# Class 12 Physics Chapter 4 Moving Charges and Magnetism NCERT Solutions

**Class 12 Physics Chapter 4:** This chapter talks about how moving charges make magnetic fields and how magnets and currents affect each other. In chapter 4 physics class 12, you learn many ideas that are very important for boards and exams like JEE and NEET. With these class 12 physics chapter 4 **NCERT Solutions**, you will understand formulas, concepts, and numerical questions in a slow and easy way. These moving charges and magnetism class 12 notes will help you revise fast and feel more confident before the exam.

**Read About:** **Class 12 Physics Chapter 1 Electric Charges and Fields**

## Class 12 Physics Chapter 4 Moving Charges and Magnetism Sub Topics

Below is a simple table of sub-topics of chapter 4 physics class 12, a small story / idea name, and what you mainly learn from it.

| Sub-topic (Chapter 4 Class 12 Physics) | Story / Concept name | Main learning / "moral" for exam |
|---|---|---|
| Magnetic Force | Push or pull on moving charge | Moving charges feel a force in a magnetic field, and this force depends on charge, speed, field, and angle between velocity and field. |
| Motion in a Magnetic Field | Charge on a curved path | A charged particle can move in a circle or helix in a magnetic field, and radius and time period depend on mass, charge, speed, and field. |

| | | |
|---|---|---|
| Magnetic Field due to a Current Element, Biot–Savart Law | Small piece of wire makes field | A small current element makes a magnetic field around it, and Biot–Savart law gives a formula to find this field. |
| Magnetic Field on the Axis of a Circular Current Loop | Field on axis of loop | A current loop acts like a tiny magnet and the magnetic field is strongest at the centre and can be found along its axis. |
| Ampere's Circuital Law | Field from symmetry | This law gives a simple way to find magnetic field for long straight wire, solenoid, etc., using current enclosed by a path. |
| The Solenoid | Coil that works like a bar magnet | A long coil of wire (solenoid) makes a strong nearly uniform magnetic field inside, useful in many devices. |
| Force between Two Parallel Currents, the Ampere | Wires attract or repel | Two parallel current-carrying wires attract if currents are in same direction and repel if opposite; this defines 1 ampere. |
| Torque on Current Loop, Magnetic Dipole | Coil as small magnet | A current loop in a magnetic field feels a turning effect (torque) and behaves like a magnetic dipole with a dipole moment. |
| The Moving Coil Galvanometer | Device to detect small currents | This instrument uses torque on a current loop in a magnetic field to detect and measure small currents; it can be changed to ammeter or voltmeter. |

**Read About:** Class 12 Physics Chapter 2 Electrostatic Potential and Capacitance

## NCERT Solution for Class 12 Physics Chapter 4

Now, let us solve the given exercise questions from physics class 12 chapter 4 in very clear steps. Each solution is explained slowly so that even if you feel weak in maths, you can still follow.

### Q1. A circular coil of wire consisting of 100 turns, each of radius 8.0 cm carries a current of 0.40 A. What is the magnitude of the magnetic field B at the centre of the coil?

For a circular coil with N turns, radius R, and current I, the magnetic field at the centre is:
$B = \mu_0 N I / (2 R)$

Here,
$N = 100$
$R = 8.0$ cm $= 0.08$ m
$I = 0.40$ A
$\mu_0 = 4\pi \times 10^{-7}$ T m $A^{-1}$

Step 1: Put the values in the formula.
$B = (4\pi \times 10^{-7} \times 100 \times 0.40) / (2 \times 0.08)$

Step 2: Simplify the numerator.
$4\pi \times 10^{-7} \times 100 \times 0.40 = 4\pi \times 10^{-7} \times 40 = 160\pi \times 10^{-7}$

Step 3: Denominator is $2 \times 0.08 = 0.16$

So,
$B = (160\pi \times 10^{-7}) / 0.16 = 1000\pi \times 10^{-7}$ T

$1000 \times 10^{-7} = 10^{-4}$, so
$B \approx \pi \times 10^{-4}$ T $\approx 3.14 \times 10^{-4}$ T

Answer: $B \approx 3.1 \times 10^{-4}$ T at the centre of the coil.

### Q2. A long straight wire carries a current of 35 A. What is the magnitude of the field B at a point 20 cm from the wire?

