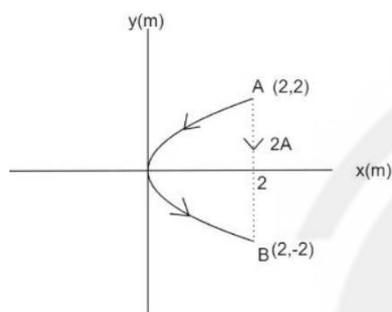# Prayas JEE (2025)

## Physics

## Magnetism

**DPP: 6**

**Q1** A conducting wire bent in the form of a parabola $y^2 = 2x$ carries a current $i = 2A$ as shown in figure. This wire is placed in a uniform magnetic field $\vec{B} = -4\hat{k}$ Tesla. The magnetic force on the wire is (in newton)



(A) $-16\hat{i}$

(B) $32\hat{i}$

(C) $-32\hat{i}$

(D) $16\hat{i}$

**Q2** A circular coil of $20$ turns and radius $10$ cm is placed in uniform magnetic field of $0.10$ T normal to the plane of the coil. If the current in coil is $5$ A, then the torque acting on the coil will be

(A) $31.4$Nm

(B) $3.14$Nm

(C) $0.314$Nm

(D) zero

**Q3** A charge $q$ moves in a region where electric field and magnetic field both exist, then force on it

(A) $q(\vec{v} \times \vec{B})$

(B) $q\vec{E} + q(\vec{v} \times \vec{B})$

(C) $q\vec{E} + q(\vec{B} \times \vec{v})$

(D) $q\vec{B} + q(\vec{E} \times \vec{v})$

**Q4** An electric field $E$ and a magnetic field $B$ applied on a proton which moves with velocity $v$, it goes undeflected through the region if

(A) E is parallel to $B$.

(B) $E$ is parallel to $v$ and perpendicular to $B$

(C) E, B and $v$ all three mutually perpendicular to each other and $v = E/B$

(D) E and B both are parallel but perpendicular to v

**Q5** A wire PQ carries a current $i$ is placed perpendicular to a long wire $XY$ carrying a current $I$. The direction of force on $PQ$ will be
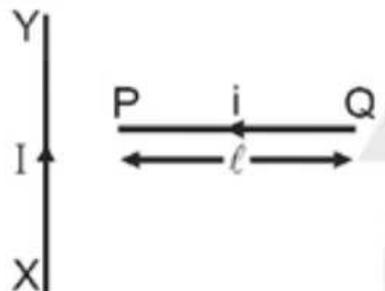


(A) Towards right     (B) Towards left

(C) Upwards     (D) Downwards

**Q6** Two parallel wires in free space are $10$ cm apart and each carries a current of $10$ A in the same direction. The magnetic force per unit length of each wire is

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(A) $2 \times 10^{-4}$ N, attractive

(B) $2 \times 10^{-4}$ N, repulsive

(C) $2 \times 10^{-7}$ N, attractive

(D) $2 \times 10^{-7}$ N, repulsive

**Q7** Figure shows a wire of arbitrary shape carrying a current $I$ between points $a$ and $b$. The length of the wire is $L$ and the distance between points $a$ and $b$ is $d$. The wire lies in a plane at right angle to a uniform magnetic field $B$. Then the force on the wire is:
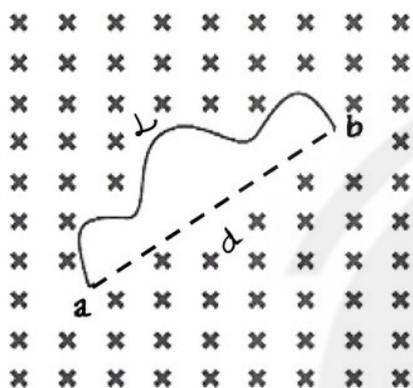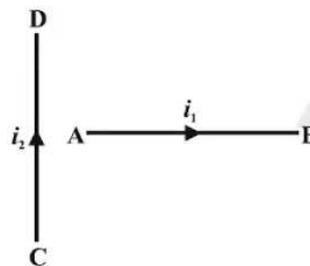


(A) $ILB$

(B) $IdB$

(C) $I(L-d)B$

(D) none of these

**Q8** Three infinite straight wires $A$, $B$ and $C$ carry currents as shown. The net force on the wire $B$ is directed
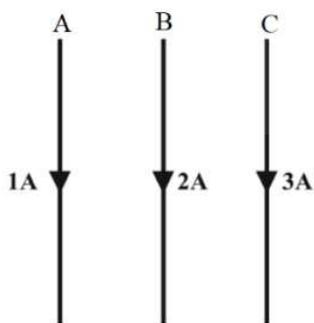


(A) towards $A$
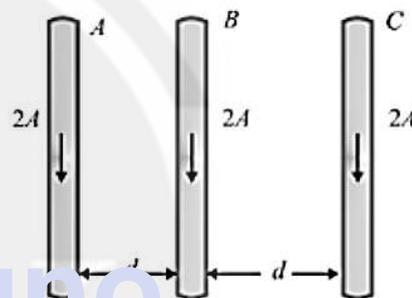
(B) towards $C$

(C) normal to plane of paper

(D) zero

**Q9** A current $i_1$ carrying wire $AB$ is placed near an another long wire $CD$ carrying current $i_2$

as shown in figure. If free to move, wire $AB$ will have



(A) rotational motion only

(B) translational motion only

(C) rotational as well as translational motion

(D) neither rotational nor translational motion

**Q10** Three long straight wires $A$, $B$ and $C$ are carrying currents as shown figure. Then the resultant force on $B$ is directed



(A) Towards $A$

(B) Net force on $B$ is zero

(C) Perpendicular to the plane of paper and outward

(D) Perpendicular to the plane of paper and inward

**Q11** A wire of length $\ell$ carries a current $i$ along the X - axis. A magnetic field exists which is given as $\vec{B} = B_0(\hat{i} + \hat{j} + \hat{k})T$. The magnitude of the magnetic force acting on the wire

(A) $ilB_o$

(B) $3ilB_o$

(C) $\sqrt{2}ilB_o$

(D) $\sqrt{3}ilB_o$

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# Answer Key

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

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