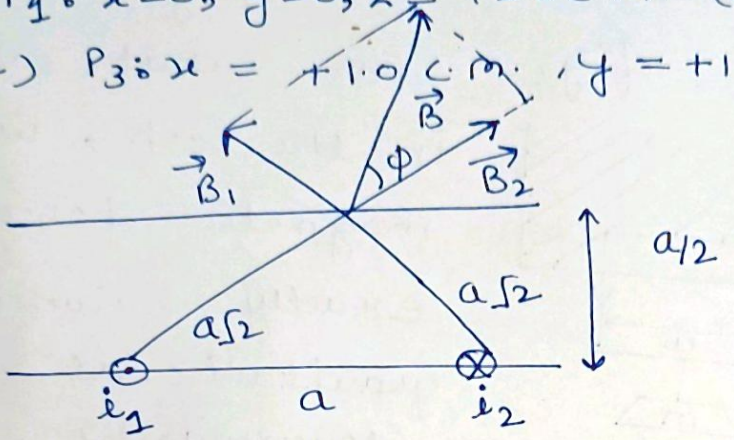
ASSIGNMENT

Q.(1) An alpha particle ($q = +2e$) is moving in the positive x direction with a speed of $0.0050c$. When the particle is at the origin, find the magnetic field at (a) P_1: $x=0$, $y=0$, $z = +2.0$ C.m. (b) P_2: $x=0$, $y=+2.0$ C.m. $z=0$ (c) P_3: $x = +1.0$ C.m., $y = +1.0$ C.m. $z = +1.0$ C.m.

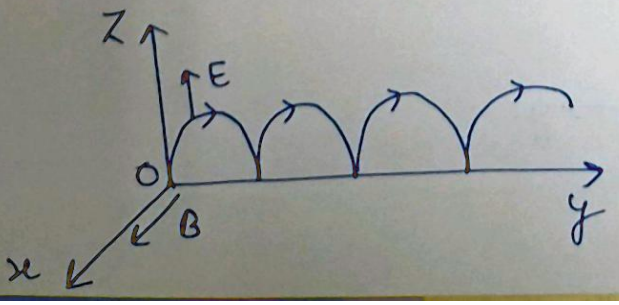
Q.(2)



Let $i_1 = 15$ A and $i_2 = 32$ A. the two wires are separated by a distance $a = 5.3$ C.m.. Find the total magnetic field at a point a distance $a/2$ along a line perpendicular to the line connecting the two wires.

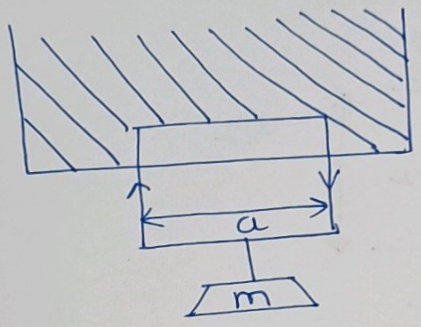
Q.(3) A solenoid has a length $L = 1.23$ m and an inner diameter $d = 3.55$ C.m. It has five layers of windings of 850 turns and carries a current $i = 5.57$ A. What is B at its center?

Q.(4) A more exotic trajectory occurs if we include a uniform electric field, at right angles to the magnetic one. Suppose, for instance, that $\vec{B}$ points in the x-direction, and $\vec{E}$ in the z-direction.

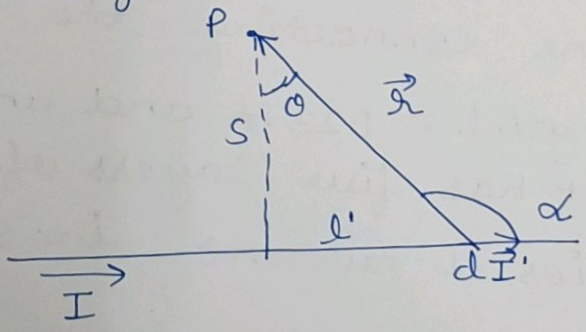


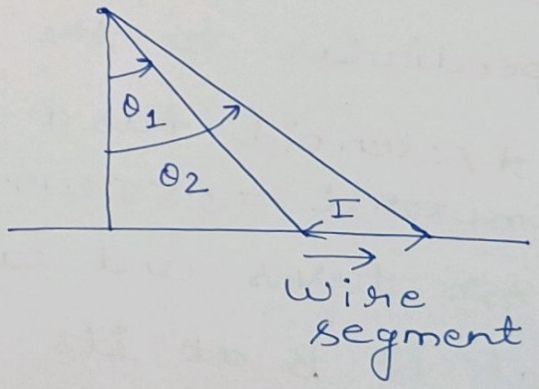
A particle at rest is released from the origin, what path will it follow?

Q.⑤ A rectangular loop of wire, supporting a mass m hangs vertically with one end in a uniform magnetic field $\vec{B}$, which points into the page in the shaded region of fig. For what current I in the loop, would the magnetic force upward exactly balance the gravitational force downward?



Q.⑥ Find the magnetic field a distance s from a long straight wire carrying a steady current I.





Q.⑦ A thick slab extending from $z = -a$ to $z = +a$ carries a uniform volume current $\vec{J} = J\hat{x}$. Find the magnetic field, as a function of z, both inside and outside the slab.