

Supplementary Assignment 5

(1)

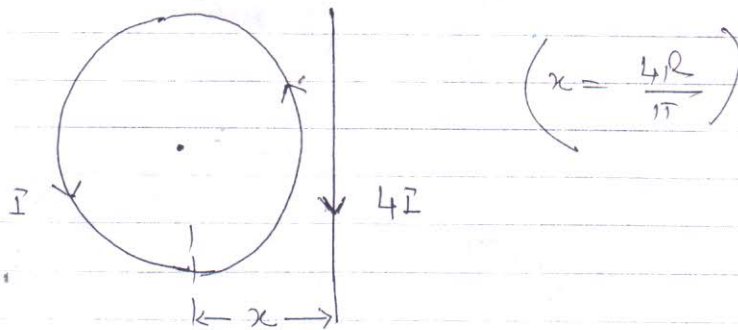
XII

Physics

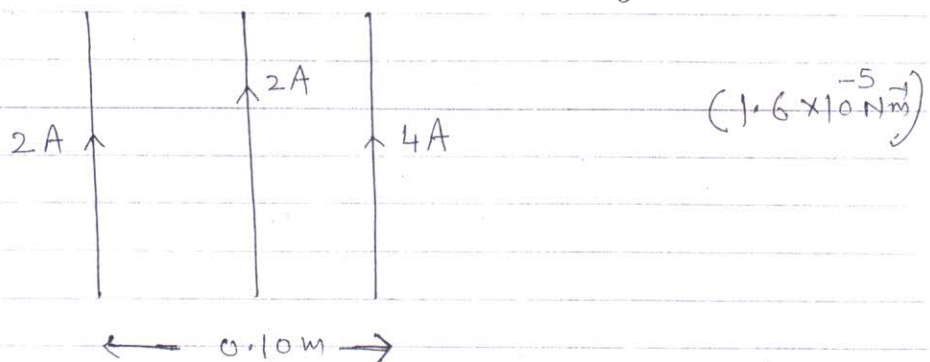
07/06/18

1. A charged particle moves perpendicular to a magnetic field. How its K.E. and momentum are affected.

2. A circular loop of radius R carries a current I . How should a long, straight wire carrying a current $4I$ be placed in the plane of the circular loop so that the magnetic field at the centre becomes zero.



3. Calculate the force experienced per unit length by a conductor carrying $2A$ current and placed at the middle point of two parallel conductors carrying currents of $2A$ and $4A$ respectively in the same direction, separated by $0.10m$.



4. Deutrons are accelerated in a cyclotron that has an oscillating frequency 10^7 Hz and a Dee's Radius $0.5m$

(a). Calculate the freq. of Deutrons strength of magnetic field required to accelerate deutrons.

(2)

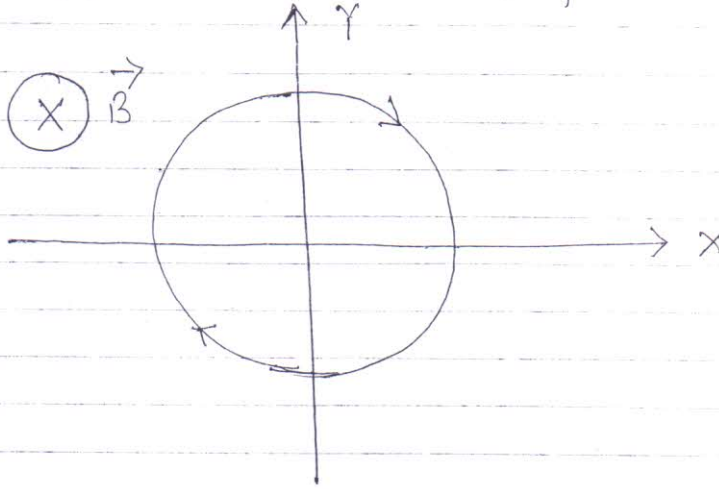
(b) Calculate the energy of deuterons emerging out of the cyclotron. $m_d = 3.34 \times 10^{-27} \text{ kg}$, $q_d = 1.6 \times 10^{-19} \text{ C}$

(a) 1.3 T

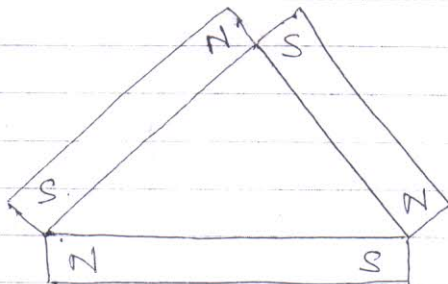
(b) 10.1 MeV.

