

SECOND SEMESTER M.Sc. DEGREE EXAMINATION, APRIL 2024
(Regular/Improvement/Supplementary)

STATISTICS
FMST2C09- DESIGN AND ANALYSIS OF EXPERIMENTS

Time: 3 Hours

Maximum Weightage: 30

Part A: Answer any *four* questions. Each carries 2 weightage.

1. What are the assumptions of ANOVA? How are residuals useful in detecting deviations from normality assumptions?
2. Explain the role of replication in the design of experiments.
3. Discuss the model and analysis of a completely randomised design.
4. Define BIBD and suggest any one method for its construction.
5. Discuss the analysis of a 2^4 experiment in which all the three factor interactions are totally confounded.
6. Explain the relative efficiency of designs.
7. State main parametric relations in Partially Balanced Incomplete Block Design.

(4 × 2 = 8 weightage)

Part B: Answer any *four* questions. Each carries 3 weightage.

8. Explain the significance of Latin square design.
9. Let Y_1, Y_2 and Y_3 be uncorrelated observations with common variance σ^2 and expectations given by $E(Y_1) = \beta_0 + \beta_1, E(Y_2) = \beta_0 + \beta_2, E(Y_3) = \beta_0 + \beta_3$, where β_i 's are unknown parameters. Derive the estimability criterion and check whether $\beta_1 - \beta_2$ and $\beta_2 - \beta_3$ are estimable or not.
10. Estimate the missing value in a Latin square design when one observation is missing.
11. How do we decompose the total sum of squares in to the sum of squares due to treatment, block and error in RBD? Explain.
12. Discuss Yate's procedure for obtaining the various effects of a 2^k experiment.
13. Let b denotes the number of blocks and v denotes the number of treatments in a BIBD. Prove that $b \geq v$.
14. Describe split-split plot design.

(4 × 3 = 12 weightage)

(P.T.O.)

Part C: Answer any two questions. Each carries 5 weightage.

15. Describe the analysis of variance for the random effect model for one-way classified data.
16. Explain the analysis of lattice designs.
17. Explain the analysis of a balanced incomplete block design. Prove that the efficiency of BIBD is less than that of RBD in terms of estimating simple linear treatment contrasts.
18. Explain the concepts of total confounding and partial confounding. Write its advantages and disadvantages.

(2 × 5 = 10 weightage)