EXPERIMENT - 4.

AIM :- SETTING UP OF PLANE TABLE AND PLOTTING FIVE POINTS BY RADIATION METHOD AND FIVE INACCESSIBLE POINTS BY INTERSECTION METHOD.

INSTRUMENTS:

Plane Table with stand, alidade, drawing sheet, pins, Plumbing fork with plumb bob, Spirit level, Trough Compass.

INTRODUCTION:

Plane tabling is a graphical method of surveying in which the field work and plotting is done simultaneously. If is most suitable for the filling in of the details between the stations previously fixed by triangulation or theodolite traversing. It is particularly adapted for small scale or medium scale mapping in which great accuracy in detail is not required as for topographical surveys.

The plane table consists essentially of

(i) A drawing board mounted on a tripod and

(ii) A straight edge called an alidade.

The following instruments are used in plane table survey:

- The plane table with leveling head
- Alidade for sighting
- Plumbing fork and plumb bob.
- Spirit level.
- Trough Compass.
- Drawing paper with a rainproof cover.

1. THE PLANE TABLE:

Three distinct types of tables (board and tripod) having devices for leveling the plane table and controlling its orientation are in common use: the Traverse Table, the Johnson Table and the Coast Survey Table.

- **The Traverse Table:**

The traverse table consists of a small drawing board mounted on a light tripod in such a way that the board can be rotated about the vertical axis and can be clamped in any position. The table is leveled by adjusting tripod legs, usually by eye-estimation.

2. THE ALIDADE:

The alidade consists of a metal (brass or gunmetal) or boxwood straight edge or ruler about 50 cm long. The beveled (ruling or working) edge of the alidade is called the fiducial edge. The alidade may be plain or telescopic according as it is fitted with sight vanes at both ends, or fitted with a telescope. One of the sight vanes is provided with a narrow slit and the other with a central vertical wire or hair. In both cases, the line of sight is in the same vertical plane as the fiducial edge or parallel to it. The telescope is provided with a vertical circle and a level tube, and is fitted with cross and steady hairs. A small circular level or two bubble tubes at right angles to each other are attached to the alidade for leveling the table. 1 The fiducial edge is graduated so as to serve as a scale for plotting distances. The alidade is sometimes fitted with a parallel ruler connected by two links to its base plate so that rays can be drawn through a plotted point without the alidade being centered on it.

3. PLUMBING FORK:

The plumbing fork used in large-scale work, is meant for centering the table over the point or station occupied by the plane table when the plotted position of that point is already known on the sheet. Also, in the beginning of the work, it is mean for transferring the ground point on to the sheet so that the plotted point and the ground station are in the same vertical line.

4. SPIRIT LEVEL:

A small spirit level may be used for ascertaining if the table is properly level. The level may be either of the tubular variety or of the circular type, essentially with a flat base so that it can be laid on the table

5. TROUGH COMPASS:

The trough compass is used for orienting the plane table to magnetic north. In a trough compass, the longer sides of the trough are parallel and flat so that either side can be used as a ruler or laid down, to coincide with a straight line drawn on the paper.

6. DRAWING PAPER:

The drawing paper used for plane tabling must be of superior quality so that it may have minimum effect of changes in the humidity of the atmosphere. The changes in the humidity of the atmosphere produce expansion and contraction in different directions and thus alter the scale and distort the map. To overcome this difficulty, sometimes two sheets are mounted with their grains at right angles and with a sheet of muslin between them. Single sheet must be seasoned previous of the use by exposing it alternatively to a damp and a dry atmosphere. For work of high precision, fiber glass sheets or paper backed with sheet aluminum are often used.

7. THE DRAWING BOARD:

The board is made of well-seasoned wood such as teak or pine and varies in size from 40 cm X 30 cm to 75 cm X 60 cm or 50 cm to 60 cm square. It is mounted on a tripod in such a manner that it can be leveled, and revolved about a vertical axis and clamped in any position. The board is fitted with a leveling head or a ball and socket arrangement.

PROCEDURE:

Three operations are needed

A. FIXING: Fixing the table to the tripod.

B. SETTING:

A. Levelling the table
B. Centering
C. Orientation.

C. SIGHTING THE POINTS.

Levelling:

For small-scale work, leveling is done by estimation. For work of accuracy, an ordinary spirit level may be used. Placing the level on the board in two positions at right angles and getting the bubble central in

Centering:

The table should be so placed over the station on the ground that the point plotted on the sheet corresponding to the station occupied should be exactly over the station on the ground. The operation is known as centering the plane table. As already described this is done by using a plumbing fork.

Orientation:

Orientation is the process of putting the plane table into some fixed direction so that line representing a certain direction on the plane is parallel to that direction on the ground. This is essential condition to be fulfilled v/hen more than one instrument station is to be used. If orientation is not done, the table will not be parallel to itself at different positions resulting in an overall distortion of the map. The processes of centering and orientation are dependent on each other. For orientation, the table will have to be rotated about its vertical axis, thus disturbing the centering. If precise work requires that the plotted point should be exactly over the ground point, repeated orientation and shifting of the whole table are necessary. That centering is a needless refinement for small-scale work.

There are two main methods of orienting the plane table:

Orientation by means of trough compass :

The trough compass is placed on the top right corner of the plane table in such a way that the magnetic needle points exactly towards N-S direction. Draw this line along the edge of the compass. Sift and set up the plane table on the next station. Place the trough compass along the N-S line. Rotate the table till the magnetic needle coincides with N-S line draw previously. This is a crude method of orientation and cannot be employed at stations where local attraction is suspected.

Orientation by means of back sighting:

This is the most accurate method of orientation. The plane table is set on a new station and the alidade is placed against the line joining the new station with the preceding station. The table is rotated until the line of sight bisects the previous station.

METHODS OF PLANE TABLING:

The methods of surveying with a plane table are traversing, intersection and resection. The applicability of the particular method of surveying depends upon the visibility between stations which are to be potted from the instrument station, the possibility of obtaining the require measurement and measurement available to locate the instrument station itself.

1. RADIATION:

In this method is suitable for locating the object from a single station. In this method, rays are drawn from the station to the objects, and the distance from the station to the object are measure and plotted to any suitable scale along the respective rays.

Suitability:

This method is suitable only when the area to be surveyed is small and all the stations are visible and accessible from the instrument station.

2. INTERSECTION:

In this method two stations are selected that all the other stations to be plotted are visible from these. The line joining these two stations is called base line. The length of this line is measure very accurately. Rays are drawn from these stations to the stations to be plotted. The intersection of the rays from the two stations gives the position of the station to be plotted on the drawing sheet. Sometimes this method is also termed as graphical triangulation.

Suitability:

This methods very commonly used for plotting details. It is preferred when the distance between the stations too large, or the stations are inaccessible, or the ground is undulating.