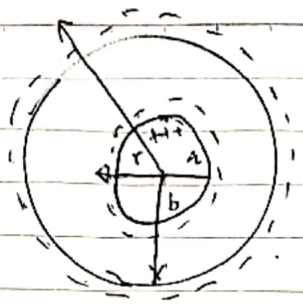

$r < a \rightarrow \vec{E} = 0$

$a < r < b$

$$\oint \vec{E}\, da = \frac{Q}{\varepsilon_0}$$

$$E(4\pi r^2) = \frac{1}{\varepsilon_0} \iiint \rho\, d\tau$$

$$\vec{E}(4\pi r^2) = \frac{\rho}{\varepsilon_0} \int_0^a \int_0^{\pi} \int_0^{2\pi} r^2 \sin\theta\, d\theta\, d\phi\, dr$$

$$\vec{E}(4\pi r^2) = \frac{4\pi}{\varepsilon_0} \int_0^a r^2 dr$$

$$\vec{E}(4\pi r^2) = \frac{4\pi}{\varepsilon_0} \frac{1}{3} r^3 \Big|_a^0$$

$$\vec{E}(4\pi r^2) = \frac{4\pi}{\varepsilon_0} \frac{a^3}{3}$$

$$E = \frac{\rho a^3}{3\varepsilon_0 r^2} \hat{r}_0$$

$\vec{E} \rightarrow r > b$

$$\oint \vec{E}\, d\vec{a} = \frac{Q}{\varepsilon_0}$$

$$\vec{E}(4\pi r^2) = \frac{1}{\varepsilon_0} \int_a^b \int_0^{2\pi} \int_0^{\pi} \rho\, r^2 \sin\theta\, d\theta\, d\phi\, dr$$

$$\vec{E}(4\pi r^2) = \frac{\rho}{\varepsilon_0} 4\pi \int_a^b r\, dr$$

$$\vec{E}(4\pi r^2) = \frac{\rho 4\pi}{\varepsilon_0} \left(\frac{1}{3} r^3 \Big|_a^b \right)$$

$$\vec{E}(4\pi r^2) = \frac{\rho 4\pi}{3\varepsilon_0} (b^3 - a^3)$$

$$\vec{E} = \frac{\rho}{3\varepsilon_0 r^2} (b^3 - a^3)$$