Chp # 32:-

Megnatism

"Magnetic field"

Electric ~~field~~ charge ⇌ el. field ⇌ q. charge

action through mediation.

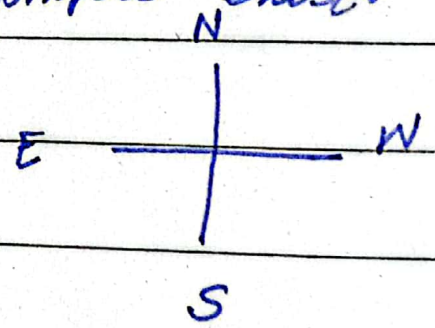
if no through e.f. → action at a distance.

→ Earth is a big magnet

→ Magnetic field lines are closed in nature.

- There is no starting & ending points.
- There is no source, no sink
- No magnetic monopole exist.

diving a bar magnet into tiny pieces, Each pic will have its own North & south pole.

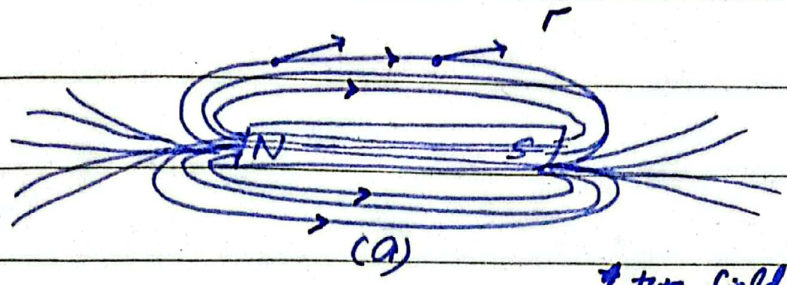


observe top

"Electric field lines start from +ve & end on -ve, here there is no starting & ending points. here +ve pole & -ve pole exist independently." we can seperate them but not in the bar magnet"

Day: Date:

current wire → bar magnet
bar magnet.



(a)

"we take outside"

"inside strong from South to North but out side is North to South and we take outside."

* field lines ~~sta~~ are closed.
* two field lines never cross
* External field is from North to South.
* field is strong near poles as more lines.

Why magnetic field lines are closed in nature?
because ~~no~~ magnetic monopole does not exist.

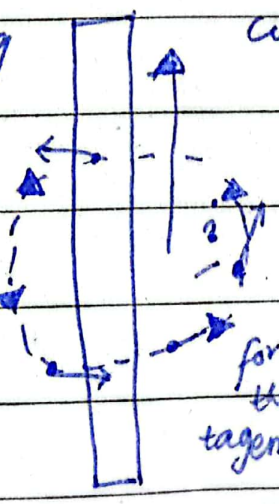
Why magnetic monopole does not exist?
because magnetic field lines are closed in nature.
figure (a)

(o) direction : tangent at a point.
(o) we observe externally created field.

Magnetic interactions and magnetic poles:

Electromagnetism.
→ magnetic field

current carrying wire has same magnetic field as a bar magnetic has its surround.



circle:
tangent is takes to join tangently circle on which has my

for circle: join all the ~~poles~~ of the tagent. point.

How to bring a charge in static condition
Ans: by placing it in an insulator.
↳ No electron/charge can move freely.

Day: _____ **Impo...**

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* The direction of magnetic field start on north and end on south. is it true?

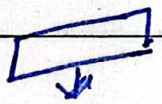
No, It's not correct. cause magnetic field lines are in form of loop. a closed loop does not have any starting and ending point. So it's a wrong statement.

* Magnetic charge $\rightleftharpoons$ M.field $\vec{B}$ $\rightleftharpoons$ M. charge

wrong. No any magnetic charge exist. There is no magnetic charge so also a wrong statement.

* Magnetic pole $\rightleftharpoons$ M.f. B $\rightleftharpoons$ Mag - Pole

↳ No pole. It is dipole, poles
↓ monopole ↓ bar magnet.



* whenever we break a magnet, then ye ~~[illegible]~~ b, تو بنتو دو North & South devide میں ...

