

PHYSICS · JEE MAIN

Moving Charges & Magnetism

Chapter-wise previous year questions, with answer key

100

PYQS

2020–2025

PAPERS

8

TOPICS

Magnetic Force on Moving Charge

Galvanometer and Conversion

Biot-Savart Law

Motion in Magnetic Field

Ampere's Circuital Law

Cyclotron

Force Between Conductors

Solenoid and Toroid

- 1 Attempt each question on paper first — they're grouped by topic, newest papers first.
- 2 Check yourself against the answer key at the end.
- 3 Got one wrong? Tap “Step-by-step solution” under it for the full working.

Stuck on a question?

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Magnetic Force on Moving Charge · 18 PYQs

Q1 JEE Main 2025 · 3 Apr · Shift 1

A 4.0 cm long straight wire carrying a current of 8 A is placed perpendicular to a uniform magnetic field of strength 0.15 T. The magnetic force on the wire is _____ mN.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/k2QIRwl_cp](https://www.prepwiser.in/questions/k2QIRwl_cp)

Q2 JEE Main 2025 · 24 Jan · Shift 2

Given below are two statements. One is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A) : A electron in a certain region of uniform magnetic field is moving with constant velocity in a straight line path.

Reason (R) : The magnetic field in that region is along the direction of velocity of the electron. In the light of the above statements, choose the correct answer from the options given below :

- (A) (A) is true but (R) is false
- (B) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (C) Both (A) and (R) are true but (R) is NOT the correct explanation of (A)
- (D) (A) is false but (R) is true

[Step-by-step solution ► prepwiser.in/questions/6_6RPtFhBg](https://www.prepwiser.in/questions/6_6RPtFhBg)

Q3 JEE Main 2024 · 5 Apr · Shift 1

A 2A current carrying straight metal wire of resistance 1Ω , resistivity $2 \times 10^{-6}\Omega\text{m}$, area of cross-section 10mm^2 and mass 500g is suspended horizontally in mid air by applying a uniform magnetic field $\vec{B}$. The magnitude of B is _____ $\times 10^{-1}\text{T}$ (given, $g = 10\text{m/s}^2$).

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/5YMIUtyqh](https://www.prepwiser.in/questions/5YMIUtyqh)

Q4 JEE Main 2024 · 5 Apr · Shift 2

The electrostatic force ($\vec{F}_1$) and magnetic force ($\vec{F}_2$) acting on a charge q moving with velocity v can be written :

- (A) $\vec{F}_1 = q\vec{B}, \vec{F}_2 = q(\vec{B} \times \vec{v})$
- (B) $\vec{F}_1 = q\vec{V} \cdot \vec{E}, \vec{F}_2 = q(\vec{B} \cdot \vec{V})$
- (C) $\vec{F}_1 = q\vec{E}, \vec{F}_2 = q(\vec{V} \times \vec{B})$
- (D) $\vec{F}_1 = q\vec{E}, \vec{F}_2 = q(\vec{B} \times \vec{V})$

[Step-by-step solution ► prepwiser.in/questions/Z_ILyUWD](https://www.prepwiser.in/questions/Z_ILyUWD)

Q5 JEE Main 2024 · 4 Apr · Shift 1

An electron is projected with uniform velocity along the axis inside a current carrying long solenoid. Then :

- (A) the electron will experience a force at 45° to the axis and execute a helical path.
- (B) the electron will be accelerated along the axis.
- (C) the electron path will be circular about the axis.
- (D) the electron will continue to move with uniform velocity along the axis of the solenoid.

[Step-by-step solution ► prepwiser.in/questions/kPk_yO_fw8](https://www.prepwiser.in/questions/kPk_yO_fw8)

Q6 JEE Main 2024 · 31 Jan · Shift 1

An electron moves through a uniform magnetic field $\vec{B} = B_0\hat{i} + 2B_0\hat{j}T$. At a particular instant of time, the velocity of electron is $\vec{u} = 3\hat{i} + 5\hat{j}m/s$. If the magnetic force acting on electron is $\vec{F} = 5e\hat{k}N$, where e is the charge of electron, then the value of B_0 is _____ T .

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/hiCNMNwfnC](https://www.prepwiser.in/questions/hiCNMNwfnC)

Q7 JEE Main 2024 · 30 Jan · Shift 1

The horizontal component of earth's magnetic field at a place is $3.5 \times 10^{-5}T$. A very long straight conductor carrying current of $\sqrt{2}A$ in the direction from South east to North West is placed. The force per unit length experienced by the conductor is _____ $\times 10^{-6}N/m$.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/UY_ukIXYNB](https://www.prepwiser.in/questions/UY_ukIXYNB)

Q8 JEE Main 2024 · 29 Jan · Shift 2

A charge of $4.0\mu C$ is moving with a velocity of $4.0 \times 10^6ms^{-1}$ along the positive y axis under a magnetic field $\vec{B}$ of strength $(2\hat{k})T$. The force acting on the charge is $x\hat{i}N$. The value of x is _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/VltNdSekQW](https://www.prepwiser.in/questions/VltNdSekQW)

Q9 JEE Main 2024 · 27 Jan · Shift 1

A proton moving with a constant velocity passes through a region of space without any change in its velocity. If $\vec{E}$ and $\vec{B}$ represent the electric and magnetic fields respectively, then the region of space may have :

- (A) $E = 0, B = 0$
- (B) $E = 0, B \neq 0$
- (C) $E \neq 0, B = 0$
- (D) $E \neq 0, B \neq 0$

Choose the most appropriate answer from the options given below :

- (A) (A), (B) and (C) only
- (B) (A), (C) and (D) only
- (C) (A), (B) and (D) only
- (D) (B), (C) and (D) only

[Step-by-step solution ► prepwiser.in/questions/jm6WhZPKpS](https://www.prepwiser.in/questions/jm6WhZPKpS)

Q10 JEE Main 2023 · 13 Apr · Shift 2

An electron is moving along the positive x-axis. If the uniform magnetic field is applied parallel to the negative z-axis, then

- A. The electron will experience magnetic force along positive y-axis
- B. The electron will experience magnetic force along negative y-axis
- C. The electron will not experience any force in magnetic field
- D. The electron will continue to move along the positive x-axis
- E. The electron will move along circular path in magnetic field

Choose the correct answer from the options given below:

- | | |
|------------------|------------------|
| (A) A and E only | (B) B and D only |
| (C) B and E only | (D) C and D only |

[Step-by-step solution ► prepwiser.in/questions/zPyJpKvTsQ](https://www.prepwiser.in/questions/zPyJpKvTsQ)

Q11 JEE Main 2023 · 11 Apr · Shift 2

An electron is allowed to move with constant velocity along the axis of current carrying straight solenoid.

- A. The electron will experience magnetic force along the axis of the solenoid.
- B. The electron will not experience magnetic force.
- C. The electron will continue to move along the axis of the solenoid.
- D. The electron will be accelerated along the axis of the solenoid.
- E. The electron will follow parabolic path-inside the solenoid.

