

Moving Charges and Magnetism

1. A charged particle is moving in a cyclotron, what effect on the radius of path of this charged particle will occur when the frequency of the ratio frequency field is doubled?

- (a) It will also be doubled.
- (b) It will be halved.
- (c) It will be increased by four times.
- (d) It will remain unchanged.

▼ Answer

Answer: d

2. Which of the following is not correct about cyclotron?

- (a) It is a machine to accelerate charged particles or ions to high energies.
- (b) Cyclotron uses both electric and magnetic fields in combination to increase the energy of charged particles.
- (c) The operation of the cyclotron is based on the fact that the time for one revolution of an ion is independent of its speed or radius of its orbit.
- (d) The charged particles and ions in cyclotron can move on any arbitrary path.

▼ Answer

Answer: d

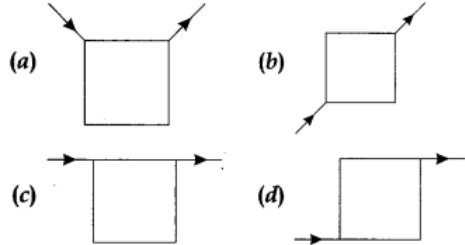
3. If an electron is moving with velocity $\vec{v}$ produces a magnetic field $\vec{B}$, then

- (a) the direction of field $\vec{B}$ will be same as the direction of velocity $\vec{v}$.
- (b) the direction of field $\vec{B}$ will be opposite to the direction of velocity $\vec{v}$.
- (c) the direction of field $\vec{B}$ will be perpendicular to the direction of velocity $\vec{v}$.
- (d) the direction of field $\vec{B}$ does not depend upon the direction of velocity $\vec{v}$.

▼ Answer

Answer: c

4. Current flows through uniform, square frames as shown in the figure. In which case is the magnetic field at the centre of the frame not zero?



▼ Answer

Answer: c

5. Ampere's circuital law is given by

- (a) $\oint \vec{H} \cdot d\vec{l} = \mu_0 I_{\text{enc}}$ (b) $\oint \vec{B} \cdot d\vec{l} = \mu_0 I_{\text{enc}}$
(c) $\oint \vec{B} \cdot d\vec{l} = \mu_0 J$ (d) $\oint \vec{H} \cdot d\vec{l} = \mu_0 J$

▼ Answer

Answer: b

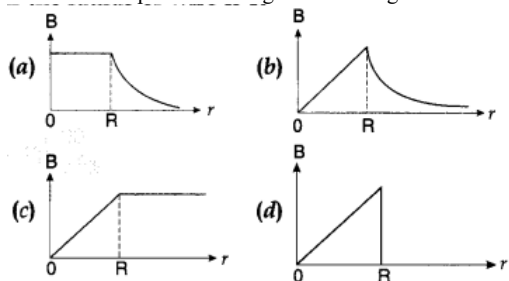
6. Two identical current carrying coaxial loops, carry current I in opposite sense. A simple amperian loop passes through both of them once. Calling the loop as C , then which statement is correct?

- (a) $\oint_C \vec{B} \cdot d\vec{l} = \pm 2\mu_0 I$
(b) the value of $\oint_C \vec{B} \cdot d\vec{l}$ is independent of sense of C .
(c) there may be a point on C where B and $d\vec{l}$ are parallel.
(d) none of these

▼ Answer

Answer: b

7. The correct plot of the magnitude of magnetic field $\vec{B}$ vs distance r from centre of the wire is, if the radius of wire is R



▼ Answer

Answer: b

8. The nature of parallel and anti-parallel currents are

- (a) parallel currents repel and antiparallel currents attract.
(b) parallel currents attract and antiparallel currents repel.
(c) both currents attract.
(d) both currents repel.

▼ Answer

Answer: b

9. The magnetic moment of a current I carrying circular coil of radius r and number of turns N varies as

- (a) $\frac{1}{r^2}$
(b) $\frac{1}{r}$
(c) r
(d) r^2

▼ Answer

Answer: d

10. A short bar magnet has a magnetic moment of 0.65 J T^{-1} , then the magnitude and direction of the magnetic field produced by the magnet at a distance 8 cm from the centre of magnet on the axis is

- (a) $2.5 \times 10^{-4} \text{ T}$, along NS direction
(b) $2.5 \times 10^{-4} \text{ T}$ along SN direction

Answer: c

- (c) 4.5×10^{-4} T, along NS direction
(d) 4.5×10^{-4} T, along SN direction

▼ Answer

Answer: b

11. A current carrying loop is placed in a uniform magnetic field. The torque acting on it does not depend upon

- (a) area of loop
(b) value of current
(c) magnetic field
(d) None of these

▼ Answer

Answer: d

12. In a moving coil galvanometer the deflection (Φ) on the scale by a pointer attached to the spring is

- (a) $\left(\frac{NA}{kB}\right) I$ (b) $\left(\frac{N}{kAB}\right) I$
(c) $\left(\frac{NAB}{k}\right) I$ (d) $\left(\frac{NAB}{kI}\right) I$

▼ Answer

Answer: c

13. A moving coil galvanometer can be converted into an ammeter by

- (a) introducing a shunt resistance of large value in series.
(b) introducing a shunt resistance of small value in parallel.
(c) introducing a resistance of small value in series.
(d) introducing a resistance of large value in parallel.

▼ Answer

Answer: b

14. The conversion of a moving coil galvanometer into a voltmeter is done by

- (a) introducing a resistance of large value in series.
(b) introducing a resistance of small value in parallel.
(c) introducing a resistance of large value in parallel.
(d) introducing a resistance of small value in series.

▼ Answer

Answer: a

15. When a magnetic compass needle is carried nearby to a straight wire carrying current, then

- (I) the straight wire cause a noticeable deflection in the compass needle.
(II) the alignment of the needle is tangential to an imaginary circle with straight wire as its centre and has a plane perpendicular to the wire
(a) (I) is correct
(b) (II) is correct
(c) both (I) and (II) are correct
(d) neither (I) nor (II) is correct

▼ Answer

Answer: c

16. A strong magnetic field is applied on a stationary electron. Then the electron

- (a) moves in the direction of the field.
(b) remained stationary.
(c) moves perpendicular to the direction of the field.
(d) moves opposite to the direction of the field.

▼ Answer

Answer: b

17. In an inertial frame of reference, the magnetic force on a moving charged particle is $\vec{F}$. Its value in another inertial frame of reference will be

- (a) remained same
- (b) changed due to change in the amount of charge
- (c) changed due to change in velocity of charged particle
- (d) changed due to change in field direction

▼ **Answer**

Answer: c

18. Which one of the following is correct statement about magnetic forces?

- (a) Magnetic forces always obey Newton's third law.
- (b) Magnetic forces do not obey Newton's third law.
- (c) For very high current, magnetic forces obey Newton's third law.
- (d) Inside low magnetic field, magnetic forces obey Newton's third law.

▼ **Answer**

Answer: b

19. A charged particle is moving on circular path with velocity v in a uniform magnetic field B , if the velocity of the charged particle is doubled and strength of magnetic field is halved, then radius becomes

- (a) 8 times
- (b) 4 times
- (c) 2 times
- (d) 16 times

▼ **Answer**

Answer: b

20. Two α -particles have the ratio of their velocities as 3 : 2 on entering the field. If they move in different circular paths, then the ratio of the radii of their paths is

- (a) 2 : 3
- (b) 3 : 2
- (c) 9 : 4
- (d) 4 : 9

▼ **Answer**

Answer: b