* Moving electric charge produce the magnetic field.

moving charge $\rightleftharpoons$ $\vec{B}$ $\rightleftharpoons$ moving electric charge
charge

moving charge $\vec{B} = q.\vec{v}$

& current ↓ v

$\vec{F} = q.\vec{v}$

drift velocity

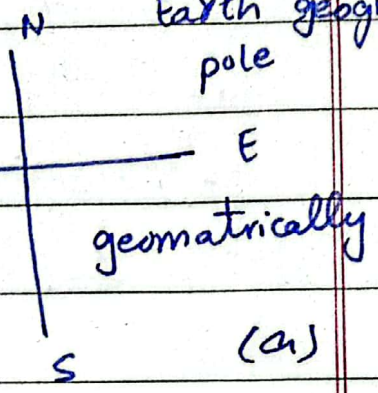
$\vec{F}$ → charge, moving

* Static charge detect electric field
* Static charge can not detect m. field.

Day: Date:

* moving charge → electric field + magnetic field

Earth geographical North is its magnetic south.



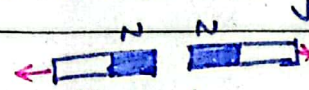
Earth geographical pole geomatrically

(a)

experiment of two bmarkets.

lets say it North seeking.

place in a m. field



* like charges repel each other.

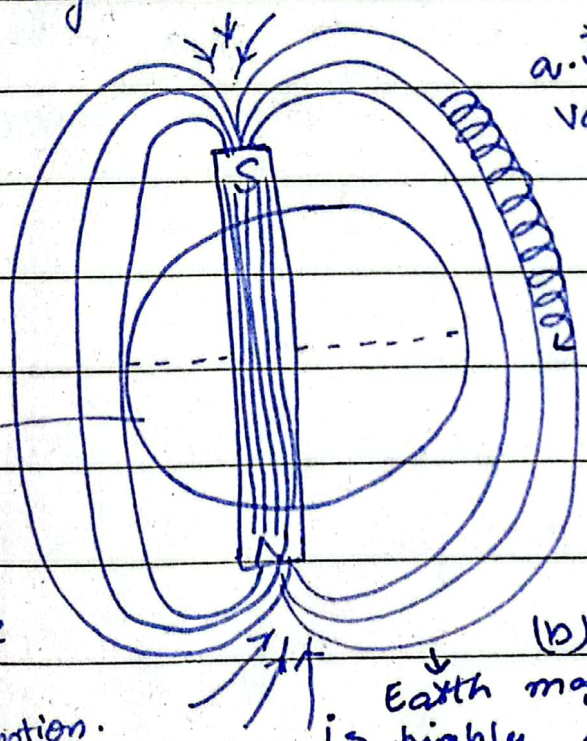
* like poles repel each other.

→ Not North It is south.

So earth geographical North is its magnetic south.

* magnetic effects are only charged object

"Earth magnetic field is due to highly temperatu core"



a. Van-Allen bellets
↳ trap-raditions charge particate
↓ collide with gasses in atmosphere
← Auroras
magnetic colourful
→ light effect
→ ions
→ gases

equator earth.

Earth
↓
spin + rotate
+ galaxy relative motion.

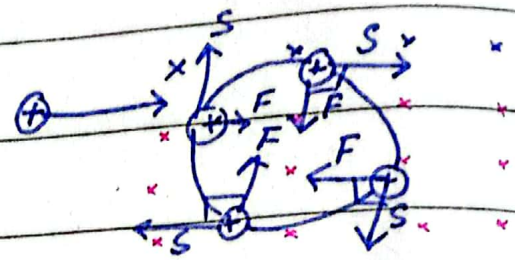
(b) compare (a) & (b)
↓
Earth magf is highly protected for us.

F_B :→ Magnetic force is a sideways deflective force.

F_B → rotate at 90° any particle.

(4) ↳ agr hum koi b particle magnetic field ki trf through krwayn to ye usy rotate ya spiral move krwati hy.

Q No 4:- Does there exist a magnetic potential energy?



No.

$\Delta U = -W$

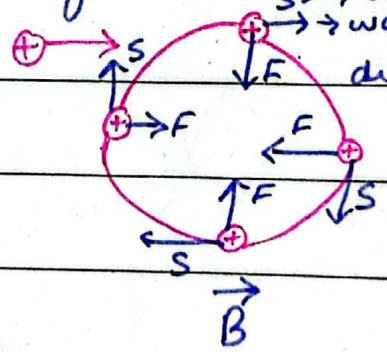
$W = \vec{F} \cdot \vec{S}$

$= FS\cos\theta$

$W = FS\cos 90 \Rightarrow 0$

$W = 0$

We cannot associate magnetic potential energy with a charge moving in magnetic field.



