

# **SURVEYING**

## **(VOLUME I)**

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The various compasses exhibiting the above features are :

- (1) Surveyor's compass
- (2) Prismatic compass
- (3) Transit or Level Compass.

#### Earth's Magnetic Field and Dip

The earth acts as a powerful magnet and like any magnet, forms a field of magnetic force which exerts a directive influence on a magnetised bar of steel or iron. If any slender symmetrical bar magnet is freely suspended at its centre of gravity so that it is free to turn in azimuth, it will align itself in a position parallel to the lines of magnetic force of the earth at that point.

The lines of force of earth's magnetic field run generally from South to North (Fig. 5.10). Near the equator, they are parallel to the earth's surface. The horizontal projections of the lines of force define the magnetic meridian. The angle which these lines of force make with the surface of the earth is called the *angle of dip* or simply the *dip* of the needle. In elevation, these lines of force (i.e. the North end of the needle), are inclined downward towards the north in the Northern hemisphere and downward towards South in Southern hemisphere. At a place near  $70^\circ$  North latitude and  $96^\circ$  West longitude, it will dip  $90^\circ$ . This area is called *North magnetic pole*. A similar area in Southern hemisphere is called the *South magnetic pole*. At any other place, the magnetic needle will not point towards the North magnetic pole, but it will take a direction and dip in accordance with the lines of force at the point. Since the lines of force are parallel to the surface of the earth only at equator, the dip of the needle will be zero at equator and the needle will remain horizontal. At any other place, one end of the needle will dip downwards. By suitably weighting the high end of the needle may be brought to a horizontal position.

#### The Magnetic needle

The compass needle is made of a slender symmetrical bar of magnetised steel or iron. It is hung from a conical jewel bearing supported on a sharp, hardened steel pivot. Before magnetisation, the needle is free to rotate both vertically and horizontally and does not tend to move away from any direction in which it is originally pointed. When it is magnetised, it will dip downwards and take a definite direction of magnetic meridian. A small coil of brass wire is wrapped around it to balance the force tending to make

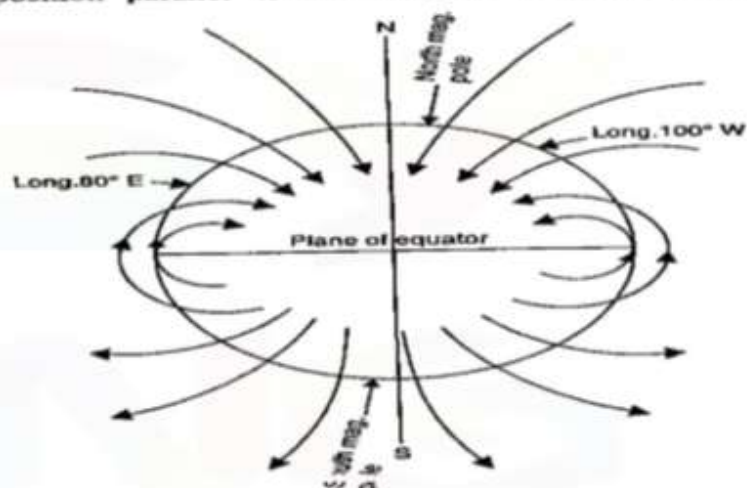


FIG. 5.10. CROSS-SECTION OF EARTH'S MAGNETIC FIELD.