

SECOND SEMESTER M.Sc. DEGREE EXAMINATION, APRIL 2025
(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. Distinguish between the random effects model and the fixed effects model.
2. Explain when a Latin Square Design is used.
3. Define: i) estimable parametric function ii) best linear unbiased estimators.
4. Explain lattice design.
5. What is the analysis of covariance? Give an example of an experiment in which ANCOVA is employed.
6. Obtain the main effects and interaction effects of a 2^2 factorial design.
7. Define Balanced Incomplete Block Design. When do you say that a balanced incomplete block design is symmetric?

(4 × 2 = 8 weightage)

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

8. Explain the non-parametric alternative of ANOVA test and its uses.
9. Show that the efficiency of Randomised Block design will never be lesser than completely randomised design.
10. Let the model equations be
$$\begin{aligned}y_1 &= 2\alpha_1 + 3\alpha_2 + e_1 \\y_2 &= 3\alpha_1 + 4\alpha_2 + e_2 \\y_3 &= 4\alpha_1 + 5\alpha_2 + e_3\end{aligned}$$
Find the best estimates of α_1 and α_2 .
11. Explain the analysis of a Graeco Latin Square Design.
12. Explain partially balanced incomplete block design. Describe the linear model corresponding to PBIBD with two associates.
13. Write down the analysis of variance table for the main plot treatments in a split plot design. Explain the disadvantages of split plot design.
14. Construct a Balanced Incomplete Block Design with $v = 7$, $b = 7$, $k = 3$, $r = 3$ and $\lambda = 1$.

(4 × 3 = 12 weightage)

(P.T.O.)

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

15. Explain the different methods for model adequacy checking.
16. Write down the linear model associated with Latin square design and discuss the estimation of its parameters.
17. Estimate the treatment effects for the Balanced Incomplete Block Design model using least squares method.
18. Describe 3^2 factorial designs and its analysis.

(2 × 5 = 10 weightage)