

National University of Computer and Emerging Sciences
Lahore Campus

Applied Physics (NS1001)

Sessional-II Exam

Date: 4th November, 2024

Total Time (Hr): 1

Course Moderator:

Total Marks: 25

Prof. Dr. Saman Shahid

Total Questions: 2

Roll No

Section

Student Signature

Do not write below this line

- Attempt all the questions. Properly mention question number and statement on the answer sheet.

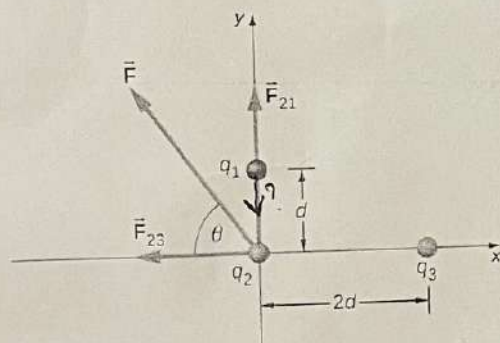
Constants: $k = 8.99 \times 10^9 \text{ Nm}^2/\text{C}^2$ and $\epsilon_0 = 8.854 \times 10^{-12} \text{ C}^2/\text{Nm}^2$

CLO # 03**Question 1 [Total Marks: 15]**

Q1(a): The electric field due to charges $q_1 = 2\mu\text{C}$ and $q_2 = 32\mu\text{C}$ at a distance of 16cm from charge q_2 is zero. What is the distance between the two charges? Also make a vector diagram.

[5 marks]

Q1(b): Three different small charged objects are placed as shown in figure below. The charges q_1 and q_3 are fixed in place; q_2 is free to move. Given $q_1 = 2e$, $q_2 = -3e$, and $q_3 = -5e$ and that $d = 2 \times 10^{-7} \text{ m}$, what is the net force on the middle charge q_2 ? Find this net force's magnitude and direction. [10 marks]

**CLO # 03****Question 2 [Total Marks: 10]**

Q2(a): A Gaussian surface (radius 'r') is inside a spherical (nonhollow) distribution of charges (radius 'R'). Find a mathematical expression of electric field for the spherical distribution of charges. [5 marks]

Q2(b): A uniformly charged, straight filament 7 m in length has a total positive charge of 2 C. An uncharged cardboard cylinder 2 cm in length and 10 cm in radius surrounds the filament at its center, with the filament as the axis of the cylinder. Find the electric field at the surface of the cylinder. [5 marks]