HW. Questions Chapter 30 (Dr. Gondal-Phys102-25-27)

T-041 **Q#1:** Two long wires are parallel to the z-axis as shown in figure 2.Find the resultant magnetic field at the origin, given that the wires carry equal current I and moves in the same direction. [Take I= 1.0 A and a=0.5 m](Ans:Zero.)

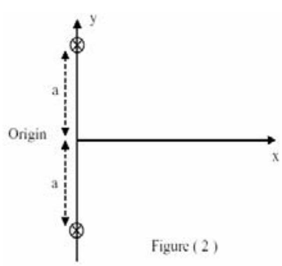
HW☞**Q#2:** A solenoid has length L=2.0 m and diameter d=4.0 cm, and it arries a current I=6.0 A. It consists of seven closed packed ayers, each with 90 turns along length L. What is B at its enter? (Ans: 2.4*10**(-3) Tesla.)

Q#3: Two infinite parallel wires are separated by 2.5 cm and carry current 10 A and 12 A in the same direction. What is the force per unit length on each wire? (Ans:1.0*10**(-3) N/m, attraction.)

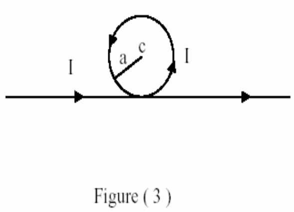
Q#4: Part of a long, flexible, current-carrying wire is made into a circular loop, while the rest of it lies in a straight line as shown in figure 3. What is the magnetic field strength at point C, the center of the loop? [Take I= 1.0 A and a=0.5 m] (Ans: 1.7*10**(-6) T, out of the page.)

Q#5: Figure 4 shows four circular loops concentric with a wire whose current is directed out of the page. The current is uniform across the cross section of the wire. Rank the loops according to the magnitude of the enclosed current, greatest first [loops a and b inside the wires, c and d are outside] (Ans: d = c > b > a.)

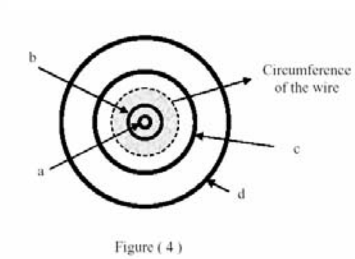
Q#6: A proton is moving along the axis of a solenoid carrying a current. Which of the following statement is CORRECT about the magnetic force acting on the proton? (Ans: No force acts.)



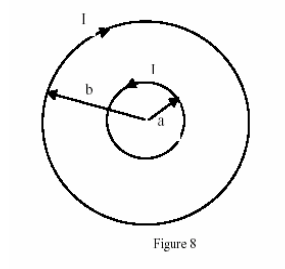
T041-Figure 2



T041-Figure 3



T041-Figure 4



T032-Figure 8

HW☞**T-032:Q#1:** Figure (8) shows two concentric circular loops of radii a and b and both carry a current I. Find the resultant magnetic field at the center of the two loops if a = 10 cm, b = 20 cm and I = 20 A. (Ans: 63 micro-T, out of the page.)

Q#2: Two long parallel wires, D and B, are separated by 2.0 cm. The current in D is THREE times the current in B. If the magnitude of the force on 2.0 m length of one of the wires is equal to 60 micro-N, find the current in B. (Ans: 1.0 A.)

HW☞**Q#3**: The radius R of a long current-carrying wire is 2.3 cm. If the magnetic field at r1 = 2.0 cm is equal to THREE times the magnetic field at r2, r2 > R, calculate the distance r2. (Ans: 7.9 cm.)

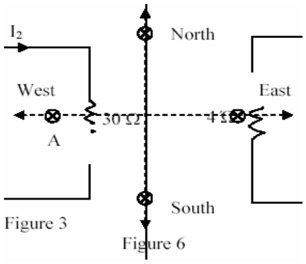
HW☞**Q#4**: A hollow cylindrical conductor of inner radius 3.0 mm and outer radius 5.0 mm carries a current of 80 A parallel to its axis. The current is uniformly distributed over the cross section of the conductor. Find the magnitude of the magnetic field at a point that is 2.0 mm from the axis of the conductor. (Ans: zero.)

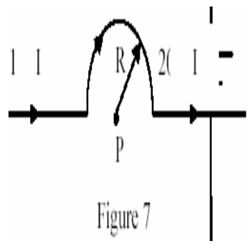
T-031: **Q#1**: Two parallel wires, carrying equal currents of 10 A, attract each other with a force F. If both currents are doubled, and the distance between them reduced by 50%, the new force will be: (Ans: 8*F.)