5. A Compass Needle is placed at the neutral point. In which direction would it stay.

6. A conducting loop carrying a current I is placed in a uniform magnetic field pointing into the plane of paper as shown. What will happen to this loop.



7. Three identical bar magnets each of magnetic moment \vec{M} are placed in the form of an equilateral triangle. Calculate the net magnetic dipole moment. Give a suitable explanation also.



(1)

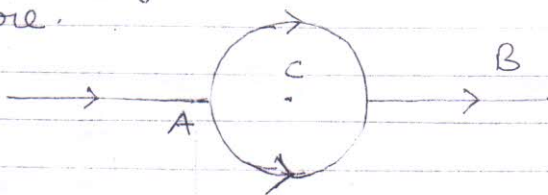
Assignment 5 class XII PHYSICS

1. Calculate the magnetic field induction at the centre of a coil bent in the form of a square of side 11 cm carrying a current of 10 A. $(1.03 \times 10^{-4} \text{ T})$
2. A long straight telephone cable contains six wires, each carrying a current of 0.5 A. The distances between the wires can be neglected.
 - (a) If the current in all the six wires are in the same direction, what is the magnitude of the magnetic field 0.10 m from the cable.
 - (b) If four wires carry currents in one direction and the other two in the opposite directions, what is the field magnitude at 0.10 m from the cable? $(6\mu\text{T}, 2\mu\text{T})$
3. A circular coil of radius R carries a current I. How should a long straight wire carrying a current of $4I$ be placed in the plane of the coil so that the magnetic field at the centre becomes zero.
4. A coil in the shape of an equilateral Δ of side 0.02 m is suspended between the poles of a permanent magnet s.t. the plane of the coil is parallel to the magnetic field of $0.5 \times 10^{-1} \text{ T}$. Calculate the torque acting on the coil, when a current of 0.1 A is passing through the coil. $[8.66 \times 10^{-7} \text{ Nm}]$
5. The coil of a moving coil galvanometer twists through 30° when a current of 15^6 A is passed through it. If the area of the coil is 10^{-4} m^2 and it has 500 turns, calculate the magnetic field of the magnet of the galvanometer. Given $k = 10^{-8} \text{ Nm/degree}$ (6 T)
6. A toroid has a core of inner radius 0.20 m and an outer radius of 0.22 m around which 4200 turns of a given wire are wound. If the current in the wire is 10 A, what is the magnetic field (a) Inside the core of toroid (b) Outside the toroid (c) In the empty space around toroid $(0.04 \text{ T}, 0, 0)$

7. What is a synchrotron? Explain.

8. A cyclotron in which the magnetic field is 2.475 Wb m^{-2} is used to accelerate deuterons. Calculate the freq. of the oscillating potential that must be applied to the Dees of the cyclotron. Also determine the period of revolution of the deuteron. $m_d = 3.3 \times 10^{-27} \text{ kg}$. [$1.9 \times 10^7 \text{ Hz}$, $5.3 \times 10^{-8} \text{ s}$]

9. In the following circuit, find the magnetic field at the centre.



10. Calculate the value of Bohr magnetone.

11. Horizontal Component of earth's magnetic field at a place is $\sqrt{3}$ times the vertical Component. What is the value of angle of dip at this place. (30°).

12. A wire in the form of a circular coil of one turn carrying a current produces a magnetic field B at the centre. If this wire is looped into a coil of 2 turns and carries same current, find new value of magnetic induction at the centre. ($4B$)

13. Relative Permeability of iron is 5500. Calculate its magnetic susceptibility.

14. At some place, the horizontal Component B_0 and vertical Component V_0 of the earth's magnetic field are equal in magnitude. Calculate the total intensity at that place.