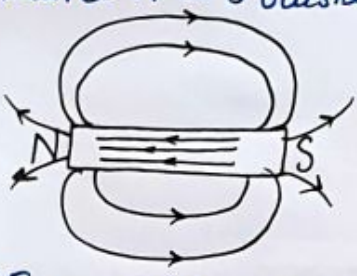
Magnetism and Matter Mindmap...

Magnetic Field Lines :→

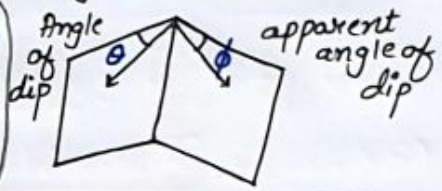
→ Travel N to S outside the magnet.



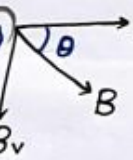
→ Form closed continuous loop.
→ Don't intersect each other.
→ No. of field lines ∝ strength of magnetic field.
→ Some poles repel each other and opposite poles attract.

Earth's Magnetism :→

$B_H = B\cos\theta$
$B_V = B\sin\theta$
$\tan\theta = \frac{B_V}{B_H}$



$\theta_{equator} = 0$
$\theta_{poles} = 90°$

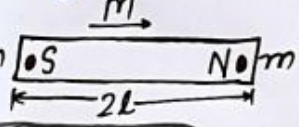


$B_H = 0$ (at magnetic poles)
$B_V = 0$ (at magnetic equator)

Gauss's Law
$\phi_B = \oint \vec{B}.\vec{dS} = 0$ through any closed surface.

Short Bar Magnet

→ Magnetic Dipole Moment



$\vec{M} = m(2\vec{l})$

Time period $T = 2\pi\sqrt{\frac{I}{MB}}$

→ Magnetic Field

On axial line - $\vec{B} = \frac{\mu_0}{4\pi}\frac{2\vec{m}}{d^3}$

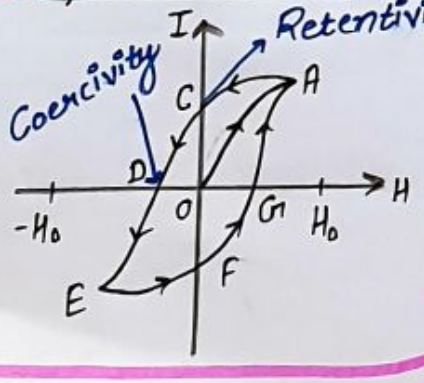
On equitorial line - $\vec{B} = \frac{\mu_0}{4\pi}\frac{\vec{m}}{d^3}$

→ Torque $\tau = MB\sin\theta$, $\vec{\tau} = \vec{M}\times\vec{B}$

→ Potential Energy $U = -MB\cos\theta = -\vec{M}.\vec{B}$

$\Delta U = W = -MB(\cos\theta_2 - \cos\theta_1)$

Hysteresis Curve :→



Some Important Terms :→

→ Relative Magnetic Permeability :→
$\mu_r = \frac{\mu}{\mu_0}$ or $\mu_r = \frac{B}{B_0}$

→ Magnetic Intensity :- $H = \frac{B_0}{\mu_0}$ or $H = \frac{B}{\mu}$

→ Magnetisation Intensity (I) :-
$I = \frac{\text{Magnetic Moment}}{\text{Volume}} = \frac{m}{V}$

→ Magnetic Susceptibility :-
$\chi_m = \frac{I}{H}$, $\mu_r = 1 + \chi_m$

→ Curie Law :- $\chi_m = \frac{C}{T - T_c}$ (for ferromagnetic)

Substance	χ_m
Diamagnetic	$-1 \le \chi_m < 0$
Paramagnetic	$0 < \chi_m < 1$
Ferromagnetic	$\chi_m >> 1$

NEET SLAYER