ALL IMPORTANT DIAGRAMS IN PHYSICS FOR CLASS XII CBSE

MAGNETIC EFFECTS OF CURRENT AND MAGNETISM

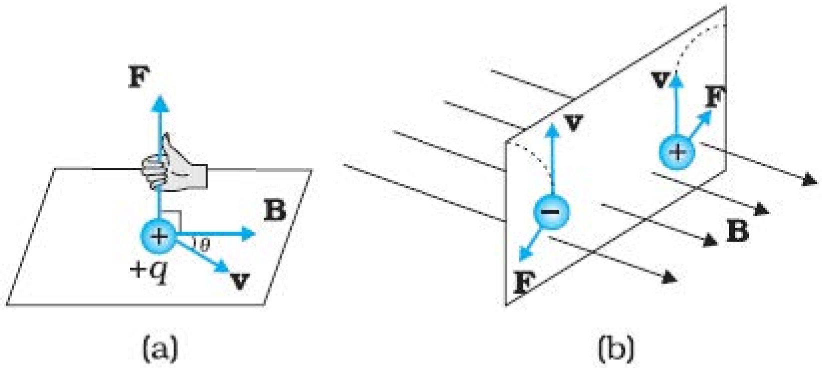


FIGURE 4.2 The direction of the magnetic force acting on a charged particle. (a) The force on a positively charged particle with velocity **v** and making an angle θ with the magnetic field **B** is given by the right-hand rule. (b) A moving charged particle q is deflected in an opposite sense to $-q$ in the presence of magnetic field.

