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A REVIEW ON RAIN GAGUE

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ABSTRACT—

The main objective of this paper is to determine the amount of rainfall. It is mainly depending upon the rate of evaporation, presence of rainfall and wind velocity. In India, there are significant seasonal and geographical variations in the amount of rainfall. A rainfall measuring electronic instrument, which typically costs around Rs. 10,500, is used to determine the intensity of the rain at a particular area. This amount of rainfall it's too high to be measured in a single instrument.

KEYWORDS: Rain gauge, rainfall, evaporation, and wind

I. INTRODUCTION

Rainfall is the important element of Indian economy. Rainfall varies from heavy to low in different areas.

A form of precipitation in which rainfall water reaches the earth from the atmosphere is measured by an instrument is called rain gauge. It is also variously known as hyetometer, ombrometer, and pluviometer. This precipitation is usually determined from accumulation of water collected in a rain gauge.

It is a standard procedure to measure the rainfall at each scheduled hour, and then calculate the total rainfall during the previous six hour and twelve hours period rainfall.

Fig-1: Rain gauge

Amount of rainfall= Rainfall volume /area

Where, volume of rainfall = depth x radius x radius x 3.14 Area= top of the bucket

II. SITE SELECTION OF RAINGAUGE:

- The site should be in levels ground and other types of the ground like hill tops, hill slope etc. and undulation type of slope is not suitable for setting of a raingauge.
- The site should be an openspace.
- The nearest object from the rain gauge should be kept at twice the height of theobject.
- The gauge should be trulyvertical.
- 10% of the total number of rain gauge stations of any basin should beself-recording.
- The observer must visit the site regularly to ensure its properreadings.

Rain gauge is classified into two different types. They are:

1. Non-recording or ordinary raingauge.
2. Recording type or automatic type raingauge.

1. Non-recording type raingauge:

Another name for non-recording type gauge is **Symon's gauge**. This rain gauge does not record the rain but only collects the rain.

Once the rain is collected, then it is measured be using the graduated cylinder as shown in the figure.

It gives only total rainfall occurred during time period.

The volume of rain measured in the measuring cylinder in below shown figure direct represents the rainfall volume in cm of water depth i.e., the **volume of water collected in cm^3 divided by the area of aperture of the gauge in cm^2 is equal to the depth of rainfall in cm.**

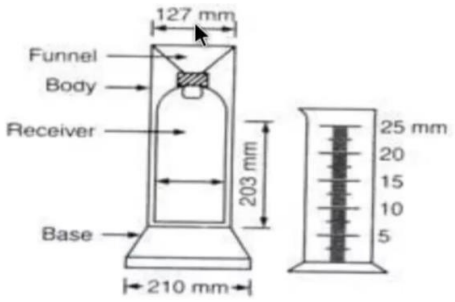

Fig-2: Non-recording or Symon's rain gauge

Construction:

It consists of a funnel and a receiver bottle. The receiver is a cylindrical (zinc) meta; bottle.

The diameter of the bottle andthetopmost diameter of funnel is 127mm. the funnel is fitted in the neck of the bottle. Both are then placed in a metal casing with suitable packings. The base of the metal casing is enlarged to 210mm.

The capacity of the bottle is such as to measure extremes of rain fall likely to occur in 24hours. Zinc receiver hold 175mm to 1000mm according to size. Gauge is provided with one measuring jar which measures the water in mm.

At the site where rainfall to be measured concrete block us constructed. The base of the gauge is permanently fixed in the constructed concrete block in such a way that the top of the casing is about 30cm above the natural surface level. While fixing the base of the gauge precaution is taken to level it perfectly.

The necessity to keep the rim of the funnel above the natural surface by 30cm is twofold:

a) It prevents the splashing of water into the funnel almost to a negligibleamount.
b) Due to wind eddies created by the gauge itself, the amount of rainwater collected diminishes if the height is kept over 30 cm.

Working:

Every day, the gauge is updated to measure the amount of rainfall. When it rains, the rainwater that covers the funnel's region flows to the receiver before any form of loss occurs. The amount of rainfall is measured every 24 hours. The measurement is typically taken at 8:30 am. I.S.T.

2. Recording type raingauge:

This type of rain gauge gives hourlyrainfall.

Construction:

It consists of a funnel 127mm in diameter fixed on one side of a rectangular box. It is also called as receiver. In the rectangular box a float is adjusted. The float is connected by means of float rid to a pin point or recording pen. The pin point touches a graph paper mounted on a rotating drum.

On the other side of the receiver, the drum is mounted. The drum is rotated by a clockwork mechanism once every 24 hours. The box is connected to a syphon at the bottom. As soon as the box is full to a particular level, the syphon activates and begins to discharge the water. Figure-3 shows complete arrangement, it is called natural siphon type recording rain-gauge.

