HW. Questions Chapter 23 (Dr. Gondal-Phys102)

HW☞1)Three charges +2.00*10**(-8) C, +2.00*10**(-8) C, and -4.00*10**(-8) C are respectively arranged at the corners F, G, and H of a right-angle triangle as shown in figure 2. Find the magnitude and direction of the resultant electric field at point P due to the three charges. A1 2.88*10**3 N/C towards H.

2) In figure 9, a small ball of mass m=2.0 g is hanging from a fixed point by a non-conducting string of length 1.00 m. The ball carries a charge q=25.0*10**(-9) C. The mass of the string is negligible. An electric field E with magnitude E=2.0*10**5 N/C, in the positive x-direction, causes the ball to be in an equilibrium position with an angle Theta. Find the angle Theta. [Take g = 9.80 m/s**2]. A1 14.3 degrees.

HW☞3) A uniform electric field is set up between two large charged plates, see Figure 3. An electron is released from the negatively charged plate, and at the same time, a proton is released from the positively charged plate. They cross each other at a distance of 5.00*10(-6) m from the positively charged plate. If only the field due to the charged plates is considered, find the distance between the two plates.
[Take the ratio mass of the electron : mass of the proton = 1 : 1833] A1 9.19 mm.

T041

Q#1: The electric field produced by a +3.0 C charge at a point 1000 m to the left of the charge is (Ans: A1 2.7*10**4 N/C toward the left)

032

HW☞Q#1:In figure 4, a 0.3 g metallic ball hangs from an insulating string in a vertical electric field of 4000 N/C directed upward as shown. If the tension in the string is 0.005 N, then the charge on the ball is: (Ans: -0.52 micro-C

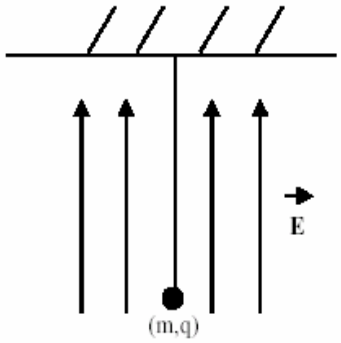

Figure 4

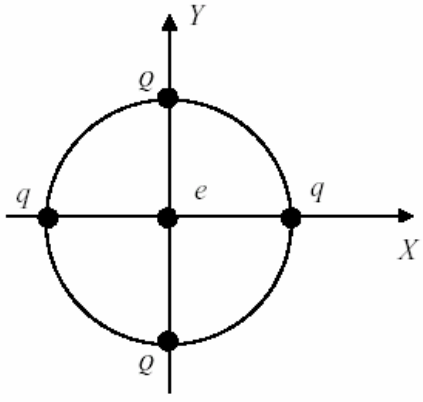

Figure 5

Q#2: In figure 5, four charges are placed on the circumference of a circle of diameter 2 m. If an electron is placed at the center of the circle, then the electron will [Take Q = 60 micro-C, q = 20 micro-C] (Ans: stay at the center.)

Q#3: A particle of mass 5.0 g and charge 40 mC moves in a region of space where the electric field is uniform and given by E = -5.5 i (N/C). If the velocity of the particle at t = 0 is given by v = 50 j (m/s), find the speed of the particle at t = 2 s. [i, and j are the unit vectors in the directions of x, and y respectively]. (Ans: 101 m/s.)

HW☞Q#4: At which point can the electric field due to the two charges shown in figure 6 be zero? (Ans: point E.)

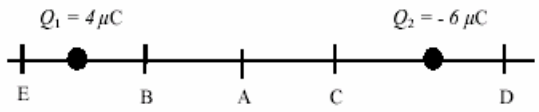

Figure 6

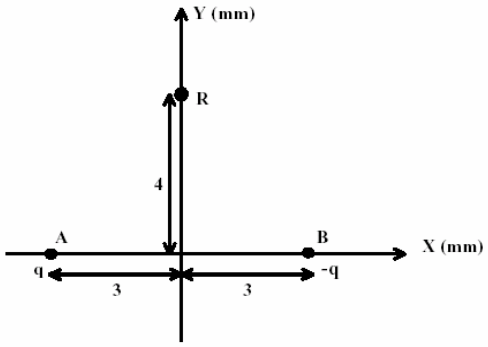

Figure (2)

031

HW☞Q#1: A particle, of mass m and charge q, is released from rest at point A in a uniform electric field, see figure (2). The kinetic energy, due to the electric field, it attains after moving a distance y is: (Ans: q*E*y.)

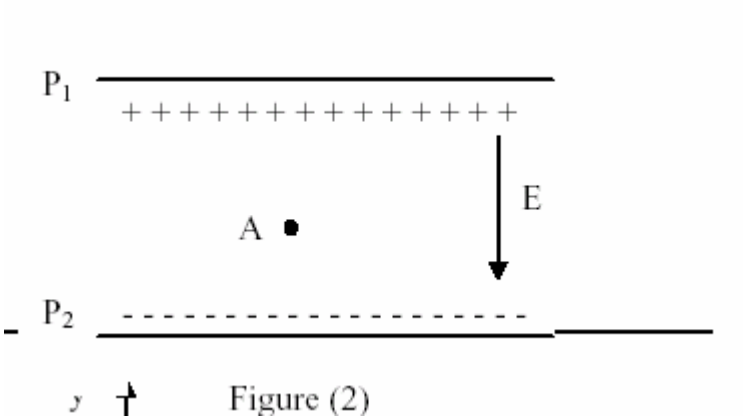

Figure (2)

Q#3: A long non-conducting cylinder (radius 12.0 cm) has a charge of uniform density 5.0 nano-C/m**3 distributed through its column. Determine the magnitude of the electric field 5.0 cm from the axis of the cylinder. [See figure (3)]. (Ans: 14 N/C.)

