National University

of Computer & Emerging Sciences

Applied Physics (NS-1001) **Quiz # 5** **Fall 2025**

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Section: BCS-B **CLO5** **Date: 19-11-2025**

Q.1: Three particles are fixed on an x axis. Particle 1 of charge q_1 is at x = - a, and particle 2 of charge q_2 is at x = + a. If their net electrostatic force on particle 3 of charge +Q is to be zero, what must be the ratio q_1/q_2 when particle 3 is at (a) x = +0.500a and (b) x = +1.50a? **(10)**

Solution:

14. (a) The individual force magnitudes (acting on Q) are, by Eq. 21-1,

$$\frac{1}{4\pi\varepsilon_0}\frac{|q_1|Q}{(-a-a/2)^2}=\frac{1}{4\pi\varepsilon_0}\frac{|q_2|Q}{(a-a/2)^2}$$

which leads to $|q_1| = 9.0\,|q_2|$. Since Q is located between q_1 and q_2, we conclude q_1 and q_2 are like-sign. Consequently, $q_1/q_2 = 9.0$.

(b) Now we have

$$\frac{1}{4\pi\varepsilon_0}\frac{|q_1|Q}{(-a-3a/2)^2}=\frac{1}{4\pi\varepsilon_0}\frac{|q_2|Q}{(a-3a/2)^2}$$

which yields $|q_1| = 25\,|q_2|$. Now, Q is not located between q_1 and q_2; one of them must push and the other must pull. Thus, they are unlike-sign, so $q_1/q_2 = -25$.