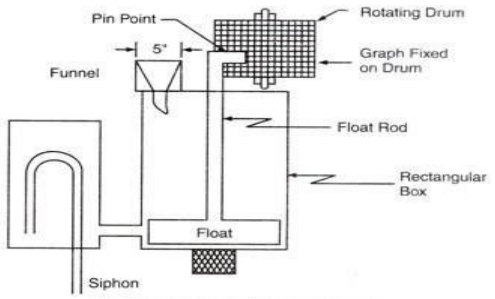

Fig-3: Recording type rain gauge

The recording type of rain gauge is also called integrating rain gauge. The reason is that the curve obtained on the graph is a cumulative curve in respect of rainfall. On y-axis we get accumulated or integrated rainfall and on x-axis we have equal time increment.

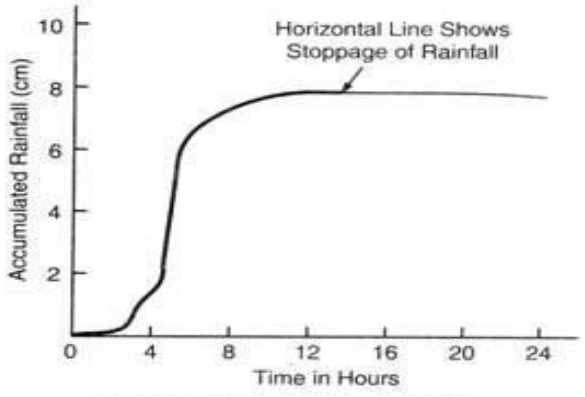

Fig-4: Mass curve of rainfall

There are different types of recording type of rain gauges. They are:

a. Weighing bucket type raingauge.
b. Tipping or tilting bucket type raingauge.
c. Siphon float type raingauge.

a. Weighing bucket type rain gauge:

This type of rain gauge used for recording rainfall as well as snowfall.

Rain is collected in a receiver vacate supported on a spring balance. A mechanical lever arm of the balance is attached to the graph paper. As it rains, the weight of the bucket gradually increases. which shifts the balance's pen position. As time passes, a line is drawn on the graph paper, which is continuously moving. The data illustrates how much precipitation has accumulated over time. Depending on the clock and the size of the drum, the recording can become stale after 24 hours or after 7days.

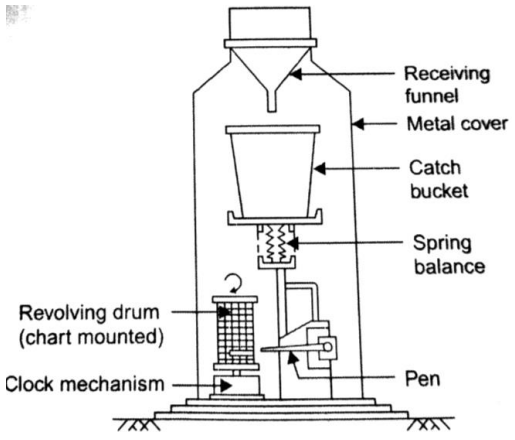

Fig-5: Weighing bucket type raingauge

b. Tipping or tilting type raingauge:

This rain gauge design principle is very simple as compared to other type rain gauges. A container is taken and divided into two vertical compartments and is balanced in an unstable equilibrium about a horizontalaxis.

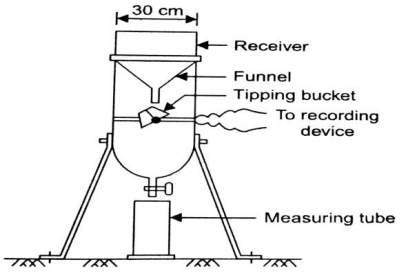

Fig-6: Tipping bucket type rain gauge

III. USES OF RAINGAUGES:

- To determine the amount of fluid in as specific precipitated space during a set period.
- This approach allows you to calculate the amount of precipitation that has fallen on a givenarea.
- A pluviometer measures the amount of rain that falls in a certain area.
- Climate adversity is a function of precipitation; therefore, it may be examined across time.
- Rain gauges of many types configure various aspects of rain, such as a weighted precipitation raingauge.
- The type of rain is determined by the tipping bucketgauge.

IV. CONCLUSION:

In this paper, the main objective is to discharge the water from rainfall or precipitation from the earth atmosphere collects the water falling on rain gauge and records the change over time in the rainfall depth. Rain is a major component of the water cycle and is responsible for depositing most of the fresh water on the earth i.e., it provides for hydroelectric power plants, crop irrigation and suitable conditions for many types of eco-systems Rain drop size distribution can be studied using an acoustic rain gauge.

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