

Unit : II

i) Mean : Non-grouped data  $\bar{x} = \frac{\sum x}{n}$   
grouped data  $\bar{x} = \frac{\sum fx}{n}$

ii) Combined mean :

$$\bar{x}_c = \frac{n\bar{x}_1 + m\bar{x}_2 + \dots + r\bar{x}_r}{n_1 + n_2 + \dots + n_r}$$

iii) weighted mean :

$$\bar{x}_w = \frac{\sum xw}{\sum w}, w = \text{weight.}$$

iv) Geometric mean :

$$G.M = \sqrt[n]{x_1 \times x_2 \times \dots \times x_n}$$

v) Harmonic Mean :

$$H.M = \frac{n}{\frac{1}{x_1} + \frac{1}{x_2} + \dots + \frac{1}{x_n}}$$

$$H.M = \frac{n}{\frac{f_1}{x_1} + \frac{f_2}{x_2} + \dots + \frac{f_r}{x_r}}$$

vii) Median :

~~Step~~ Step 1 : Arrange the data in ascending order

$$M = \left( \frac{n+1}{2} \right)^{\text{th}} \text{ obs.} \rightarrow \text{for ungrouped data}$$

~~Step 2~~  $M = \left( \frac{n}{2} \right)^{\text{th}} \text{ obs.} \rightarrow \text{for grouped data}$

$$M = L + \frac{\frac{n}{2} - cf}{f} \times c$$

viii) Mode :

The most repeated number in the data is called Mode for ungrouped data.

for grouped data :

$$M_o = L + \frac{f_1 - f_2}{2f_1 - f_0 - f_2} \times h$$

⑦ Coefficient of Variation (C.V)

$$= \frac{\text{Standard Deviation } (\sigma)}{\text{Mean } (\bar{x})} \times 100$$

Unit : 3

① Range = Highest Value - Lowest Value

For grouped data =

$$\text{Coefficient of Range} = \frac{\text{Highest Value} - \text{Lowest Value}}{\text{Highest Value} + \text{Lowest Value}}$$

② Quartile - :

$$Q_1 = \left( \frac{n+1}{4} \right)^{\text{th}} \text{ obs.}$$

$$Q_3 = 3 \left( \frac{n+1}{4} \right)^{\text{th}} \text{ obs.}$$

for grouped data :

$$Q_d = L + \left( \frac{\frac{n}{4} - cf}{f} \right) \times h$$

③ Quartile Deviation :  $\frac{Q_3 - Q_1}{2}$

④ Coefficient of Quartile Deviation :

$$\frac{Q_3 - Q_1}{Q_3 + Q_1}$$

④ Mean Deviation:  ~~$\frac{\sum f|x - \bar{x}|}{\sum f}$~~   $\frac{\sum f|x - \bar{x}|}{\sum f}$

$$\bar{x} = \frac{\sum fx}{\sum f}$$

for ungrouped data:  $\frac{\sum |x - \bar{x}|}{n}$

⑤ Standard deviation:  $\sqrt{\frac{\sum (x - \bar{x})^2}{n}}$

⑥ Variance:  $\sigma^2 = (s)^2$

$$s = \sqrt{\frac{\sum x^2}{n} - \left(\frac{\sum x}{n}\right)^2}$$

or

$$s = \sqrt{\frac{\sum di^2}{n} - \left(\frac{\sum di}{n}\right)^2}$$

$$d = x - A$$

for grouped data

$$s = \sqrt{\frac{\sum fx^2}{n} - \left(\frac{\sum fx}{n}\right)^2}$$

## Unit -4

① Types of Correlation :-

(i) Positive Correlation

e.g. Height and Weight

(ii) Negative Correlation

(iii) Zero (No) Correlation

② Karl Pearson's Product Moment Method :-

for ungrouped Data :-

$$r = \frac{\sum (x - \bar{x})(y - \bar{y})}{\sqrt{\sum (x - \bar{x})^2 \sum (y - \bar{y})^2}}$$

for grouped data :-

$$r = \frac{n \sum xy - (\sum x)(\sum y)}{\sqrt{n \sum x^2 - (\sum x)^2} \sqrt{n \sum y^2 - (\sum y)^2}}$$

③ Spearman's Rank Correlation

$$r = 1 - \frac{6 \sum d^2}{n(n^2-1)}$$

④ Regression line of Y on X

for ungrouped :

$$b = \frac{\sum (x - \bar{x})(y - \bar{y})}{\sum (x - \bar{x})^2}$$

grouped :

$$b = \frac{n \sum xy - (\sum x)(\sum y)}{n \sum x^2 - (\sum x)^2}$$

or

$$b_{yx} = r \times \frac{\sigma_y}{\sigma_x}$$

$$a = \bar{y} - b\bar{x}$$

$$\hat{y} = a + b_{yx}x$$