



SNS COLLEGE OF TECHNOLOGY



AN AUTONOMOUS INSTITUTION

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COIMBATORE

DEPARTMENT OF CIVIL ENGINEERING

19GET102 – BASIC CIVIL AND MECHANICAL ENGINEERING

I YEAR / I SEMESTER

Unit 1 : Civil Engineering Materials and Surveying

Topic : Measurements of Angles, Distances



Types of Measurements

- Surveying is the art of making suitable measurements in horizontal or vertical planes. This is one of the important subjects of civil engineering. Without taking a survey of the plot where the construction is to be carried out, the work cannot begin.
- From the above definition, we conclude on two types of measurements in surveying. They are as follows:
 1. Linear measurements
 2. Angular measurements



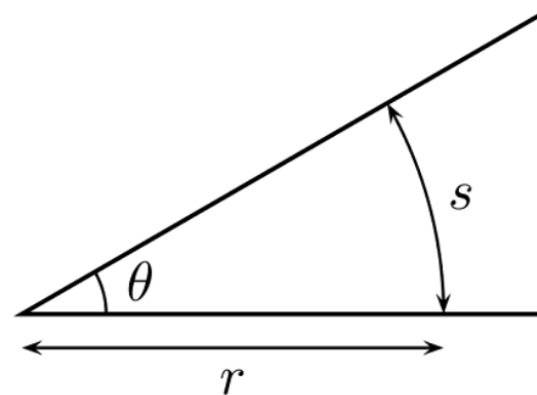
Types of Measurements

➤ Linear measurements are further classified as follows:

1. Horizontal Distance
2. Vertical Distance

Horizontal Distance

A horizontal distance is measured in horizontal plane if a distance is measured along a slope, it is reduced to its horizontal equivalent.





Types of Measurements

Vertical Distance

A vertical distance is measured along the direction of gravity at that point. The vertical distance are measured to determine difference in elevations in various points.

Angular Measurements

As the name itself suggests, the two sides meeting at an angle are measured. The angle between them is measured and represented in degrees or radians.



Horizontal Distances and Angle

- A linear measurement on the horizontal plane determines the horizontal distance between two points. However, the true horizontal distance is actually curved like the Earth's surface. Due to this curvature, the direction of gravity is different at each point.
- Subsequently, vertical axes are not parallel to each other.



Vertical Distances and Angle

- Vertical distances are measured along the vertical axis to determine the difference in height (or elevation) between points. Vertical angles are measured in the vertical plane either above or below the horizontal plane of the instrument. Zenith angles, used as a reference for measuring vertical angles, are defined as 0° directly overhead and 90° at the horizontal plane.



Measurements

- There are three main types of horizontal or linear distance measurement.
 1. Direct Method.
 2. Optical Method.
 3. Electronic Method.



Measurements

1. Direct Method:- This method is most common method for linear measurement. In this method the distance are measured actual on the ground. List of Instrument used for direct measurement.

- (i) Passometer:- The passometer is used counting the number of steps automatically by some mechanical device.
- (ii) speedometer:- This is used in automobile for recording distance.
- (iii) Perambulator:- This instrument a wheel fitted with a fork and handle and shows a distance per revolution.
- (iv) Chain:- This is an accurate and common method of measuring distance in this method the distance is measured in the field by chain or tape. A metric chain divided into 100 links is made of galvanized mild steel wire 4mm in diameter. The ends of each link are bent into loops and connected together by means of three oval rings. Which afford flexibility.



Measurements





Measurements

2. Optical Method:- In this method, the distance is not measured in the field. It is computed indirectly. The principal of optics is used to determine the distance observations are taken through a telescope fitted with a stadia diaphragm in the transit theodolite.

Optical Method:- Tacheometer

The tachometer is a branch of an angular survey in which the horizontal and vertical distance of points is obtained by instrumental observation. It is the most rapid and less accurate. It is used where the chaining and leveling are difficult and inaccurate.



Measurements

3.Electronic Method:- Electronic method is more accurate and has high precision. This method is more rapid. Distance is measured with instruments that rely on propagation, reflection, and subsequent reception of either radio or light waves.

Modern E.D.M instruments, basically two types:

i. Electro-optical instruments:- which use light waves measuring distances such as Geodimeter, Makometer, Total station

Total station:-Now days commonly use of measurement of distance, surveying, and leveling. It consists of an EDM electronic theodolite as one unit.it also includes a data collector that automatically collects field data and transfers them to a computer that processes the observed data. It is a high precision instrument.

ii Microwave instruments:-which use radio waves for measurements of distance, such as Electrotape,, Diameter and Micro chain.



Thank You!!