# t - test

**Introduction :-** In the experiments of different schools of S.ST, especially when the effects of two factors are considered, it becomes essential to compare the means of two samples and two draw a meaningful conclusion before interpreting the results.

While comparing two samples on a quantitative basis, the variables are usually arranged in a table to facilitate comparison of means of two samples. It seems essential because visual expressions of the difference between the means of two samples, often does not prove that there is, infact, a significant difference between the means of two samples. At that time it becomes difficult to draw a conclusion about which of the two means is significantly greater, than the other. Even if one is greater, it is essential to decide to what extent it is greater than the other. The degree of level of significance of this difference is to be quantified so that a meaningful conclusion and idea can be developed.

To attach a statistical significance of such a difference (or no difference) a statistical test is applied known as the t-test. It was introduced by W.S. Gossett (1908) under nom de plume of 'student'. The pan name of Gossett was student and therefore t-test is also known as student t-test. Its multifold explanation was developed by fischer. It is based on the principle of null hypothesis.

**Definitions :** (i) According to Gossett: t is a critical ratio in which more exact estimate

of standard deviation of difference between
two means is used.

(2) t-test is the statistics through which the
significance of difference between two groups
(either correlated or uncorrelated) is tested.

(3) t-test is a ratio of difference between
two means and standard error of difference
between two means i.e.,

$$t = \frac{\text{Difference between two means}}{\text{Standard error of difference between two means}}$$

**Characteristics :-** (1) The difference between the
means of two variables may be due to
variability of data in samples and thus the
difference between the means has no significance.

(2) It tests the significance difference of two
means, when the groups are smaller.

(3) The sampling distribution of t is
normal when n is larger.

(4) Its value changes with the degree of freedom.

(5) It gives accurate estimate when n is
less than 30.

(6) It utilizes both the means and standard
deviations of two samples.

(7) It gives internal estimation of small
samples.

**Uses :-** To find out fiducial limit: If we
choose a value of Probability of occurrence
of time mean to lie in a range on either
side of the Sample mean and then we can
find out corresponding t-values with the
degree of freedom. Now, we can have
the limits with t-value, sample mean and