Choose the correct answer from the options given below:

- | | |
|---------------------|------------------|
| (A) B, C and D only | (B) B and C only |
| (C) A and D only | (D) B and E only |

[Step-by-step solution ► prepwiser.in/questions/74wt5zDaxk](https://www.prepwiser.in/questions/74wt5zDaxk)

Q12 JEE Main 2022 · 26 Jul · Shift 1

A charge particle is moving in a uniform magnetic field $(2\hat{i} + 3\hat{j})$ T. If it has an acceleration of $(\alpha\hat{i} - 4\hat{j})$ m/s², then the value of α will be :

- | | |
|--------|-------|
| (A) 3 | (B) 6 |
| (C) 12 | (D) 2 |

[Step-by-step solution ► prepwiser.in/questions/-05qmymPBQ](https://www.prepwiser.in/questions/-05qmymPBQ)

Q13 JEE Main 2022 · 29 Jun · Shift 2

Given below are two statements :

Statement I : The electric force changes the speed of the charged particle and hence changes its kinetic energy; whereas the magnetic force does not change the kinetic energy of the charged particle.

Statement II : The electric force accelerates the positively charged particle perpendicular to the direction of electric field. The magnetic force accelerates the moving charged particle along the direction of magnetic field.

In the light of the above statements, choose the most appropriate answer from the options given below :

- (A) Both Statement I and Statement II are correct.
- (B) Both Statement I and Statement II are incorrect.
- (C) Statement I is correct but Statement II is incorrect.
- (D) Statement I is incorrect but Statement II is correct.

[Step-by-step solution ► prepwisser.in/questions/VbXN2Im4rK](https://www.prepwisser.in/questions/VbXN2Im4rK)

Q14 JEE Main 2021 · 18 Mar · Shift 1

A loop of flexible wire of irregular shape carrying current is placed in an external magnetic field. Identify the effect of the field on the wire.

- (A) Loop assumes circular shape with its plane normal to the field.
- (B) Loop assumes circular shape with its plane parallel to the field.
- (C) Wire gets stretched to become straight.
- (D) Shape of the loop remains unchanged.

[Step-by-step solution ► prepwisser.in/questions/FaP53LCQ6d](https://www.prepwisser.in/questions/FaP53LCQ6d)

Q15 JEE Main 2021 · 16 Mar · Shift 2

A charge Q is moving $\vec{dl}$ distance in the magnetic field $\vec{B}$. Find the value of work done by $\vec{B}$.

- (A) Zero
- (B) -1
- (C) Infinite
- (D) 1

[Step-by-step solution ► prepwisser.in/questions/WS5SuURaMI](https://www.prepwisser.in/questions/WS5SuURaMI)

Q16 JEE Main 2021 · 25 Feb · Shift 1

A proton, a deuteron and an α particle are moving with same momentum in a uniform magnetic field. The ratio of magnetic forces acting on them is _____ and their speed is _____, in the ratio.

- (A) $2 : 1 : 1$ and $4 : 2 : 1$
- (B) $4 : 2 : 1$ and $2 : 1 : 1$
- (C) $1 : 2 : 4$ and $2 : 1 : 1$
- (D) $1 : 2 : 4$ and $1 : 1 : 2$

[Step-by-step solution ► prepwisser.in/questions/m-XqGX2jSd](https://www.prepwisser.in/questions/m-XqGX2jSd)

Q17 JEE Main 2020 · 5 Sep · Shift 1

An electron is constrained to move along the y-axis with a speed of $0.1c$ (c is the speed of light) in the presence of electromagnetic wave, whose electric field is

$$\vec{E} = 30\hat{j} \sin(1.5 \times 10^7 t - 5 \times 10^{-2} x)$$

V/m.

The maximum magnetic force experienced by the electron will be :

(given $c = 3 \times 10^8 \text{ ms}^{-1}$ and electron charge $= 1.6 \times 10^{-19} \text{ C}$)

(A) $4.8 \times 10^{-19} \text{ N}$

(B) $2.4 \times 10^{-18} \text{ N}$

(C) $3.2 \times 10^{-18} \text{ N}$

(D) $1.6 \times 10^{-18} \text{ N}$

[Step-by-step solution ► prepwisar.in/questions/vG0HNFAsvh](https://www.prepwisar.in/questions/vG0HNFAsvh)

Q18 JEE Main 2020 · 3 Sep · Shift 1

A charged particle carrying charge $1 \mu\text{C}$ is moving

with velocity $(2\hat{i} + 3\hat{j} + 4\hat{k}) \text{ ms}^{-1}$. If an external

magnetic field of $(5\hat{i} + 3\hat{j} - 6\hat{k}) \times 10^{-3} \text{ T}$ exists in the region where the particle is moving then the

force on the particle is $\vec{F} \times 10^{-9} \text{ N}$. The vector $\vec{F}$ is :

(A) $-0.30\hat{i} + 0.32\hat{j} - 0.09\hat{k}$

(B) $-300\hat{i} + 320\hat{j} - 90\hat{k}$

(C) $-30\hat{i} + 32\hat{j} - 9\hat{k}$

(D) $-3.0\hat{i} + 3.2\hat{j} - 0.9\hat{k}$

[Step-by-step solution ► prepwisar.in/questions/TcNoX9Weqf](https://www.prepwisar.in/questions/TcNoX9Weqf)

Galvanometer and Conversion · 22 PYQs

Q19 JEE Main 2025 · 2 Apr · Shift 2

In a moving coil galvanometer, two moving coils M_1 and M_2 have the following particulars :

$$R_1 = 5\Omega, N_1 = 15, A_1 = 3.6 \times 10^{-3} \text{ m}^2, B_1 = 0.25 \text{ T}$$

$$R_2 = 7\Omega, N_2 = 21, A_2 = 1.8 \times 10^{-3} \text{ m}^2, B_2 = 0.50 \text{ T}$$

Assuming that torsional constant of the springs are same for both coils, what will be the ratio of voltage sensitivity of M_1 and M_2 ?

(A) 1 : 1

(B) 1 : 3

(C) 1 : 2

(D) 1 : 4

[Step-by-step solution ► prepwisar.in/questions/VCQJX87KnT](https://www.prepwisar.in/questions/VCQJX87KnT)

Q20 JEE Main 2025 · 23 Jan · Shift 2

A galvanometer having a coil of resistance 30Ω need 20 mA of current for full-scale deflection. If a maximum current of 3 A is to be measured using this galvanometer, the resistance of the shunt to be added to the galvanometer should be $\frac{30}{X}\Omega$, where X is

- (A) 447 (B) 298
(C) 149 (D) 596

Step-by-step solution ► prepwisar.in/questions/wvMdUFX9fU

Q21 JEE Main 2025 · 23 Jan · Shift 1

Consider a moving coil galvanometer (MCG):

- A. The torsional constant in moving coil galvanometer has dimensions $[ML^2T^{-2}]$
B. Increasing the current sensitivity may not necessarily increase the voltage sensitivity.
C. If we increase number of turns (N) to its double ($2N$), then the voltage sensitivity doubles.
D. MCG can be converted into an ammeter by introducing a shunt resistance of large value in parallel with galvanometer.
E. Current sensitivity of MCG depends inversely on number of turns of coil.

