1.4 CLASSIFICATION OF SURVEYING

A. Primary Classification

Surveying is primarily classified as under:

1. Plane surveying
2. Geodetic surveying

Plane Surveying

We know that the shape of the earth is spheroidal. Thus, the surface is obviously curved. But in plane surveying, the curvature of the earth is not taken into consideration. This is because plane surveying is carried out over a small area. So, the surface of the earth is considered plane. In such surveying, a line joining any two points is considered straight. The triangle formed by any three points is considered a plane triangle and the angles of the triangle are assumed to be plane angles. Plane surveying is conducted by state agencies like the Irrigation Department, Railway Department, etc. Plane surveying is done on an area of less than 250 km^2.

Geodetic Surveying

In geodetic surveying, the curvature of the earth is taken into consideration. It is extended over a large area. The line joining any two points is considered a curved line. The triangle formed by any three points is considered spherical and the angles of the triangle are assumed to be spherical angles. Geodetic surveying is conducted by the Survey of India department, and is carried out over an area exceeding 250 km^2.

B. Secondary Classification

1. **Based on instruments**
   - (a) Chain surveying,
   - (b) Compass surveying,
   - (c) Plane table surveying,
   - (d) Theodolite surveying,
   - (e) Tacheometric surveying, and
   - (f) Photographic surveying.
2. **Based on methods**
   - (a) Triangulation surveying, and
   - (b) Traverse surveying.
3. **Based on objects**
   - (a) Geological surveying,
   - (b) Mine surveying,
   - (c) Archaeological surveying, and
   - (d) Military surveying.

4. **Based on nature of field**
   (a) Land surveying,
   (b) Marine surveying, and
   (c) Astronomical surveying.

Again, land surveying is divided into the following classes:

1. *Topographical surveying,* which is done to determine the natural features of a country.
2. *Cadastral surveying,* which is conducted in order to determine the boundaries of fields, estates, houses, etc.
3. *City surveying,* which is carried out to locate the premises, streets, water supply and sanitary systems, etc.
4. *Engineering surveying,* which is done to prepare detailed drawings of projects involving roads, railways, etc.

1.5 GENERAL PRINCIPLE OF SURVEYING

The general principles of surveying are given below:

- To work from the whole to the part, and
- To locate a new station by at least two measurements (linear or angular) from fixed reference points.

1. According to the first principle, the whole area is first enclosed by *main stations* (i.e. controlling stations) and *main survey lines* (i.e. controlling lines). The area is then divided into a number of parts by forming well-conditioned triangles. A nearly equilateral triangle is considered the best well-conditioned triangle. The main survey lines are measured very accurately with a standard chain. Then the sides of the triangles are measured. The purpose of this process of working is to prevent accumulation of error. During this procedure, if there is any error in the measurement of any side of a triangle then it will not affect the whole work. The error can always be detected and eliminated.

   But, if the reverse process (i.e. from the part to the whole) is followed then the minor errors in measurement will be magnified in the process of expansion and a stage will come when these errors will become absolutely uncontrollable.
2. According to the second principle, the new stations should always be fixed by at least two measurements (linear or angular) from fixed reference points. Linear measurements refer to horizontal distances measured by chain or tape. Angular measurements refer to the magnetic bearing or horizontal angle taken by a prismatic compass or theodolite.

   In chain surveying, the positions of main stations and directions of main survey lines are fixed by tie lines and check lines.