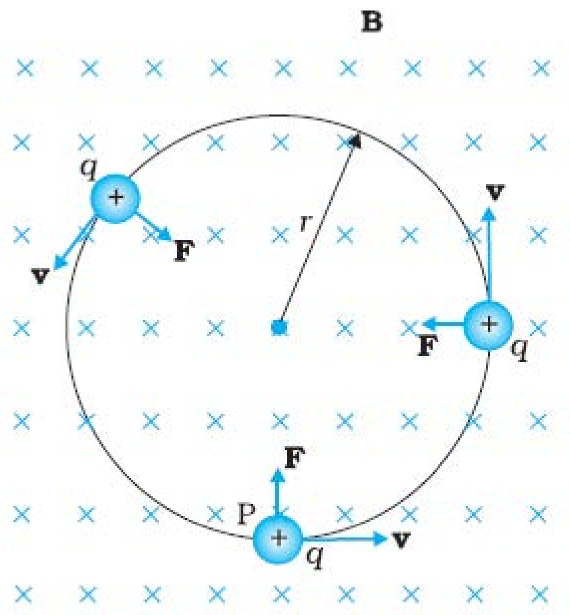


FIGURE 4.5 Circular motion

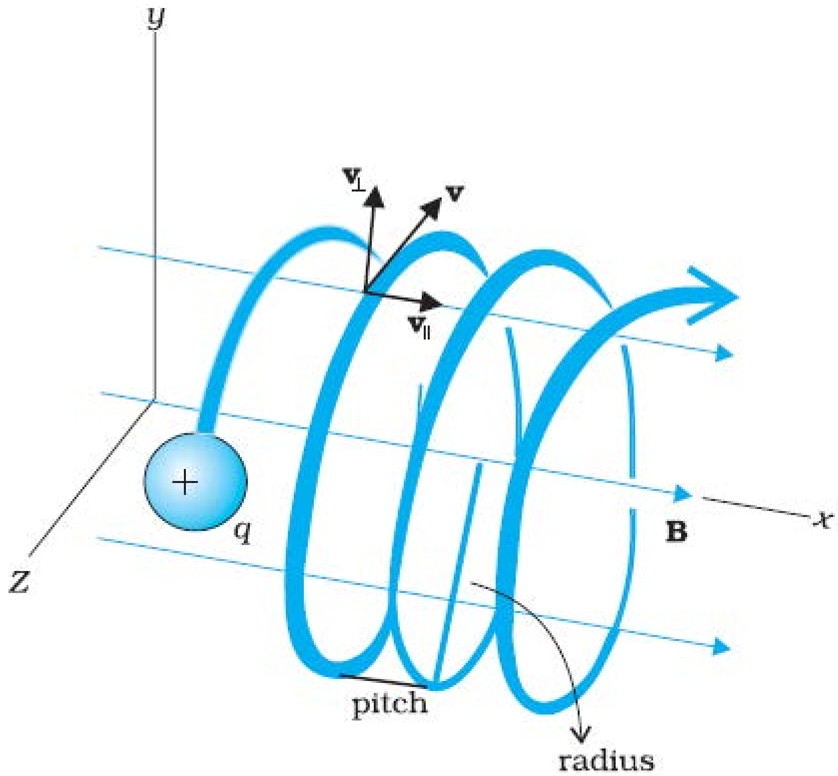


FIGURE 4.6 Helical motion

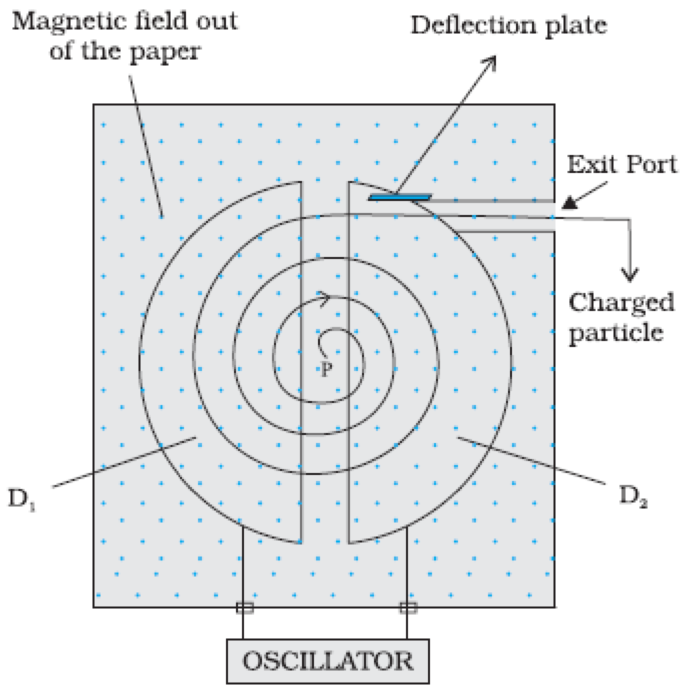


FIGURE 4.8 A schematic sketch of the cyclotron. There is a source of charged particles or ions at P which move in a circular fashion in the dees, D_1 and D_2, on account of a uniform perpendicular magnetic field B. An alternating voltage source accelerates these ions to high speeds. The ions are eventually 'extracted' at the exit port.

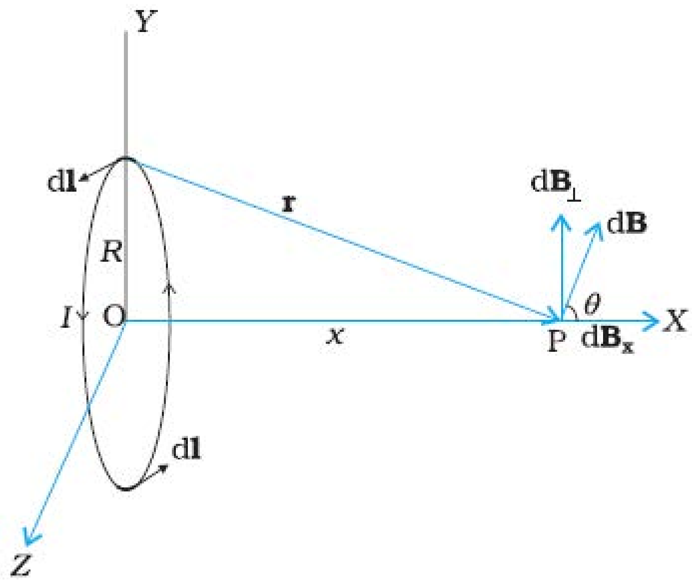


FIGURE 4.11 Magnetic field on the axis of a current carrying circular loop of radius R. Shown are the magnetic field $d\mathbf{B}$ (due to a line element $d\mathbf{l}$) and its components along and perpendicular to the axis.

