National University of Computer and Emerging Sciences

Lahore Campus

Applied Physics (NS1001) — **Sessional-II Exam**

Date: 4th November, 2024

Course Moderator:
Prof. Dr. Saman Shahid

Total Time (Hr):	1
Total Marks:	25
Total Questions:	2

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

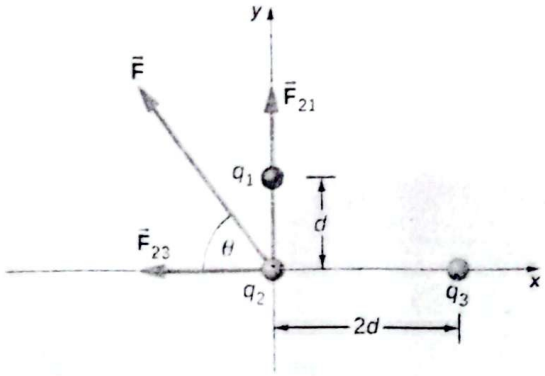
Constants: $k = 8.99\times10^{9}\ Nm^2/C^2$ and $\varepsilon_o = 8.854\times10^{-12}\ C^2/Nm^2$

CLO # 03

Question 1 [Total Marks: 15]

Q1(a): The electric field due to charges q_1=**2μC** and q_2=**32μC** 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] 20cm

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 = 2×10^{-7} 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] 5.215×10^{10}