



## DEPARTMENT OF MATHEMATICS UNIT - IV DESIGN OF EXPERIMENTS

RANDOMISED BLOCK DESIGN (RBD) (or) TWO WAY CLASSIFICATION

Three varieties A, B, C, of a crop are tested in a randomized block design with four replications. The plot yields in pounds are as follows:

A	6	C	5	A	8	B	7
C	8	A	4	B	6	C	9
B	7	B	6	C	10	A	6

Analysis: The experimental yield and state your conclusion.

Soln:

Varities	Yields
A	6 4 8 6
B	7 6 6 9
C	8 5 10 9

	$n_1$	$n_2$	$n_3$	$n_4$	Total	$n_1^2$	$n_2^2$	$n_3^2$	$n_4^2$
$y_1$	6	4	8	6	24 $\Sigma y_1$	36	16	64	36
$y_2$	7	6	6	9	28 $\Sigma y_2$	49	36	36	81
$y_3$	8	5	10	9	32 $\Sigma y_3$	64	25	100	81
	$\frac{21}{\Sigma n_1}$	$\frac{15}{\Sigma n_2}$	$\frac{24}{\Sigma n_3}$	$\frac{24}{\Sigma n_4}$	$\frac{84}{\Sigma y_4}$	$\frac{149}{\Sigma n_1^2}$	$\frac{77}{\Sigma n_2^2}$	$\frac{200}{\Sigma n_3^2}$	$\frac{198}{\Sigma n_4^2}$

step 1: Formulating  $H_0$  and  $H_1$

$H_0$ : There is no significant difference between yields and varieties

$H_1$ : There is significant difference between yields and varieties.



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Step 2: To find  $N$  &  $T$

$$N = n_1 + n_2 + n_3 + n_4 \\ = 3 + 3 + 3 + 3 = 12$$
$$T = \sum x_1 + \sum x_2 + \sum x_3 + \sum x_4 \\ = 21 + 15 + 24 + 24 \\ = 84$$

Mean sum  
of squares

$$M.S.C = \frac{18}{3} \\ = 6$$

$$M.S.R = \frac{8}{2}$$

F-Ratio

$$F_0 = \frac{6}{1.6} = 3.75$$

$$F_{\alpha}(3,6) = 4.76$$

$$F_R = \frac{4}{1.6} = 2.5$$

$$F_{\alpha}(2,6) = 5.14$$

Now  
Step 3: Correction factor, C.F.

$$C.F = \frac{T^2}{N} = \frac{84^2}{12} = 588$$

Step 4:  $TSS = \sum x_1^2 + \sum x_2^2 + \sum x_3^2 + \sum x_4^2 - C.F$

$$= 149 + 77 + 200 + 198 - 588 \\ = 36$$

Step 5:  $SSC = \frac{(\sum x_1)^2}{n_1} + \frac{(\sum x_2)^2}{n_2} + \frac{(\sum x_3)^2}{n_3} + \frac{(\sum x_4)^2}{n_4} - C.F$  between

$$= \frac{21^2}{3} + \frac{15^2}{3} + \frac{24^2}{3} + \frac{24^2}{3} - 588 \\ = 18$$

$$SSR = \frac{(\sum y_1)^2}{n_1'} + \frac{(\sum y_2)^2}{n_2'} + \frac{(\sum y_3)^2}{n_3'} - C.F$$
$$= \frac{24^2}{4} + \frac{28^2}{4} + \frac{32^2}{4} - 588 \\ = 8$$

Step 6:  $SSE = TSS - SSC - SSR$

$$= 36 - 18 - 8 \\ = 10$$

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**DEPARTMENT OF MATHEMATICS**

**UNIT – IV DESIGN OF EXPERIMENTS**