TESTING OF HYPOTHESIS

BASIC DEFINITIONS :

Population :-
A population is used to refer any collection of individual it may be finite or infinite.

Sample :-
A sample is a small portion selected (or drawn) from the population and the process of drawing a sample from a population is called sampling.

Sample size :-
The no. of individual in a selected sample is called the sample size.

Parameter and statistics :-
Any statistical method computed from population data is known as parameter and Any statistical method computed from sample data is known as statistics.

NOTATIONS :–

MEASURE	POPULATION	SAMPLE
Size	$\rightarrow$ N	$\rightarrow$ n
Mean	$\rightarrow$ μ	$\rightarrow$ $\bar{x}$
Standard deviation	$\rightarrow$ σ	$\rightarrow$ s
Proportion	$\rightarrow$ P	$\rightarrow$ P'
Variance	$\rightarrow$ σ^2	$\rightarrow$ s^2

Sampling Distribution :–

The various value of statistics so obtained may be arrange as a frequency distribution which is known as sampling distributions.

Standard Error :–

The standard deviation of sampling distribution of a statistic is known as its standard error, abbreviated as S.E. (i.e. avg. amount of variability from the observation of a sampling distribution).

Statistical Hypothesis :—

In attempting to reach decision about population on the basis of sample observations, we make assumptions about population, which are not necessarily true, are called statistical hypothesis.

Null Hypothesis :—

Null hypothesis is the hypothesis which is tested for possible rejection under the assumption that it is true and is denoted by H_0.

[(i.e) hypothesis of no difference].

Alternative Hypothesis :—

A hypothesis that is complementary to null hypothesis is called alternative hypothesis and is denoted by H_1.

A procedure for deciding whether to accept or reject the null hypothesis is called the test of hypothesis.

Level of Significance :—

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

Critical region (or) Region of rejection :—

The critical region of a test of statistical hypothesis is that region of the normal curve which corresponds to the rejection of null hypothesis, H_0. Those region which lead to the acceptance of H_0 is called acceptance region.

Error in Sampling :—

Errors are Type I, Type II errors.

Type I error: Reject H_0 when it is true.

Type II error: Accept H_0 when it is false.

$P(\text{Type I error}) = \alpha$ & $P(\text{Type II error}) = \beta$.

One tail & two tail test :—

If μ_0 is population parameter & μ is the sample statistics, then the null hypothesis is given by

$$H_0 : \mu = \mu_0$$

Alternative hypothesis is given by,

$H_1 : \mu \neq \mu_0$ (two-tailed)

$H_1 : \mu > \mu_0$ (Right tailed) (one tail)

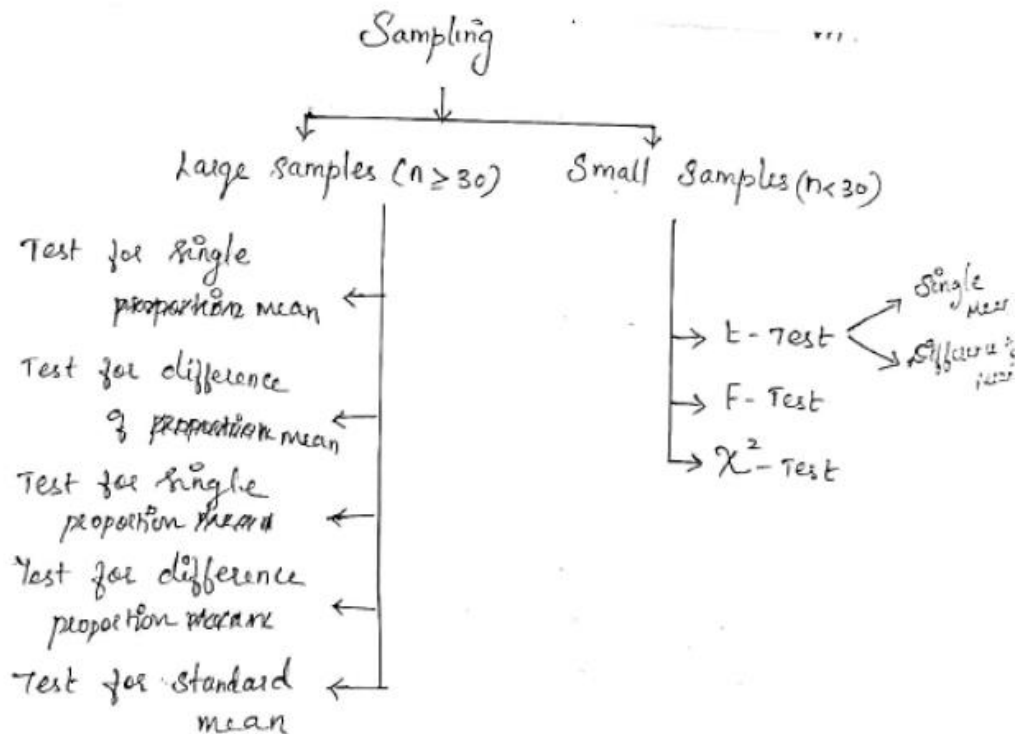$H_1 : \mu < \mu_0$ (Left tailed) (")

PROCEDURE FOR TESTING A HYPOTHESIS :-

1) Formulate H_0 and H_1
2) choose the level of significance α
3) compute the test statistic, using the data available.
4) pick out the critical value from the tabulation
5) Conclusion: compare the computed value of the test statistic with the critical value at the given level of significance.

Sampling   ···.

Large samples $(n \geq 30)$ Small Samples $(n < 30)$

Test for single proportion mean

Test for difference of proportion mean

Test for single proportion mean

Test for difference proportion variance

Test for standard mean

t - Test → Single mean / difference mean

F - Test

χ^2 - Test

Large samples $(n \geq 30)$

Critical values (or) Significant values:–

The sample values of the statistic beyond which the null hypothesis will be rejected are called critical values or significant values.

Natures of Test	Level of significance		
	1 %	5 %	10 %
Two tailed test (z_α):	2.58	1.96	1.645
One tailed test (z_α):	2.33	1.645	1.28 (right)
	-2.33	-1.645	-1.28 (left)