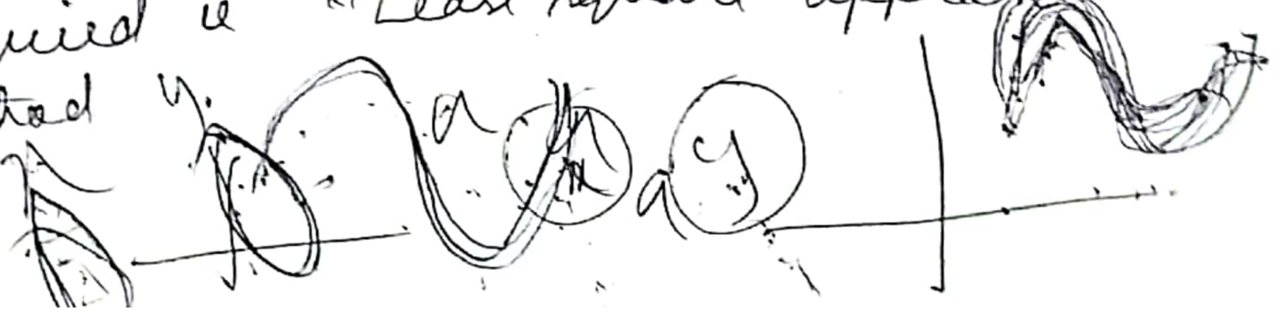
Curve Fitting:

In many branches of science and engineering, it is required to express the data obtained from observations in the form of a law connecting the two variables involved. For this purpose, we first plot the corresponding values of the given data say $(x_i, y_i), i = 1, 2, \dots n$ as rectangular co-ordinates in graph. A smooth curve can be drawn to pass through near the plotted points. Such a curve is called approximating curve.

The general problem of finding the eqn of approximating curve which fit given data is called curve fitting.

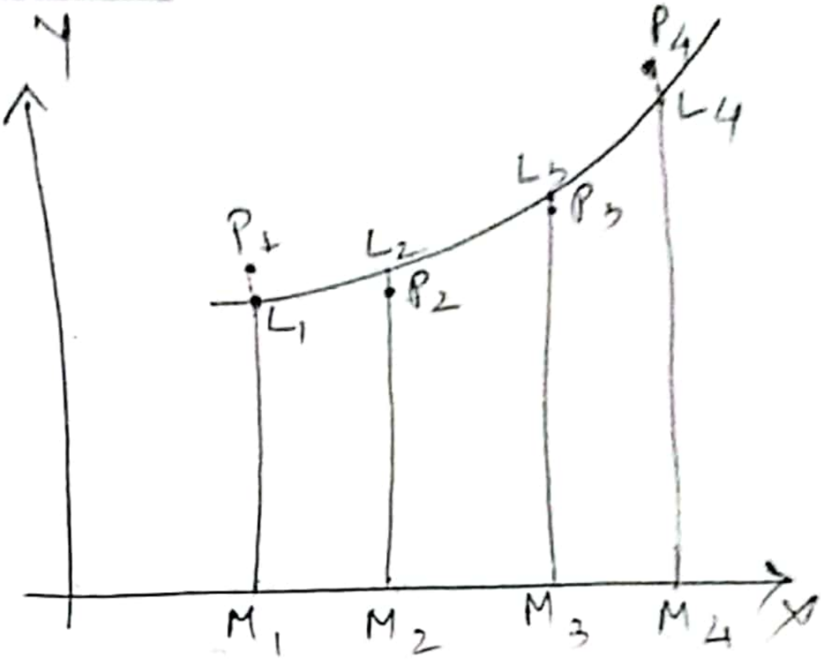
The constants occurring in the eqn of approximation can be found by several method.

But in our syllabus only one method is required ie "Least square approximation" method.



Principle of Least square:

Let $(x_i, y_i), i = 1, 2 \ldots n$ be the n sets of observations and let $y = f(x) \rightarrow (1)$ be the curve of approximation between x and y.



Let at $x = x_i$ let the observed value of y is $P_i M_i$ and expected value is $L_i M_i$

$\therefore$ Error at $x = x_i$ is $= P_i M_i - L_i M_i$

$$= y_i - f(x_i) = e_i$$

It is obvious that this error e_i is + ve or negative.

So, we consider, $E = \sum_{i=1}^{n} e_i^2$

$$= \sum_{i=1}^{n} [y_i - f(x_i)]^2$$

If $E = 0$ then the observed value lie on the curve.
Thus, the curve of best fit is that for which this error E is minimum.
This is the least square method.