HW. Questions Chapter 29 (Dr. Gondal-Phys102-25-27)

T-041

Q#1: In **figure 5**, an electron moves toward the west at speed of 1.0*10**7 m/s in a downward (normal into the page) uniform magnetic field of 3.0*10**(-4) T. The magnetic force on the electron is (Ans: 4.8*10**(-16), north.)

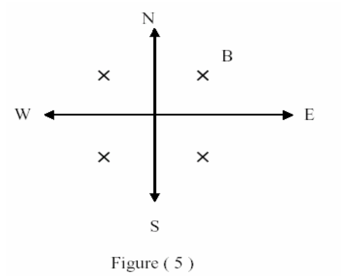
HW☞ **Q#2**: A circular area with a radius of 8.0 cm lies in the xy-plane. What is the magnitude of the magnetic flux through this circle due to a uniform magnetic field of 0.5 T at an angle of degrees from the positive z-axis?. (Ans: 8.7*10**(-3) Wb.)

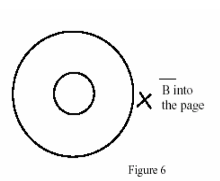
Q#3: An electron is accelerated by a potential difference of 2.0 kV. Then it passes normally through a region of magnetic field, where it moves in a circular path with radius 0.2 m. What is the magnitude of the magnetic field? (Ans: 7.5*10**(-4) T.)

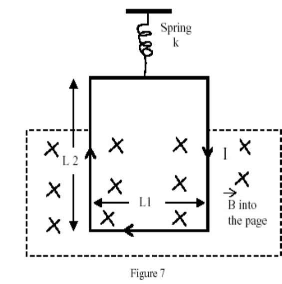
HW☞ **Q#4:** The plane of area 4.0 cm**2 rectangular loop of wire is parallel to a 2.0 T magnetic field. The loop carries a current of 6.0 A. Calculate the magnitude of the torque acts on the loop. (Ans:4.8*10**(-3) N*m.)

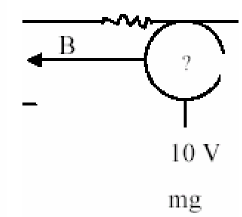
Q#5: A charged particle is placed in a region of space and it experiences a force only when it is in motion. It can be conclude that the region encloses (Ans: A magnetic field only.)

HW☞ **Q#6** An electric field and a magnetic field normal to each other. The electric field is 4.0 kV/m and the magnetic field strength is 2.0 mT. They are act on a moving electron to produce no force, calculate the electron speed. (Ans: 2.0*10**6 m/s.)









T041-Figure 5 T032-Figure 6 T032-Figure 7 T031-Figure 5

T-032:

HW☞ **Q#1**: Figure 6 shows the circular paths of an electron and a proton that travel at the same speed in a uniform magnetic field B**,** which points into the page. (a) Which particle follows the bigger circle, and (b) does that particle travel clockwise or counterclockwise? (Ans: (a) proton (b) counterclockwise)

HW☞ **Q#2**: In figure 7, a rectangular loop, L1 = 2.0 cm by L2 = 3.0 cm, carrying a current I = 0.1 A, is suspended from a spring of spring constant, k = 8.0*10**(-2) N/m. The loop is placed into a uniform magnetic field, which points into the page, and the spring is observed to stretch 1.0 cm. What is the magnitude of the magnetic field? [Neglect the mass of the loop] (Ans:0.4 T.)

Q#3: At a point in a uniform magnetic field the acceleration of an electron is 5.0*10**14 m/s**2 and its speed is 7.0*10**6 m/s. If the magnitude of the magnetic field is 1.0 mT, what is the angle between the electron's velocity and the magnetic field? (Ans:24 degrees.)

HW☞ **Q#4**:A proton moves with constant velocity, v = (8.0*10**5 m/s) i, through crossed electric and magnetic fields. If the magnetic field is B = (2.5 mT) j, what is the electric field? [i, j and k are the unit vectors in the positive x, y and z directions, respectively]. (Ans: (-2.0 kV/m) k.)

