

Q-1(H)  
Paper II

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### Capacitance of a cylindrical capacitor.

A cylindrical capacitor consists of two coaxial cylinders, the space between the cylinders contains air or some other dielectric. Let A and B represent the sections of two coaxial cylinders of radius  $a$  and  $b$  respectively. Let the cylinder B be earthed and a charge  $\lambda$  per unit length be given to the cylinder A.

Now we consider a point P within the two cylinders at a distance  $r$  from the axis, then magnitude of electric field intensity

$$E = \frac{1}{2\pi\epsilon_0} \frac{\lambda}{r}$$

The field at every point is radially directed out ward.

∴ The difference of potential between the two cylinders.

$$V_a - V_b = \int_a^b -\vec{E} \cdot d\vec{r}$$

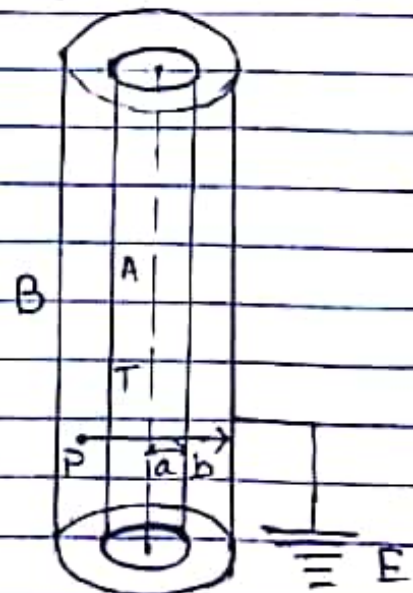


Fig.

As the vectors  $\vec{E}$  &  $d\vec{r}$  are both in the same direction.