"UTSAAH" Test Series

12thTOPIC –Moving Charges & Magnetism

Physics 12th Answer Keys Paper on 10.09.2022

1. Biot-Savart law indicates that the moving electrons (velocity v) produce a magnetic field B such that
   (a) B Perpendicular to v
   (b) B Parellel to v
   (c)It obeys inverse cube law.
   (d) It is along the line joining the electron and point of observation

2. An electron is projected with uniform velocity along the axis of a current carrying long Solenoid. Which of the following is true?
   (a) The electron will be accelerated along the axis.
   (b) The electron path will be circular about the axis.
   (c) The electron will experience a force at 45° to the axis and hence execute a helical path.
   (d) The electron will continue to move with uniform velocity along the axis of the solenoid.

3. A wire in the form of a circular loop, of one turn carrying a current, produces magnetic induction B at the centre. If the same wire is looped into a coil of two turns and carries the same current, the new value of magnetic induction at the centre is
   (a) B (b) 2 B **(c)** 4 B (d) 8 B
4. A solenoid has 1000 turns per meter length. If a current of 5A is flowing through it, then magnetic field inside the solenoid is
   (a) 2π X 10^{-3} T
   (b) 2π X 10^{-5} T
   (c) 4π X 10^{-3} T
   (d) 4π X 10^{-5} T

5. The coil of a moving coil galvanometer is wound over a metal frame in order to
   (a) Reduce hysteresis
   (b) Increase sensitivity
   (c) Increase moment of inertia
   (d) Provide electromagnetic damping
6. If the beams of electrons and protons move parallel to each other in the same direction, then they
   (a) Attract each other.
   b) Repel each other.
   (c) No relation.
   (d) Neither attracts nor repel.

7. Currents of 10 A and 2 A are flowing in opposite directions through two parallel wires A and B respectively. If the wire A is infinitely long and wire B is 2 m long, then force on wire B which is situated at 10 cm from A, is
   (a) 8 X 10^{-5} N
   (b) 6 X 10^{-5} N
   (c) 4 X 10^{-5} N
   (d) 2 X 10^{-5} N

8. 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.

9. 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

10. 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) **3 : 2** (b) 2 : 3 (c) 4 : 9 (d) 9 : 4

11. If a current I is flowing in a straight wire parallel to x axis and magnetic field is there along the y axis then
(a) The wire experiences force in x direction
(b) The wire experiences force in y direction
(c) The wire experiences no force
(d) The wire experiences force in *z* direction

12. Two wires of same length are shaped into a square and a circle if they carry same current, ratio of magnetic moment is :
(a) 2 : π (b) π : 2 (c) 4 : π **(d) π : 4**

13. Current sensitivity of a galvanometer can be increased by decreasing :
(a) Magnetic field B
(b) Number of turns N
(c) spring constant c
(d) Area A

14. 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

Instructions For questions 15-18: *Two statements are given-one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below.*

(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 and R is also false

15. **Assertion (A):** The voltage sensitivity may not necessarily increase on increasing the current sensitivity.
Reason (R): Current sensitivity increases on increasing the number of turns of the coil.

16. **Assertion (A):** If a proton and an α-particle enter a uniform magnetic field perpendicularly with the same speed, the time period of revolution of α-particle is double than that of proton.
Reason (R): In a magnetic field, the period of revolution of a charged particle is directly proportional to the mass of the particle and inversely proportional to the charge of the particle.

17. **Assertion (A):** The magnetic field at the ends of a very long current carrying solenoid is half of that at the centre.
Reason (R): If the solenoid is sufficiently long, the field within it is uniform.

18. **Assertion (A):** If an electron and proton enter a magnetic field with equal momentum, then the paths of both of them will be equally curved.

Reason (R): The magnitude of charge on an electron is same as that on a proton

Answers. 15. A 16. B 17. A 18. A

19. The value of 1 Gauss is equal to
(a) 10^4 Tesla
(b) 10^{-4} Tesla
(c) 10^2 Tesla
(d) 10^{-2} Tesla

20. When the charged particles move in a combined magnetic & electric field then a special force acting at is known as-
(a) Centrifugal force
(b) Centripetal force
(c) Orbital Force
(d) Lorentz force

CASE STUDY

I-TOROID

The toroid is a hollow circular ring on which a large number of turns of wire are closely wound. It can be viewed as a solenoid which has been bent into a circular shape to close on itself. The magnetic field vanishes in the open space inside and outside the toroid. The magnetic field inside the toroid is constant in magnitude and is given by B = μ0 n I, where n is the number of turns per unit length and I is the current flowing in the toriod, μ0 is the absolute permeability of the free space.

21. The magnetic field inside a toroid of radius R is B. If the current through it is doubled and its radius is also doubled keeping the number of turns per unit length the same, magnetic field produced by it will be
(a) B/2 (b) B/4 (c) B **(d) 2B**

22. What is the magnetic field in the empty space enclosed by the toroid of radius R?
(a) $\frac{\mu_0}{4\pi}\frac{2I}{R}$
(b) Infinity
(c) Zero
(d) $\frac{\mu_0}{4\pi}\frac{I}{R}$

23. A toroid of 300 turns/m and radius 2 cm is carrying a current of 5 A. What is the magnitude of magnetic field intensity in the interior of the toriod?
(a) 1.9 T
(b) 1.9 x 10^{-6} T
(c) 1.9 x 10^{-3} T
(d) 1.9 x 10^{-7} T

24. Magnetic field due to a current carrying toroid is independent of
(a) Its number of turns
(b) Current
(c) Radius
(d) None of these

25. How can you increase the magnetic field inside a toroid?
(a) by increasing the radius
(b) by decreasing the current
(c) by introducing a soft iron core inside a toroid
(d) by decreasing the total number of turns