25c)

$$\vec{E} = \frac{kq}{\left[r_{12}^2\right]^{3/2}}$$

$\vec{r}_1 = 2\hat{x} - 8\hat{y}$

$\vec{r}_p = 3\hat{x} + 5\hat{y}$

$\vec{r}_{1p} = \vec{r}_p - \vec{r}_1 = 1\hat{x} + 13\hat{y}$

$$\vec{E} = \frac{8.99(1)(1\hat{x} + 13\hat{y})}{\left[1^2 + 13^2\right]^{3/2}} = 4.05\hat{x} + 52.7\hat{y} \ \frac{N}{C}$$

$|\vec{E}| = \sqrt{E_x^2 + E_y^2} = 52.9 \frac{N}{C}$

$\vec{F} = q\vec{E} = 2 \times (4.05\hat{x} + 52.7\hat{y}) \times 10^{-6}$

$= 8 \times 10^{-6}\hat{x} + 1.05 \times 10^{-4}\hat{y}$ N

$$\vec{r}_1 = -1\hat{x} + 0\hat{y} \qquad \vec{r}_2 = 1\hat{x} + 0\hat{y}$$

$$\vec{r}_p = 0\hat{x} + 4\hat{y}$$

$$\vec{r}_{1p} = \vec{r}_p - \vec{r}_1 = 1\hat{x} + 4\hat{y}$$

$$\vec{r}_{2p} = \vec{r}_p - \vec{r}_2 = -1\hat{x} + 4\hat{y}$$

$$\vec{E} = 2 \times 8990 \left[(-)\,\frac{1\hat{x} + 4\hat{y}}{[1^2 + 4^2]^{3/2}} + (1)\,\frac{-1\hat{x} + 4\hat{y}}{[1^2 + 4^2]^{3/2}} \right]$$

$$\vec{E} = \frac{4 \times 8990}{17^{3/2}} (-\hat{x}) = -1410\hat{x}\,\frac{N}{C}$$

$$\vec{p} = \sum q_i \vec{r}_i$$

$$= -2\mu(\cancel{0\hat{x}} - 1\hat{x} + 0\hat{y})$$

$$+ 2\mu(1\hat{x} + 0\hat{y})$$

$$= 4\mu\hat{x} = 4\times10^{-6}\hat{x}\ \text{cm}$$

$$- \longrightarrow +$$

$$\rho = \frac{5Q}{4\pi b^3}\left(\frac{r^2}{b^2}\right)$$

$\vec{E} \parallel \vec{A}$

$|\vec{E}|$ const $\qquad \Phi_E = \frac{Q_{enc}}{\varepsilon_0}$

$$Q_{enc} = \iiint \rho \, d^3r = 4\pi \int_{r=0}^{r=r} \rho r^2 dr$$

$$= 4\pi\left(\frac{5Q}{4\pi b^3}\right)\cdot\frac{1}{b^2}\int_0^r r^4 dr$$

$$= 4\pi\left(\frac{5Q}{4\pi b^5}\right) r^5$$

$$\Phi_E = \oiint \vec{E}\cdot d\vec{A} = E(4\pi r^2)$$

$$\vec{E}_{inside} = \frac{5Q}{4\pi b^5 \epsilon_0} r^3 \hat{r}$$

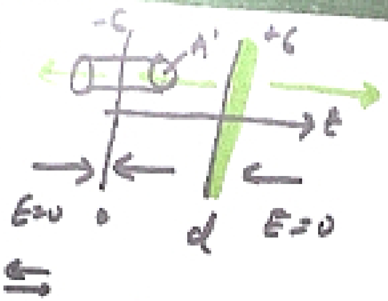
$\vec{E} \parallel \vec{A}$

$|\vec{E}|$ const

$$\Phi_E = \frac{q_{enc}}{\epsilon_0} = \frac{Q}{\epsilon_0}$$

$$\Phi_E = \oiint \vec{E} \cdot d\vec{A} = E(4\pi r^2)$$

$$\vec{E}_{out} = \frac{Q}{4\pi \epsilon_0 r^2} \hat{r}$$



$$\oint \Phi_E = \frac{q_{enc}}{\varepsilon_0}$$

$$EA' = \frac{\sigma A'}{\varepsilon_0} \Rightarrow \vec{E} = \frac{\sigma}{\varepsilon_0}\hat{z}$$

$$\vec{E} = -\frac{\sigma}{\varepsilon_0}\hat{x}$$

$$\vec{E} = -\frac{2\times10^{-6}}{8.8\times10^{-12}} = -2.26\times10^{5}\,\frac{N}{C}\,\hat{z}$$