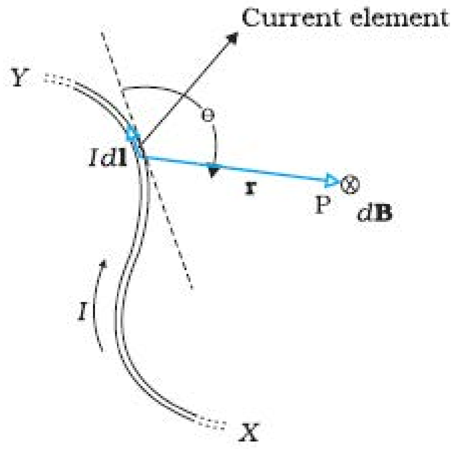


FIGURE 4.9 Illustration of the Biot-Savart law. The current element $I\,d\mathbf{l}$ produces a field $d\mathbf{B}$ at a distance r. The ⊗ sign indicates that the field is perpendicular to the plane of this page and directed into it.

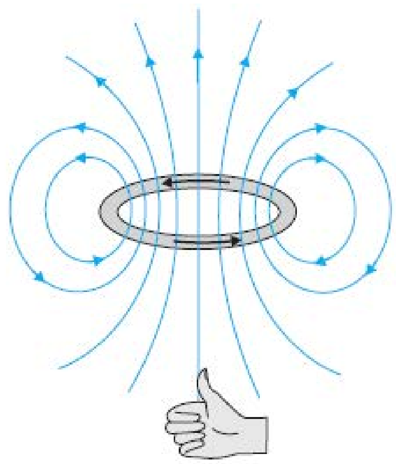


FIGURE 4.12 The magnetic field lines for a current loop. The direction of the field is given by the right-hand thumb rule described in the text. The upper side of the loop may be thought of as the north pole and the lower side as the south pole of a magnet.

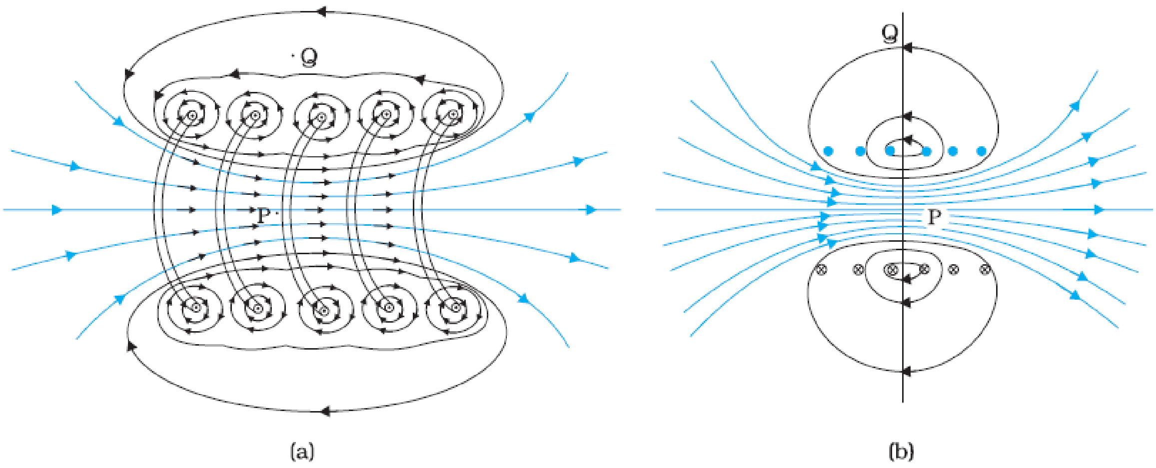


FIGURE 4.17 (a) The magnetic field due to a section of the solenoid which has been stretched out for clarity. Only the exterior semi-circular part is shown. Notice how the circular loops between neighbouring turns tend to cancel. (b) The magnetic field of a finite solenoid.