Q#5: Which one of the following statements is FALSE (NOT TRUE). A uniform magnetic field (Ans: changes the kinetic energy of a charge.)

T031

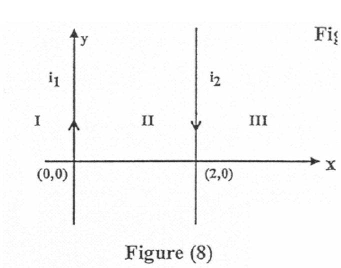
Q#1: An electron that has velocity v = 3.2*10**7 i m/s traveling parallel to a uniform magnetic field of strength 2.60*10**(-3) Tesla. The force on the electron is: [i is the unit vectors in the directions of x] (Ans:zero.)

HW☞ **Q#2**: A straight horizontal length of copper wire is located in a place where the magnetic field of the earth B = 0.5*10**(-4)T (see figure 5). What minimum current in the wire is needed to balance the gravitational force on the wire? [The linear density of the wire is 60.0 gram/m] (Ans:1.2*10**4 A into the page.)
Q#3: The path of a charged particle in a magnetic field, when its direction of motion is not at right angle to the magnetic field, will be a: (Ans: helix.)
Q#4: An electron moving at right angle to a uniform magnetic field completes a circular orbit in 10**(-8) s. What is the magnitude of the magnetic field. (Ans: 3.6*10**(-3) T.)

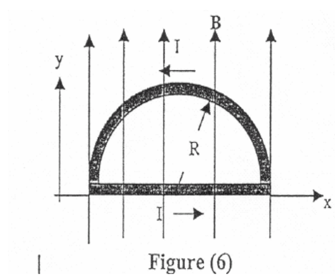
HW☞**T011**: **Q#1**: An electric field of 1.5*10**3 V/m and a magnetic field of 0.50 T act on a moving electron to produce no net force. Calculate the minimum speed of the moving electron. (Ans:. Zero.)

HW☞ **Q#2**: Figure (8) shows two wires carrying anti-parallel currents. If i2 is greater than i1, the point at which the resultant magnetic field of the two wires will be zero is located in the region (regions): (Ans: II and III.)
Q#3: A proton that has velocity **v**=(3.0*10**6 i- 2.0*10**6 j) m/s moves in a magnetic field **B** = (0.50 i) T. Find the force on the proton. (i, j and k are the rectangular unit vectors.) (Ans: -1.6*10**(-13) kN.)
Q#4: A 2.0 Tesla uniform magnetic field makes an angle of 60 degrees with the xy-plane. The magnetic flux through an area of 3 m**2 portion of the xy-plane is: (Ans: 3.0 Wb.)

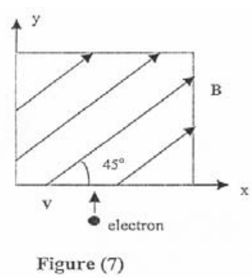
HW☞ **Q#5**: A wire bent into a semicircle of radius R = 2.0 m forms a closed circuit and carries a current of 1.5 A. The circuit lies in the xy-plane, and a uniform magnetic field B = 3.0 T is present along the y axis, as shown in figure (6). Find the magnitude of the magnetic force on the curved portion of the wire. (Ans: 18 N.)
Q#6: What uniform magnetic field, applied perpendicular to a beam of electrons moving at 1.4*10**6 m/s is required to make the electrons travel in a circular orbit of radius 0.40 m? (Ans: 7.0*10**(-5) T.)
Q#7: What is the initial direction of the deflection of an electron, moving in the y direction as it enters the magnetic field shown in figure (7)? [The magnetic field is in the xy-plane and makes an angle of 45 degrees with the x axis]. (Ans: y direction.).