Choose the correct answer from the options given below:

- (A) A, D Only (B) A, B Only
(C) A, B, E Only (D) B, D, E Only

Step-by-step solution ► prepwisar.in/questions/sgZDwkQX1m

Q22 JEE Main 2024 · 9 Apr · Shift 1

A galvanometer has a coil of resistance 200Ω with a full scale deflection at $20\mu A$. The value of resistance to be added to use it as an ammeter of range $(0 - 20)mA$ is :

- (A) 0.40Ω (B) 0.10Ω
(C) 0.20Ω (D) 0.50Ω

Step-by-step solution ► prepwisar.in/questions/RTDVVr-cxc

Q23 JEE Main 2024 · 5 Apr · Shift 2

A galvanometer of resistance 100Ω when connected in series with 400Ω measures a voltage of upto 10V. The value of resistance required to convert the galvanometer into ammeter to read upto 10A is $x \times 10^{-2}\Omega$. The value of x is :

- (A) 2 (B) 20
(C) 800 (D) 200

Step-by-step solution ► prepwisar.in/questions/HKHtBU3xld

Q24 JEE Main 2024 · 1 Feb · Shift 1

A galvanometer has a resistance of 50Ω and it allows maximum current of $5mA$. It can be converted into voltmeter to measure upto 100V by connecting in series a resistor of resistance :

- (A) 19500Ω (B) 5975Ω
(C) 20050Ω (D) 19950Ω

Step-by-step solution ► prepwisar.in/questions/-rgphl_q0h

Q25 JEE Main 2024 · 1 Feb · Shift 2

A moving coil galvanometer has 100 turns and each turn has an area of 2.0cm^2 . The magnetic field produced by the magnet is 0.01T and the deflection in the coil is 0.05 radian when a current of 10mA is passed through it. The torsional constant of the suspension wire is $x \times 10^{-5}\text{N} - \text{m/rad}$. The value of x is _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/oiDVXVGTv6](https://www.prepwiser.in/questions/oiDVXVGTv6)

Q26 JEE Main 2024 · 1 Feb · Shift 2

In an ammeter, 5% of the main current passes through the galvanometer. If resistance of the galvanometer is G , the resistance of ammeter will be :

(A) $199G$

(B) $200G$

(C) $\frac{G}{20}$

(D) $\frac{G}{199}$

[Step-by-step solution ► prepwiser.in/questions/vSZu0wipjr](https://www.prepwiser.in/questions/vSZu0wipjr)

Q27 JEE Main 2024 · 29 Jan · Shift 1

A galvanometer having coil resistance 10Ω shows a full scale deflection for a current of 3mA . For it to measure a current of 8A , the value of the shunt should be:

(A) $3.75 \times 10^{-3}\Omega$

(B) $3 \times 10^{-3}\Omega$

(C) $4.85 \times 10^{-3}\Omega$

(D) $2.75 \times 10^{-3}\Omega$

[Step-by-step solution ► prepwiser.in/questions/oCxVLcaRpZ](https://www.prepwiser.in/questions/oCxVLcaRpZ)

Q28 JEE Main 2024 · 27 Jan · Shift 2

A current of $200\mu\text{A}$ deflects the coil of a moving coil galvanometer through 60° . The current to cause deflection through $\frac{\pi}{10}$ radian is :

(A) $120\mu\text{A}$

(B) $180\mu\text{A}$

(C) $30\mu\text{A}$

(D) $60\mu\text{A}$

[Step-by-step solution ► prepwiser.in/questions/hpSgTuuUSL](https://www.prepwiser.in/questions/hpSgTuuUSL)

Q29 JEE Main 2023 · 13 Apr · Shift 1

When a resistance of 5Ω is shunted with a moving coil galvanometer, it shows a full scale deflection for a current of 250mA , however when 1050Ω resistance is connected with it in series, it gives full scale deflection for 25 volt. The resistance of galvanometer is _____ Ω .

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/UZA_k7QuEB](https://www.prepwiser.in/questions/UZA_k7QuEB)

Q30 JEE Main 2023 · 11 Apr · Shift 1

The current sensitivity of moving coil galvanometer is increased by 25% . This increase is achieved only by changing in the number of turns of coils and area of cross section of the wire while keeping the resistance of galvanometer coil constant. The percentage change in the voltage sensitivity will be:

(A) $+25\%$

(B) -50%

(C) -25%

(D) Zero

[Step-by-step solution ► prepwiser.in/questions/pyMznusvC-](https://www.prepwiser.in/questions/pyMznusvC-)

Q31 JEE Main 2023 · 10 Apr · Shift 1

Given below are two statements:

Statement I : If the number of turns in the coil of a moving coil galvanometer is doubled then the current sensitivity becomes double.

Statement II : Increasing current sensitivity of a moving coil galvanometer by only increasing the number of turns in the coil will also increase its voltage sensitivity in the same ratio

In the light of the above statements, choose the correct answer from the options given below :

- (A) Statement I is true but Statement II is false
- (B) Statement I is false but Statement II is true
- (C) Both Statement I and Statement II are false
- (D) Both Statement I and Statement II are true

[Step-by-step solution ► prepwiser.in/questions/_vfIokFTLF](https://www.prepwiser.in/questions/_vfIokFTLF)

Q32 JEE Main 2023 · 8 Apr · Shift 1

Certain galvanometers have a fixed core made of non magnetic metallic material. The function of this metallic material is

- (A) to bring the coil to rest quickly
- (B) to produce large deflecting torque on the coil
- (C) to oscillate the coil in magnetic field for longer period of time
- (D) to make the magnetic field radial

[Step-by-step solution ► prepwiser.in/questions/NGTxN2Qv4B](https://www.prepwiser.in/questions/NGTxN2Qv4B)

Q33 JEE Main 2023 · 31 Jan · Shift 2

The number of turns of the coil of a moving coil galvanometer is increased in order to increase current sensitivity by 50%. The percentage change in voltage sensitivity of the galvanometer will be :

- | | |
|----------|---------|
| (A) 0% | (B) 75% |
| (C) 100% | (D) 50% |

[Step-by-step solution ► prepwiser.in/questions/10jxoMvMJz](https://www.prepwiser.in/questions/10jxoMvMJz)

Q34 JEE Main 2023 · 25 Jan · Shift 2

For a moving coil galvanometer, the deflection in the coil is 0.05 rad when a current of 10 mA is passes through it. If the torsional constant of suspension wire is $4.0 \times 10^{-5} \text{ Nm rad}^{-1}$, the magnetic field is 0.01T and the number of turns in the coil is 200, the area of each turn (in cm^2) is :

- | | |
|---------|---------|
| (A) 1.5 | (B) 2.0 |
| (C) 0.5 | (D) 1.0 |

[Step-by-step solution ► prepwiser.in/questions/m95cs_Ec72](https://www.prepwiser.in/questions/m95cs_Ec72)

Q35 JEE Main 2022 · 28 Jul · Shift 1

The current sensitivity of a galvanometer can be increased by :

- (A) decreasing the number of turns
- (B) increasing the magnetic field
- (C) decreasing the area of the coil
- (D) decreasing the torsional constant of the spring

Choose the most appropriate answer from the options given below :

- (A) (B) and (C) only
- (B) (C) and (D) only
- (C) (A) and (C) only
- (D) (B) and (D) only

[Step-by-step solution ► prepwisser.in/questions/AKMMZ7CAg_](https://www.prepwisser.in/questions/AKMMZ7CAg_)

Q36 JEE Main 2021 · 27 Aug · Shift 2

For full scale deflection of total 50 divisions, 50 mV voltage is required in galvanometer. The resistance of galvanometer if its current sensitivity is 2 div/mA will be :

- (A) 1Ω
- (B) 5Ω
- (C) 4Ω
- (D) 2Ω

[Step-by-step solution ► prepwisser.in/questions/hkRZhc59ww](https://www.prepwisser.in/questions/hkRZhc59ww)

Q37 JEE Main 2020 · 5 Sep · Shift 2

A galvanometer is used in laboratory for detecting the null point in electrical experiments. If, on passing a current of 6 mA it produces a deflection of 2° , its figure of merit is close to :

