CLASS 12 PHYSICS NCERT SOLUTIONS

NCERT Solutions for Class 12 Physics Chapter 5: Magnetism and Matter – Free PDF Download

Complete, verified solutions to the NCERT Class 12 Physics Chapter 5 (Magnetism and Matter) exercise questions.

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NCERT Exercise Solutions

5.1 A short bar magnet of moment 0.32 J/T placed at 30° with an external field of 0.15T. (a) Torque on the magnet. (b) Work done in turning it to be normal to the field. (c) Work done for 180°.
Ans: (a) $\tau = mB\sin\theta = 0.32\times0.15\times\sin30° = 0.024$ J. (b) $W = mB(\cos\theta_1 - \cos\theta_2) = mB(\cos30° - \cos90°) = 0.32\times0.15\times0.866 \approx 0.0416$ J. (c) For 180°: $W = mB(\cos30° - \cos180°) = 0.32\times0.15\times(0.866+1) = 0.32\times0.15\times1.866 \approx 0.0896$ J.

5.2 A short bar magnet of magnetic moment 0.48 J/T is placed in a horizontal plane. Find the magnitude and direction of the magnetic field at a point 10cm from its centre on (a) the axis, (b) the equatorial line.
Ans: (a) Axial: $B = (\mu_0/4\pi)\times2m/r^3 = 10^{-7}\times2\times0.48/(0.1)^3 = 0.96\times10^{-7}/10^{-3} = 9.6\times10^{-5}$ T, along the direction of the magnetic moment. (b) Equatorial: $B = (\mu_0/4\pi)\times m/r^3 = 10^{-7}\times0.48/10^{-3} = 4.8\times10^{-5}$ T, opposite to the direction of the magnetic moment (i.e., anti-parallel).

5.3 What are the direction and magnitude of the magnetic moment of a current loop, and what determines it?
Ans: Magnitude m=NIA (number of turns × current × area); direction given by the right-hand rule (curl fingers along current direction, thumb points along m), perpendicular to the plane of the loop.

5.4 A short bar magnet placed with its axis at 30° with a uniform external magnetic field of 0.25T experiences a torque of 4.5×10^{-2} J. (a) Magnetic moment. (b) Work done in moving it from the most stable to most unstable position.
Ans: (a) $\tau = mB\sin\theta \Rightarrow m = \tau/(B\sin\theta) = 0.045/(0.25\times0.5) = 0.36$ J/T. (b) Most stable is θ=0°, most unstable is θ=180°: $W = mB(\cos0° - \cos180°) = 0.36\times0.25\times2 = 0.18$ J.