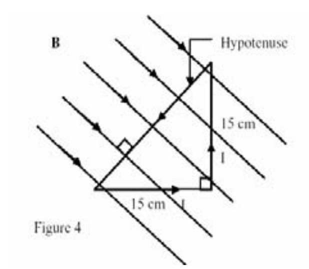
T011-Figure 8



T011-Figure 6



T011-Figure 7



T002-Figure 4

T002:

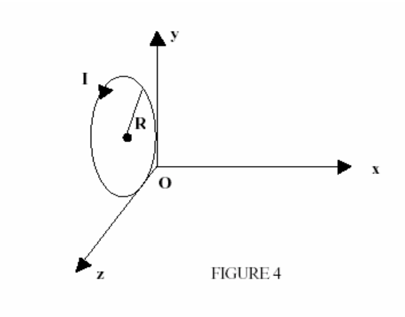
Q#1: An electron is projected into a uniform magnetic field B = (0.8 k) T. Find the magnitude of the magnetic force, on the electron when the velocity is: v = (5.0*10**5 i + 3.0*10**5 j) m/sec. (i, j and k are the unit vectors in the x, y and z directions, respectively). (Ans:7.5*10**(-14) N.)

HW☞ **Q#2**: In figure (4), a loop of wire carrying a current, I, of 2.0 A is in the shape of a right triangle with two equal sides, each 15 cm long. A 0.7 T uniform magnetic field is in the plane of the triangle and is perpendicular to the hypotenuse. The resultant magnetic force on the two equal sides is: (Ans: 0.30 N, into the page.)
Q#3: A magnetic field CANNOT: (Ans: cannot change the kinetic energy of a charge.)
Q#4: Electrons are accelerated from rest through a potential difference of 500 V. They are then deflected by a magnetic field of 0.2 T that is perpendicular to their velocity. The radius of the electrons trajectory is: (Ans: 0.38 milli-m.)

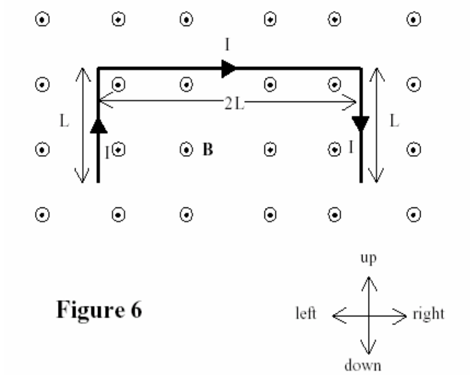
T992

HW☞ Q#1: An electron enters a region of magnetic field B = (0.40 i) T with a velocity v = (3.0*10**4 i + 2.0*10**5 j) m/s. (i, j and k are the unit vectors in x, y and z directions, respectively). The magnetic force that the electron experiences is: (Ans: (1.3*10**(-14) k) N)
Q#2: An electron moving perpendicular to a 50 micro-T magnetic field, goes through a circular trajectory. What is the time required to complete one revolution? (Ans: 715 nano-seconds)

HW☞Q#3: A current of 17 mA is maintained in a circular loop of 2 m circumference which is parallel to the y-z plane (see Figure 4). A magnetic field B = (- 0.8 k) T is applied. Calculate the torque exerted on the loop by the magnetic field. (i, j and k are the unit vectors in x, y and z directions, respectively). (Ans:(4.33*10**(-3) j) N*m)



T992-Figure 4



T991-Figure 6

T-991

Q#1: An electron is projected into a uniform magnetic field B = (1.4i + 2.1j) T. Find the force on the electron when the velocity is v = (3.7*10**5 j) m/sec (i, j and k are the unit vectors in the x, y and z directions, respectively). (Ans: (8.3*10**(-14) k) N)

Q#2: An electron moving in a circular path perpendicular to a uniform magnetic field takes 1.0 nano-second to complete one revolution. Determine the magnitude of the magnetic field. (Ans: 36 milli-T)

HW☞Q#3: A wire of total length 4L and carrying a current I is placed in a uniform magnetic field B that is directed out of the page as shown in Figure 6. Determine the net magnetic force on the wire. (Ans: 2ILB down)

Q#4: A square loop, of side a = 5 cm and 200 turns, carries a current of 10 A. The loop is placed in an external magnetic field of 2.0 T. Determine the magnitude of the maximum torque exerted on the loop. (Ans: 10 N*m)