- (A) 6×10^{-3} A/div
- (B) 666° A/div
- (C) 3×10^{-3} A/div
- (D) 333° A/div

[Step-by-step solution ► prepwisser.in/questions/Huh30HrePu](https://www.prepwisser.in/questions/Huh30HrePu)

Q38 JEE Main 2020 · 5 Sep · Shift 1

A galvanometer of resistance G is converted into a voltmeter of range 0 – 1 V by connecting a resistance R_1 in series with it. The additional resistance that should be connected in series with R_1 to increase the range of the voltmeter to 0 – 2 V will be :

- (A) G
- (B) R_1
- (C) $R_1 + G$
- (D) $R_1 - G$

[Step-by-step solution ► prepwisser.in/questions/kecpW69z5Z](https://www.prepwisser.in/questions/kecpW69z5Z)

Q39 JEE Main 2020 · 3 Sep · Shift 2

A galvanometer coil has 500 turns and each turn has an average area of $3 \times 10^{-4} \text{ m}^2$. If a torque of 1.5 Nm is required to keep this coil parallel to a magnetic field when a current of 0.5 A is flowing through it, the strength of the field (in T) is _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwisser.in/questions/sb7MA3bXOa](https://www.prepwisser.in/questions/sb7MA3bXOa)

Q40 JEE Main 2020 · 8 Jan · Shift 2

A galvanometer having a coil resistance 100Ω gives a full scale deflection when a current of 1 mA is passed through it. What is the value of the resistance which can convert this galvanometer into a voltmeter giving full scale deflection for a potential difference of 10 V?

(A) 8.9 k Ω

(B) 10 k Ω

(C) 9.9 k Ω

(D) 7.9 k Ω

[Step-by-step solution ► prepwisser.in/questions/nM6QoVvF_x](https://www.prepwisser.in/questions/nM6QoVvF_x)

Biot-Savart Law · 15 PYQs

Q41 JEE Main 2025 · 24 Jan · Shift 1

A current of 5 A exists in a square loop of side $\frac{1}{\sqrt{2}} \text{ m}$. Then the magnitude of the magnetic field B at the centre of the square loop will be $p \times 10^{-6} \text{ T}$. where, value of p is _____ [Take $\mu_0 = 4\pi \times 10^{-7} \text{ TmA}^{-1}$].

Numerical answer — enter the value.

[Step-by-step solution ► prepwisser.in/questions/2wKqov0yWj](https://www.prepwisser.in/questions/2wKqov0yWj)

Q42 JEE Main 2024 · 30 Jan · Shift 2

The current of 5A flows in a square loop of sides 1m is placed in air. The magnetic field at the centre of the loop is $X\sqrt{2} \times 10^{-7} \text{ T}$. The value of X is _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwisser.in/questions/5itRqo1xL9](https://www.prepwisser.in/questions/5itRqo1xL9)

Q43 JEE Main 2023 · 15 Apr · Shift 1

An electron in a hydrogen atom revolves around its nucleus with a speed of $6.76 \times 10^6 \text{ ms}^{-1}$ in an orbit of radius $0.52 \text{ \AA}$. The magnetic field produced at the nucleus of the hydrogen atom is _____ T.

Numerical answer — enter the value.

[Step-by-step solution ► prepwisser.in/questions/AbNN1D0t2O](https://www.prepwisser.in/questions/AbNN1D0t2O)

Q44 JEE Main 2023 · 8 Apr · Shift 2

The ratio of magnetic field at the centre of a current carrying coil of radius r to the magnetic field at distance r from the centre of coil on its axis is $\sqrt{x} : 1$. The value of x is _____

Numerical answer — enter the value.

[Step-by-step solution ► prepwisser.in/questions/XJcT7hwZ75](https://www.prepwisser.in/questions/XJcT7hwZ75)

Q45 JEE Main 2023 · 31 Jan · Shift 2

A long conducting wire having a current I flowing through it, is bent into a circular coil of N turns. Then it is bent into a circular coil of n turns. The magnetic field is calculated at the centre of coils in both the cases. The ratio of the magnetic field in first case to that of second case is :

(A) $N^2 : n^2$

(B) $N : n$

(C) $n : N$

(D) $n^2 : N^2$

[Step-by-step solution ► prepwiser.in/questions/fZaDZsRhIN](https://www.prepwiser.in/questions/fZaDZsRhIN)

Q46 JEE Main 2023 · 29 Jan · Shift 2

The electric current in a circular coil of four turns produces a magnetic induction 32 T at its centre. The coil is unwound and is rewound into a circular coil of single turn, the magnetic induction at the centre of the coil by the same current will be :

(A) 2 T

(B) 4 T

(C) 8 T

(D) 16 T

[Step-by-step solution ► prepwiser.in/questions/kKmbV9O45W](https://www.prepwiser.in/questions/kKmbV9O45W)

Q47 JEE Main 2022 · 29 Jul · Shift 1

A closely wound circular coil of radius 5 cm produces a magnetic field of $37.68 \times 10^{-4} \text{ T}$ at its center. The current through the coil is _____ A.

[Given, number of turns in the coil is 100 and $\pi = 3.14$]

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/2XAS34EDUp](https://www.prepwiser.in/questions/2XAS34EDUp)

Q48 JEE Main 2022 · 29 Jul · Shift 1

A wire of length 314 cm carrying current of 14 A is bent to form a circle. The magnetic moment of the coil is _____ $\text{A} \cdot \text{m}^2$. [Given $\pi = 3.14$]

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/ovARzTGcwj](https://www.prepwiser.in/questions/ovARzTGcwj)

Q49 JEE Main 2022 · 28 Jul · Shift 2

The magnetic field at the center of current carrying circular loop is B_1 . The magnetic field at a distance of $\sqrt{3}$ times radius of the given circular loop from the center on its axis is B_2 . The value of B_1/B_2 will be

(A) 9 : 4

(B) $12 : \sqrt{5}$

(C) 8 : 1

(D) $5 : \sqrt{3}$

[Step-by-step solution ► prepwiser.in/questions/qbdGsf_n-Y](https://www.prepwiser.in/questions/qbdGsf_n-Y)

Q50 JEE Main 2022 · 26 Jul · Shift 1

B_X and B_Y are the magnetic fields at the centre of two coils X and Y respectively each carrying equal current. If coil X has 200 turns and 20 cm radius and coil Y has 400 turns and 20 cm radius, the ratio of B_X and B_Y is :

(A) 1 : 1

(B) 1 : 2

(C) 2 : 1

(D) 4 : 1

[Step-by-step solution ► prepwiser.in/questions/gD25u3ahXC](https://www.prepwiser.in/questions/gD25u3ahXC)

Q51 JEE Main 2022 · 25 Jul · Shift 2

The electric current in a circular coil of 2 turns produces a magnetic induction B_1 at its centre. The coil is unwound and is rewound into a circular coil of 5 turns and the same current produces a magnetic induction B_2 at its centre. The ratio of $\frac{B_2}{B_1}$ is

- (A) $\frac{5}{2}$ (B) $\frac{25}{4}$
(C) $\frac{5}{4}$ (D) $\frac{25}{2}$

Step-by-step solution ► [prepwiser.in/questions/h62C9CSp3q](https://www.prepwiser.in/questions/h62C9CSp3q)

Q52 JEE Main 2022 · 29 Jun · Shift 2

Two long current carrying conductors are placed to each other at a distance of 8 cm between them. The magnitude of magnetic field produced at mid-point between the two conductors due to current flowing in them is $300 \mu\text{T}$. The equal current flowing in the two conductors is :

- (A) 30A in the same direction. (B) 30A in the opposite direction.
(C) 60A in the opposite direction. (D) 300A in the opposite direction.

