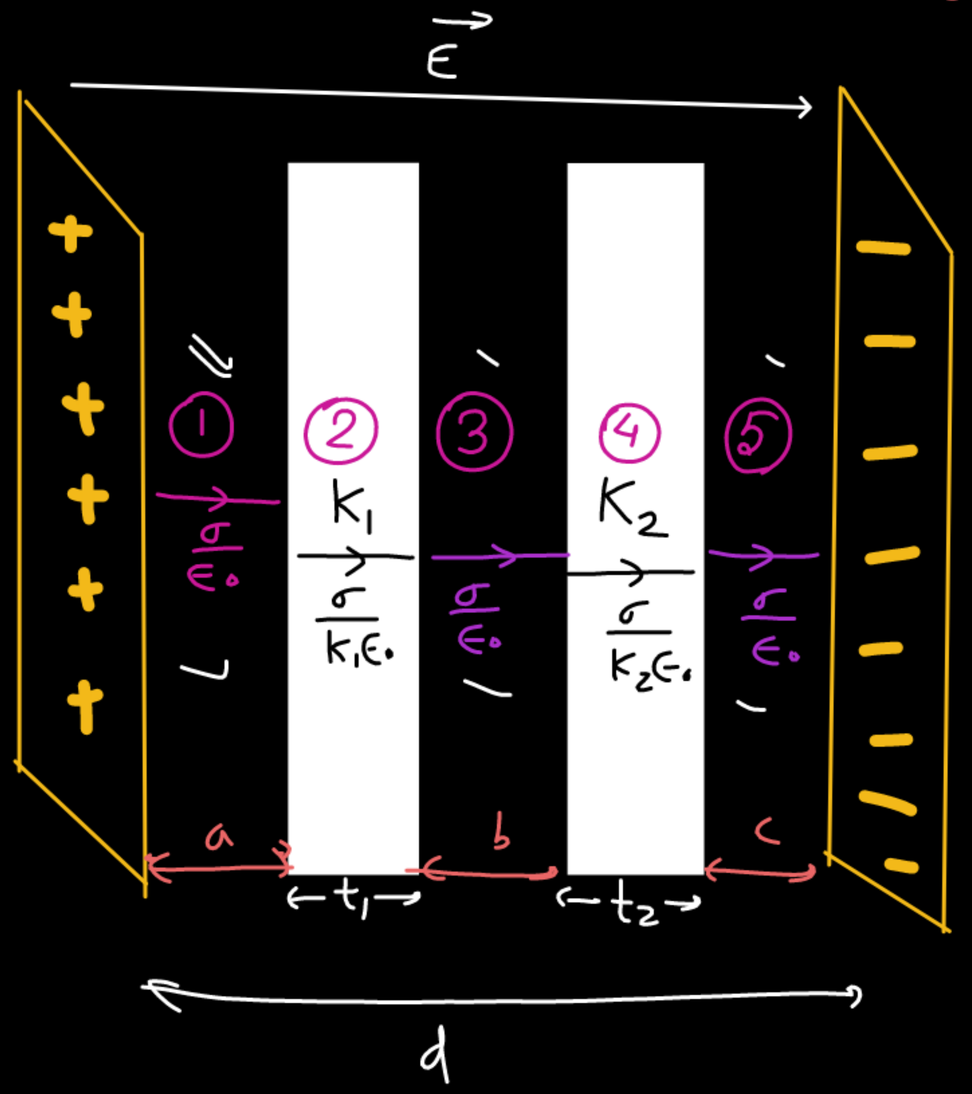
$$\left[V_3 = \frac{Q}{A\epsilon_0}\left(\frac{d-t}{2}\right)\right.$$

$$C = \frac{Q}{V_T} = \frac{Q}{V_1 + V_2 + V_3}$$

$$= \frac{Q}{\frac{Q(d-t)}{2A\epsilon_0} + \frac{Qt}{A\epsilon_0 K} + \frac{Q(d-t)}{2A\epsilon_0}}$$

$$= \frac{Q}{\frac{Q(d-t)}{A\epsilon_0} + \frac{Qt}{A\epsilon_0 K}}$$

$$= \frac{1}{\frac{1}{A\epsilon_0}\left[d - t + \frac{t}{K}\right]}$$




$$a = b = c = \frac{d-(t_1+t_2)}{3}$$

$$C = \frac{Q}{V_1+V_2+V_3+V_4+V_5}$$

$$= \frac{Q}{\frac{Q}{A\epsilon_0}\frac{[d-(t_1+t_2)]}{3}\times 3 + \frac{Q\,t_1}{AK_1\epsilon_0} + \frac{Q\,t_2}{AK_2\epsilon_0}}$$

$$\boxed{C = \frac{A\epsilon_0}{d-(t_1+t_2)+\frac{t_1}{K_1}+\frac{t_2}{K_2}}}$$

$$C = \frac{A\epsilon_0}{d - t + \frac{t}{k}}$$

$$C = \frac{A\epsilon_0}{d - t\left(1 - \frac{1}{k}\right)}$$