TM243840C

Reg. No :..............................

Name :..................................

MASTER'S DEGREE (C.S.S) EXAMINATION, NOVEMBER 2024

2023 ADMISSIONS REGULAR

SEMESTER III - CORE COURSE Applied Statistics and Data Analytics

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 parametric vector in the context of linear parametric functions.
2. Define Stochastic linear model.
3. Give the assumptions of ANOVA. Derive the efficiency of LSD when compared to RBD.
4. Give the advantages of Randomisation.
5. Write a short note on efficiency of a design.
6. With usual notations for the parameters of a BIBD, show that bk = vr.
7. Define partially balanced incomplete block design (PBIBD).
8. Write a short note on factorial experiment with factors at 2 levels.
9. write a short note on response surface design.
10. Explain contrast with examples.

Part B

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

11. Let L'Y be an estimate of the estimable function $\lambda'\beta$ and L_s be the projection of L on V_s . Show that L_s'Y is also an estimate of $\lambda'\beta$ and $V(L_s'Y) < V(L'Y)$.
12. Estimate the parametric vector β using method of least square hence find its mean and variance.
13. Explain the Analysis of variance for one way classified data.
14. Develop the missing plot technique used for the analysis of RBD with a single observation missing.
15. Give an example of a BIBD with parameters (10,3,6,5,2).
16. Give an example of BIBD with parameters (12,3,9,4,1).
17. Sketch the analysis of a partially confounded 2^3 experiment by confounding AB and AC in 2 duplicates.
18. Derive the expressions for the various main effects and interaction effects of a 2^3 factorial experiment. Show that they constitute seven mutually orthogonal contrasts.

Part C

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

19. Show that the BLUE of estimable linear parametric function is unique and it is obtained by substituting for θ any solution of the normal equation obtained by the method of least square.
20. Derive the analysis of Greco - Latin square design. Compare its precision with LSD.
21. State and prove Fisher's inequality with usual notations of BIBD.
22. Explain the analysis of a 2^3 factorial experiment laid out in RBD with r replications.