DPP

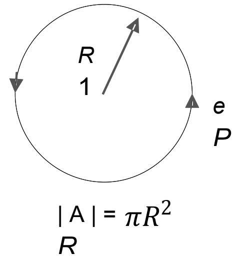
DAILY PRACTICE PROBLEMS

Class : XIIth | **Subject : PHYSICS**
Date : | **DPP No. : 6**

Topic :- MOVING CHARGES AND MAGNETISM

1. An electron ($e = 1.6 \times 10^{-19}$C) moves in a circular orbit of radius 1.42 cm with a speed of 10^5 ms^{-1} in presence of magnetic field of 4×10^{-2}T. If the mass of electron is 9.1×10^{-31} kg the energy gained by the electron in going one round the circular orbit is
   a) zero b) 4.54×10^{-28} J c) 9.08×10^{-28} J d) 28.55×10^{-28} J
2. An electron $(\text{mass} = 9.0 \times 10^{-31})$ kg and charge (1.6×10^{-19} C) is moving in a circular orbit in a magnetic field of 1.0×10^{-4} Wbm^{-2}. Its period of revolution is
   a) 2.1×10^{-6} s b) 1.05×10^{-6} s c) 7×10^{-7} s d) 3.5×10^{-7} s
3. A particle of mass m, charge Q and kinetic energy T enters a transverse uniform magnetic field of induction $\vec{B}$. After 3 seconds the kinetic energy of the particle will be
   a) T b) $4\,T$ c) $3\,T$ d) $2\,T$
4. The magnetic moment of a circular coil carrying current is
   a) Directly proportional to the length of the wire in the coil
   b) Inversely proportional to the length of the wire in the coil
   c) Directly proportional to the square of the length of the wire in the coil
   d) Inversely proportional to the square of the length f the wire in the coil
5. A long wire carries a steady current. It is bent into a circle of one turn and the magnetic field at the centre of the coil is B. It is then bent into a circular loop of n turns. The magnetic field at the centre of the coil will be
   a) nB b) n^2B c) $2nB$ d) $2n^2B$
6. Which of the following statements is true
   a) The presence of a large magnetic flux through a coil maintains a current in the coil if the circuit is continuous
   b) A coil of a metal wire kept stationary in a non-uniform magnetic field has an e.m.f. induced in it
   c) A charged particle enters a region of uniform magnetic field at an angle of 85° to the magnetic line of force; the path of the particle is a circle
   d) There is no change in the energy of a charged particle moving in a magnetic field although a magnetic force is acting on it
7. An electron is moving on a circular path of radius r with speed v in a transverse magnetic field B. e/m for it will be
   a) $\frac{v}{Br}$ b) $\frac{B}{rv}$ c) Bvr d) $\frac{vr}{B}$

8. An electron is moving in an orbit of radius R with a time period T as shown in the figure. The magnetic moment produced may be given by $|e|$ represents the magnitude of the electron charge.



a) $\mathbf{M} = \frac{2\pi|e|\mathbf{A}}{T}$ b) $\mathbf{M} = -\frac{2\pi|e|\mathbf{A}}{T}$ c) $\mathbf{M} = \frac{|e|\mathbf{A}}{T}$ d) $\mathbf{M} = -\frac{|e|\mathbf{A}}{T}$

9. The radius of circular path of an electron when subjected to a perpendicular magnetic field is

a) $\frac{mv}{Be}$ b) $\frac{me}{Be}$ c) $\frac{mE}{Be}$ d) $\frac{Be}{mv}$

10. A steady current I goes through a wire loop PQR having shape of a right angle triangle with $PQ = 3x$, $PR = 4\,x$ and $QR = 5x$. If the magnitude of the magnetic field at P due to this loop is $k\left(\frac{\mu_0 I}{48\pi\,x}\right)$, find the value of k

a) 8 b) 3 c) 7 d) None of these

11. A beam of well collimated cathode rays travelling with a speed of $5 \times 10^6\ ms^{-1}$ enter a region of mutually perpendicular electric and magnetic fields and emerge undeviated from this region. If $|B| = 0.02\ T$, the magnitude of the electric field is

a) $10^5\ Vm^{-1}$ b) $2.5 \times 10^8\ Vm^{-1}$ c) $1.25 \times 10^{-10}\ Vm^{-1}$ d) $2 \times 10^3\ Vm^{-1}$

12. In ballistic galvanometer, the frame on which the coil is wound is non-metallic to

a) Avoid the production of induced e.m.f.

b) Avoid the production of eddy currents

c) Increase the production of eddy currents

d) Increase the production of induced e.m.f.

13. A and B are two conductors carrying a current i in the same direction. x and y are two electron beams moving in the same direction

a) There will be repulsion between A and B attraction between x and y

b) There will be attraction between A and B repulsion between x and y

c) There will be repulsion between A and B and also x and y

d) There will be attraction between A and B and also x and y

14. A power line lies along the east-west direction and carries a current of 10 $ampere$. The force per metre due to the earth's magnetic field of 10^{-4} $tesla$ is

a) $10^{-5}N$ b) $10^{-4}N$ c) $10^{-3}N$ d) $10^{-2}N$

15. If m is magnetic moment and B is the magnetic field, then the torque is given by

a) $\vec{m} \cdot \vec{B}$ b) $\frac{|\vec{m}|}{|\vec{B}|}$ c) $\vec{m} \times \vec{B}$ d) $|\vec{m}| \cdot |\vec{B}|$

16. A square current carrying loop is suspended in a uniform magnetic field acting in the plane of the loop. If the force on one arm of the loop is $\vec{F}$, the net force on the remaining three arms of the loop is

a) $\vec{F}$ b) $3\vec{F}$ c) $-\vec{F}$ d) $-3\vec{F}$

17. If two streams of protons move parallel to each other in the same direction, then they

a) Do not exert any force on each other b) Repel each other

c) Attract each other d) Get rotated to be perpendicular to each other

18. A charged particle moving in a uniform magnetic field penetrates layer of lead and there by loss one-half of its kinetic energy. How does the radius of curvature of its path change?

a) The radius reduces to $r\sqrt{2}$ b) The radius reduces to $\frac{r}{\sqrt{2}}$

c) The radius remains the same d) The radius becomes $r/2$

19. The deflection in moving coil galvanometer is reduced to half, when it is shunted with a 40 Ω coil. The resistance of the galvanometer is

a) 60 Ω b) 10 Ω c) 40 Ω d) 20 Ω

20. Two wires A and B are of lengths 40 cm and 30 cm. A is bent into a circle of radius r and B into an arc of radius r. A current i_1 is passed through A and i_2 through B. To have the same magnetic inductions at the centre, the ratio of $i_1 : i_2$ is

a) 3 : 4 b) 3 : 5 c) 2 : 3 d) 4 : 3