Paper III : Analysis of Variance and Design of Experiment

Section—A

1. 'Analysis of Variance' is developd by :
(a) Mahalanobis (b) Prof. R. A. Fisher
(c) Yates (d) None of the above.

2. In one way classification there are 3 varieties and each has four observations. The degree of freedom for error sum of squares in the analysis of variance will be :
(a) 1 (b) 3 (c) 6 (d) 9.

3. In the linear model of analysis of variance the error part is assumed to be distributed :
(a) $N(\mu, \sigma^2)$ (b) $N(0, \sigma^2)$ (c) $N(\mu, 0)$ (d) $N(0, 1)$.

4. Local control in experimental design is meant by :
(a) Increase the efficiency of design (b) Reduce experimental error
(c) Form homogeneous blocks (d) For all of these.

5. A completely randomized design involves four treatments replicated 3, 6, 3, 5 times respectively. The degrees of freedom for error sum of squares are : (a) 3 (b) 10 (c) 16 (d) 13.

6. In a RBD with 6 treatments and 5 blocks, the following results were obtained MSSB = 20, MSST = 25, TSS = 245. Then the error mean sum of squares is : (a) 40 (b) 20 (c) 5 (d) 2.

7. In the degrees of freedom for error sum of squares is Latin square design are 6. then the order of the design is :
(a) 3×3 (b) 4×4 (c) 5×5 (d) 6×6.

8. Missing observations are not estimated in :
(a) Completely randomized design (b) Randomized block design
(c) Latin square design (d) Both (a) and (c).

9. In a 2^2 factorial experiment, the main effect A is given by :
(a) $\frac{1}{2}\{(ab) - (a) + (b) - (1)\}$ (b) $\frac{1}{2}\{(ab) + (a) - (b) - (1)\}$
(c) $\frac{1}{2}\{(ab) - (a) + (b) + (1)\}$ (d) $\frac{1}{2}\{(ab) - (a) - (b) + (1)\}$.

10. In a 2^3 factorial experiment, which statement is correct ?
(a) It has two factors at three levels each (b) It has three factors at two levels each (c) It has the factors at the same level each (d) None of the above.

Section—B

1. Define analysis of variance and mention its underlying assumptions. 2. Give linear model for two way classification and state its assumptions. 3. What are the basic principles of design of experiment ? 4. Explain clearly

the difference between completely Randomized Design and Randomized block design. **5.** Give the lay out of CRD. **6.** Explain why there can not be a 2×2 Latin square design. **7.** What is a standard Latin square design ? Give one example. **8.** In a 4×4 Latin square design, the following results were obtained : (a) Total yield from all plot 7566 (b) Row or crude sum of square : 24475 (c) Row totals : 1747, 1794, 2150, 1865 (d) Column totals : 1766, 2030, 2065, 1695 (e) Treatment totals : 1839, 2030, 1855, 1799 Perform the analysis of variance. **9.** Explain the terms 'main effects' and 'Interaction' in a factorial experiment. **10.** What is a factorial expriment ?

Section—C

1. Give the linear model of One way classification and derive the analysis of variance by the method of least square.

2. Give the lay-out and analysis of variance of a Randomized block design. Mention the advantages and disadvantages of this design.

3. Write short notes on the following :

(i) Experimental error, (ii) Critical difference, (iii) Missing plot technique.

4. Discuss latin square design and how do you make analysis of variance in this ?

5. Find out the main effects and interaction in the following 2^2 factorial experiment and write down the analysis of variance table :

Block	Yield			
	(l)	k	p	kp
I	23	25	22	38
	p	(l)	k	kp
II	40	26	36	38
	(l)	k	kp	p
III	29	20	30	20
	kp	k	p	(l)
IV	34	31	24	28