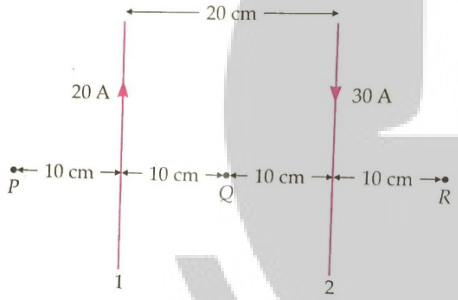
Ch—04 Moving Charges and Magnetism

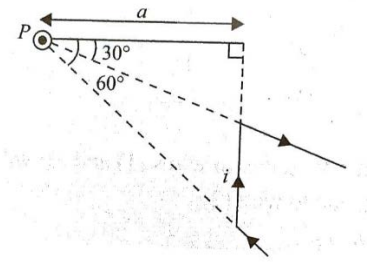
Daily Practice Problem 01

Q1. A closed circuit is in the form of a regular hexagon of side a. If the circuit carries current I, what is magnetic induction at the center of the hexagon?

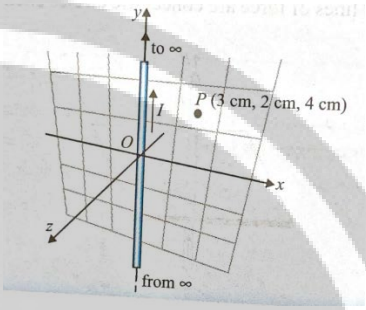
Q2. Figure shows two current-carrying wires 1 and 2. Find the magnitudes and directions of the magnetic field at points P, Q and R.



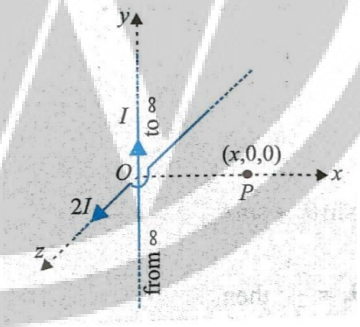
Q3. Find the magnitude and direction of magnetic field at point P due to the current carrying wire as shown in figure.



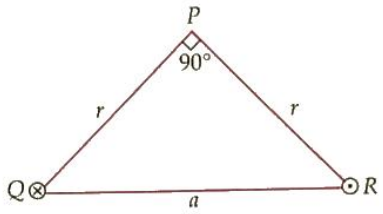
Q4. A long straight wire carrying current i = 10 A lies along y-axis Find the magnetic field at P (3 cm, 2 cm, 4 cm).

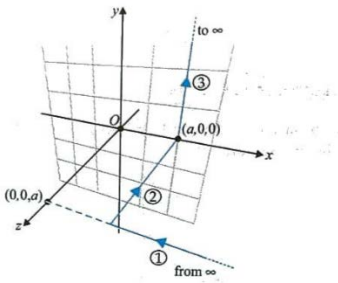


Q5. Two long straight current carrying wires having currents I and 2I lie along y- and z-axes, respectively, as shown in figure. Find $\vec{B}$ at the point P (x, 0, 0).

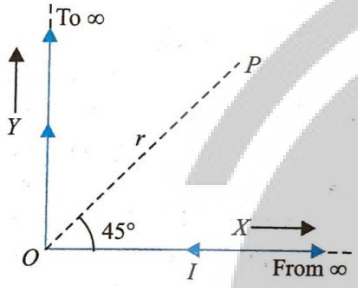


Q6. Figure shows a right-angled isosceles APQR having its base equal to a. A current of I ampere is passing downwards along a thin straight wire cutting the plane of paper normally as shown at Q. Likewise a similar wire carries an equal current passing normally upwards at R. Find the magnitude and direction of the magnetic induction B at P. Assume the wires to be infinitely long.





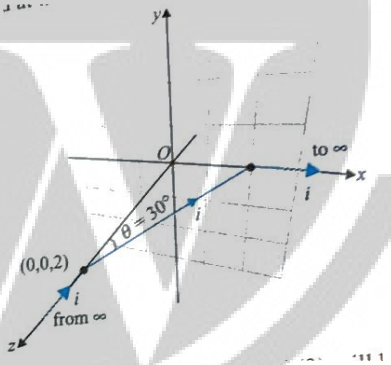
Q7. Current I flow through a long conducting wire bent at right angle as shown in figure. Find the magnetic field at point P on the right bisector of the angle XOY at distance r from O.



Q8. An infinite current carrying conductor is bent into three segments (1), (2) and (3) as shown in figure. If it carries a current i, find the magnetic induction at the origin.

Q9. A vertical wire in which a current is flowing produces a neutral point with the earth's magnetic field at a distance of 10 cm from the wire. What is the current if B_H = 1.8 x10^{-4} T?

Q10. Find the field at the origin O due to the current $i = 2\ A$.



ANSWERS

1. $B = \frac{\sqrt{3}\mu_0 I}{\pi a}$

2. **(i)** $B_P = \mathbf{2} \times 10^{-5} T$ **(ii)** $B_Q = 10^{-4}$
(iii) $B_R = 4.5 \times 10^{-5}$

3. $B = \frac{\mu_0 I}{8\pi R}\ (\sqrt{3} - 1)$

4. $B_P = 0.04\ mT$

5. $B_P = \frac{\mu_0 i}{2\pi x}[2\hat{j} - \hat{k}]$

6. $B = \frac{\mu_0 I}{\pi a}$ *towards the midpoint of QR*

7. $\frac{\mu_0}{2\pi}\frac{I}{r}\ (\sqrt{2} + 1)$

8. $\vec{B} = \frac{\mu_0}{4\pi}\frac{i}{a}\ [(\sqrt{2} - 1)\hat{j} + \hat{k}]$

9. 90 A

10. $(\sqrt{3} + 1) \times 10^{-7}\ T$