DESIGN AND ANALYSIS OF EXPERIMENTS
(Elective-II)

Subject Code: 13ME2117 **L P C**
4 0 3

Pre requisites: Probability and Statistics

Course Educational Objectives:
To make the student learn
1. the effect of input factors on the output parameters
2. design of experiments by different methods
3. to develop regression models and response surface methods

Course Outcomes:
The student will be able to
1. conduct the experiment by using factorial and fractional factorial design
2. fit the best model for the given experimental data
3. check the adequacy of the regression model using ANOVA
4. optimize using response surface method

UNIT-I
Strategy of experimentation: guidelines for designing experiments, sampling and sampling distributions, hypothesis testing, choice of sample size.
Experiments with single factor**:** analysis of variance, analysis of the fixed effects model, model adequacy checking, sample computer output, regression approach to the analysis of variance.

UNIT-II
Factorial designs: principles, advantage of factorials, two-factor factorial design, general factorial design, fitting response curves and surfaces.
2^k factorial design: 2^2 design, 2^3 design, General 2^k design, single replicate of 2^k design.

UNIT-III
Two-level fractional factorial designs: one-half fraction of 2^K design, one-quarter fraction of 2^K design, blocking replicated 2^K factorial design, confounding in 2^K factorial design

Three-level and mixed-level factorial design: 3^K factorial design, confounding in 3^K factorial design, fractional replication of 3^K factorial design, factorials with mixed levels.

UNIT-IV

Regression models: Linear regression models, estimation of the parameters, hypothesis testing in multiple regression, confidence intervals in multiple regression, prediction of new response observations, regression model diagnostics.

UNIT-V

Response surface methods: introduction, method of steepest ascent, analysis of second-order response surface, experimental designs for fitting response surfaces.

TEXT BOOK:

1. D.C. Montgomery, "*Design and Analysis of Experiments*", 5th edition, John Wiley and sons, 2009.

REFERENCES:

1. D.C. Montgomery, " *Introduction to Statistical Quality Control*", 4th edition, John Wiley and sons, 2001.

2. Angela Dean and Daniel Voss, "*Design and Analysis of Experiments*", Springer, 1999.