Magnetic Properties of Materials:

Magnet:

An object which can attract magnetic substance and can show north and south direction on when it is freely suspended is known as magnet.

Natural magnet: Magnetite, Load stone

Artificial Magnet: Bar magnet, Electromagnet

Properties of magnet:

1. It can attract magnetic substances
2. There is attraction between unlike poles and repulsion between like poles of magnet.
3. A freely suspended magnet always points north and south direction.
4. Single pole (monopole) of magnet does not exist.
5. Magnet can transfer its magnetic properties to other magnetic substances

Pole strength:

Pole strength is defined as the strength of magnetic pole to attract magnetic material towards itself. It is denoted by $'m'$. Its SI unit is $Ampere/meter$ (A/m).

Coulomb's law in Magnetism:

Force of attraction of repulsion between two magnetic poles is given by:

$$F = \frac{\mu_0}{4\pi}\frac{m_1 m_2}{r^2}$$

Where, m_1 & m_2 pole strength of two magnetic poles and r is distance between two magnetic poles.

Remember: Pole strength within same magnet is equal

Magnetic Dipole:

- Magnetic dipole is an arrangement of two unlike poles of equal pole strength separated by a very small distance.
- Every magnet possesses two magnetic poles so known as magnetic dipole.

Magnetic moment or Magnetic dipole moment:

Product of strength of one of the magnetic poles and its effective length is known as magnetic moment or magnetic dipole moment.

If $'m'$ be the pole strength and $2l$ be the effective length of a magnet, Magnetic moment,

$$M = m \times 2l$$

Remember:

- *Actual length of magnet* (L) *is called geometrical length*
- *Distance between two poles of magnet is equivalent (effective length) length* $(2l)$
- *Geometric length and effective length of magnet are related as:* $2l = 85\%\ of\ L$