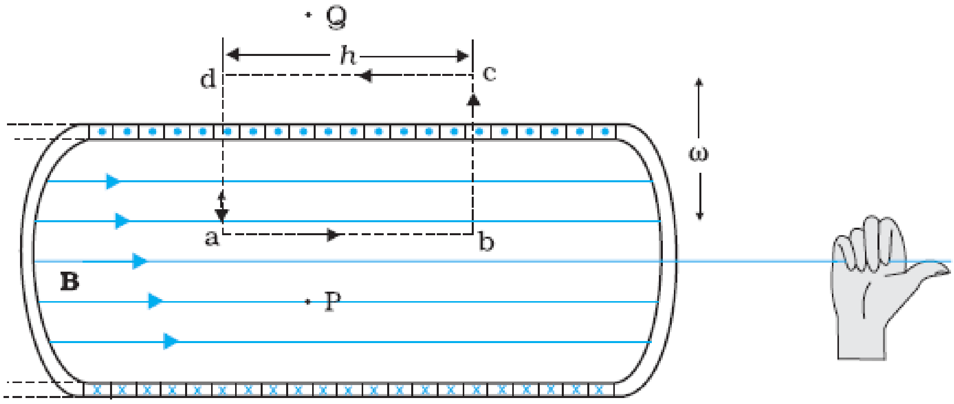
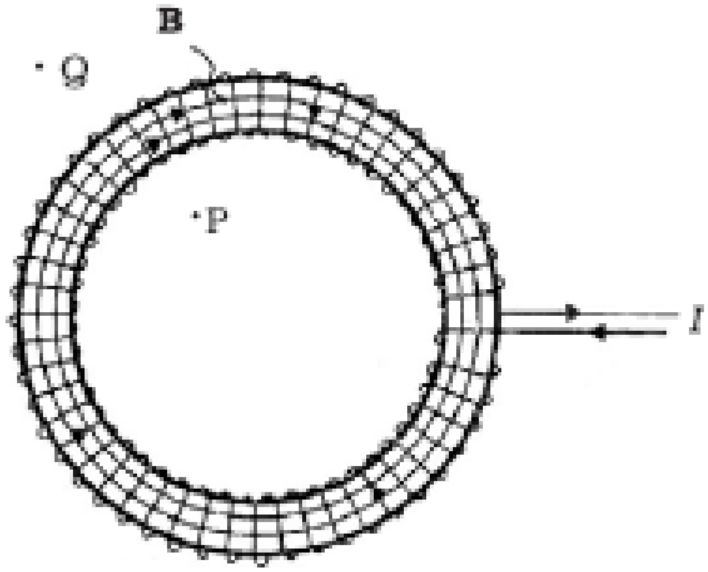
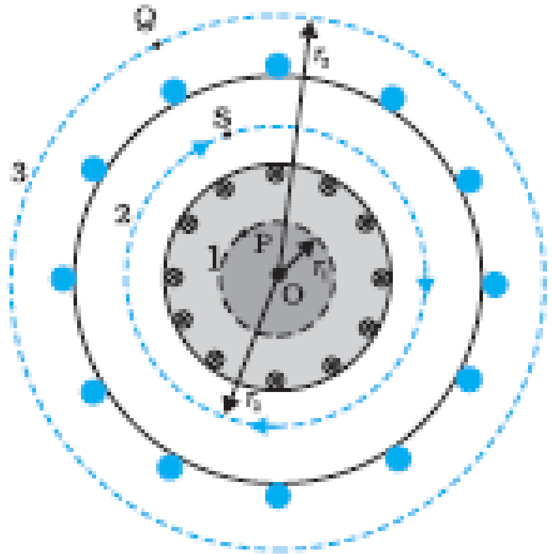


FIGURE 4.18 The magnetic field of a very long solenoid. We consider a rectangular Amperian loop abcd to determine the field.



(a)



(b)

FIGURE 4.19 (a) A toroid carrying a current *I*. (b) A sectional view of the toroid. The magnetic field can be obtained at an arbitrary distance *r* from the centre O of the toroid by Ampere's circuital law. The dashed lines labelled 1, 2 and 3 are three circular Amperian loops.

