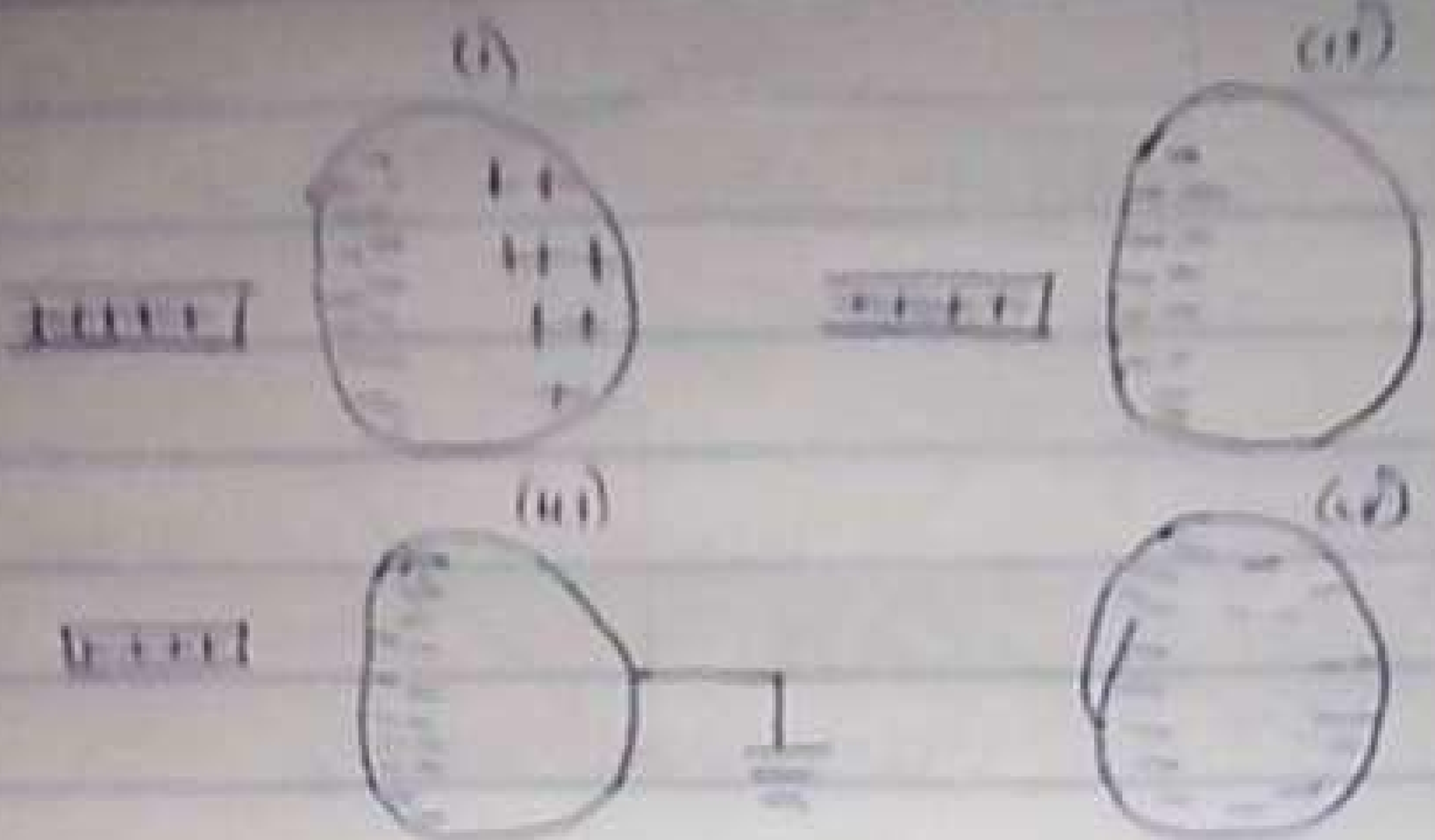
Part (c)

1)(a)