Step-by-step solution ► [prepwiser.in/questions/tMSJQKauoR](https://www.prepwiser.in/questions/tMSJQKauoR)

Q53 JEE Main 2022 · 24 Jun · Shift 1

The magnetic field at the centre of a circular coil of radius r , due to current I flowing through it, is B . The magnetic field at a point along the axis at a distance $\frac{r}{2}$ from the centre is :

- (A) $B/2$
(B) $2B$
(C) $\left(\frac{2}{\sqrt{5}}\right)^3 B$
(D) $\left(\frac{2}{\sqrt{3}}\right)^3 B$

Step-by-step solution ► [prepwiser.in/questions/iCLkPWqF6C](https://www.prepwiser.in/questions/iCLkPWqF6C)

Q54 JEE Main 2021 · 26 Aug · Shift 1

The fractional change in the magnetic field intensity at a distance ' r ' from centre on the axis of current carrying coil of radius ' a ' to the magnetic field intensity at the centre of the same coil is : (Take $r < a$)

- (A) $\frac{3}{2} \frac{a^2}{r^2}$ (B) $\frac{2}{3} \frac{a^2}{r^2}$
(C) $\frac{2}{3} \frac{r^2}{a^2}$ (D) $\frac{3}{2} \frac{r^2}{a^2}$

Step-by-step solution ► [prepwiser.in/questions/4J579R2qd2](https://www.prepwiser.in/questions/4J579R2qd2)

Q55 JEE Main 2020 · 7 Jan · Shift 1

Consider a circular coil of wire carrying constant current I , forming a magnetic dipole. The magnetic flux through an infinite plane that contains the circular coil and excluding the circular coil area is given by ϕ_i . The magnetic flux through the area of the circular coil area is given by ϕ_0 . Which of the following option is correct?

- (A) $\phi_i = \phi_0$
(B) $\phi_i < \phi_0$
(C) $\phi_i > \phi_0$
(D) $\phi_i = -\phi_0$

Step-by-step solution ► [prepwiser.in/questions/IBZXOG3NRc](https://www.prepwiser.in/questions/IBZXOG3NRc)

Q56 JEE Main 2025 · 4 Apr · Shift 2

A particle of charge $1.6\mu\text{C}$ and mass $16\mu\text{g}$ is present in a strong magnetic field of 6.28 T . The particle is then fired perpendicular to magnetic field. The time required for the particle to return to original location for the first time is _____ s. ($\pi = 3.14$)

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/hwNCVKxkcD](https://www.prepwiser.in/questions/hwNCVKxkcD)

Q57 JEE Main 2025 · 3 Apr · Shift 2

Given below are two statements: one is labelled as **Assertion A** and the other is labelled as **Reason R**

Assertion A : If Oxygen ion (O^{-2}) and Hydrogen ion (H^{+}) enter normal to the magnetic field with equal momentum, then the path of O^{-2} ion has a smaller curvature than that of H^{+} .

Reason R : A proton with same linear momentum as an electron will form a path of smaller radius of curvature on entering a uniform magnetic field perpendicularly.

In the light of the above statements, choose the correct answer from the options given below

- (A) Both **A** and **R** are true but **R** is NOT the correct explanation of **A**
- (B) **A** is false but **R** is true
- (C) **A** is true but **R** is false
- (D) Both **A** and **R** are true and **R** is the correct explanation of **A**

[Step-by-step solution ► prepwiser.in/questions/53BWMxR67K](https://www.prepwiser.in/questions/53BWMxR67K)

Q58 JEE Main 2025 · 2 Apr · Shift 1

A monochromatic light is incident on a metallic plate having work function ϕ . An electron, emitted normally to the plate from a point A with maximum kinetic energy, enters a constant magnetic field, perpendicular to the initial velocity of electron. The electron passes through a curve and hits back the plate at a point B . The distance between A and B is : (Given : The magnitude of charge of an electron is e and mass is m , h is Planck's constant and c is velocity of light. Take the magnetic field exists throughout the path of electron)

- (A) $\sqrt{2m\left(\frac{hc}{\lambda} - \phi\right)}/eB$
- (B) $\sqrt{8m\left(\frac{hc}{\lambda} - \phi\right)}/eB$
- (C) $\sqrt{m(hc/\lambda - \phi)}/eB$
- (D) $2\sqrt{m(hc/\lambda - \phi)}/eB$

[Step-by-step solution ► prepwiser.in/questions/CWNt6T5HvX](https://www.prepwiser.in/questions/CWNt6T5HvX)

Q59 JEE Main 2025 · 22 Jan · Shift 2

A proton is moving undeflected in a region of crossed electric and magnetic fields at a constant speed of $2 \times 10^5 \text{ ms}^{-1}$. When the electric field is switched off, the proton moves along a circular path of radius 2 cm . The magnitude of electric field is $x \times 10^4 \text{ N/C}$. The value of x is _____. Take the mass of the proton = $1.6 \times 10^{-27} \text{ kg}$.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/c0qL3Vhq57](https://www.prepwiser.in/questions/c0qL3Vhq57)

Q60 JEE Main 2024 · 9 Apr · Shift 2

A proton and a deuteron ($q = +e, m = 2.0u$) having same kinetic energies enter a region of uniform magnetic field $\vec{B}$, moving perpendicular to $\vec{B}$. The ratio of the radius r_d of deuteron path to the radius r_p of the proton path is:

(A) 1 : 2

(B) 1 : 1

(C) $\sqrt{2} : 1$

(D) 1 : $\sqrt{2}$

[Step-by-step solution ► prepwisser.in/questions/dnmB41eA1r](https://www.prepwisser.in/questions/dnmB41eA1r)

Q61 JEE Main 2024 · 8 Apr · Shift 1

An electron with kinetic energy 5eV enters a region of uniform magnetic field of $3 \mu\text{T}$ perpendicular to its direction. An electric field E is applied perpendicular to the direction of velocity and magnetic field. The value of E , so that electron moves along the same path, is _____ NC^{-1} .

(Given, mass of electron = $9 \times 10^{-31}\text{kg}$, electric charge = $1.6 \times 10^{-19}\text{C}$)

Numerical answer — enter the value.

[Step-by-step solution ► prepwisser.in/questions/SI8b4wbcEX](https://www.prepwisser.in/questions/SI8b4wbcEX)

Q62 JEE Main 2024 · 29 Jan · Shift 2

Two particles X and Y having equal charges are being accelerated through the same potential difference. Thereafter they enter normally in a region of uniform magnetic field and describes circular paths of radii R_1 and R_2 respectively. The mass ratio of X and Y is :

(A) $\left(\frac{R_1}{R_2}\right)$

(B) $\left(\frac{R_2}{R_1}\right)$

(C) $\left(\frac{R_2}{R_1}\right)^2$

(D) $\left(\frac{R_1}{R_2}\right)^2$

[Step-by-step solution ► prepwisser.in/questions/oXIUT1M_NO](https://www.prepwisser.in/questions/oXIUT1M_NO)

Q63 JEE Main 2023 · 8 Apr · Shift 1

A charge particle moving in magnetic field B , has the components of velocity along B as well as perpendicular to B . The path of the charge particle will be

(A) helical path with the axis along magnetic field B

(B) straight along the direction of magnetic field B

(C) circular path

(D) helical path with the axis perpendicular to the direction of magnetic field B

[Step-by-step solution ► prepwisser.in/questions/7zPpiMtcx](https://www.prepwisser.in/questions/7zPpiMtcx)

Q64 JEE Main 2023 · 6 Apr · Shift 2

A proton with a kinetic energy of 2.0eV moves into a region of uniform magnetic field of magnitude $\frac{\pi}{2} \times 10^{-3}\text{T}$. The angle between the direction of magnetic field and velocity of proton is 60° . The pitch of the helical path taken by the proton is _____ cm. (Take, mass of proton = $1.6 \times 10^{-27}\text{kg}$ and Charge on proton = $1.6 \times 10^{-19}\text{C}$).

