28/10/25

TM2253758Z

Reg. No :.....

Name :.....

MASTER'S DEGREE (C.S.S) EXAMINATION, OCTOBER 2025

2024 ADMISSIONS REGULAR

SEMESTER III - CORE COURSE

ST3C12TM - Design and Analysis of Experiments

Time : 3 Hours

Maximum Weight : 30

Part A

I. Answer any Eight questions. Each question carries 1 weight (8x1=8)

1. Explain the estimability of a parametric function.
2. What is BLUE of a linear function?
3. Write a short note on efficiency of a design.
4. Outline the important uses of uniformity trials in experimental design.
5. Explain the advantages of Local control.
6. Define an incomplete block design. When do you say that an incomplete block design becomes a balanced incomplete block design (BIBD) ?
7. With usual notations for the parameters of a BIBD, show that bk = vr.
8. Explain orthogonal contrasts with examples.
9. write a short note on response surface design.
10. Explain confounding with an example.

Part B

II. Answer any Six questions. Each question carries 2 weight (6x2=12)

11. Estimate the parametric vector β using method of least square hence find its mean and variance.
12. Briefly explain the likelihood ratio test.
13. Develop the missing plot technique used for the analysis of RBD with a single observation missing.
14. Consider a RBD with k treatments and r replications. Let n observations be missing such that each belong to different blocks and different treatment. Explain how you would analyze the data. Explain how you would analyze the data.
15. Using an example, show that for a BIBD, with incidence matrix $N = (n_{ij})_{v \times b}$,

    (a) $\sum_{j=1}^{b} n_{ij}^2 = r$

    (b) $\sum_{i=1}^{v} n_{ij}^2 = k$

    (c) $\sum_{i=1}^{v} n_{ij} n_{ij'} = \lambda, j \neq j'$
16. Explain any one method to construct a BIBD.
17. Construct a 2^5 design in blocks of 8 plots confounding ABC, ADE and BCDE.
18. Obtain confounded arrangement of 2^5 factorial experiment with factors A,B,C,D,E in which AB, BCD, ACE are confounded.

Part C

III. Answer any Two questions. Each question carries 5 weight **(2x5=10)**

19. Stating the assumption, Explain how you will proceed to test a linear hypothesis.
20. Work out the analysis of variance for a two-way classification with m observation per cell.
21. Write a note on Partially Balanced Incomplete Block Design.
22. Explain the analysis of a 2^2 factorial experiment with r replications.