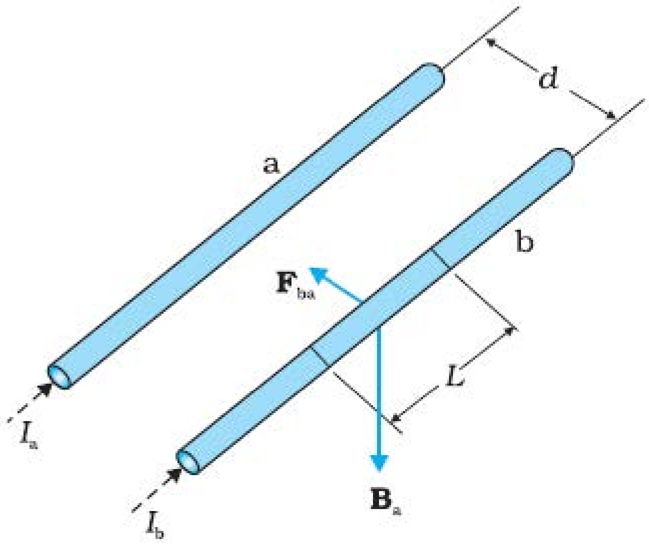
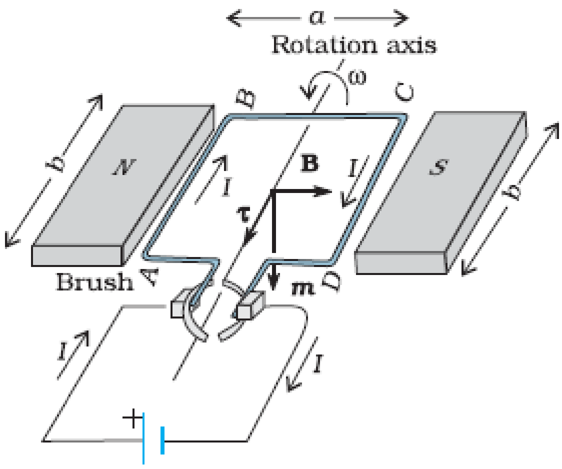
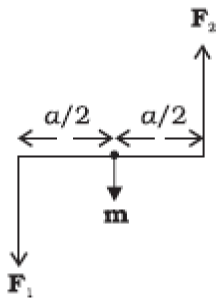


FIGURE 4.20 Two long straight parallel conductors carrying steady currents I_a and I_b and separated by a distance d. $\mathbf{B}_a$ is the magnetic field set up by conductor 'a' at conductor 'b'.



(a)



(b)

FIGURE 4.21 (a) A rectangular current-carrying coil in uniform magnetic field. The magnetic moment **m** points downwards. The torque **τ** is along the axis and tends to rotate the coil anticlockwise. (b) The couple acting on the coil.

