**Experiment No. (8)**

**Calculate the average depth of rainfall over a given area ))))**

In many diverse hydrological issues it is necessary to know the mean depth rain ( Mean depth ) Over a specific area as a result of a particular storm or during a particular season or year.

There are three common methods for calculating annual or seasonal rainfall from the information available at weather stations.

**1- Mathematical method (arithmetic mean method) :**

It is the simplest way to calculate the average depth of rain falling on a specific area, where the arithmetic average is calculated for the readings of the different gauges located within the area or region.



*P :* is the rate of rain falling It is rain falling at the stations This method gives good estimates in the case of flat lands if the scales are distributed over the area in a regular manner and assuming that the readings of the different scales do not differ much from the average.

**2- Polygonal method :**

This method takes into account the effect of the irregular distribution of rain gauges by introducing a coefficient to reevaluate the reading of each gauge separately.

In this method, the location of the stations is drawn on a map, and they are connected by lines (Figure 1). From the midpoints of the connecting lines, columns are built on these lines to form a group of polygons. Inside each polygon there is one of the stations. The sides of each polygon are the boundaries of the area represented by the station within the polygon.

The area of each polygon is found using a planimeter Then it is calculated as a percentage of the total area.

After that, the rain values at each station are multiplied by their estimated areas as a percentage of the total area, then the resulting values from all stations are combined to obtain the weighted average of rain fall, which takes into account the relative weights of the stations.

if it was  Represents the rainfall values at the stations

same space The weighted average rainfall is:





This method gives more accurate results than the results given by the simplified arithmetic mean method from the socket to this method is its inflexibility, as it is required to specify the polygons at each expression in the network of measures, and this method does not take into account the effect of topography.

**3- The method of equal rain lines : **

It is considered the most accurate way to obtain the average rainfall over an area, where the locations of the different stations are drawn on a suitable map and the value of rain is written at each station, then lines are drawn equal to the rain (Fig. 2). After that, the area between each successive equal rain lines is determined by means of a platmeter and the value of this area is multiplied by the average rainfall between these two lines.

The analyst can benefit from his available information about the effect of the terrain and how storms are formed. On this basis, the final map will represent the pattern of rain falling on the area in a more realistic way than what can be obtained from the map based on the measurements readings only, and this method depends largely on the experience of the analyst.

**practical part:**

Use the attached maps to calculate the rainfall in the following ways:

1- .

2- .

Using the planometer and the tables attached to the above methods:

