PHYSICS

BOOKS - BETTER CHOICE PUBLICATION

MAGNETIC EFFECTS OF CURRENT

Very Short Answer Questions

1. What is SNOW rule ?

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2. What kind of magnetic field is produced by an infinitely long current carrying conductor?

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3. Define Ampere's swimming rule for the magnetic effect of current.

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4. Write expression for the Biot-Savart's law.

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5. State Ampere's circuital law.

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6. State Biot-Savert's law.

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Most Expected Questions

1. Which physical quantity has the unit webber per square metre $\left(wbm^{-2}\right)$? Is it a scalar or vector quantity ?

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2. What do you mean by a solenoid ?

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3. What is a toroid?

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4. Give the SI unit of electrical permittivity of free space.

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5. What kind of magnetic field is produced by a current carrying solenoid ?

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6. Does a current carrying circular coil produce uniform magnetic field?

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7. What is the nature of the magnetic field due to a current carrying (a) linear conductor (b) circular coil

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8. In what respect does a wire carrying a current differ from a wire, which carries no current?

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9. Magnetic field lines can be entirely confined within the core of a toroid, but not within a straight solenoid. Why?

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10. A long straight wire carries a current of 10 A. An electron moving at $10^7 ms^{-1}$ is $2.0cm$ from the wire. Find the force acting on the electron if its velocity is directed towards the wire.

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11. A test charge of 1.6×10^{-19} C is moving with velocity $v = \left(2\hat{i} + 3\hat{j}\right)\frac{m}{\sec}$ in magnetic field $\overrightarrow{B} = \left(2\hat{i} + 3\hat{j}\right)Wbm^{-2}$. Find the force acting on the test charge.

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12. A 2 MeV proton is moving perpendicular to a uniform magnetic field o 2.5 tesla. The force on the proton is

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13. A toroidal coil has a core of inner radius 24 cm and outer radius 26 cm around which 2500 turns of a wire are wound. If the current in the

wire is 10 A, what is the magnetic field (a) inside the core of the toroid (b) outside the toroid (c) in the empty space surrounded by toroid ?

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14. A wire 5m above the ground through which 50A current is flowing from south to north. Find the direction and magnitude of magnetic field directly below the cable.

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15. A Sobnoid of length 50cm, having 100 turns Carries a Current of 2.5A. Find the magnetic field (B), (a) in the interior of sobnoid (b) at one end of the sobnoid.

Give $\mu = 4 \times 10^{-7} wbA^{-1}M^{-1}$

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Short Answer Type Questions

1. Explain Biot-Savart law for the magnetic field produced at a point due to the current flowing in a current element. How will you determine the direction of the field?

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2. Using Ampere's circuital law, derive an expression for the magnetic field along the axis of a toroidal solenoid.

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3. Derive an expression for magnetic field at the centre of circular current carrying coil.

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4. Using Ampere's circuital theorem, calculate the magnetic field due to an infinitely long wire carrying current I.

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Long Answer Type Questions

1. Using Ampere's circuital law, derive an expression for the magnetic field along the axis of a toroidal solenoid.

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2. Using Ampere's circuital law, derive an expression for the magnetic field along the axis of a toroidal solenoid.

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3. Derive an expression for magnetic field at the centre of circular current carrying coil.

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4. The magnetic field at a point due to a current carrying conductor is directly proportional to

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5. State the Biot-Savart's law for the magnetic field due to a current carrying element. Use this law to obtain a formula for magnetic field at athe centre of circular loop of radius r carrying steady current I. Sketch the magnetic field lines for a current loop clearly indicating the direction of the field.

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6. Derive an expression for magnetic field at the centre of circular current carrying coil.

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7. Derive an expression for magnetic field at the centre of circular current carrying coil.

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8. Write expression for the magnetic flux density at a point due to a current carrying wire of:

an infinite length?

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9. Write expression for the magnetic flux density at a point due to a current carrying wire of:

a finite length?

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10. State Ampere's circuital law. By using it derive an expression for magnetic field

intensity at a point due to a straight current carrying conductor.

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11. State Ampere's circuital law. By using it derive an expression for magnetic field intensity at a point due to a straight current carrying conductor.

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12. State Ampere's circuital law. By using it derive an expression for magnetic field intensity at a point due to a straight current carrying conductor.

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13. State the rule that is used to find the direction of field acting at a point near a current carrying straight conductor.

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14. Using Ampere's circuital theorem, calculate the magnetic field due to an infinitely long wire carrying current I.

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15. What is Maxwell's right hand thumb rule?

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16. State Biot-Savart law. Using Biot-Savart law find the magnitude and direction of magnetic field at a point on the axis of a circular coil of radius 'r', distant 'x' from the center having number of turns N carrying current 'I'.

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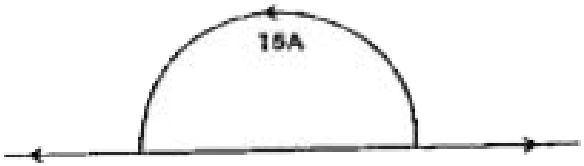
Numericals Problems

1. A current of 15A flows through a coil Magnetic field at centre of semi-circular loop of 5.0 cm radius as shown in fig. Find out the direction and magnitude of magnetic field at the centre of the arc.



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2. A horizontal wire 0.1 m long carries a current of 5 A. Find the magntiude and diretion of the magnetic field, which can support the weight of the wire. Assume wire to be of mass $3 \times 10^{-3} kgm^{-1}$

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3. A 0.5 m long solenoid has 500 tuns and has a flux density of $2.52 \times 10^{-3} T$ at its centre.

Find the current in the solenoid. Given $\mu_0 = 4\pi \times 10^{-7} Hm^{-1}$

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