For a long straight wire, magnetic field at distance r is:
$B = \mu_0 I / (2\pi r)$

Here,
$I = 35$ A
$r = 20$ cm $= 0.20$ m
$\mu_0 = 4\pi \times 10^{-7}$ T m $A^{-1}$

$B = (4\pi \times 10^{-7} \times 35) / (2\pi \times 0.20)$

Cancel π on top and bottom:
$B = (4 \times 10^{-7} \times 35) / (2 \times 0.20)$

First, numerator: $4 \times 35 \times 10^{-7} = 140 \times 10^{-7}$
Denominator: $2 \times 0.20 = 0.40$

So,
$B = (140 \times 10^{-7}) / 0.40 = 350 \times 10^{-7}$ T

$350 \times 10^{-7} = 3.5 \times 10^{-5}$ T

Answer: $B = 3.5 \times 10^{-5}$ T.

**Q3. A long straight wire in the horizontal plane carries a current of 50 A in north to south direction. Give the magnitude and direction of B at a point 2.5 m east of the wire.**

Use same formula:
$B = \mu_0 I / (2\pi r)$

$I = 50$ A
$r = 2.5$ m
$\mu_0 = 4\pi \times 10^{-7}$ T m $A^{-1}$

$B = (4\pi \times 10^{-7} \times 50) / (2\pi \times 2.5)$

Cancel π:
$B = (4 \times 10^{-7} \times 50) / (2 \times 2.5)$

Numerator: $4 \times 50 \times 10^{-7} = 200 \times 10^{-7}$
Denominator: $2 \times 2.5 = 5$

So,
$B = (200 \times 10^{-7}) / 5 = 40 \times 10^{-7}$ T $= 4.0 \times 10^{-6}$ T

Now, for direction, use right-hand thumb rule:

- Current is from north to south (thumb points south).
- At a point east of the wire, the magnetic field will be vertically downwards (into the ground).

Answer: $B = 4.0 \times 10^{-6}$ T, direction vertically downward at the point east of the wire.

## Q4. A horizontal overhead power line carries a current of 90 A in east to west direction. What is the magnitude and direction of the magnetic field due to the current 1.5 m below the line?

Again, use:
$B = \mu_0 I / (2\pi r)$

$I = 90$ A
$r = 1.5$ m
$\mu_0 = 4\pi \times 10^{-7}$ T m $A^{-1}$

$B = (4\pi \times 10^{-7} \times 90) / (2\pi \times 1.5)$

Cancel π:
$B = (4 \times 10^{-7} \times 90) / (2 \times 1.5)$

Numerator: $4 \times 90 \times 10^{-7} = 360 \times 10^{-7}$
Denominator: $2 \times 1.5 = 3$

So,
$B = (360 \times 10^{-7}) / 3 = 120 \times 10^{-7}$ T $= 1.2 \times 10^{-5}$ T

Direction:

- Current is from east to west.
- Using right-hand thumb rule, at a point below the wire, field will point towards the south.

Answer: $B = 1.2 \times 10^{-5}$ T, direction towards the south.

**Q5. What is the magnitude of magnetic force per unit length on a wire carrying a current of 8 A and making an angle of 30° with the direction of a uniform magnetic field of 0.15 T?**

Force per unit length on a current-carrying wire is:
$F/L = B I \sin\theta$

Here,
$B = 0.15$ T
$I = 8$ A
$\theta = 30°$

$\sin 30° = 1/2$

$F/L = 0.15 \times 8 \times (1/2)$

First, $8 \times (1/2) = 4$

So,
$F/L = 0.15 \times 4 = 0.60$ N m^-1

Answer: Magnetic force per unit length = 0.60 N/m.

**Q6. A 3.0 cm wire carrying a current of 10 A is placed inside a solenoid perpendicular to its axis. The magnetic field inside the solenoid is given to be 0.27 T. What is the magnetic force on the wire?**

Use:
$F = B I L \sin\theta$

Here,
$B = 0.27$ T
$I = 10$ A
$L = 3.0$ cm $= 0.03$ m
Wire is perpendicular to field, so $\theta = 90°$, $\sin 90° = 1$

So,
$F = 0.27 \times 10 \times 0.03 \times 1$

First, $0.27 \times 10 = 2.7$
Then $2.7 \times 0.03 = 0.081$ N

Answer: F = 0.081 N on the wire.