(b) $q_1 + q_2 = 5.0 \times 10^{-5}$ C $F = 1$ N

$F = \frac{Kq_1q_2}{r^2}$ $\frac{F}{h}$ $r = 2$ m

$K = 9 \times 10^9$

$q_1 q_2 = \frac{1 \times 2^2}{9 \times 10^9} = 4.444 \times 10^{-10}$

$q_1 + q_2 = 5.0 \times 10^{-5}$

$q_2 = 5.0 \times 10^{-5} - q_1$

$q_1(5.0 \times 10^{-5} - q_1) = 4.444 \times 10^{-10}$

$q_1^2 - (5.0 \times 10^{-5} q_1) + 4.444 \times 10^{-10} = 0$

A B C

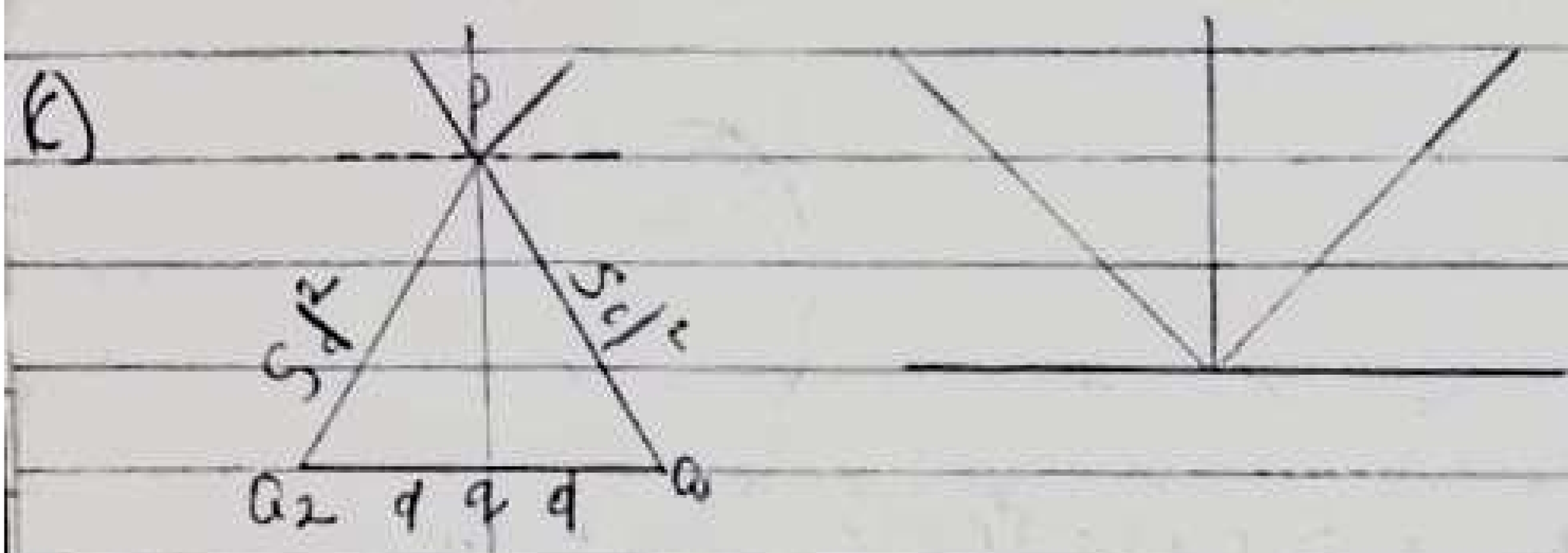
$$\frac{5.0\times10^{-5} + \sqrt{(5.0\times10^{-5})^2 - 4(4444\times10^{-10})}}{2}$$

$$q_1 = 3.84\times10^{-5}\ C$$

$$q_2 = 5.0\times10^{-5} - 3.84\times10^{-5}$$

$$q_2 = 1.16\times10^{-5}\ C$$

c)



$$E_2 = \frac{KQ_2}{r^2} = \frac{9\times10^9\times5\times10^{-6}}{(1/2)^2}$$

$$E_1 = 57397.9978$$

$$E_q = \frac{KQ}{r^2} = \frac{9\times10^9\times q}{1} = 9\times10^9 q$$

$t_1 = 5739795918$	63.4	25706.45765	5322.62839
$t_2 = 5739795918$	63.4	-25700.45765	51322.62635

$$q \quad t_R = \sqrt{(0)^2 + (102645.2565)^2}$$

$$t_q = 0 + 102645.2565$$

$$a = \frac{t_q}{9 \times 10^9} = \frac{102645.2568}{9 \times 10^9}$$

$$q = 1.14 \times 10^{-5} C$$

16)

Electric field - is a region of space in which an electric charge will experience an electric field

Electric field intensity - can be defined as the force per unit charge.

(4) Magnetic flux is defined as the strength of the magnetic field represented by lines of force

(b) $m = 9.11 \times 10^{-31} kg \quad r = 1.9 \times 10^{-}$

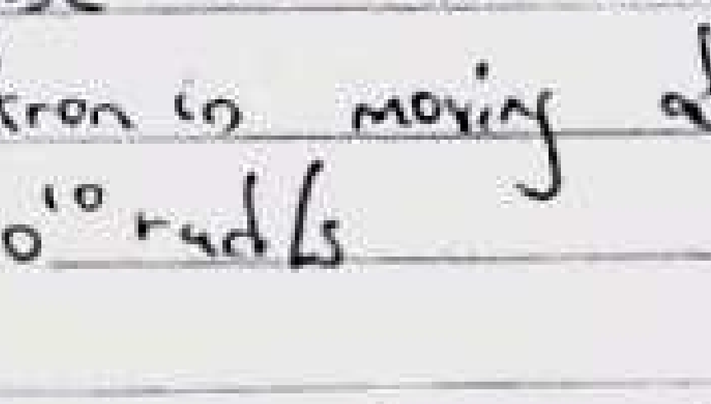
$B = 3.5 \times 10^{-1} wb/m^2 \quad q = -1.6 \times 10^{-19}$

$\omega = \frac{qB}{m} = \frac{-1.6 \times 10^{-19} \times 3.5 \times 10^{-1}}{9.11 \times 10^{-31}}$

$\omega = -6.5 \times 10^{10} rad/s$

(c) The answer is negative because we are dealing with an electron but the electron is moving at a cyclotron frequency of $6.15 \times 10^{10} rad/s$

(5) a The Biot-Savart law is used to find the total magnetic field created at some point on a current carrying wire or current consisting of charges flowing through space



(b) $B = \frac{\mu_0 I}{4\pi} \int_{-q}^{q} \frac{dl \sin\phi}{r^2}$

$\sin(\pi - \phi) = \sin\theta$

$B = \frac{\mu_0 I}{4\pi} \int_{-q}^{q} \frac{dl \sin(\pi - \phi)}{r^2}$ from Diagram $r^2 = x^2 + y^2$