S → direction of displacem → want to go → there but due to m. force, field it goes in deflective direction

Magnetic force on a moving charge:-

magnetite → iron core that is naturally magnetic. magnetic effect ز material کو deflect کرتی ہے

Rule 1:- RHR ① : General rule

(5) $\vec{C} = \vec{A} \times \vec{B}$

$F_B = q(\vec{v} \times \vec{B})$

Date: _____ M T W T F S

~~No Potential~~

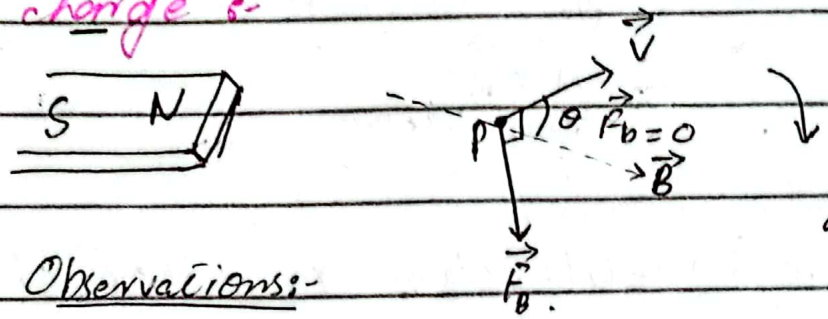
M.F → nonconservative, velocity dependent.
→ 90°

nonconservative

force of a barmagnet.

Magnetic force on a moving charge :-

at point P, particle of different magnitude are fired.



Observations:-

$F_B \propto q$ ($\vec{V}$, $\vec{F_b}$) constant

$F_B \propto V$ (q, direction same)

$\vec{F_B} \perp \vec{V}$

θ is angle b/w velocity and that orientation of velocity for which $F_b = 0$.

$F_B \rightarrow$ It will zero when we throughs a charge in mag. field and there is no effect of m. field on charge. from the point θ angle starts.

$F_B \propto \sin\theta$.

$F_B \propto qV\sin\theta$

$F_B = Bqv\sin\theta \rightarrow qvB\sin\theta$

$F_B = qvB\sin\theta$

field is constant at point. vary from point to point.

$F = q(\vec{v} \times \vec{B})$

thumb (Fingers tip) · (Fingers bent)

Right hand rule for negative charge :-

$F_B = q(\vec{v} \times \vec{B})$

$F_B = -e(\vec{v} \times \vec{B})$

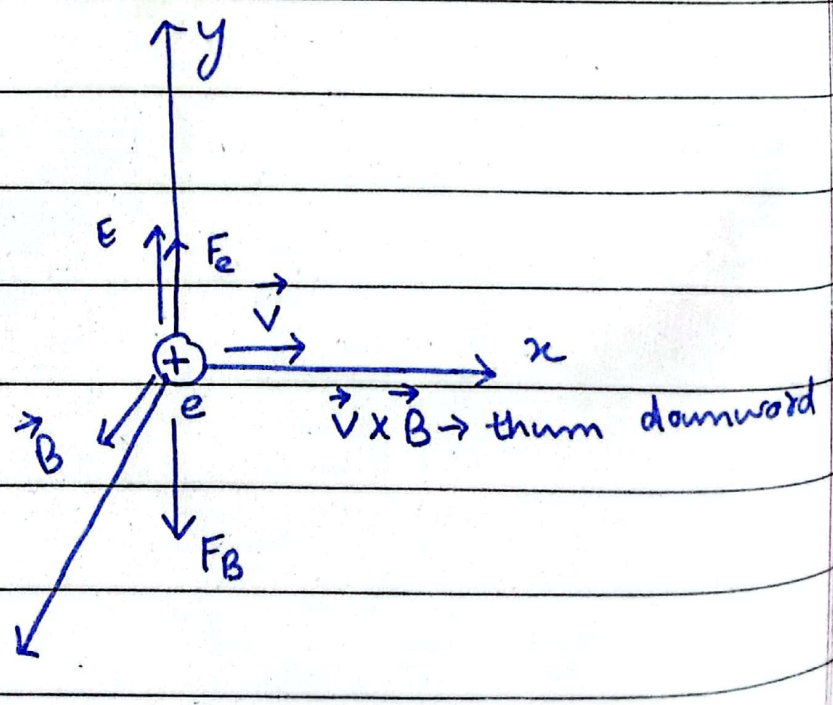
↳ electron.