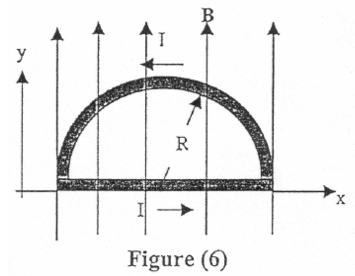
Q#2: Four long straight wires carry equal currents into page as shown in Figure 6. The magnetic force exerted on wire "A" is: (Ans: East.)

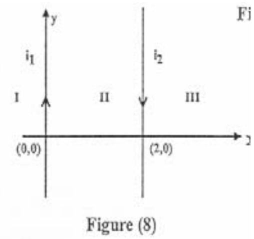
HW☞**Q#3**: Consider two solenoids, A and B, having the same current. Solenoid B has twice the radius and six times the number of turns per unit length as solenoid A. The ratio of the magnetic field in the interior of solenoid B to that in the interior of solenoid A is: (Ans:6.)

HW☞**Q#4**: The segment of wire is formed into the shape as shown in Figure 7 and carries a current I = 6 A. When R = 6.28 cm, what is the magnetic field at the point P? (Ans: 3.0*10**(-5) T into the page.)









T031-Figure 6 **T031-Figure 7** **T011-Figure 6** **T011-Figure 8**

T011: **Q#1**: 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#2: 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.)

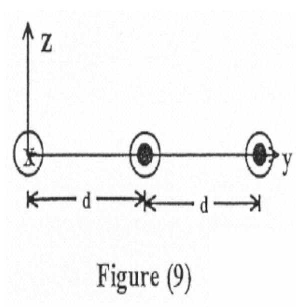
HW☞Q#3: A wire bent into a semicircle of radius R = 2.0 m forms a closed circuit and carries a current of 1.5 A. The circuit lies in the xy-plane, and a uniform magnetic field B = 3.0 T is present along the y axis, as shown in figure (6). Find the magnitude of the magnetic force on the curved portion of the wire. (Ans: 18 N.)

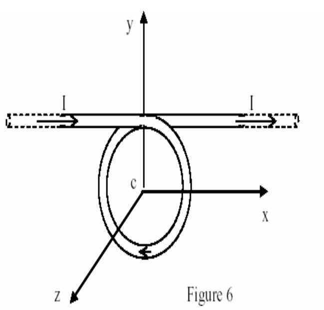
Q#4: A current of 2.5 A passes in a solenoid of length L = 50 cm. It produces a magnetic field of 2.3*10**(-3) T at its center. The number of turns in the solenoid is: (Ans: 366.)

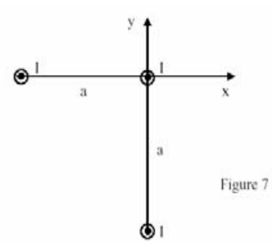
HW☞Q#5: Consider an infinitely long straight wire carrying a current I. If the magnetic field at r1 = 2.5 am inside the wire and at r2 = 10 am outside the wire are equal, then the radius of the wire is: (Ans: 4.0 mm.)

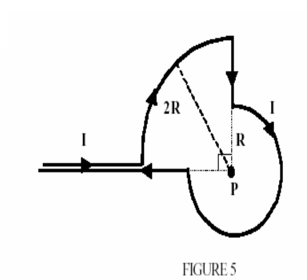
HW☞Q#6: Three long parallel wires, shown in figure (9), are in the xy-plane. Each wire carries a current of 3.0 A. The separation between the adjacent wires is d = 8.0 cm. What is the magnitude of the net force per meter exerted on the central wire by the other two wires? (Ans: . 9.2*10**(-5) N/m.)

Q#7: The magnitude of the magnetic field at 88.0 cm from the axis of an infinitely long wire is 7.30*10**(-6) T. What is the current in the wire? (Ans: 42.8 A.)









T011-Figure 9 **T002-Figure 6** **T002-Figure 7** **T001-Figure 5**

HW☞T002: **Q#1:** A conductor consists of a circular loop of radius R = 0.10 m and two straight, long sections, as in Figure (6). The wire lies in the plane of the paper (xy-plane) and carries a current of I = 5.3 A. Determine the magnetic field, in Tesla, at the center of the loop. (k is a unit vector in +z-direction) (Ans: -4.4*10**(-5) k.)

