FIELD n POTENTIAL

$$F = qE \qquad dW = F.dx = qE.dx$$

$$dW = -q.dV \qquad -q.dV = qE.dx \Rightarrow E = -\frac{dV}{dx} \qquad V = -\int \vec{E}.d\vec{x}$$

If E is zero, is it necessary that V is also zero

$$E = -\frac{dV}{dx}; E = 0 \Rightarrow \frac{dV}{dx} = 0 \Rightarrow V \text{ is constant}$$

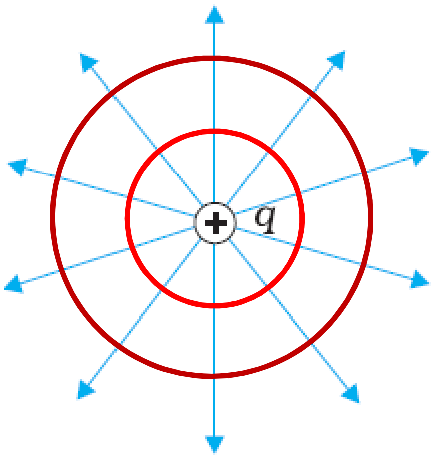
If V is zero, is it necessary that E is also zero

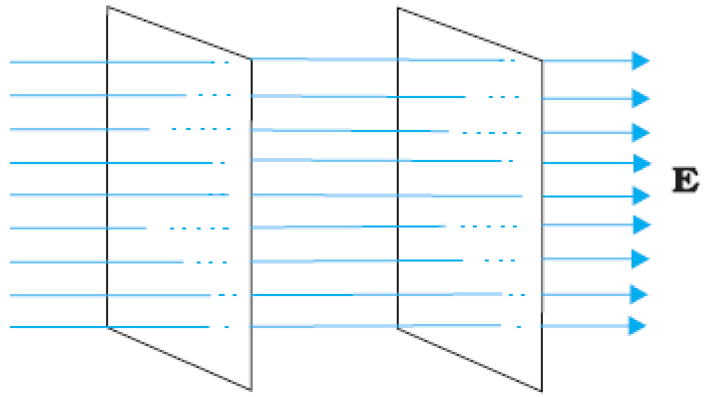
$$V = -\int \vec{E}.d\vec{x} = -\int E.dx.\cos\theta \Rightarrow \theta = \frac{\pi}{2}$$

FIELD n POTENTIAL

$$V = -\int \vec{E}.d\vec{x} = -\int E.dx.\cos\theta \Rightarrow \theta = \frac{\pi}{2}$$

Equipotential Surface ; Surface where potential is same i.e. $\Delta V = 0$





$$V = f(x, y, z)$$

$$\Rightarrow E = -\frac{\partial V}{\partial x}\hat{i} - \frac{\partial V}{\partial y}\hat{j} - \frac{\partial V}{\partial z}\hat{k}$$

$$V = xy + z^2 \text{ at } (1,1) \quad E = -y - x - 2z \text{ at } (1,1) \Rightarrow E = -\hat{i} - \hat{j} - 2\hat{k}$$