

SHRIMATHI DEVKUNVAR NANALAL BHATT VAISHNAV COLLEGE FOR WOMEN  
(AUTONOMOUS)

(Affiliated to the University of Madras and Re-accredited with 'A+' Grade by NAAC)  
Chromepet, Chennai - 600 044.

B.Sc.Statistics - END SEMESTER EXAMINATIONS - APRIL 2025  
SEMESTER - V

**20USTCT5010 - Design of Experiments**

Total Duration : 2 Hrs.30 Mins.

Total Marks : 60

**Section B**

Answer any **SIX** questions ( $6 \times 5 = 30$  Marks)

1. Explain the principles of Replication, Randomization, and Local Control in experimentation.
2. Describe Fair field Smith's variance law and its significance in experimental design.
3. State Cochran's Theorem and explains its importance in the analysis of variance.
4. Explain how you would analyse a randomized block design.
5. Describe the advantages of using a Randomized Block Design (RBD) over a Completely Randomized Design.
6. Explain the least squares method for estimating one missing observation in a Randomized Block Design (RBD).
7. Discus in detail the importance and the analysis of a SPLIT-Plot design.
8. Explain the principles of confounding.

**Section C**

Answer any **THREE** questions ( $3 \times 10 = 30$  Marks)

9. Discuss the concept of the size of an experimental unit. Explain the methods used to determine the appropriate size, including the Maximum Curvature Method.
10. Describe the multiple range tests: Newman-Keuls test, Duncan's multiple range test, and Tukey's test. Compare their advantages and limitations.
11. Explain the procedure for conducting an experiment using a Latin Square Design (LSD). Discuss how the effects of rows, columns, and treatments are separated in the analysis.
12. Derive the analysis of covariance (ANCOVA) table for a Completely Randomized Design (CRD) and explain how it improves the precision of treatment comparisons.
13. Describe the analysis of a  $3^2$  factorial experiment and discuss the interpretation of main effects and interaction effects.

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