QUES 02:-

The electrostatic force on a small sphere of charge 0.4 μC due to another small sphere of charge -0.8 μC in air is 0.2 N.

a. What is the distance between the two spheres?
b. What is the force on the second sphere due to the first?

Sol.

a. Here, F = 0.2N

$q_1 = 0.4\ \mu C = 0.4 \times 10^{-6} C$

$q_2 = 0.8\ \mu C = 0.8 \times 10^{-6} C$

$F = \frac{1}{4\pi\varepsilon_0} \frac{q_1 q_2}{r^2}$

Thus, $r^2 = \frac{1}{4\pi\varepsilon_0} \frac{q_1 q_2}{F}$

$r^2 = \frac{9\times10^9\times0.4\times10^{-6}\times0.8\times10^{-6}}{0.2}$

$r^2 = 36 \times 4 \times 10^{-4} = 144 \times 10^{-4}$

$r = 12 \times 10^{-2} m = 0.12m = 12$ cm.

b. Force on the second sphere due to the first is same, i.e. 0.2 N and force is attractive as charges are unlike.