Paper III : Analysis of Variance and Design of Experiment

Note : Attempt **all** questions from **Section-A** (Objective type) and **all** questins from **Section-B** (Short answer type) and **three** questions from **Section-C** (Long/Essay type).

Section—A $1 \times 10 = 10$

1. In the linear model of analysis of variance the error part is assumed to be distributed as :

(a) $N(\mu, \sigma^2)$ (b) $N(0, \sigma^2)$ (c) $N(\mu, 0)$ (d) $N(0, 1)$.

2. In the analysis of variance correction factor is given by :

(a) $\frac{(\sum\sum y_{ij})^2}{N}$ (b) $\left(\frac{\sum\sum_{ij}}{N}\right)^2$ (c) $\frac{\sum\sum Y_{ij}^2}{N}$ (d) $N\sum_i \sum_j y_{ij}^2$.

3. Replication in experimental design is meant to :

(a) To form homogenous blocks (b) Reduce experimental error (c) Increase the efficiency of the design (d) All of these.

4. Missing plot technique is applicable in :

(a) LRD (b) RBD (c) LSD (d) Both (b) and (c).

5. In a Latin square design, which statement is true :

(a) Number of treatments equals the number of rows (b) Number of treatments equals the number of columns (c) Number of rows equals the number of columns (d) All of these.

6. A completely randomised design involves four treatments replicated 3, 6, 3, 5 times respectively. They degrees of freedom for error sum of squares are :

(a) 3 (b) 10 (c) 13 (d) 16.

7. 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.

8. If the degrees of freedom for error sum of squares in Latin square design are 6, then, the order of the design is :

(a) 3×3 (b) 4×4 (c) 5×5 (d) 6×6.

9. In a 3^2 factorial experiment, which statement is correct :

(a) It has 2 factors at 3 levels each (b) If that 3 factors at 2 levels each (c) It has 9 factors at the same leveis (d) None of these.

10. In a 2^3 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) $\frac{1}{2}\{(ab) + (a) + (b) + (1)\}$.

Section—B $2 \times 5 = 10$

1. What do you mean by within and between class variations ?
2. Give linear model for one way classification and state its assumptions.
3. Explain randomisation and local control. What purpose do they serve ?

4. What do you understand by critical difference and experimental error ?

5. Explain concept and definition of efficiency of design.

6. Give the layout of CRD.

7. Explain why there can not be 2×2 latin square design.

8. Differentiate between symmetrical and asymmetrical factorial experiments.

9. Show that in a 2^2 factorial experiment main effects and interaction effect are mutually orthogonal contract.

10. Explain Yate's method of 2^2 factorial experiment with an example.

Section—C $10 \times 3 = 30$

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

2. Give the lay-out and analysis of variance of a Randomised Block Design. Mention the advantages and disadvantages of this design.

3. Obtain the estimate of a missing observation in a LSD.

4. What do you mean by factorial experiment ? Give in detail the analysis of 2^3 factorial experiment conducted in RBD.

5. Explain why factororial experiments are better than other experiments. Obtain various factorial effect totals using yates procedure for 2^4 factorial experiments.