

### **3. Isohyetal method**

*An isohyet is a line joining points of equal rainfall magnitude. In this method, stations locations and amounts are plotted on a suitable map and contours of equal precipitation are then drawn.*

*The average precipitation for an area is computed by weighting the average precipitations between successive isohyets by the area between the isohyets, total these products, and dividing by the total area as:*

$$\bar{P} = \frac{A_1 \left( \frac{P_1 + P_2}{2} \right) + A_2 \left( \frac{P_2 + P_3}{2} \right) + A_3 \left( \frac{P_3 + P_4}{2} \right) + \dots}{A_T}$$

**Where:**

*$P_1, P_2, \dots$  = isohyets value.*

*$A_1, A_2, \dots$  = area between isohyets.*

*$\bar{P}$  = average precipitation over an area.*

**Example1:** Find the average rainfall by using Isohyetal method for a square catchment area, bounded at the corners by four gage stations. The coordinates of the station and rainfall values are given below:

|                            |                       |                        |                       |                        |
|----------------------------|-----------------------|------------------------|-----------------------|------------------------|
| <b><i>Station no.</i></b>  | <b><i>1</i></b>       | <b><i>2</i></b>        | <b><i>3</i></b>       | <b><i>4</i></b>        |
| <b><i>Coordinates</i></b>  | <b><i>(50,80)</i></b> | <b><i>(100,80)</i></b> | <b><i>(50,30)</i></b> | <b><i>(100,30)</i></b> |
| <b><i>Rainfall,cm.</i></b> | <b><i>5</i></b>       | <b><i>4</i></b>        | <b><i>4</i></b>       | <b><i>3</i></b>        |

**Example2:** A catchment area has a rectangular shape with the following coordinates: (10,10), (110,10), (110,60,)and (10,60). The coordinates of eight rain gages and their average annual precipitations are given below. Find the average precipitation by using Isohyetal method.

|                 |               |                |                |                |                |                |                |               |
|-----------------|---------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------|
| <b>Sta. no.</b> | <b>1</b>      | <b>2</b>       | <b>3</b>       | <b>4</b>       | <b>5</b>       | <b>6</b>       | <b>7</b>       | <b>8</b>      |
| <b>Coord.</b>   | <b>(5,15)</b> | <b>(20,40)</b> | <b>(48,50)</b> | <b>(95,25)</b> | <b>(90,50)</b> | <b>(30,75)</b> | <b>(65,20)</b> | <b>(6,62)</b> |
| <b>Prec.mm</b>  | <b>110</b>    | <b>100</b>     | <b>109</b>     | <b>140</b>     | <b>130</b>     | <b>100</b>     | <b>132</b>     | <b>93</b>     |