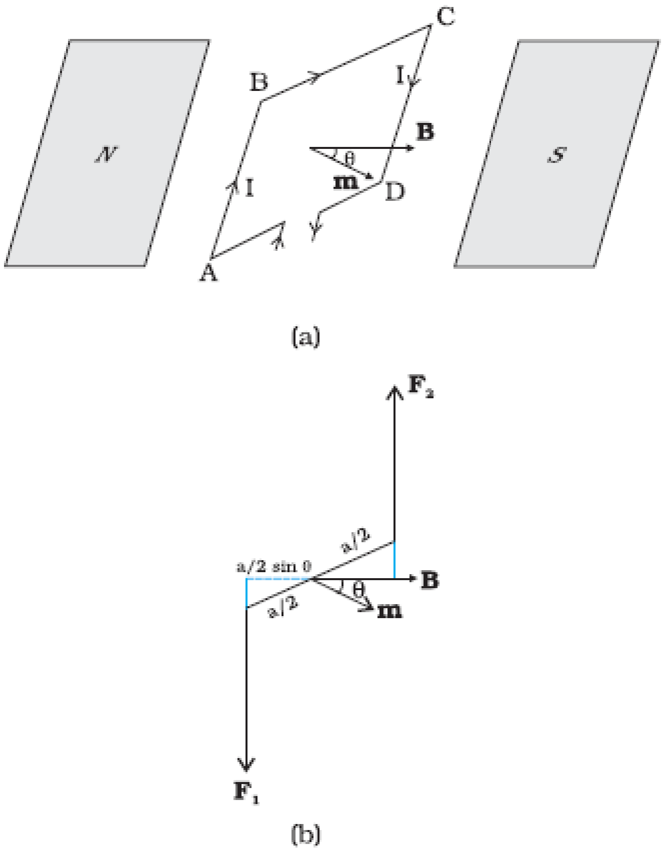


FIGURE 4.22 (a) The area vector of the loop ABCD makes an arbitrary angle θ with the magnetic field. (b) Top view of the loop. The forces $\mathbf{F}_1$ and $\mathbf{F}_2$ acting on the arms AB and CD are indicated.

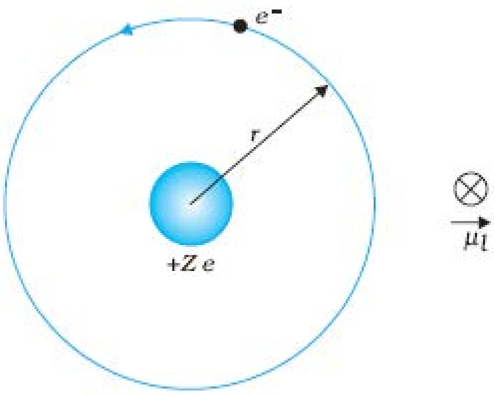


FIGURE 4.23 In the Bohr model of hydrogen-like atoms, the negatively charged electron is revolving with uniform speed around a centrally placed positively charged (+Z e) nucleus. The uniform circular motion of the electron constitutes a current. The direction of the magnetic moment is into the plane of the paper and is indicated separately by ⊗.

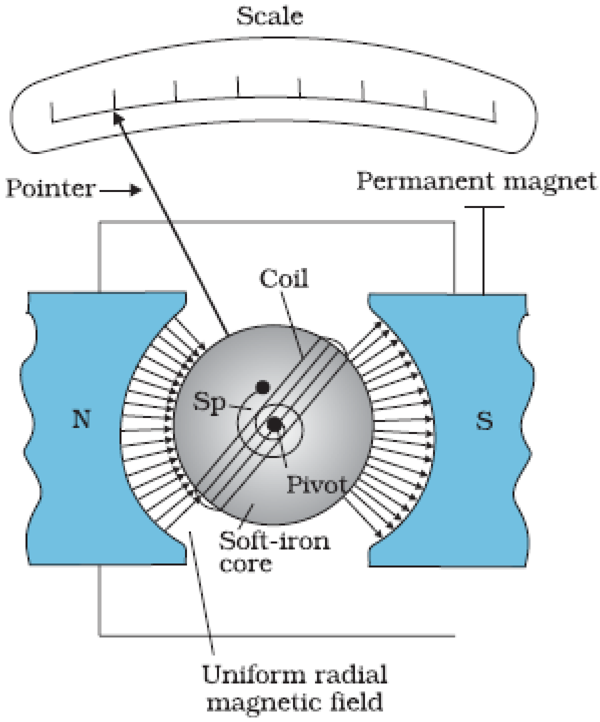


FIGURE 4.24 The moving coil galvanometer. Its elements are described in the text. Depending on the requirement, this device can be used as a current detector or for measuring the value of the current (ammeter) or voltage (voltmeter).

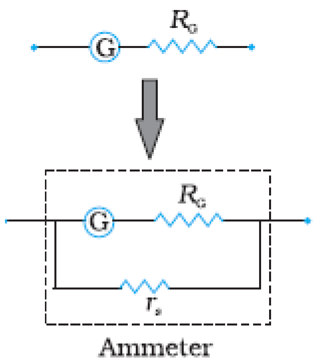


FIGURE 4.25 Conversion of a galvanometer (G) to an ammeter by the introduction of a shunt resistance r_s of very small value in parallel.

