# SECTION – 5

## QUESTION-1.

## ANSWER:-

### Coefficient of Standard Deviation:-

The standard deviation is the absolute measure of dispersion. Its relative measure is called the standard coefficient of dispersion or coefficient of standard deviation. It is defined as:

$$Coefficient\,of\,Standard\,Deviation = \frac{S}{\bar{X}}$$

Coefficient of Variation

The most important of all the relative measures of dispersion is the coefficient of variation. This word is variation not variance. There is no such thing as coefficient of variance. The coefficient of variation (C.V) is defined as:

$$(C.V) = \frac{S}{\bar{X}} \times 100$$

Thus C.V is the value of S when $\bar{X}$ is assumed equal to 100. It is a pure number and the unit of observation is not mentioned with its value. It is written in percentage form like 20% or 25%. When its value is 20%, it means that when the mean of the observations is assumed equal to 100, their standard deviation will be 20. The C.V is used to compare the dispersion in different sets of data particularly the data which differ in their means or differ in their units of measurement. The wages of workers may be in dollars and the consumption of meat in families may be in kilograms. The standard deviation of wages in dollars cannot be compared with the standard deviation of amount of meat in kilograms. Both the standard deviations need to be converted into a coefficient of variation for comparison. Suppose the value of C.V for wages is 10% and the values of C.V for kilograms of meat is 25%. This means that the wages of workers are consistent. Their wages are close to the overall average of their wages. But the families consume meat in quite different quantities. Some families consume very small quantities of meat and some others consume large quantities of meat. We say that there is greater variation in their consumption of meat. The observations about the quantity of meat are more dispersed or more variant.

Example:

Calculate the coefficient of standard deviation and coefficient of variation for the following sample data: 2, 4, 8, 6, 10, and 12.

Solution:

| X | $(X-\bar{X})^2$ |
|---|---|
| 2 | $(2-7)^2=25$ |
| 4 | $(4-7)^2=9$ |
| 8 | $(8-7)^2=1$ |
| 6 | $(6-7)^2=1$ |
| 10 | $(10-7)^2=9$ |
| 12 | $(12-7)^2=25$ |
| $\sum X=42$ | $\sum(X-\bar{X})^2=70$ |

$$\bar{X}=\frac{\sum X}{n}=\frac{42}{6}=7$$

$$S=\sqrt{\frac{\sum(X-\bar{X})^2}{n}}$$

$$S=\sqrt{\frac{70}{6}}=\sqrt{\frac{35}{3}}=3.42$$

Coefficient of Standard Deviation $=\frac{S}{\bar{X}}=\frac{3.42}{7}=0.49$

Coefficient of Variation

$(C.V)=\frac{S}{\bar{X}}\times100=\frac{3.42}{7}\times100=48.86\%$