CSU11031

Problem Sheet 6

1. A negative point charge of 10^{-6} C is situated in air at the origin of a rectangular coordinate system. A second negative point charge of 10^{-4} C is situated on the positive x-axis at a distance of 50 cm from the origin. What is the force on the second charge?

2. Determine the resultant force acting on a point charge of -2.0×10^{-6} C situated at the origin of a rectangular coordinate system in the vicinity of point charges 3.0×10^{-6} C and -4.0×10^{-6} C at distances 0.12 m along the positive x-axis and 0.08m along the half-line $y = x$ where $x, y \le 0$ respectively.

3. Compute the Electric Field Strength midway between two point charges of 30 μC and 40μC when the charges are placed 10cm apart in air.

4. An electron, starting from rest, moves unimpeded in an electric field of strength E V/m.
   Taking $q = 1.602\times10^{-19}$ C and $m_e = 9.11\times10^{-31}$ Kg find:

   (i) the force it experiences,
   (ii) its acceleration,

Answers:

Q1. $F = \hat{i}3.6$ N; Q2. $14.15 < 34.20^{o}$ N; Q3. $E = 36\times10^{6}$ N/C directed from the 40 μC charge to the 30 μC charge; Q4. F=(1.602X10^-19)E N; a=(1.758X10^11)E m/s^2; W=(5.93X10^5)(sqrt(V)) m/s.