UNIT-II DESIGN OF EXPERIMENTS

ANALYSIS OF VARIANCE (ANOVA):

ANOVA is a technique that will enable us to test the significance of the difference among more than two sample mean.

ASSUMPTION:

1) The observations are random.
2) The observations are independent.
3) The samples are drawn from normal populations.
4) Population variances are equal.

BASIC PRINCIPLES:

1) Randomisation
2) Replication
3) Local control.

BASIC DESIGN:

* Completely randomised design (CRD) One-way classifi
* Randomised Block design (RBD) Two-way classificat
* Latin square design (LSD) Three-way classificati
* Two square factorial design

Hint :- F- Ratio : $F = \frac{S_1^2}{S_2^2}$ where $S_1^2 > S_2^2$

procedure to find :-

2). Sum of all the terms (T) & Total no. of sample size (N)

3) Correction factor (C.F), $C.F = \frac{T^2}{N}$

4) TSS : Total sum of squares
= (sum of the squares of all the terms) − C.F.

5) SSC : Sum of squares between samples

6) SSE : Error sum of squares
= TSS − SSC

7) Annova table

8) Conclusion :

1) Formulating H_0 & H_1

1) A completely randomised design experiment with 10 plots and 3 treatments gave the following result.

plot No. :	1	2	3	4	5	6	7	8	9	10
treatment :	A	B	C	A	C	C	A	B	A	B
yield :	5	4	3	7	5	1	3	4	1	7

Analyse the result for treatment effects.

Treatment	Yield			
(x_1) A	5	7	3	1
(x_2) B	4	4	7	-
(x_3) C	3	5	1	-

Treatment

A	B	C
5	4	3
7	4	5
3	7	1
1	-	

x_1	x_2	x_3	Total	x_1^2	x_2^2	x_3^2
5	4	3	12	25	16	9
7	4	5	16	49	16	25
3	7	1	11	9	49	1
1	-	-	1	1	-	-
16	15	9	40	84	81	35
Σx_1	Σx_2	Σx_3		Σx_1^2	Σx_2^2	Σx_3^2

step 1 : Formulating Ho & H_1 :

Ho : there is no significance difference between the treatments.

H_1 : There is significance difference between the treatments.

step 2 : To find T & N :

$T = \Sigma x_1 + \Sigma x_2 + \Sigma x_3$

$= 16 + 15 + 9 = 40$

$N = n_1 + n_2 + n_3$

$= 4 + 3 + 3 = 10$

Step 3: Correction Factor, C.F.

$$C.F = \frac{T^2}{N} = \frac{40^2}{10}$$
$$= 160$$

Step 4: $TSS = \Sigma x_1^2 + \Sigma x_2^2 + \Sigma x_3^2 - C.F$

$$= 84 + 81 + 35 - 160$$
$$= 40$$

Step 5: $SSC = \frac{(\Sigma x_1)^2}{n_1} + \frac{(\Sigma x_2)^2}{n_2} + \frac{(\Sigma x_3)^2}{n_3} - C.F.$

$$= \frac{16^2}{4} + \frac{15^2}{3} + \frac{9^2}{3} - 160$$
$$= 6$$

Step 6: $SSE = TSS - SSC$

$$= 40 - 6 = 34$$

Step 7: Annova table:

Source of variation	Sum of squares	Degrees of freedom	Mean square	F-Rat[illegible]
Between samples (Column)	SSC : 6	$C-1 = 3-1$ $= 2$	$MSC : 6/2$ $: 3$	F_c : [illegible]
Within samples (Error)	SSE : 34	$N-C = 10-3$ $= 7$	$MSE : 34/7$ $: 4.9$	F_α [illegible]

Step 8: Conclusion:

$F_c = 1.61 < 19.35 = F_\alpha$, Ho is accepted

i.e. There is no significance difference between the treatments.