M. G. Science Institute, Ahmedabad

Autonomous | Affiliated to Gujarat University, Ahmedabad

(Managed by The Ahmedabad Education Society)

Department of Statistics

Bachelor of Science (Hons.) in Statistics

B.Sc. (Hons.) Statistics

4 Year, 8 Semester Full-Time Programme

Choice Based Credit System (CBCS) & Grading System

Outcome-Based Education Pattern

(Effective from Academic Year 2024-25)

STM362 Design of Experiments

Semester: VI	Course Title:	Credit: 4
Course No.: STM362		Hours: 4/week

Course Outcomes: On successful completion of the course the learner will be able to

CO	COGNITIVE ABILITIES	COURSE OUTCOMES
CO 1	REMEMBERING	Recall fundamental concepts, principles, and types of experimental designs and ANOVA methods.
CO 2	UNDERSTANDING	Explain layouts, assumptions, and analysis procedures of CRD, RBD, LSD, and factorial designs.
CO 3	APPLYING	Apply ANOVA techniques to analyze experimental data and handle missing values in designs.
CO 4	ANALYSING	Compare efficiencies of different designs and interpret experimental results statistically.
CO 5	EVALUATING	Evaluate the suitability of different experimental designs for given research problems.
CO 6	CREATING	Develop experimental designs and construct ANOVA tables for factorial experiments.

CO-PO Mapping

CO / PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	1	0	0
CO2	2	3	2	1	0
CO3	1	2	3	2	1
CO4	0	1	2	3	2
CO5	0	1	2	3	3
CO6	0	0	1	2	3

Unit	Detailed Syllabus	No. of Hours of Teaching
I	**One Way Analysis of Variance and Completely Randomized** Design (CRD) - For fixed effect model One way classification – purpose and Analysis with equal number of observations per cell using ANOVA technique - Concept of treatment, plot, block, yield, Shapes and Sizes of Plots and Blocks - Principles of experimental design: Randomization, Replication and Local Control - Complete randomized Design (CRD)- Introduction, Layout, statistical analysis and merit demerits of CRD.	15
II	**Two Way Analysis of Variance and Randomized Block Design (RBD)** - Two-way classification – purpose and Analysis with equal number of observations per cell using ANOVA technique	15

	- Expected values of sum of squares for both one- and two-way classifications - Randomized Block Design (RBD) - Introduction, Layout, statistical analysis and merit demerits of RBD - Estimation of One and two missing yields - Efficiency of Randomized Block Design Over Completely Randomized Design.	
III	**Latin Square Design (LSD)** - Latin Square Design - Introduction, Layout, statistical analysis and merit demerits of LSD - Estimation of One and two missing yields - Efficiency of Latin Square Design (LSD) over Randomized Block Design (RBD) and over Completely Randomized Design (CRD)	15
IV	**Factorial Design** - Concept and need of factorial experiments - Idea of terms – main and interaction effect, - Yates' Procedure and Yates' table – for analysing 2^2 and 2^3 factorial designs - confounding – total and partial.	15

Suggested Reference Books:

1. Gupta, S. C. And Kapoor, V. K. (2005): Fundamentals of Applied Statistics, Sultan Chand & Sons.
2. Mukhopadhyay P. (1999): Applied Statistics
3. Gupta, S. C. (2005): Business Statistics, Himalaya Publishing House.