$\vec{A} \times \vec{B} = -\vec{B} \times \vec{A}$

↳ vectors law anti commutative

$F_B = e(\vec{B} \times \vec{v})$

Combine effect of Electric & Magnetic fields :- (Lorentz force)



(7)

(8)

Day:

$\vec{F} = \vec{F_e} + \vec{F_B}$ $\therefore F = 0$

$0 = qE - qvB\sin 90$ $\uparrow F_e$

$0 = qE - qvB$ → opposite in direction $\downarrow F_B$

$qE = qvB$

$V = \frac{E}{B}$ → velocity selector

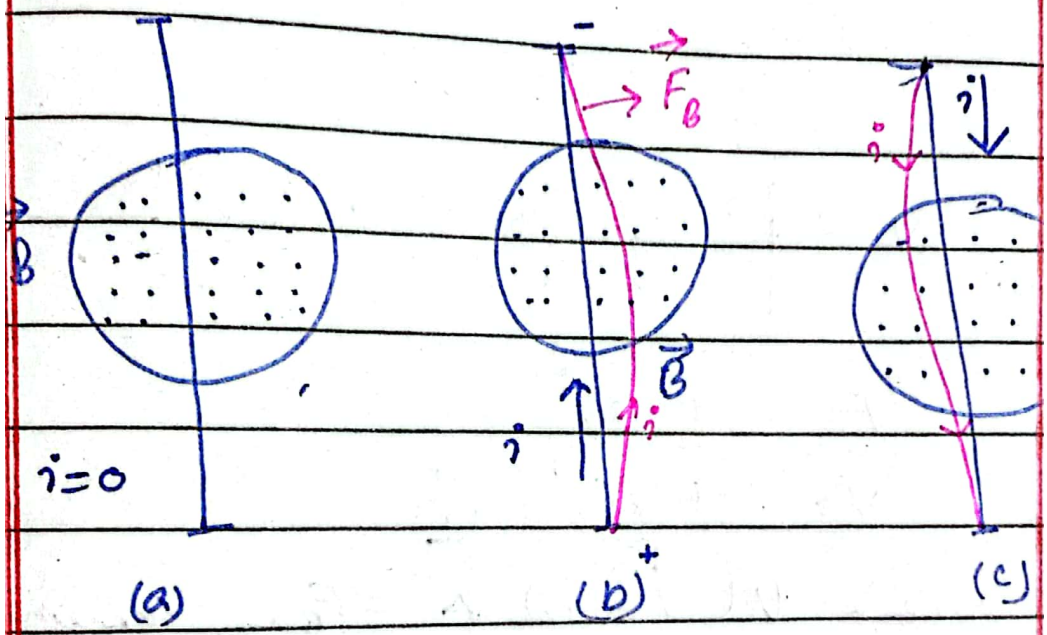
1) $F \perp V$, $F \perp B$

2) can be anywhere.

(8)

$\vec{F}_B = q(\vec{v} \times \vec{B})$ for singal moving

Force on a current (current carrying wire, outword uniform wire) field. (equidistant •)



When we place a current carrying wire inside a magnetic field, then every moving charge will the influence of $\vec{B}$ and as a result, the wire will deflect in a particular direction (• → x, reverse current, change diagram)

(a)

$F_B = q(\vec{v} \times \vec{B})$

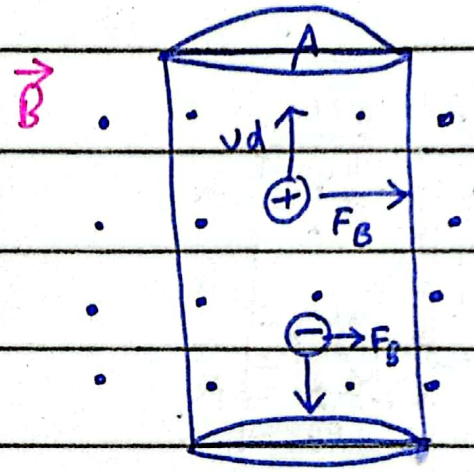
let electron

$\vec{F}_B = -e(\vec{V}_d \times \vec{B})$

$\vec{F}_B = -eN(\vec{V}_d \times \vec{B})$. (from single charge to whole

N :: number density

vancy ⊕ represent



number density

$n = \frac{N}{V} \Rightarrow N = nV \Rightarrow N = n$

$F_B = -enAL(\vec{V}_d \times \vec{B})$ $\vec{j} =$

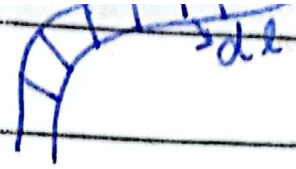
$F_B = iL \times \vec{B}$ $i = j$

(current) i is not a vector and cannot be a vector.