Numerical answer — enter the value.

[Step-by-step solution ► prepwisser.in/questions/QdxPf1ppjI](https://www.prepwisser.in/questions/QdxPf1ppjI)

Q65 JEE Main 2022 · 26 Jul · Shift 2

A velocity selector consists of electric field $\vec{E} = E \hat{k}$ and magnetic field $\vec{B} = B \hat{j}$ with $B = 12 \text{ mT}$. The value of E required for an electron of energy 728 eV moving along the positive x -axis to pass undeflected is :

(Given, mass of electron = $9.1 \times 10^{-31} \text{ kg}$)

(A) 192 kVm^{-1}

(B) 192 mVm^{-1}

(C) 9600 kVm^{-1}

(D) 16 kVm^{-1}

[Step-by-step solution ► prepwisar.in/questions/rGs-FmashB](https://www.prepwisar.in/questions/rGs-FmashB)

Q66 JEE Main 2022 · 25 Jul · Shift 1

Two charged particles, having same kinetic energy, are allowed to pass through a uniform magnetic field perpendicular to the direction of motion. If the ratio of radii of their circular paths is $6 : 5$ and their respective masses ratio is $9 : 4$. Then, the ratio of their charges will be :

(A) $8 : 5$

(B) $5 : 4$

(C) $5 : 3$

(D) $8 : 7$

[Step-by-step solution ► prepwisar.in/questions/0fAi0iySro](https://www.prepwisar.in/questions/0fAi0iySro)

Q67 JEE Main 2022 · 28 Jun · Shift 1

A singly ionized magnesium atom ($A = 24$) ion is accelerated to kinetic energy 5 keV , and is projected perpendicularly into a magnetic field B of the magnitude 0.5 T . The radius of path formed will be _____ cm.

Numerical answer — enter the value.

[Step-by-step solution ► prepwisar.in/questions/-EbVeO_GC1](https://www.prepwisar.in/questions/-EbVeO_GC1)

Q68 JEE Main 2022 · 27 Jun · Shift 2

A deuteron and a proton moving with equal kinetic energy enter into a uniform magnetic field at right angle to the field. If r_d and r_p are the radii of their circular paths respectively, then the ratio $\frac{r_d}{r_p}$ will be $\sqrt{x} : 1$ where x is _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwisar.in/questions/8w_7RNh2vs](https://www.prepwisar.in/questions/8w_7RNh2vs)

Q69 JEE Main 2022 · 26 Jun · Shift 1

A proton and an alpha particle of the same velocity enter in a uniform magnetic field which is acting perpendicular to their direction of motion. The ratio of the radii of the circular paths described by the alpha particle and proton is :

(A) $1 : 4$

(B) $4 : 1$

(C) $2 : 1$

(D) $1 : 2$

[Step-by-step solution ► prepwisar.in/questions/BiZ2Gex42f](https://www.prepwisar.in/questions/BiZ2Gex42f)

Q70 JEE Main 2022 · 24 Jun · Shift 2

A proton, a deuteron and an α -particle with same kinetic energy enter into a uniform magnetic field at right angle to magnetic field. The ratio of the radii of their respective circular paths is :

- (A) $1 : \sqrt{2} : \sqrt{2}$ (B) $1 : 1 : \sqrt{2}$
(C) $\sqrt{2} : 1 : 1$ (D) $1 : \sqrt{2} : 1$

Step-by-step solution ► [prepwisser.in/questions/6rHsjct23d](https://www.prepwisser.in/questions/6rHsjct23d)

Q71 JEE Main 2022 · 24 Jun · Shift 1

Given below are two statements : One is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A) : In an uniform magnetic field, speed and energy remains the same for a moving charged particle.

Reason (R) : Moving charged particle experiences magnetic force perpendicular to its direction of motion.

- (A) Both (A) and (R) are true and (R) is the correct explanation of (A).
(B) Both (A) and (R) are true but (R) is NOT the correct explanation of (A).
(C) (A) is true but (R) is false.
(D) (A) is false but (R) is true.

Step-by-step solution ► [prepwisser.in/questions/4pwrEeD0a_](https://www.prepwisser.in/questions/4pwrEeD0a_)

Q72 JEE Main 2021 · 25 Jul · Shift 2

Two ions having same mass have charges in the ratio $1 : 2$. They are projected normally in a uniform magnetic field with their speeds in the ratio $2 : 3$. The ratio of the radii of their circular trajectories is :

- (A) $1 : 4$ (B) $4 : 3$
(C) $3 : 1$ (D) $2 : 3$

Step-by-step solution ► [prepwisser.in/questions/4VcA1MVfZO](https://www.prepwisser.in/questions/4VcA1MVfZO)

Q73 JEE Main 2021 · 20 Jul · Shift 1

A deuteron and an alpha particle having equal kinetic energy enter perpendicularly into a magnetic field. Let r_d and r_α be their respective radii of circular path. The value of $\frac{r_d}{r_\alpha}$ is equal to :

- (A) 1 (B) 2
(C) $\sqrt{2}$ (D) $\frac{1}{\sqrt{2}}$

Step-by-step solution ► [prepwisser.in/questions/PDKe1leQBp](https://www.prepwisser.in/questions/PDKe1leQBp)

Q74 JEE Main 2021 · 18 Mar · Shift 2

A proton and an α -particle, having kinetic energies K_p and K_α respectively, enter into a magnetic field at right angles.

The ratio of the radii of trajectory of proton to that of α -particle is $2 : 1$. The ratio of $K_p : K_\alpha$ is :

- (A) $8 : 1$ (B) $4 : 1$
(C) $1 : 8$ (D) $1 : 4$

Step-by-step solution ► [prepwisser.in/questions/ddiTk7UG9O](https://www.prepwisser.in/questions/ddiTk7UG9O)

Q75 JEE Main 2020 · 6 Sep · Shift 1

A particle of charge q and mass m is moving with a velocity $-v\hat{i}$ ($v \neq 0$) towards a large screen placed in the $Y-Z$ plane at a distance d . If there is a magnetic field $\vec{B} = B_0\hat{k}$, the maximum value of v for which the particle will not hit the screen is :

- (A) $\frac{2qdB_0}{m}$ (B) $\frac{qdB_0}{3m}$
(C) $\frac{qdB_0}{2m}$ (D) $\frac{qdB_0}{m}$

Step-by-step solution ► [prepwisser.in/questions/OoLSTPYdVi](https://www.prepwisser.in/questions/OoLSTPYdVi)

Q76 JEE Main 2020 · 2 Sep · Shift 1

A beam of protons with speed $4 \times 10^5 \text{ ms}^{-1}$ enters a uniform magnetic field of 0.3 T at an angle of 60° to the magnetic field. The pitch of the resulting helical path of protons is close to :

(Mass of the proton = $1.67 \times 10^{-27} \text{ kg}$, charge of the proton = $1.69 \times 10^{-19} \text{ C}$)

