

2018

STATISTICS

(Major)

Paper : 6.2

(Design of Experiments)

Full Marks : 60

Time : 3 hours

The figures in the margin indicate full marks for the questions

1. Answer the following as directed : 1×7=7

(a) The linear mathematical model used for analysis of variance is _____.

(Fill in the blank)

(b) The plots in a randomized block design should be homogeneous _____.

(Fill in the blank)

(2)

- (c) If the degrees of freedom for error sum of squares in Latin square design is 6, then the order of the design is

(i) 3×3

(ii) 4×4

(iii) 5×5

(iv) 6×6

(Choose the correct option)

- (d) For a 2^2 -factorial experiment in r randomized blocks, the sum of squares for the effect A in the analysis of variance table is _____.

(Fill in the blank)

- (e) Analysis of variance was developed by

(i) Karl Pearson

(ii) R. A. Fisher

(iii) Irving Fisher

(iv) G. W. Snedecor

(Choose the correct option)

(3)

- (f) The method of confounding is a device to reduce the size of

(i) experiments

(ii) replications

(iii) blocks

(iv) All of the above

(Choose the correct option)

- (g) If σ_1^2 is the error variance of design-1 and σ_2^2 of design-2 utilizing the same experimental material, the efficiency of design-1 over design-2 is

(i) $\frac{1}{\sigma_1^2} / \frac{1}{\sigma_2^2}$

(ii) $\frac{1}{\sigma_2^2} / \frac{1}{\sigma_1^2}$

(iii) σ_1^2 / σ_2^2

(iv) None of the above

(Choose the correct option)

(4)

2. Answer the following :

$$2 \times 4 = 8$$

(a) State some applications of analysis of variance.

(b) What do you understand by randomization in experimental design?

(c) Write the linear model of one-way classified data when there is a concomitant variable.

(d) In a partially confounded 2^3 -factorial experiment, the control blocks of two replications are given below :

(i)

(1)	a	bc	abc
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(ii)

(1)	b	ac	abc
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Identify the confounded effects and write down the other blocks of the replications.

(5)

3. Answer any *three* of the following.:

$$5 \times 3 = 15$$

(a) What do you understand by the principle of local control? What are its uses in design of experiment?

(b) Explain how analysis of variance can be used for testing the linearity of regression.

(c) What is missing plot technique? Find the estimate of the missing observation in a randomized block design.

(d) Describe the factorial method of experimentation. Stating its advantages over a simple experiment, explain the situation where it could be used.

(e) Suppose in a 2^4 -design, the highest order interaction has been confounded. Write down the contents of different sub-blocks. Also write the breakup of degrees of freedom supposing you have four similar replications.

(6)

4. Answer all questions :

- (a) Give the layout and analysis of Latin square design. Explain why the number of treatments tested in LSD should not be less than three. 10

Or

Describe the layout and give an outline of the analysis of a split plot design.

- (b) Suppose in a 2^4 -design, the effects ABC and ABD are confounded. Write down the contents of the control block. Taking four such replications, discuss the analysis of such a design. 10

Or

Derive the expression to measure the efficiency of Latin square design over a randomized block design when—

- (i) rows are used as blocks;
(ii) columns are used as blocks.
- (c) (i) Write explanatory notes on : 10
(1) Confounding
(2) Analysis of covariance

(7)

Or

(ii) Answer the following : 10

- (1) Explain how one can get a balanced confounding in a 2^5 -factorial experiment in five replications.

- (2) Write about the effect of violation of the assumptions made in analysis of variance technique.