**Q7. Two long and parallel straight wires A and B carrying currents of 8.0 A and 5.0 A in the same direction are separated by a distance of 4.0 cm. Estimate the force on a 10 cm section of wire A.**

Magnetic field at wire A due to wire B:
$B = \mu_0 I_2 / (2\pi d)$

Here,
$I_2 = 5.0$ A
$d = 4.0$ cm $= 0.04$ m
$\mu_0 = 4\pi \times 10^{-7}$ T m $A^{-1}$

$B = (4\pi \times 10^{-7} \times 5.0) / (2\pi \times 0.04)$

Cancel π:
$B = (4 \times 10^{-7} \times 5.0) / (2 \times 0.04)$

Numerator: $4 \times 5 \times 10^{-7} = 20 \times 10^{-7}$
Denominator: $2 \times 0.04 = 0.08$

So,
$B = (20 \times 10^{-7}) / 0.08 = 250 \times 10^{-7}$ T $= 2.5 \times 10^{-5}$ T

Now force on length L of wire A:
$F = B I_1 L$

$I_1 = 8.0$ A
$L = 10$ cm $= 0.10$ m

$F = 2.5 \times 10^{-5} \times 8.0 \times 0.10$

First, $8.0 \times 0.10 = 0.8$

So,
$F = 2.5 \times 10^{-5} \times 0.8 = 2.0 \times 10^{-5}$ N

Direction: since currents are in same direction, wires attract, so force on A is towards B.

Answer: Force on 10 cm of wire A is $2.0 \times 10^{-5}$ N towards wire B.

**Q8. A closely wound solenoid 80 cm long has 5 layers of windings of 400 turns each. The diameter of the solenoid is 1.8 cm. If the current carried is 8.0 A, estimate the magnitude of B inside the solenoid near its centre.**

Total number of turns,
$N = 5 \times 400 = 2000$

Length of solenoid,
$L = 80 \text{ cm} = 0.80 \text{ m}$

Current,
$I = 8.0 \text{ A}$

Magnetic field inside a long solenoid is:
$B = \mu_0 n I$

Where $n = N / L$ (turns per metre).

First,
$n = 2000 / 0.80 = 2500$ turns/m

Now,
$B = \mu_0 n I = 4\pi \times 10^{-7} \times 2500 \times 8.0$

First, $2500 \times 8.0 = 20000$

So,
$B = 4\pi \times 10^{-7} \times 20000 = 80000\pi \times 10^{-7}$

$80000 \times 10^{-7} = 8 \times 10^{-3}$

Thus,
$B \approx 8\pi \times 10^{-3} \text{ T} \approx 0.025 \text{ T}$

Answer: $B \approx 2.5 \times 10^{-2}$ T inside the solenoid near its centre.

**Q9. A square coil of side 10 cm consists of 20 turns and carries a current of 12 A. The coil is suspended vertically and the normal to the plane of the coil makes an angle of 30° with the direction of a uniform horizontal magnetic field of magnitude 0.80 T. What is the magnitude of torque experienced by the coil?**

Torque on a current loop:
$\tau = N I A B \sin\theta$

Here,
Side of square = 10 cm = 0.10 m
Area, $A = side^2 = (0.10)^2 = 0.01\ m^2$
N = 20
I = 12 A
B = 0.80 T
Angle between normal and field = 30°, so θ = 30°, sin 30° = 1/2

Now,
$\tau = 20 \times 12 \times 0.01 \times 0.80 \times (1/2)$

First, 20 × 12 = 240
Then 240 × 0.01 = 2.4
Then 2.4 × 0.80 = 1.92
Now multiply by 1/2:
$\tau = 1.92 \times (1/2) = 0.96$ N m

Answer: Torque on the coil is 0.96 N m.

**Q10. Two moving coil meters, M1 and M2, have the following particulars:**

- **$R_1 = 10\ \Omega$, $N_1 = 30$, $A_1 = 3.6 \times 10^{-3}\ m^2$, $B_1 = 0.25$ T**
- **$R_2 = 14\ \Omega$, $N_2 = 42$, $A_2 = 1.8 \times 10^{-3}\ m^2$, $B_2 = 0.50$ T**

**(The spring constants are identical for the two meters).**

**Determine the ratio of (a) current sensitivity and (b) voltage sensitivity of M2 and M1.**

For a moving coil meter, current sensitivity (deflection per unit current) is proportional to:
$S_I \propto N A B / k$

