CHAPTER 1: INTRODUCTION TO GEODESY

1.1 Definition and Fundamentals of Geodesy

➢ Geodesy is a science based on earth and mathematics used to make global positioning possible and measuring, understanding & monitoring the geometric shape, size, orientation and its gravity field by representing it in a three dimensional space. Temporal variation in the position of the earth is also studied. The term Geodesy is derived from the Greek word "geodesic" meaning "dividing the earth".

➢ The sub-disciplines of Geodesy are:
- Geometrical geodesy
- Physical geodesy
- Mathematical geodesy
- Dynamical geodesy
- Satellite geodesy
- Marine geodesy
- Geophysical geodesy, etc.

Geoid

It is a model having same gravitational potential of the earth's gravity field. It acts as close mathematical and physical representation including geometric shape, size of earth. This is the surface that most closely approximates sea level, assuming that it is free of winds, ocean currents and other distributing forces. (Figure 1.1)
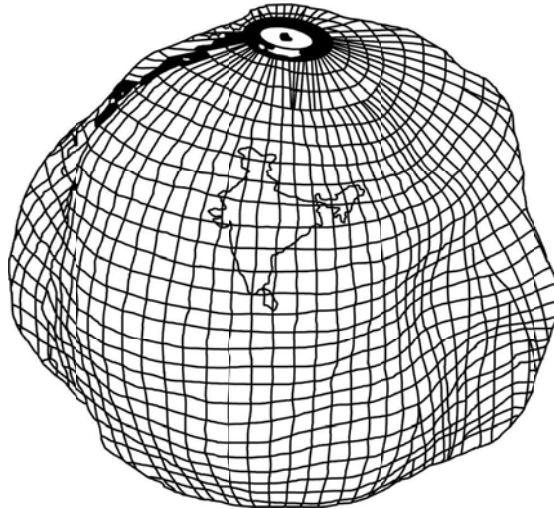

Figure 1.1: Geoid

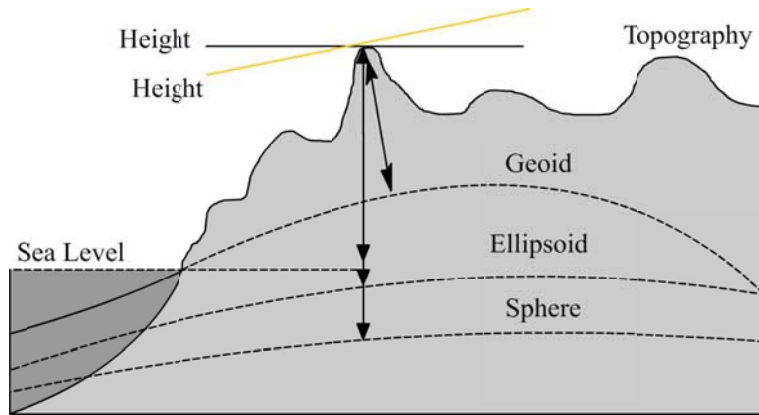(Very close to the topography of the earth but not to the actual shape of the earth)

Figure 1.2: Showing Ellipsoid, Sphere, Geoid and actual topography of the earth

Reference Ellipsoid

As shown in figure 1.2, the earth is not in a spherical shape. The Earth's shape may be taken as resembling an ellipsoid but it is not a perfect ellipsoid. The polar radius of earth is approx 21 km smaller than equatorial radius. So it is a mathematically defined surface of the earth.