1. Interpretation of Divergence.

Ex: $\nabla \cdot D = \rho_v$

Consider $D = K(x a_x + y a_y)$.

Calculate the value of charge ~~that originates~~ density from which the field originates for

a) $K = 1$

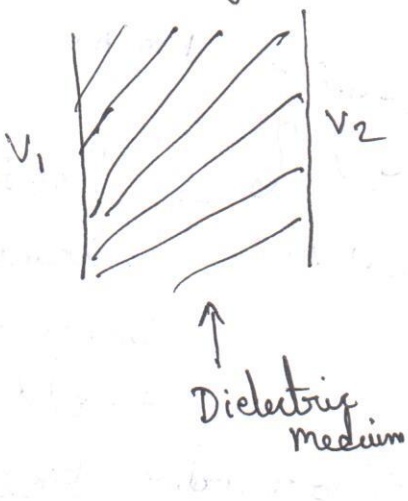
$\nabla \cdot D = 2$

b) $K = 2$

$\nabla \cdot D = 4$.

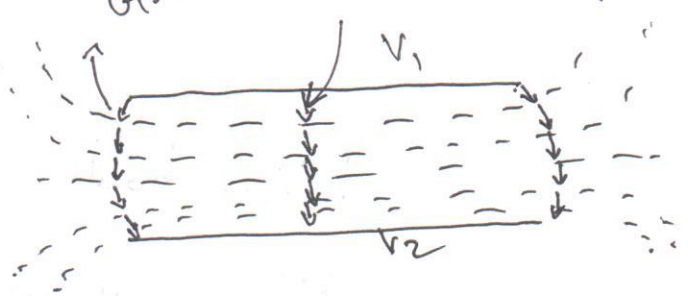
2. Interpretation of ~~divergen~~ gradient and significance of -ve sign.

Ex: Calculate the value of E-field inside the region bounded by V_1, V_2

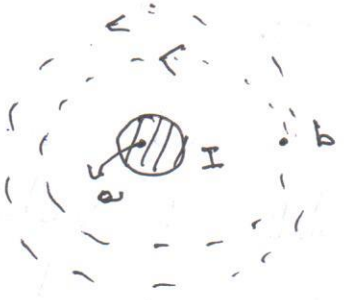


$\Rightarrow E = -\nabla V$

Gradient, Gradient

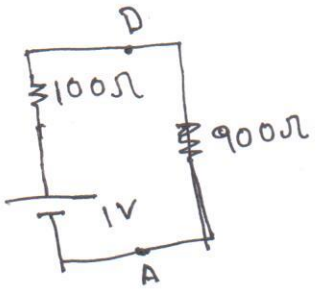


3. Calculate the value of $\nabla \times H$ at the two points given in the figure



at 'a' $\nabla \times H = J$

at 'b' $\nabla \times H = 0$.

4. 

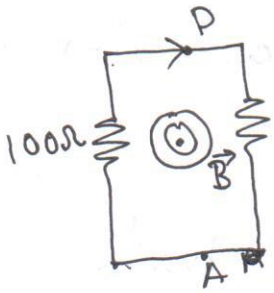
find $V_D - V_A$

$E = IR \Rightarrow I = \frac{1}{1000} = 1mA$

$V_D - V_A = 0.9V$

$\nabla \times E = 0$

Conservative field.



find $V_D - V_A$

$\vec{B}$ is increasing magnetic field

Consider E induced = 1V.

Current $= \frac{1}{100+900} = 1mA$.

$V_D - V_A = 0.9V$

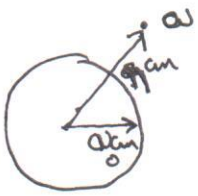
$V_D - V_A = -0.1V$.

→ Difference is because of non Conservative field.

KVL holds for Conservative fields.

KVL is a spl case of Faradays law.

5. Consider a flux tube that carries Magnetic field intensity of $H = \sin(\omega t)$. find the value of E at Point 'a' ~~as bo~~ shown in figure



$$\nabla \times E = -\frac{d}{dt}\mu_0 \sin(\omega t)$$

$$\nabla \times E = -\mu_0 \omega \cos(\omega t)$$

apply stokes theorm

~~$\oint (\nabla \times E) \cdot ds$~~

$$\iint (\nabla \times E) \cdot dS = -\iint \mu_0 \omega \cos(\omega t)\, dS$$

$$\oint E \cdot dl = -\mu_0 (\pi a_0^2) \cos \omega t$$

$$E(2\pi r) = -\mu_0 (\pi a_0^2) \cos \omega t$$

$$E = \frac{-\mu_0 \pi a_0^2 \cos(\omega t)}{2\pi r}$$

$$E = \frac{-\mu_0 \cos(\omega t) a_0^2}{2r}.$$