Since spring constant k is same, ratio of current sensitivities is:
$(S_{I2} / S_{I1}) = (N_2 A_2 B_2) / (N_1 A_1 B_1)$

Now put values:
$N_2 A_2 B_2 = 42 \times 1.8 \times 10^{-3} \times 0.50$
$N_1 A_1 B_1 = 30 \times 3.6 \times 10^{-3} \times 0.25$

First numerator:
$42 \times 1.8 = 75.6$
$75.6 \times 0.50 = 37.8$

So numerator = $37.8 \times 10^{-3}$

Denominator:
$30 \times 3.6 = 108$
$108 \times 0.25 = 27$

So denominator = $27 \times 10^{-3}$

Ratio:
$(S_{I2} / S_{I1}) = 37.8 / 27 = 1.4$

So current sensitivity of M2 is 1.4 times that of M1.

Voltage sensitivity $S_V$ = (current sensitivity) / resistance
So:
$S_V \propto (N A B) / (k R)$

As k is same:
$(S_{V2} / S_{V1}) = (N_2 A_2 B_2 / R_2) / (N_1 A_1 B_1 / R_1)$
$= (N_2 A_2 B_2 / N_1 A_1 B_1) \times (R_1 / R_2)$

We already have $(N_2 A_2 B_2 / N_1 A_1 B_1) = 1.4$

Now $R_1 = 10\ \Omega$, $R_2 = 14\ \Omega$

So,
$(S_{V2} / S_{V1}) = 1.4 \times (10 / 14) = 1.4 \times (5 / 7)$

1.4 = 14/10, so
$(14/10) \times (5/7) = (14 \times 5) / (10 \times 7) = 70 / 70 = 1$

So voltage sensitivities are equal.

Answer:
(a) Current sensitivity ratio M2:M1 = 1.4 : 1
(b) Voltage sensitivity ratio M2:M1 = 1 : 1.

**Q11. In a chamber, a uniform magnetic field of 6.5 G (1 G = $10^{-4}$ T) is maintained. An electron is shot into the field with a speed of $4.8 \times 10^6$ m/s normal to the field. Explain why the path of the electron is a circle. Determine the radius of the circular orbit.**

**(e = $1.5 \times 10^{-19}$ C, me = $9.1 \times 10^{-31}$ kg)**

First, change field to tesla:
B = 6.5 G = $6.5 \times 10^{-4}$ T

Reason for circular path:
Magnetic force on a moving charge is given by $F = q v B \sin \theta$.
Here, velocity is perpendicular to field ($\theta = 90°$, $\sin 90° = 1$), so force is always perpendicular to velocity.
A force that is always at right angle to motion acts like centripetal force and makes the particle move in a circle.

Now, equate magnetic force and centripetal force:
$q v B = m v^2 / r$

So,
$r = m v / (q B)$

Put values:
m = $9.1 \times 10^{-31}$ kg
v = $4.8 \times 10^6$ m/s
q = $1.5 \times 10^{-19}$ C
B = $6.5 \times 10^{-4}$ T

$r = (9.1 \times 10^{-31} \times 4.8 \times 10^6) / (1.5 \times 10^{-19} \times 6.5 \times 10^{-4})$

First numerator:
$9.1 \times 4.8 \approx 43.68$
Powers: $10^{-31} \times 10^6 = 10^{-25}$

So numerator = $43.68 \times 10^{-25}$

Denominator:
$1.5 \times 6.5 = 9.75$
Powers: $10^{-19} \times 10^{-4} = 10^{-23}$

So denominator = $9.75 \times 10^{-23}$

Now divide:
$r = (43.68 \times 10^{-25}) / (9.75 \times 10^{-23})$

$= (43.68 / 9.75) \times 10^{(-25+23)}$
$\approx 4.48 \times 10^{-2}$ m

So $r \approx 0.045$ m = 4.5 cm (approx).

Answer: Path is a circle because magnetic force is always perpendicular to velocity and acts as centripetal force, and radius $\approx 4.5 \times 10^{-2}$ m.

**Q12. In Exercise 11, obtain the frequency of revolution of the electron in its circular orbit. Does the answer depend on the speed of the electron? Explain.**

Frequency f is number of turns per second:
$f = v / (2\pi r)$

But from $r = m v / (q B)$, we can write $v = q B r / m$.
If we put this in f, we get a simpler form:

$f = (q B) / (2\pi m)$

So frequency depends only on charge, mass, and magnetic field, not on speed.

