Measures of central Tendency :

There are five types of measures of central tendency -

(1) Arithmatic mean (2) Median

(3) Mode (4) Geometric mean

(5) Harmonic mean.

We will discuss first three here.

(1) Arithmatic mean:

If $x_1, x_2, \ldots x_n$ are given data, then arithmatic mean $\bar{x}$ is given by,

$$\bar{x} = \frac{x_1 + x_2 + \ldots + x_n}{n} = \frac{1}{n} \sum_{i=1}^{n} x_i$$

If we are given frequency distribution,

$x : x_1, x_2, \ldots x_n$,

$f : f_1, f_2, \ldots f_n$.

then, $\bar{x} = \frac{f_1 x_1 + f_2 x_2 + \ldots + f_n x_n}{f_1 + f_2 + \ldots + f_n}$

$= \frac{\sum fx}{N}$, $N = f_1 + f_2 + \ldots + f_n$.

If we use shifting of the origin to a point a for frequency dist., then

$$\bar{x} = a + \frac{1}{N}\sum f_i(x_i - a)$$

where, a is the assumed mean

$$\bar{x} = a + h\,\frac{\sum f_i u_i}{N}$$

where, $u = \frac{x-a}{h}$, a = assumed mean and h is the class interval.

Ex:- Find the mean of the following data.

Marks	No of students.
Below 10	5
Below 20	9
" 30	17
" 40	29
" 50	45.
" 60	60
" 70	70
" 80	78
" 90	83
Below 100	85

Sol^{n} Let make the frequency distribution table as follows.

We consider, $a = 55$

Here, $h = 10$.

Marks	mid values (x_i)	f	$u = \frac{x-a}{h}$	fu
0 - 10	5	5	-5	-25
10 - 20	15	4	-4	-16
20 - 30	25	8	-3	-24
30 - 40	35	12	-2	-24
40 - 50	45	16	-1	-16
50 - 60	55	15	0	0
60 - 70	65	10	1	10
70 - 80	75	8	2	16
80 - 90	85	5	3	15
90 - 100	95	2	4	8

$N = \Sigma f$

$= 85$

$\Sigma fu = -56$

Mean, $\bar{x} = a + h \frac{\Sigma fu}{N}$

$= 55 + 10 \times \frac{(-56)}{(85)}$

$= 48.42$