QUIZ 2

PHY 112

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Sec : 08

GQ 2

a) $\sigma_1 = 11\ 4\ C/m^2$

$= 11 \times 10^{-6}\ C/m^2$

Co ordinat of P: $(-6, -15, -9)$

Now, E of infinte sheet, $E = \frac{6}{2\epsilon_0}$

$\therefore E = \frac{11 \times 10^{-6}}{2 \times 8.85 \times 10^{-12}}$

$E = 621968.92\ N/C$

(b) Given,

Radius of shell, $R = 13\ cm$

$P_2\ (6, 6, 18)$

$P_3\ (32, 6, 8)$

$E_{shell} = 21 \times 10^9\ N/C$

~~As we know~~

Now,

Distance between, P_2 and P_3 ⇒

$$r = \sqrt{(32-6)^2 + 0 + (8-18)^2}$$

$$= \sqrt{26^2 + (-10)^2} = 27.856\ cm$$

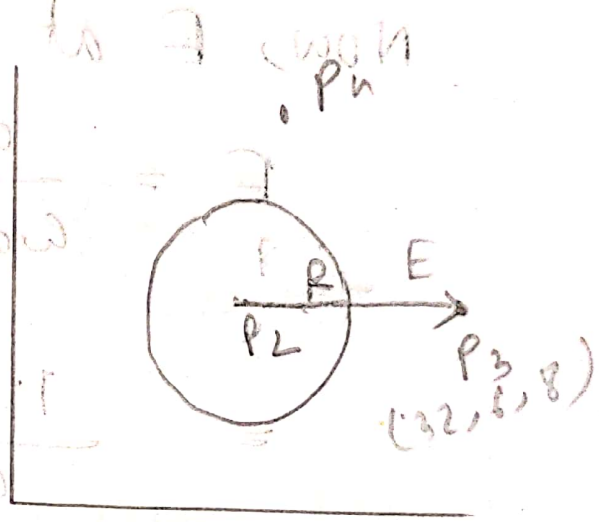
In terms of sphere,

$$E \times 4\pi r^2 = \frac{q}{\epsilon_0}$$

$$\Rightarrow q = E \times 4\pi r^2 \epsilon_0$$

$\Rightarrow \sigma = 21 \times 10^{9} \times 4 \times 3.1416 \times \left(\frac{27.856}{100}\right)^{2} \times 1 \times \varepsilon_0$

$\Rightarrow \sigma = 1.813 \times 10^{-6}\ C$



C

given, $P_4(6, 32, 18)$

from(b), total chary on shell,

$\sigma = 1.813 \times 10^{-6}$

Distance between P_4 and P_3,

$$r = \sqrt{(32-6)^2 + (6-32)^2 + (8-18)^2}$$

$$= \sqrt{26^2 + (-26)^2 + (-10)^2}$$

$$= 38.10\ cm = 0.38\ m$$

Now, E at P4,

$$E = \frac{\sigma r}{\epsilon_0 \, 4\pi r^2}$$

$$= \frac{1.8813 \times 10^{-6}}{\epsilon_0 \times 4\pi (0.38)^2}$$

$$= \frac{1.813 \times 10^{-6}}{1.60 \times 10^{-11}}$$

$$= 112849.45 \text{ N/C } \hat{j}$$

Again, Due to sheet, at P4,

$$E = \frac{6}{2\epsilon_0} = 621468 \text{ N/C } \hat{i}$$

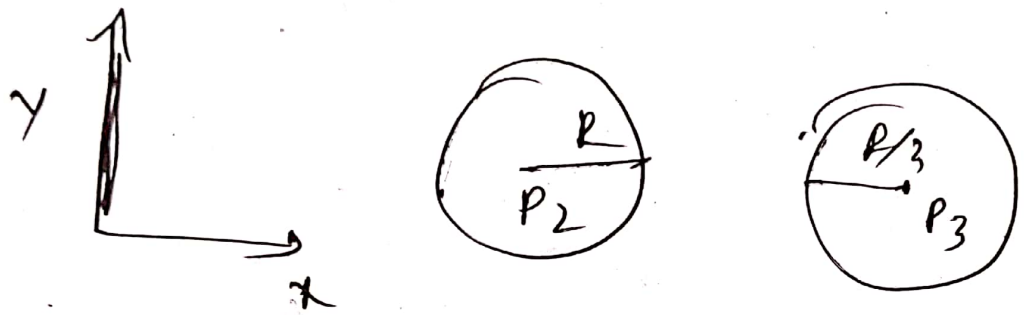
~~$|E| = 621468 + 112849.45$~~

~~$= 734317$~~

$$\text{net } E = \sqrt{(621468)^2 + (112849.4)^2}$$

$$= 621570.44 \text{ N/C}$$

d



if we choose spherical gaussian surface of radius R/2 at point P_3 we get the above figure. But there is no charge enclosed in it.

$\therefore$ $q_{net} = 0$

As $q_{net} = 0$, net flux will also be $\Phi = 0$.