- (A) 2 cm (B) 12 cm
(C) 5 cm (D) 4 cm

Step-by-step solution ► [prepwisser.in/questions/uB2grrJMAJ](https://www.prepwisser.in/questions/uB2grrJMAJ)

Q77 JEE Main 2020 · 7 Jan · Shift 2

A particle of mass m and charge q has an initial velocity $\vec{v} = v_0\hat{j}$. If an electric field $\vec{E} = E_0\hat{i}$ and magnetic field $\vec{B} = B_0\hat{i}$ act on the particle, its speed will double after a time:

- (A) $\frac{3mv_0}{qE_0}$ (B) $\frac{\sqrt{2}mv_0}{qE_0}$
(C) $\frac{\sqrt{3}mv_0}{qE_0}$ (D) $\frac{2mv_0}{qE_0}$

Step-by-step solution ► [prepwisser.in/questions/mTG1YGQHqc](https://www.prepwisser.in/questions/mTG1YGQHqc)

Ampere's Circital Law · 6 PYQs

Q78 JEE Main 2025 · 29 Jan · Shift 1

Consider a long straight wire of a circular cross-section (radius a) carrying a steady current I . The current is uniformly distributed across this cross-section. The distances from the centre of the wire's cross-section at which the magnetic field [inside the wire, outside the wire] is half of the maximum possible magnetic field, any where due to the wire, will be :

- (A) $[a/2, 3a]$
(B) $[a/4, 3a/2]$
(C) $[a/2, 2a]$
(D) $[a/4, 2a]$

Step-by-step solution ► [prepwisser.in/questions/Ldc2aDNM-K](https://www.prepwisser.in/questions/Ldc2aDNM-K)

Q79 JEE Main 2024 · 9 Apr · Shift 1

Given below are two statements :

Statement (I) : When currents vary with time, Newton's third law is valid only if momentum carried by the electromagnetic field is taken into account

Statement (II) : Ampere's circuital law does not depend on Biot-Savart's law.

In the light of the above statements, choose the correct answer from the options given below :

- (A) Both Statement I and Statement II are false
- (B) Statement I is false but Statement II is true
- (C) Both Statement I and Statement II are true
- (D) Statement I is true but Statement II is false

[Step-by-step solution ► prepwiser.in/questions/rHXGbjwuSa](https://www.prepwiser.in/questions/rHXGbjwuSa)

Q80 JEE Main 2024 · 8 Apr · Shift 2

A long straight wire of radius a carries a steady current I . The current is uniformly distributed across its cross section. The ratio of the magnetic field at $\frac{a}{2}$ and $2a$ from axis of the wire is :

- (A) 4 : 1
- (B) 3 : 4
- (C) 1 : 1
- (D) 1 : 4

[Step-by-step solution ► prepwiser.in/questions/0D8wRs_pEW](https://www.prepwiser.in/questions/0D8wRs_pEW)

Q81 JEE Main 2024 · 5 Apr · Shift 1

In a co-axial straight cable, the central conductor and the outer conductor carry equal currents in opposite directions. The magnetic field is zero :

- (A) inside the outer conductor
- (B) outside the cable
- (C) in between the two conductors
- (D) inside the inner conductor

[Step-by-step solution ► prepwiser.in/questions/P2Z275u8rp](https://www.prepwiser.in/questions/P2Z275u8rp)

Q82 JEE Main 2023 · 6 Apr · Shift 1

A long straight wire of circular cross-section (radius a) is carrying steady current I . The current I is uniformly distributed across this cross-section. The magnetic field is

- (A) uniform in the region $r < a$ and inversely proportional to distance r from the axis, in the region $r > a$
- (B) zero in the region $r < a$ and inversely proportional to r in the region $r > a$
- (C) directly proportional to r in the region $r < a$ and inversely proportional to r in the region $r > a$
- (D) inversely proportional to r in the region $r < a$ and uniform throughout in the region $r > a$

[Step-by-step solution ► prepwiser.in/questions/6WOIJ8CNX6](https://www.prepwiser.in/questions/6WOIJ8CNX6)

Q83 JEE Main 2022 · 25 Jun · Shift 1

A long straight wire with a circular cross-section having radius R , is carrying a steady current I . The current I is uniformly distributed across this cross-section. Then the variation of magnetic field due to current I with distance r ($r < R$) from its centre will be :

- (A) $B \propto r^2$
- (B) $B \propto r$
- (C) $B \propto \frac{1}{r^2}$
- (D) $B \propto \frac{1}{r}$

[Step-by-step solution ► prepwiser.in/questions/fhVHtvjXZa](https://www.prepwiser.in/questions/fhVHtvjXZa)

Cyclotron · 5 PYQs

Q84 JEE Main 2022 · 27 Jul · Shift 2

A cyclotron is used to accelerate protons. If the operating magnetic field is 1.0T and the radius of the cyclotron 'dees' is 60cm , the kinetic energy of the accelerated protons in MeV will be :

$$[\text{use } m_p = 1.6 \times 10^{-27}\text{kg}, e = 1.6 \times 10^{-19}\text{ C}]$$

]

- (A) 12
- (B) 18
- (C) 16
- (D) 32

[Step-by-step solution ► prepwiser.in/questions/BYtYAbuze8](https://www.prepwiser.in/questions/BYtYAbuze8)

Q85 JEE Main 2022 · 25 Jul · Shift 2

An electron with energy 0.1 keV moves at right angle to the earth's magnetic field of $1 \times 10^{-4}\text{ Wbm}^{-2}$. The frequency of revolution of the electron will be :

(Take mass of electron = $9.0 \times 10^{-31}\text{ kg}$)

- (A) $1.6 \times 10^5\text{Hz}$
- (B) $5.6 \times 10^5\text{Hz}$
- (C) $2.8 \times 10^6\text{Hz}$
- (D) $1.8 \times 10^6\text{Hz}$

[Step-by-step solution ► prepwiser.in/questions/VrN-IJTnjX](https://www.prepwiser.in/questions/VrN-IJTnjX)

Q86 JEE Main 2022 · 30 Jun · Shift 1

A cyclotron is working at a frequency of 10 MHz . If the radius of its dees is 60 cm . The maximum kinetic energy of accelerated proton will be :

(Take : $e = 1.6 \times 10^{-19}\text{ C}$, $m_p = 1.67 \times 10^{-27}\text{ kg}$)

- (A) 7.4 MeV
- (B) 14.86 MeV
- (C) 7.4 GeV
- (D) 704 GeV

[Step-by-step solution ► prepwiser.in/questions/KOfijt7Qnm](https://www.prepwiser.in/questions/KOfijt7Qnm)

Q87 JEE Main 2022 · 29 Jun · Shift 1

A charge particle moves along circular path in a uniform magnetic field in a cyclotron. The kinetic energy of the charge particle increases to 4 times its initial value. What will be the ratio of new radius to the original radius of circular path of the charge particle :

- (A) 1 : 1 (B) 1 : 2
(C) 2 : 1 (D) 1 : 4

[Step-by-step solution ► prepwiser.in/questions/b5i4VtKTqY](https://www.prepwiser.in/questions/b5i4VtKTqY)

Q88 JEE Main 2021 · 26 Aug · Shift 2

If the maximum value of accelerating potential provided by a ratio frequency oscillator is 12 kV. The number of revolution made by a proton in a cyclotron to achieve one sixth of the speed of light is

[$m_p = 1.67 \times 10^{-27}$ kg, $e = 1.6 \times 10^{-19}$ C, Speed of light = 3×10^8 m/s]

