

Physics Model Question Paper 10: (For Class 11 and 12 and Pre-Medical/Engineering Entrance)

Question 1 : A charged particle is moving in a magnetic field of strength B perpendicular to the direction of the field. If q and m denote the charge and mass of the particle respectively. Then the frequency of rotation of the particle is

(A) $f = \frac{2\pi m}{qB}$

(B) $f = \frac{2\pi^2 m}{qB}$

(C) $f = \frac{qB}{2\pi m^2}$

(D) $f = \frac{qB}{2\pi m}$

Answer : (D)

Question 2 : A circular coil carrying a certain current produces a magnetic field B_0 at its centre. The coil is now rewound so as to have 3 turns and the same current is passed through it. The new magnetic field at the centre is

(A) $3B_0$

(B) $\frac{B_0}{3}$

(C) $9B_0$

(D) $\frac{B_0}{9}$

Answer : (C)

Question 3 : A current of 5 A is passing through a metallic wire of cross-sectional area $4 \times 10^{-6} \text{m}^2$. If the density of charge carriers of the wire is $5 \times 10^{26} \text{m}^{-3}$, the drift velocity of the electrons will be

(A) $1 \times 10^{-2} \text{ms}^{-1}$

(B) $1.56 \times 10^{-3} \text{ms}^{-1}$

(C) $1.56 \times 10^{-2} \text{ms}^{-1}$

(D) $1 \times 10^2 \text{ms}^{-1}$

Answer : (C)

Question 4 : A cylinder of radius r and length l is placed in an uniform electric field E parallel to the axis of the cylinder. The total flux for the surface of the cylinder is given by _____.

- (A) $p r^2 E$
- (B) $(p r^2 + pl^2)E$
- (C) zero
- (D) $2p r^2 E$

Answer : (C)

Question 5 : A glass tube is open at both the ends. A tuning fork of frequency f resonates with the air column inside the tube. Now the tube is placed vertically inside water so that half the length of the tube is filled with water. Now the air column inside the tube is in unison with another fork of frequency f' . Then

- (A) $f' = \frac{f}{2}$
- (B) $f' = 2f$
- (C) $f' = 4f$
- (D) $f' = f$

Answer : (D)

Question 6 : A nucleus ${}^m_n X$ emits one α particle and two β -particles. The resulting nucleus is

- (A) ${}^{m-4}_{n-2} Y$
- (B) ${}^{m-6}_{n-4} Z$
- (C) ${}^{m-6}_n Z$
- (D) ${}^{m-4}_n X$

Answer : (D)

Question 7 : A parallel plate condenser has a uniform electric field E (V/m) in the space between the plates. If the distance between the plates is d (m) and area of each plate is A (m^2) the energy (joules) stored in the condenser is

(A) $\frac{1}{2} \epsilon_0 E^2 Ad$

(B) $E^2 Ad / \epsilon_0$

(C) $\frac{1}{2} \epsilon_0 E^2$

(D) $\epsilon_0 E Ad$

Answer : (A)

Question 8 : A planet moving along an elliptical orbit is closest to the sun at a distance r_1 and farthest away at a distance of r_2 . If v_1 and v_2 are the linear velocities at these points respectively. Then the ratio

$\frac{v_1}{v_2}$ is

(A) $\frac{r_1}{r_2}$

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

(C) $\frac{r_2}{r_1}$

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

Answer : (C)

Question 9 : A radioactive nucleus of mass M emits a photon of frequency ν and the nucleus recoils. The recoil energy will be

(A) $h\nu$

(B) $Mc^2 - h\nu$

(C) $\frac{h^2 \nu^2}{2Mc^2}$

(D) Zero

Answer : (C)

Question 10 : A ray of light is travelling from glass to air. (Refractive index of glass = 1.5) The angle of incidence is 50° . The deviation of the ray is

(A) $\sin^{-1}\left[\frac{\sin 50^\circ}{1.5}\right] - 50^\circ$

(B) $50^\circ - \sin^{-1}\left[\frac{\sin 50^\circ}{1.5}\right]$

(C) 80°

(D) 0°

Answer : (C)