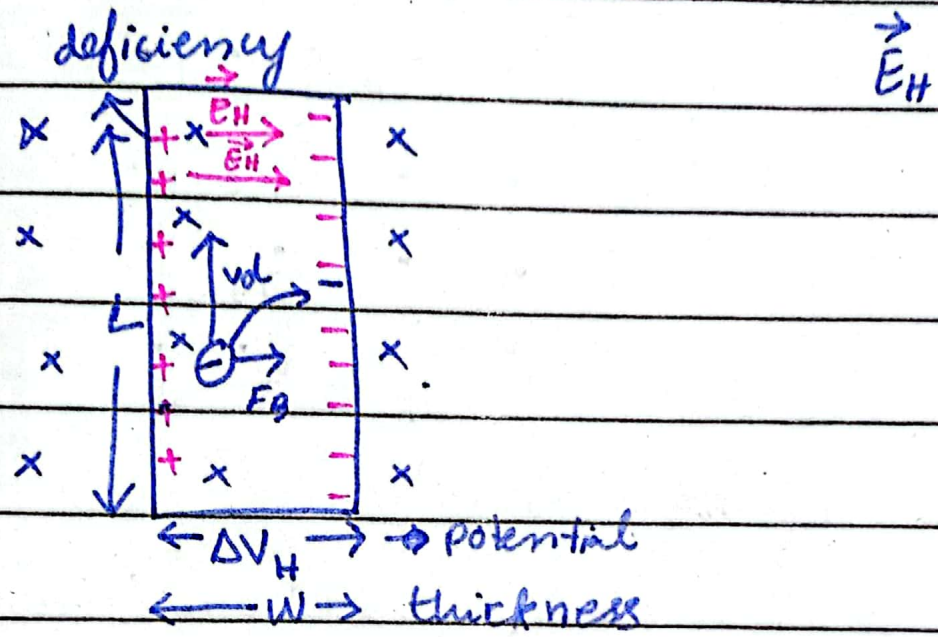
L → magnitude of wire, & and direction is toward conventi current.

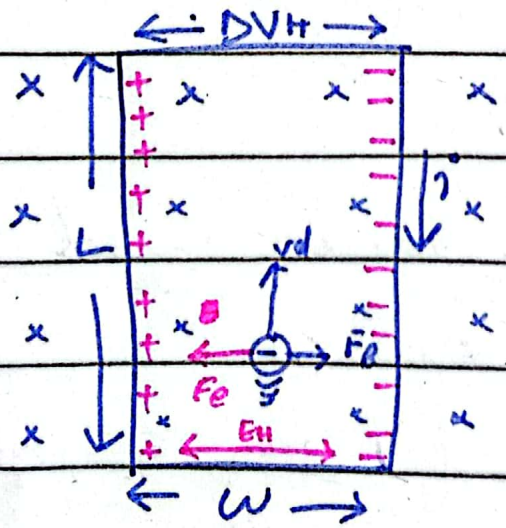
(10) $\boxed{F_B = i\vec{L} \times \vec{B}}$ → Regular shape

$\vec{E}\cdot\vec{ds}$



Hall effect :-





(11) $F = \vec{F_e} + \vec{F_B}$

$0 = eE_H - e(\vec{V_d} \times \vec{B})$

$eE_H = e(V_d B \sin 90^\circ)$

Date:

$E_H = v_d B$

$\Delta V_H = E_H w$

$= V_d B w$

$= \frac{j}{ne} \cdot Bw$

$\Delta V = \int \vec{E} \cdot \vec{ds}$

$\Delta V = Ew$

elevation width

$\Delta V_H = \frac{i}{Ane} \cdot Bw$

$n = \frac{iBw}{eA\Delta V_H}$ $\quad A = Lw$

$n = \frac{iB\cancel{w}}{L\cancel{w}e\Delta V_H} = \frac{iB}{Le\Delta V_H}$

$n \uparrow$ $\uparrow$ conductor. more free charge.

$n = \frac{iB}{Le\Delta V_H}$

with the help of Hall Effect we can find number density.