

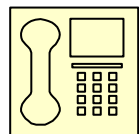
Elements of Earth's Magnetic field

03.06.09

By **R. S. Saini**

(M.Sc. Physics, M.Ed.)

Kendriya Vidyalaya, Sector 47, Chandigarh



9417071540

Terrestrial or Earth's Magnetism:

- i) Geographic Axis is a straight line passing through the geographical poles of the earth. **It is the axis of rotation of the earth.** It is also known as polar axis.
- ii) Geographic Meridian at any place is a vertical plane passing through the geographic north and south poles of the earth.
- iii) Geographic Equator is a great circle on the surface of the earth, in a plane perpendicular to the geographic axis. All the points on the geographic equator are at equal distances from the geographic poles.
- iv) Magnetic Axis is a straight line passing through the magnetic poles of the earth. It is inclined to Geographic Axis nearly at an angle of 17° .
- v) Magnetic Meridian at any place is a vertical plane passing through the magnetic north and south poles of the earth.
- vi) Magnetic Equator is a great circle on the surface of the earth, in a plane perpendicular to the magnetic axis. All the points on the magnetic equator are at equal distances from the magnetic poles.

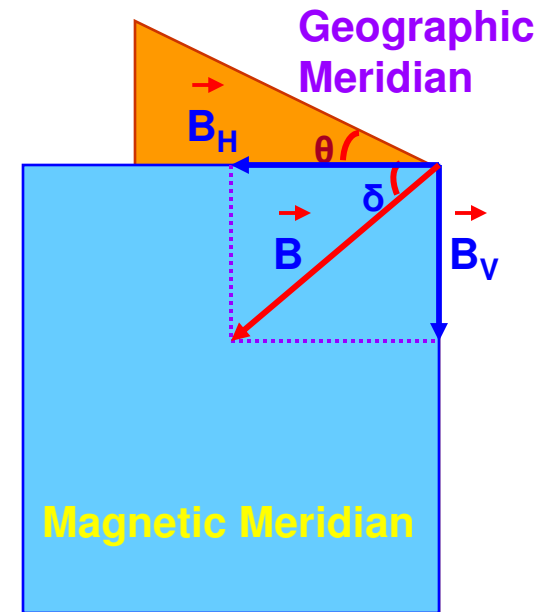
(I) Declination (θ):

The angle between the magnetic meridian and the geographic meridian at a place is Declination at that place.

It varies from place to place.

Lines shown on the map through the places that have the same declination are called **isogonic** line.

Line drawn through places that have zero declination is called an **agonic** line.



(ii) Dip or Inclination (δ):

The angle between the horizontal component of earth's magnetic field and the earth's resultant magnetic field at a place is Dip or Inclination at that place. It is measured with **Dip Circle**

It is zero at the equator and 90° at the poles.

Lines drawn up on a map through places that have the same dip are called **isoclinic** lines.

The line drawn through places that have zero dip is known as an **acclinic** line. It is the magnetic equator.

(iii) Horizontal Component B_H :

The component of Earth's total magnetic field in horizontal direction at any point on earth's surface is called Horizontal component.

This component is important as many devices such as

Tangent Galvanometer

Vibration magnetometer

Magnetic compass

are based on it

Mathematically $B_H = B \cos \delta$ and $B_V = B \sin \delta$

Squaring and Adding the Two

$$B_H^2 + B_V^2 = B^2 \cos^2 \delta + B^2 \sin^2 \delta = B^2(\cos^2 \delta + \sin^2 \delta) = B^2$$

$$\text{Or } B = \sqrt{B_H^2 + B_V^2}$$

