DESIGN AND ANALYSIS OF EXPERIMENTS
(Open Elective)

COURSE CODE: 15CH1149   **L T P C**
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COURSE OUTCOMES:
At the end of the course the student shall be able to

CO1:	Understand the importance of Design of Experiments
CO2:	Given a number of factors which affects the experiment, the student should be able to determine the most important factor
CO3:	Learn the factorial design of experiments
CO4:	Design a learn regression model for an experiment and construct confidence intervals for each parameter.
CO5:	Asses the importance of curvature in regression and construct response surface

UNIT-I   (10 LECTURES)

Learning Objectives: Theory of probability and statistics will be explained with regards to this course.

Strategy of Experimentation, Some Typical Applications of Experimental Design, Basic Principles, Guidelines for Designing Experiments, A Brief History of Statistical Design
Summary: Using Statistical Techniques in Experimentation.
Sampling and Sampling Distributions, Inferences about the Differences in Means-Randomized Designs, Inferences about the Differences in Means- Paired Comparison Designs, Inferences about the Variances of Normal Distributions

UNIT-II   (10 LECTURES)

Learning Objectives: The effect of more than one factor will be explained by ANOVA method

The Analysis of Variance, Analysis of the Fixed Effects Model
Statistical Analysis of the RCBD

UNIT-III   (10 LECTURES)

Learning Objectives:
1. To calculate factor levels that optimizes the outcome of an experiment
2. To learn the factorial design of experiments

Introduction to Factorial Designs, Basic Definitions and Principles, The Advantage of Factorials, The Two-Factor Factorial Design, The General Factorial Design
The 2k Factorial Design, Introduction, The 22 Design, The 23 Design, The General 2k Design, A single replicate of the 2k design, The addition of center points to the 2k design.

UNIT-IV   (10 LECTURES)

Learning Objectives: Regression model for factorial analysis will be developed

Fitting Regression Models, Introduction, Linear Regression Models, Estimation of the Parameters in Linear Regression Models, Hypothesis testing in multiple regression, Confidence intervals in multiple regression

UNIT-V   (10 LECTURES)

Learning Objectives: The quadratic effect of responses will be analyzed by Response surface methodology

 Introduction to Response Surface Methodology, the Method of Steepest Ascent, Experimental Designs for Fitting Response Surfaces- Designs for Fitting the First-Order Model, Designs for Fitting the Second-Order Model, Evolutionary Operation.

TEXT BOOKS:

1. Montgomery, D.C., "Design and Analysis of Experiments", 5 Ed., John Wiley and Sons Inc., New York, 2006.

REFERENCES:

1. George. E. P. Box, J. Stuart Hunter, William G. Hunter, "Statistics for Experimenters: Design, Innovation, and Discovery", 2nd Edition, Wiley, 2005.

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