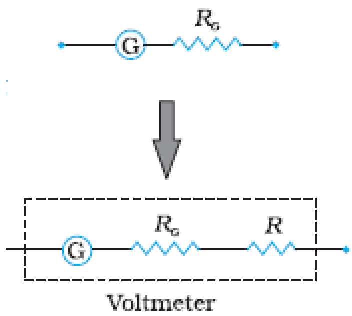


FIGURE 4.26 Conversion of a galvanometer (G) to a voltmeter by the introduction of a resistance R of large value in series.

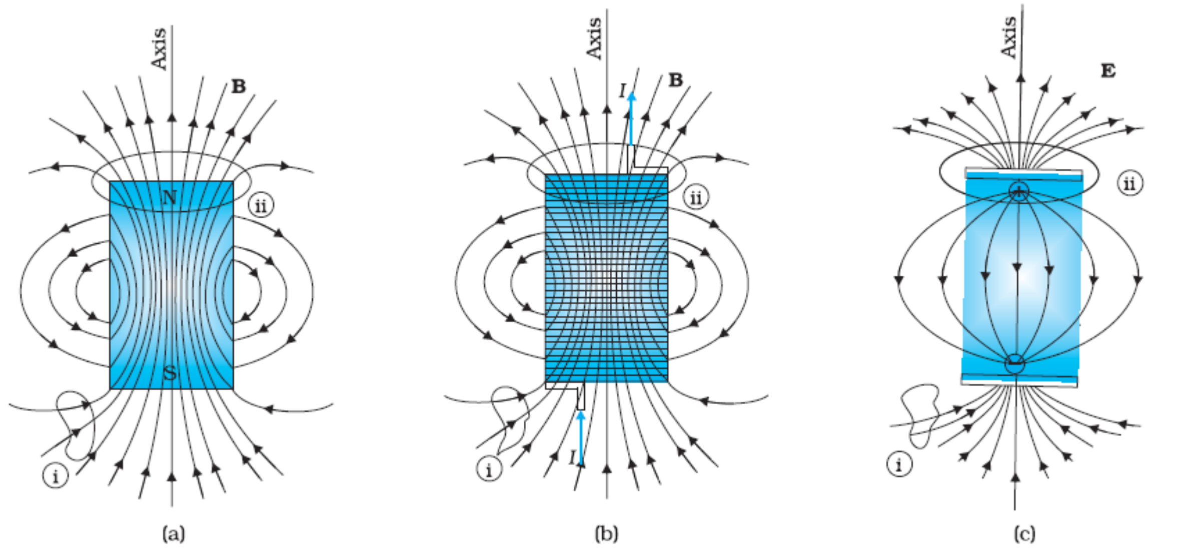


FIGURE 5.3 The field lines of (a) a bar magnet, (b) a current-carrying finite solenoid and (c) electric dipole. At large distances, the field lines are very similar. The curves labelled (i) and (ii) are closed Gaussian surfaces.

