

Chapter 4

Moving Charges and Magnetism

(Assertion and Reason Questions)

Directions: These questions consist of two statements, each printed as Assertion and Reason. While answering these questions, you are required to choose any one of the following four responses.

- (a) If both Assertion and Reason are correct and the Reason is a correct explanation of the Assertion.
- (b) If both Assertion and Reason are correct but Reason is not a correct explanation of the Assertion.
- (c) If the Assertion is correct but Reason is incorrect.
- (d) If both the Assertion and Reason are incorrect.

Q.1. Assertion: Cyclotron is a device which is used to accelerate the positive ion.
Reason: Cyclotron frequency depends upon the velocity.

Q.2. Assertion: Cyclotron does not accelerate electron.
Reason: Mass of the electrons is very small.

Q.3. Assertion: In electric circuits, wires carrying currents in opposite directions are often twisted together
Reason: If the wires are not twisted together, the combination of the wires forms a current loop, the magnetic field generated by the loop might affect adjacent circuits or components.

Q.4. Assertion: The magnetic field produced by a current carrying solenoid is independent of its length and cross-sectional area.
Reason: The magnetic field inside the solenoid is uniform.

Q.5. Assertion: A charge, whether stationary or in motion produces a magnetic field around it.

Reason: Moving charges produce only electric field in the surrounding space.

Q.6. Assertion: A proton and an alpha particle having the same kinetic energy are moving in circular paths in a uniform magnetic field. The radii of their circular paths will be equal.

Reason: Any two charged particles having equal kinetic energies and entering a region of uniform magnetic field B in a direction perpendicular to B , will describe circular trajectories of equal radii.

Q.7. Assertion: If the current in a solenoid is reversed in direction while keeping the same magnitude, the magnetic field energy stored in the solenoid remains unchanged.

Reason: Magnetic field energy density is proportional to the magnetic field.

Q.8. Assertion: The magnetic field at the centre of the circular coil in the following figure due to the currents I_1 and I_2 is zero.

Reason: $I_1 = I_2$ implies that the fields due to the current I_1 and I_2 will be balanced.

Q.9. Assertion: If the current in a solenoid is reversed in direction while keeping the same magnitude, the magnetic field energy stored in the solenoid decreases.

Reason: Magnetic field energy density is proportional to square of current.

Q.10. Assertion: Free electrons always keep on moving in a conductor even then no magnetic force act on them in magnetic field unless a current is passed through it.

Reason: The average velocity of free electron is zero.

Q.11. Assertion: To convert a galvanometer into an ammeter a small resistance is connected in parallel with it.

Reason: The small resistance increases the combined resistance of the combination.

-X-X-X-

ANSWER KEY

Q.1: (c)

Q.2: (c)

Q.3: (a)

Q.4: (b)

Q.5: (d)

Q.6: (c)

Q.7: (c)

Q.8: (d)

Q.9: (d)

Q.10: (b)

Q.11: (c)