

Chapter 01

ELECTRIC CHARGES AND FIELDS

Example- 6:

The sum of two point charges is $7\mu\text{C}$. They repel each other with a force of 1 N when kept 30 Cm apart in free space. Calculate the value of each charge.

Solution:

Given,

$$q_1 + q_2 = 7$$

$$q_2 = 7 - q_1$$

$$r = 3 \times 10^{-1} \text{ m}$$

$$F = 1 \text{ N}$$

$$F = 9 \times 10^9 \times \frac{q_1 q_2}{r^2}$$

$$1 = \frac{9 \times 10^9 q_1 (7 - q_1)}{(3 \times 10^{-1})^2}$$

$$9 \times 10^{-2} = 9 \times 10^9 q_1 (7 - q_1)$$

$$q_1^2 - 7q_1 + 10 = 0$$

$$(q_1 - 2)(q_1 - 5) = 0$$

$$\boxed{q_1 = 2 \mu\text{C}}, \boxed{q_2 = 5 \mu\text{C}}.$$