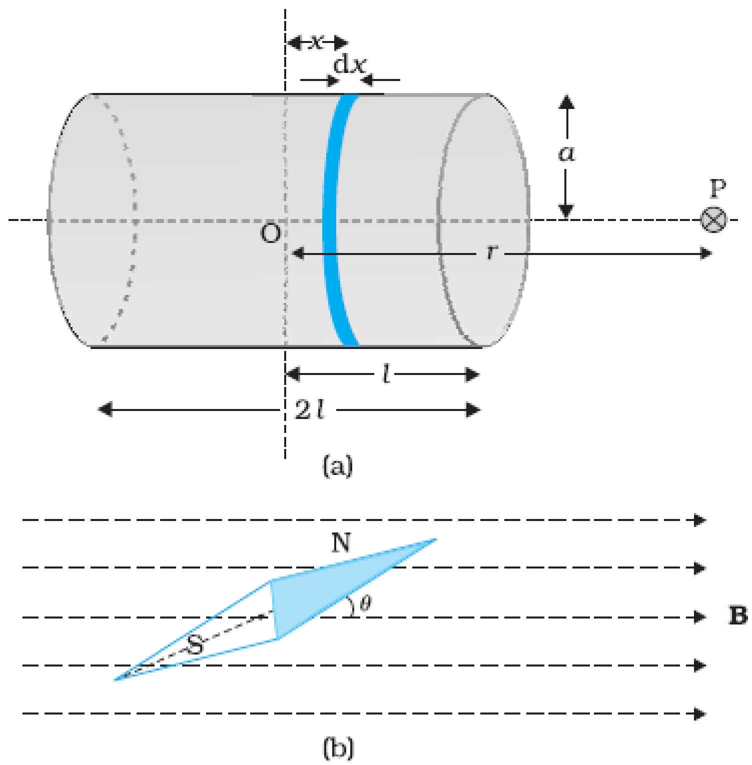


FIGURE 5.4 (a) Calculation of the axial field of a finite solenoid in order to demonstrate its similarity to that of a bar magnet. (b) A magnetic needle in a uniform magnetic field **B**. The arrangement may be used to determine either **B** or the magnetic moment **m** of the needle.

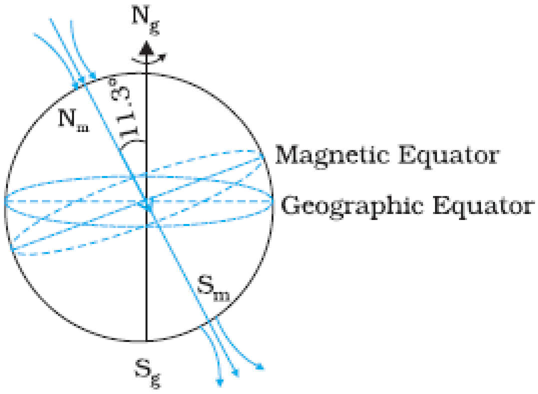


FIGURE 5.8 The earth as a giant magnetic dipole.

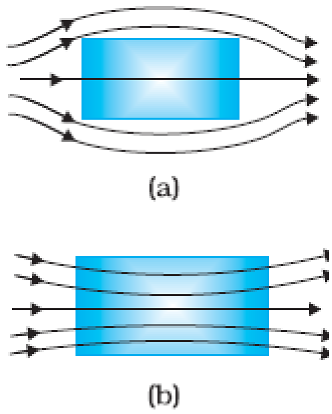


FIGURE 5.12 Behaviour of magnetic field lines near a (a) diamagnetic, (b) paramagnetic substance.

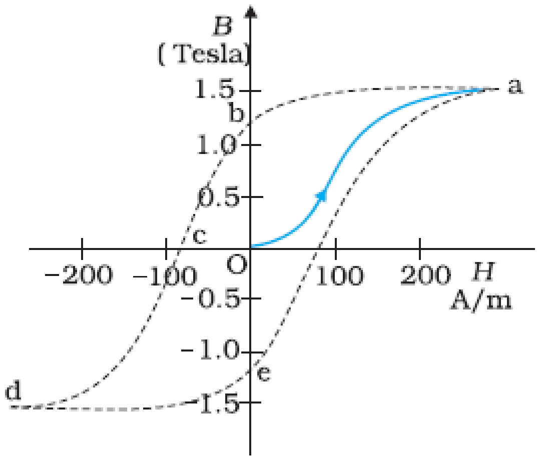


FIGURE 5.14 The magnetic hysteresis loop is the B-H curve for ferromagnetic materials.

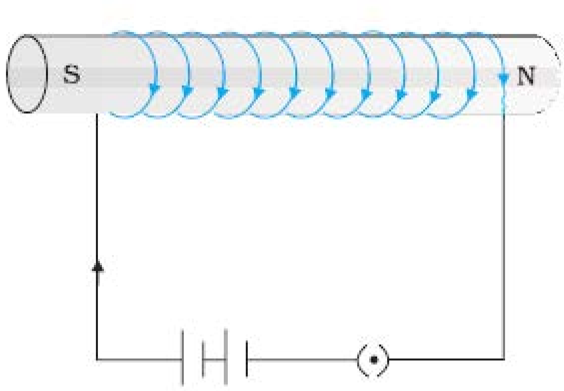


FIGURE 5.16 A soft iron core in solenoid acts as an electromagnet.