Now put values:
$q = 1.5 \times 10^{-19}$ C
$B = 6.5 \times 10^{-4}$ T
$m = 9.1 \times 10^{-31}$ kg

$f = (1.5 \times 10^{-19} \times 6.5 \times 10^{-4}) / (2\pi \times 9.1 \times 10^{-31})$

First numerator:
$1.5 \times 6.5 = 9.75$
Powers: $10^{-19} \times 10^{-4} = 10^{-23}$

So numerator = $9.75 \times 10^{-23}$

Denominator:
$2\pi \times 9.1 \approx 6.283 \times 9.1 \approx 57.2$
So denominator ≈ 57.2 × 10^-31

Now divide:
f = (9.75 × 10^-23) / (57.2 × 10^-31)
= (9.75 / 57.2) × 10^8
≈ 0.17 × 10^8 = 1.7 × 10^7 Hz

So frequency is about 1.7 × 10^7 revolutions per second.

The formula f = q B / (2π m) shows that f does not depend on speed v; it depends only on q, B and m.

Answer: f ≈ 1.7 × 10^7 Hz, and it does not depend on speed.

**Q13.**

**(a) A circular coil of 30 turns and radius 8.0 cm carrying a current of 6.0 A is suspended vertically in a uniform horizontal magnetic field of magnitude 1.0 T. The field lines make an angle of 60° with the normal of the coil. Calculate the magnitude of the counter torque that must be applied to prevent the coil from turning.**

**(b) Would your answer change if the circular coil in (a) were replaced by a planar coil of some irregular shape that encloses the same area? (All other particulars are also unaltered.)**

(a) Torque on a current loop:
τ = N I A B sin θ

Here,
N = 30
Radius r = 8.0 cm = 0.08 m
Area A = π r^2 = π × (0.08)^2 = π × 0.0064 ≈ 0.0064π m^2
I = 6.0 A
B = 1.0 T
Angle between normal and B is 60°, so θ = 60°, sin 60° = √3 / 2 ≈ 0.866

Now,
$\tau = 30 \times 6.0 \times (0.0064\pi) \times 1.0 \times 0.866$

First, $30 \times 6.0 = 180$
Then $180 \times 0.0064 = 1.152$

So,
$\tau \approx 1.152\pi \times 0.866$

$1.152 \times 0.866 \approx 0.999$ (about 1.0)

So $\tau \approx \pi$ N m ≈ 3.14 N m

This is the turning effect of the magnetic field. To keep the coil from turning, an equal and opposite counter torque must be applied.

Answer: Counter torque needed ≈ 3.1 N m.

(b) Area enters the formula only as A, not the exact shape. If the planar coil has same area and same N, I, B, and angle, the torque will be the same. So the answer does not change.

Answer: No, the counter torque will be the same if the area and other quantities remain same.

**Read About:** Class 12 Physics Chapter 3 Current Electricity

## Physics Class 12 chapter 4 Moving Charges and Magnetism Summary

Now, let us write class 12 physics chapter 4 notes in very simple words, topic by topic. This helps in fast revision.

## Magnetic Force

In this part of chapter 4 class 12 physics, you learn that a moving charge in a magnetic field feels a force called magnetic force. This force depends on charge (q), speed (v), magnetic field (B), and angle θ between v and B, with formula $F = q v B \sin\theta$, and acts perpendicular to both velocity and field.

## Motion in a Magnetic Field

Here, you study how a charged particle moves when only magnetic field acts on it. If velocity is perpendicular to field, it moves in a circle of radius $r = m v / (q B)$, and if velocity has a component along field, the path becomes helix (spiral).

## Magnetic Field due to a Current Element, Biot–Savart Law

This topic shows that a small piece of current-carrying wire makes a magnetic field around it. Biot–Savart law gives a formula for the tiny magnetic field dB due to a current element, and by adding these small contributions, we can get field for a whole wire or loop.

## Magnetic Field on the Axis of a Circular Current Loop

Here, you use Biot–Savart law to find the magnetic field at a point on the axis of a circular loop. You see that magnetic field is maximum at the centre, decreases as you go away along the axis, and at large distance the loop behaves like a small bar magnet.

## Ampere’s Circuital Law

This law is an important tool in class 12 physics chapter 4 notes, because it makes problems easier when there is symmetry. Ampere’s law relates the line integral of magnetic field around a closed path to the total current passing through that path, and helps to find B for long straight wire, solenoid, and toroid.