HW☞Q#4: In figure (4), what is the magnitude of the electric field at point P, center of the equilateral triangle? [take d = 2 m, q = 10**(-9) C] (Ans: A1 Zero.)

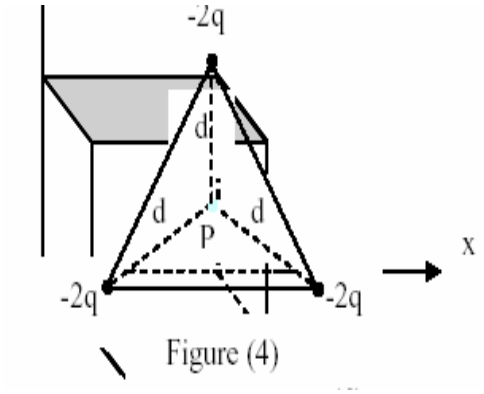

Figure (4)

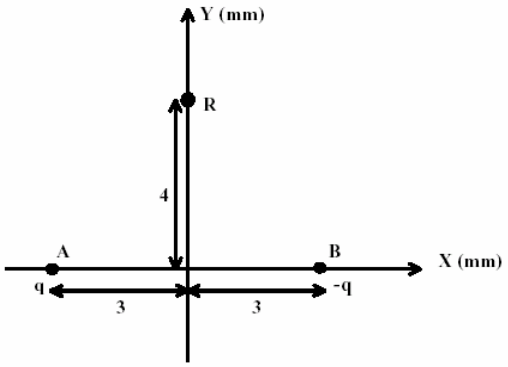

Figure (2)

012

HW☞Q#1: In figure (2), find the magnitude of the electric field at the point R: (0,4) mm due to two-point charges q (1 micro-C) and - q placed at points A: (-3, 0) mm and B: (3, 0) mm, respectively.(Ans: 4.3*10**8 N/C.)

Q#2: An electric dipole consists of two opposite charges, each of magnitude 5.0*10**(-19) C, separated by a distance of 1.00*10**(-9) m. The dipole is placed in an electric field of strength 2.45*10**5 N/C. Calculate the magnitude of the torque exerted on the dipole when the dipole moment is perpendicular to the electric field. (Ans: 1.2*10**(-22) N*m.).

002

Q#1: A point charge of 4.0 nano-C is located at a point having coordinates (30.0 cm, 40.0 cm). At what point will the electric field be 72 N/C and pointing in the negative y-direction? (Ans: (30.0, -30.7) cm)

Q#2: An electric dipole consists of a positive charge of magnitude 6.0*10**(-6) C at the origin and a negative charge of magnitude 6.0*10**(-6) C on the x-axis at x = 3.0*10**(-3) m. Its dipole moment is: (Ans: A1 1.8*10**(-8) C.m, in the negative x direction.)

Q#3: A charged particle has a mass of 2.0*10**(-4) kg. If it is held stationary by a downward 300 N/C electric field, the charge of the particle is: (Ans: - 6.5*10**(-6) C)

001

HW☞Q#1: Four electric charges are arranged so that the total electric field at the origin is zero. Which configuration in figure (1) would achieve this? (Ans: Configuration 1.)

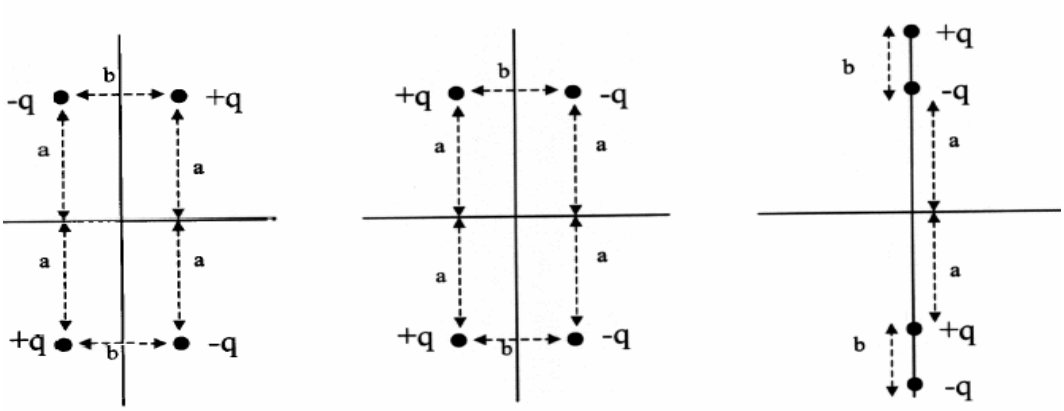

Figure 1

Q#2: An electron, traveling with initial velocity 10**5 i m/s, enters a region of a uniform electric field given by E = 4.0*10**3 i N/C. Determine the time it takes for the electron to come to rest momentarily.(i is a unit vector in the positive x-direction) (Ans: 1.4*10**(-10) s.)

992

Q#3: An electron, traveling with initial velocity 10**5 i m/s, enters a region of a uniform electric field given by E = 4.0*10**3 i N/C. Determine the time it takes for the electron to come to rest momentarily.

Final-032

Q#1: The electric field 20 mm from a certain point charge has a magnitude |E|. The magnitude of the electric field 10 mm from the point charge is : (Ans: 4.0*|E|.)