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/yi19LG5av8](https://www.prepwiser.in/questions/yi19LG5av8)

Force Between Conductors · 3 PYQs

Q89 JEE Main 2023 · 24 Jan · Shift 1

Two long straight wires P and Q carrying equal current 10A each were kept parallel to each other at 5 cm distance. Magnitude of magnetic force experienced by 10 cm length of wire P is F_1 . If distance between wires is halved and currents on them are doubled, force F_2 on 10 cm length of wire P will be:

- (A) $\frac{F_1}{8}$ (B) $10 F_1$
(C) $\frac{F_1}{10}$ (D) $8 F_1$

[Step-by-step solution ► prepwiser.in/questions/wcXFZzDHGU](https://www.prepwiser.in/questions/wcXFZzDHGU)

Q90 JEE Main 2022 · 28 Jun · Shift 2

Two parallel, long wires are kept 0.20 m apart in vacuum, each carrying current of x A in the same direction. If the force of attraction per meter of each wire is 2×10^{-6} N, then the value of x is approximately :

- (A) 1 (B) 2.4
(C) 1.4 (D) 2

[Step-by-step solution ► prepwiser.in/questions/QI_GSIiAKY](https://www.prepwiser.in/questions/QI_GSIiAKY)

Q91 JEE Main 2022 · 26 Jun · Shift 2

Two 10 cm long, straight wires, each carrying a current of 5A are kept parallel to each other. If each wire experienced a force of 10^{-5} N, then separation between the wires is _____ cm.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/xhF3rMui6v](https://www.prepwiser.in/questions/xhF3rMui6v)

Solenoid and Toroid · 9 PYQs

Q92 JEE Main 2025 · 29 Jan · Shift 2

The magnetic field inside a 200 turns solenoid of radius 10 cm is 2.9×10^{-4} Tesla. If the solenoid carries a current of 0.29 A, then the length of the solenoid is _____ π cm.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/mO5mKITLWT](https://www.prepwiser.in/questions/mO5mKITLWT)

Q93 JEE Main 2025 · 24 Jan · Shift 2

A tightly wound long solenoid carries a current of 1.5 A. An electron is executing uniform circular motion inside the solenoid with a time period of 75 ns. The number of turns per metre in the solenoid is _____.

[Take mass of electron $m_e = 9 \times 10^{-31}$ kg, charge of electron $|q_e| = 1.6 \times 10^{-19}$ C,

$$\mu_0 = 4\pi \times 10^{-7} \frac{\text{N}}{\text{A}^2}, 1\text{ns} = 10^{-9}\text{s}]$$

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/w4qGoQ2aKG](https://www.prepwiser.in/questions/w4qGoQ2aKG)

Q94 JEE Main 2024 · 5 Apr · Shift 2

A solenoid of length 0.5m has a radius of 1cm and is made up of 'm' number of turns. It carries a current of 5A. If the magnitude of the magnetic field inside the solenoid is 6.28×10^{-3} T then the value of m is _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/p4EQ2ktZOR](https://www.prepwiser.in/questions/p4EQ2ktZOR)

Q95 JEE Main 2023 · 8 Apr · Shift 1

The magnetic intensity at the center of a long current carrying solenoid is found to be $1.6 \times 10^3 \text{ Am}^{-1}$. If the number of turns is 8 per cm, then the current flowing through the solenoid is _____ A.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/6GLA97wIEP](https://www.prepwiser.in/questions/6GLA97wIEP)

Q96 JEE Main 2023 · 25 Jan · Shift 1

A solenoid of 1200 turns is wound uniformly in a single layer on a glass tube 2 m long and 0.2 m in diameter. The magnetic intensity at the center of the solenoid when a current of 2 A flows through it is :

- (A) 1 Am^{-1} (B) $2.4 \times 10^{-3} \text{ Am}^{-1}$
(C) $1.2 \times 10^3 \text{ Am}^{-1}$ (D) $2.4 \times 10^3 \text{ Am}^{-1}$

[Step-by-step solution ► prepwiser.in/questions/d8niRTToGrW](https://www.prepwiser.in/questions/d8niRTToGrW)

Q97 JEE Main 2023 · 24 Jan · Shift 2

A long solenoid is formed by winding 70 turns cm^{-1} . If 2.0 A current flows, then the magnetic field produced inside the solenoid is _____ ($\mu_0 = 4\pi \times 10^{-7} \text{ TmA}^{-1}$)

- (A) $88 \times 10^{-4} \text{ T}$ (B) $1232 \times 10^{-4} \text{ T}$
(C) $176 \times 10^{-4} \text{ T}$ (D) $352 \times 10^{-4} \text{ T}$

[Step-by-step solution ► prepwiser.in/questions/6arUwFQU33](https://www.prepwiser.in/questions/6arUwFQU33)

Q98 JEE Main 2022 · 25 Jun · Shift 2

A long solenoid carrying a current produces a magnetic field B along its axis. If the current is doubled and the number of turns per cm is halved, the new value of magnetic field will be equal to

- (A) B (B) $2B$
(C) $4B$ (D) $\frac{B}{2}$

[Step-by-step solution ► prepwisar.in/questions/nbW5L-LNib](https://www.prepwisar.in/questions/nbW5L-LNib)

Q99 JEE Main 2021 · 27 Aug · Shift 1

A uniform conducting wire of length is $24a$, and resistance R is wound up as a current carrying coil in the shape of an equilateral triangle of side ' a ' and then in the form of a square of side ' a '. The coil is connected to a voltage source V_0 . The ratio of magnetic moment of the coils in case of equilateral triangle to that for square is $1 : \sqrt{y}$ where y is

Numerical answer — enter the value.

[Step-by-step solution ► prepwisar.in/questions/1XW7M2Umhs](https://www.prepwisar.in/questions/1XW7M2Umhs)

Q100 JEE Main 2021 · 17 Mar · Shift 1

A solenoid of 1000 turns per metre has a core with relative permeability 500. Insulated windings of the solenoid carry an electric current of 5A. The magnetic flux density produced by the solenoid is :
(permeability of free space = $4\pi \times 10^{-7}$ H/m)

- (A) πT
(B) $2 \times 10^{-3} \pi T$
(C) $10^{-4} \pi T$
(D) $\frac{\pi}{5} T$

[Step-by-step solution ► prepwisar.in/questions/o3WuCM4m7n](https://www.prepwisar.in/questions/o3WuCM4m7n)

Answer key — Moving Charges & Magnetism

Numbers match the question numbers above. For full working, open the solution link under each question.

1	48	2	B	3	5	4	C	5	D	6	5	7	35	8	32
9	C	10	C	11	B	12	B	13	C	14	A	15	A	16	A
17	A	18	C	19	A	20	C	21	B	22	C	23	B	24	D
25	4	26	C	27	A	28	D	29	50	30	A	31	A	32	A
33	A	34	D	35	D	36	D	37	C	38	C	39	20	40	C
41	8	42	40	43	40	44	8	45	A	46	A	47	3	48	11
49	C	50	B	51	B	52	B	53	C	54	D	55	D	56	0
57	C	58	B	59	2	60	C	61	4	62	D	63	A	64	40
65	A	66	B	67	10	68	2	69	C	70	D	71	A	72	B
73	C	74	B	75	D	76	D	77	C	78	C	79	D	80	C
81	B	82	C	83	B	84	B	85	C	86	A	87	C	88	543
89	D	90	C	91	5	92	8	93	250	94	500	95	2	96	C
97	C	98	A	99	3	100	A								

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