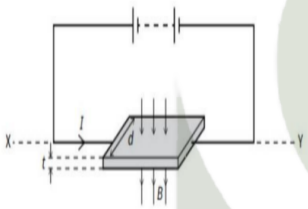
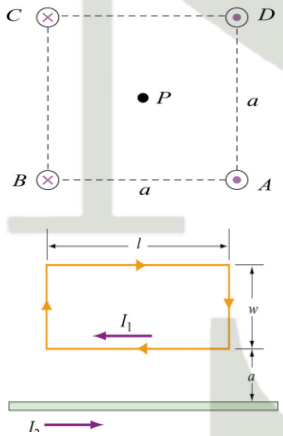
8. Figure below shows a thin metal strip of thickness 't' and width 'd'. The metal strip is in a magnetic field of flux density 'B' and carries a current 'I' as shown.



a) Copy the diagram and mark on your diagram:
   i. The side of the strip that becomes negative because of the Hall Effect.
   ii. Where a voltmeter needs to be placed to measure the hall voltage.

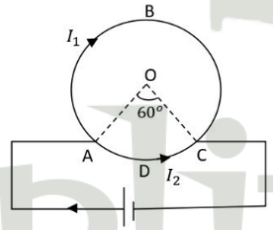
b) Given that I=40 mA, d=9 mm, t=0.030mm, B=0.60T and n=8.5×10^{28} m^{-3}, calculate,
   i. The mean drift velocity of the free electrons in the metal. The hall voltage across the metal strip.

9. Four infinitely long parallel wires carrying equal current I are arranged in such a way that when looking at the cross-section, they are at the corners of a square, as shown in Figure. Currents in A and D point out of the page, and into the page at B and C. What is the magnetic field at the center of the square?

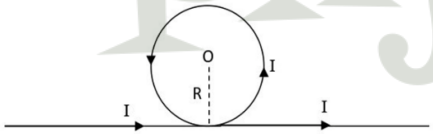


10. A rectangular loop of length l and width w carries a steady current I_1. The loop is then placed near a finitely long wire carrying a current I_2, as shown in Figure. What is the magnetic force experienced by the loop due to the magnetic field of the wire?

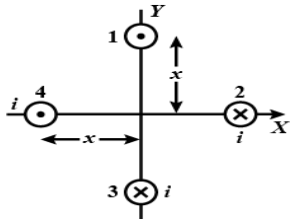
11. A cell is connceted between the points A and C of a circular conductor $ABCD$ having center at O and $\angle AOC = 60^0$. B_1 and B_2 are the magnitudes of magnetic fields at O due to current in $ABC$and ADC respectively. Find the ratio of $\frac{B_1}{B_2}$.



12. An infinitely long conductor is bent into a circle as shown in the figure. It carries a current I Amp and the radius of the loop is R $meter$. Find the magnetic induction at the center of the loop.

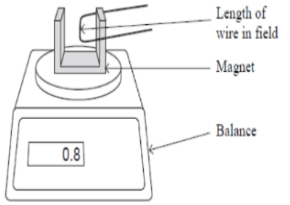


13. What will be the resultant magnetic field at origin due to four infinite current carrying wires 1, 2,3 and 4. Each wire carries a current of 2A and is equidistance (10 cm) from origin.



14. A vertical straight conductor X of length 0.5m is situated in a uniform horizontal magnetic field of flux density 0.1T. (i) Calculate the force on X when a current of 4A is passed through it. (ii) Through what angle must X be turned in a vertical plane so that the force on X is halved?
[0.2N, 60^0]

15. The figure shows a horizontal wire which is at right angles to magnetic field. The magnetic field is produced by a horseshoe magnet, which is on a balance adjusted to zero when current in the wire is zero. When the current is 4A, the reading on the balance is 0.8 gram. The length of wire in the magnetic field is 0.05m. Calculate the magnetic flux density along the length of the wire.



16. The given diagram shows a wire situated between the poles of a horseshoe magnet which is placed on a top-pan balance. The reading on the balance is 142 gm when there is no current in the wire and 144.6 gm when there is a current is 2A in the direction XY. Calculate reading on the balance when there is a current of 3A in the direction of YX.