Testing of Hypothesis

Population :-

The group of individuals under study is called population. The population may be finite or infinite.

Sample :-

A finite subset of statistical individuals in a population is called sample.

Sample size :-

The number of individuals in a sample is called sample size.

Sampling error :

Sampling errors are statistical errors that arise when a sample does not represent the whole population.

Parameters :-

Statistical measures computed from population namely population mean μ and variance σ^2 are called parameters.

Statistic :-

Statistical measures computed from sample observation alone namely mean $\bar{x}$ and variance s^2 are called statistic.

Standard error :

The standard deviation of sampling distribution of a statistic is known as its standard error (S.E).

Sampling distribution.

It is a probability distribution of a statistic that is obtained by drawing a large number of samples from a specific population.

Statistical Hypothesis:-

A statistical hypothesis is an assumption about a population parameter. This assumption may or may not be true.

Null Hypothesis:

A definite statement about the population parameter. Such a hypothesis is usually a hypothesis of no-difference and it is denoted by H_0.

Alternative Hypothesis:

Any hypothesis which is complementary to the null hypothesis is called alternative hypothesis and it is denoted by H_1.

Errors in Sampling:

The main objective in sampling theory is to draw valid inferences about the population parameters on the basis of sample results.

i) Type -I error – Reject H_0 when it is true

ii) Type -II error – Accept H_0 when it is wrong

(iii) Accept H_0 when H_1 is true.

Critical region:

A region corresponding to a statistic t in the sample space S which lead to the rejection of H_0 is called critical region or Rejection Region.

Those region which lead to the acceptance of H_0 give us a region called Acceptance region.

Level of significance :

It is the probability level below which null hypothesis is rejected. Generally 5% and 1% Level of significance are used.

One tailed and Two tailed test:

A test of any statistical hypothesis where the alternate hypothesis is one tailed is called one tailed test.

We assume that null hypothesis $H_0 : \mu = \mu_0$ against the alternative hypothesis

$$H_1 = \mu > \mu_0 \ (\text{Right tailed})$$

(or)

$$H_1 = \mu < \mu_0 \ (\text{left tailed}).$$

is called one tailed test

In a test of statistical hypothesis where the alternative hypothesis is two tailed,

We assume that the null hypothesis

$$H_0 : \mu = \mu_0$$

against the alternative hypothesis

$$H_1 : \mu \neq \mu_0$$

is called two tailed test.

Types of test

Level of Significance (LOS)		
1 %	5 %	10 %

Types of test	1 %	5 %	10 %
Two tailed test	2.58	1.96	1.645
one tailed test	2.33	1.645	1.28

Test of significance of Small sample:

when the sample size n is less than 30 $(n < 30)$ then that sample is called small sample.