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Prayas JEE (2025)

Physics

Magnetism

DPP: 4

Q1 A proton and an alpha particle are separately projected in a region where a uniform magnetic field exists. The initial velocities are perpendicular to the direction of magnetic field. If both the particles move along circles of equal radii, the ratio of momentum of proton to alpha particle $\left(\frac{P_\rho}{P_\alpha}\right)$ is

(A) 1
(B) $1/2$
(C) 2
(D) $1/4$

Q2 Two identically charged particles A and B initially at rest, are accelerated by a common potential difference V. They enters into a uniform transverse magnetic field B and describe a circular path of radii r_1 and r_2 respectively then their mass ratio is

(A) $\left(\frac{r_1}{r_2}\right)^2$
(B) $\left(\frac{r_2}{r_1}\right)^2$
(C) $\left(\frac{r_1}{r_2}\right)$
(D) $\left(\frac{r_2}{r_1}\right)$

Q3 A charge having $\mathrm{q/m}$ equal to $10^8 \mathrm{C/kg}$ and with velocity $3 \times 10^5\ \mathrm{m/s}$ enters into a uniform magnetic field $\mathrm{B} = 0.3$ tesla at an angle 30° with direction of field. Then radius will be

(A) $0.01\ \mathrm{cm}$
(B) $0.5\ \mathrm{cm}$
(C) $1\ \mathrm{cm}$
(D) $2\ \mathrm{cm}$

Q4 An electron having mass m and kinetic energy E enter in uniform magnetic field B perpendicularly, then its frequency of uniform circular motion will be

(A) $\frac{eE}{qVB}$
(B) $\frac{2\pi m}{eB}$
(C) $\frac{eB}{2\pi m}$
(D) $\frac{2B}{eBE}$

Q5 A charge particle is moving in the direction of a magnetic field. The magnetic force acting on the particle

(A) Is in the direction of its velocity
(B) Is in the direction opposite to its velocity
(C) Is perpendicular to its velocity
(D) Is zero

Q6 An electron of kinetic energy of $7.2 \times 10^{-18}\ \mathrm{J}$ is revolving on circular path in magnetic field $9 \times 10^{-5}\ \mathrm{Wb/m^2}$ then radius of its circular path is

(A) $1.25\ \mathrm{cm}$
(B) $2.5\ \mathrm{m}$
(C) $2.5\ \mathrm{cm}$
(D) $25.0\ \mathrm{cm}$

Q7 A proton, deutron and an α-particle are accelerated by same potential, enter in uniform magnetic field perpendicularly. Ratio of radii of circular path respectively

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(A) $1:\sqrt{2}:\sqrt{2}$

(B) $2:2:1$

(C) $1:2:1$

(D) $1:1:1$

Q8 A charged particle moves through a magnetic field in a direction perpendicular to it. Then the

(A) Speed of the particle remains unchanged

(B) Direction of motion of particle remains unchanged

(C) Acceleration of particle remains unchanged

(D) Velocity of particle remains unchanged

Q9 A magnetic field

(A) Always exerts a force on charged particle

(B) Never exerts a force on charged particle

(C) Exert a force, if the charged particle is moving across the magnetic field line

(D) Exerts a force, if the charged particle is moving along the magnetic field line

Q10 An electron accelerated by 200 V, enters a magnetic field. If its velocity is 8.4×10^{6} m/sec. then (e/m) for it will be: (in C/kg):

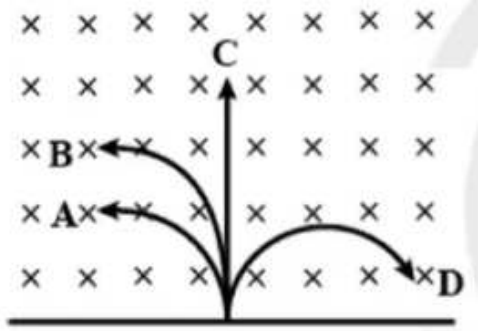
(A) 1.75×10^{10}

(B) 1.75×10^{11}

(C) 1.75×10^{9}

(D) 1.75×10^{6}

Q11 A neutron, a proton, an electron and an α-particle enter a region of uniform magnetic field with equal velocities. The magnetic field is perpendicular to the paper and directed into it. The tracks of particles are labeled in figure. The neutron follows the track



(A) A (B) B

(C) C (D) D

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Answer Key

Q1	B
Q2	A
Q3	B
Q4	C
Q5	D
Q6	D
Q7	A
Q8	A
Q9	C
Q10	B
Q11	C

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