HW☞Q#2: A long solid cylindrical conductor of radius R= 4.0 mm carries a current I parallel to its axis. The current density in the wire is 2*10**4 A/m**2. Determine the magnitude of the magnetic field at a point that is 5.0 mm from the axis of the conductor. (Ans: 40 micro-T.)

HW☞Q#3: A solenoid is 3.0 m long and has a circumference of 9.4*10**(-2) m. It carries a current of 12.0 A. The magnetic field inside the solenoid is 25.0*10**(-3) T. The length of the wire forming the solenoid is: (Ans: 467 m.)

Q#4: Suppose that the identical currents I in figure (7) are all out of the page. The magnitude of the force per unit length on the wire at the origin is: [take I = 10.0 A, and a = 1.0*10**(-4) m.] (Ans: 0.28 N/m.)

HW☞T-001 **Q#1**: A segment of wire is formed into the shape shown in Figure 5 and carries a current I = 1.0 A. What is the magnitude of the resulting magnetic field at the point P if R = 10 cm? (Ans: 5.5 micro-T into the page)

HW☞Q#2: A 500 turns solenoid is 30 cm long, has a radius of 0.5 cm and carries a current of 2.0 A. The magnitude of the magnetic field at the center of the solenoid is: (Ans: 4.2*10**(-3) T)

Q#3: Two long wires parallel to the x-axis carry currents I1 and I2 as shown in Figure 6. If I1 = 5 A, what is the magnitude and direction of I2 if the net magnetic field at the origin is 0.35 micro-T and directed out the page. (Ans: 1 A to the left)

Q#4: What must be the radius R of a long current-carrying wire if the magnetic field at r1 = 2.0 cm (inside the wire) is equal to three times the magnetic field at r2 = 8.0 cm (outside the wire). (Ans: 2.3 cm)

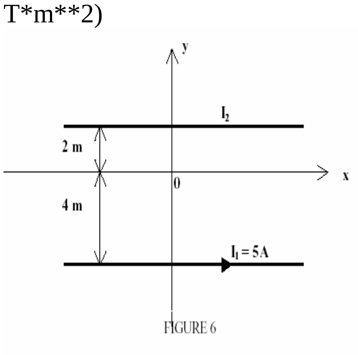
HW☞Q#5: A uniform magnetic field B = (2.0 i + 4.0 j + 5.0 k) T intersects a circular surface of radius 2 cm lying in the yz plane. What is the magnetic flux through this surface? (Ans: 2.5*10**(-3) T*m**2)

HW☞T-991 **Q#1:** What is the magnitude of the magnetic field at point P due to the current carrying wire shown in Figure 7, if I = 2.0 A, a = 20 cm and b = 2a? (Ans: 0.8 micro-T)

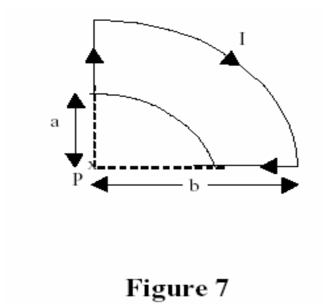
Q#2: Figure 8 shows a cross section of three long parallel wires each carrying a current of 15 A. The currents in the wires A and C are out of the paper, while that in wire B is into the paper. If the distance a = 5.0 mm, what is the magnitude of the force per unit length on wire C? (Ans: 4.5 milli-N/m)

Q#3: A long cylindrical wire has a radius R = 2.0 cm and carries a current I = 40 A that is uniformly distributed through the cross-section of the wire. What is the magnitude of the magnetic field at a point which is 1.5 cm from the axis of the wire? (Ans: 3*10**(-4) T)

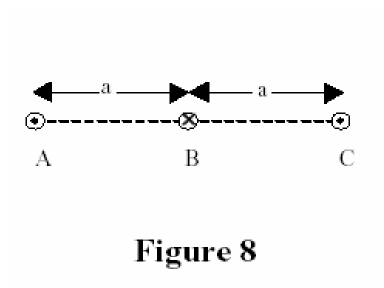
HW☞Q#4: Consider a circular loop of radius R = 20 cm lying in the x-y plane. There is throughout the region a uniform magnetic field given by B = (5.0i + 4.0j + 3.0k) T. Calculate the magnetic flux though the loop. (Ans: 0.38 T*m**2)



T001-Figure 6



T991-Figure 7



T991-Figure 8