*Magnetic Field and Magnetic Field Intensity:*

- *Magnetic field* is the space around the magnet up to which its magnetic force can be experienced.
- *Magnetic field intensity* at a point inside magnetic field can be defined as magnetic force $(F)$ experienced by unit pole strength$(m)$. It is denoted by $'B'$. It is a vector quantity. Its SI unit is Tesla (T) & CGS unit is Gauss $(1\ T = 10^4 Gauss)$,

  *Mathematically,* $$\boldsymbol{B = \frac{F}{m}}$$

*Cause of Magnetism: (Imp)*

*Molecular theory of magnetism:*

Each magnetic material consists of large number of tiny magnets called molecular magnets called dipoles. In an un-magnetized substances dipoles align in random orientation and on magnetizing dipoles align in particular directions.

*Modern Theory: Magnetic moment of an atom*

- Orbital motion of electron (It constitute an electric current. And current loop behaves as magnetic dipole)
- Magnetic moment associated with spin angular momentum of an electron (very small)
- Magnetic moment of nucleus (Very Small)
- Net magnetic moment of atom is due to magnetic moment of all electrons.

*The orbital motion of electron in an atom constitutes an electric current and this current loop behaves as Magnetic dipole. Magnetic Moment In terms of current:* $\vec{M} = I\vec{A} \implies M = NIA$

- *In atom of some elements the magnetic moment of electrons cancels in pair- no magnetic Moment-Diamagnetic substance*
- *In atom of some elements magnetic moments of electrons do not cancel- magnetic moment exist- paramagnetic or ferromagnetic substance*
- *Due to random orientation of atomic dipole, net magnetic moment is zero, on application of external magnetic field, a torque acts on dipole, due to which dipole align in direction of external magnetic field and net magnetic moment exist in atom.*

*Domain Theory of Ferromagnetism:*

- The ferromagnetic material consists of large number of small magnetized regions called domains.
- Each domains contains a large number of tiny atomic magnets (dipoles) which are aligned in same direction.
- Each domain has a resultant magnetic moment but the net magnetic moment of ferromagnetic material is zero due to alignment of dipoles in random direction.