## The Solenoid

A solenoid is a long, tightly wound coil of many turns of wire. With Ampere’s law, you show that the magnetic field inside a long solenoid is nearly uniform, given by $B = \mu_0 n I$, and the solenoid acts like a strong bar magnet.

## Force between Two Parallel Currents, the Ampere

This part explains that two parallel wires carrying currents exert force on each other. If currents are in the same direction, they attract; if opposite, they repel, and from this situation the unit of current, ampere, is defined using force per unit length between such wires.

## Torque on Current Loop, Magnetic Dipole

A current loop placed in a magnetic field experiences a torque which tries to align its magnetic moment with the field. You define magnetic dipole moment m = N I A, and see that a current loop behaves like a magnetic dipole, just like an electric dipole in an electric field.

## The Moving Coil Galvanometer

This device uses the torque on a current loop in a magnetic field to detect very small currents. In the chapter, you learn its working principle, design features, and how to convert a galvanometer into an ammeter (by adding shunt) or a voltmeter (by adding series resistance).

## Connecting note for the whole chapter

If you connect all sub-topics, chapter 4 physics class 12 shows a full story of how moving charges and currents create magnetic fields and how these fields push and turn charges and current loops. You start from force on a single moving charge, then study fields made by wires and coils, then learn laws (Biot–Savart and Ampere), and finally see how these ideas build devices like solenoids and moving coil galvanometer used in real life.

## How to Learn Moving Charges and Magnetism class 12 Physics Chapter 4 Easily

Below are some simple tips to study physics chapter 4 class 12 in a smart way. Use these as a checklist while making your own moving charges and magnetism class 12 notes.

- **Break into parts:** First, divide class 12 physics chapter 4 into small blocks like magnetic force, Biot–Savart law, Ampere's law, solenoid, torque, galvanometer. Study one block at a time so that you do not feel stress.

- **Note key formulas:** Make a small list of main formulas like $F = q v B \sin \theta$, $F = B I L \sin \theta$, $B = \mu_0 I / (2\pi r)$, $B = \mu_0 n I$, torque $\tau = N I A B \sin \theta$. Keep these on one sheet and revise every day.
- **Draw simple diagrams:** For each concept, draw small neat diagrams of field lines around a wire, circular loop, solenoid, and forces on charges. Simple pictures fix the ideas better than long reading.
- **Practice numerical questions:** Solve all given moving charges and magnetism ncert solutions and extra questions from your notes. This helps you see how formulas are used and improves speed for board exams.
- **Narrate in your own words:** After you finish a topic, close the book and try to explain it to a friend or to yourself in very simple language. If you can explain, it means you have really understood.
- **Connect with real life:** Think of magnets, speakers, electric motors, and meters you see around you and relate them to solenoids, coils, and magnetic forces. This makes the chapter feel useful and interesting, not just theory.
- **Revise regularly:** Do a quick revision of class 12 physics chapter 4 notes once every few days, not only at exam time. Short, frequent revisions help you remember better.

## Physics Class 12 Chapter 1 FAQs

**Q1. How many main sub-topics are in class 12 physics chapter 4?**

**Ans:** There are about 9 main parts in chapter 4 physics class 12, including magnetic force, motion in magnetic field, Biot–Savart law, field of a loop, Ampere's law, solenoid, force between currents, torque on loop, and moving coil galvanometer.

**Q2. Which concepts are most important for board exams in this chapter?**

**Ans:** Important concepts are magnetic force on moving charge and current-carrying wire, motion of charged particles, Biot–Savart law, Ampere's law, field in solenoid, and working of moving coil galvanometer.

**Q3. Is chapter 4 physics class 12 numerical based?**

**Ans:** Yes, moving charges and magnetism has many numerical questions based on formulas for magnetic field and force, but the sums are easy if you know the formulas and units well.

**Q4. How does this chapter help in competitive exams like JEE or NEET?**

**Ans:** The ideas of magnetic force, motion in fields, Biot–Savart law, and Ampere's law form the base for full electromagnetism, which is very important for JEE, NEET, and other entrance exams.

**Q5. Is reading only moving charges and magnetism ncert pdf enough for boards?**

**Ans:** NCERT and class 12 physics chapter 4 ncert solutions are must and should be done fully; after that, you should also attempt some extra practice questions for better speed and confidence.