Course code	Course Name	L-T-P - Credits	Year of Introduction
IE486	DESIGN AND ANALYSIS OF EXPERIMENTS	3-0-0-3	2016
	Prerequisite : Nil		

Course Objectives:
- To introduce the concept of experimentation
- To equip students to understand the necessity of experimentation
- To provide basic methods of designing an experiment

Syllabus:
Statistical fundamentals, hypothesis testing, analysis of variance, block design, statistical analysis of models, full factorial and fractional factorial designs, introduction to Taguchi method.

Expected outcome .
 The students will be able to:
- Understand the need for a design for experimentation
- Apply the basic principles to do an experiment design
- Make inferences out of the outcomes of experimental design.

References:
1. Montgomery, D.C., Design and Analysis of experiments, 8the Ed, John Wiley and Sons, 2013.
2. Montgomery, D.C., Statistical Quality Control, 6th Ed., John Wiley & Sons, Inc. 2009
3. Nicolo Belavendram, Quality by Design; Taguchi techniques for industrial experimentation, Prentice Hall, 1995.
4. Phillip J.Rose, Taguchi techniques for quality engineering, McGraw Hill, 1996.
5. Phadke, Quality Engineering Using Robust Design, Pearson Education Singapore Pte Ltd; First edition, 2008

Course Plan

Module	Contents	Hours	End Sem. Exam Marks
I	Basic Statistical Concepts, sampling and sampling distributions, comparisons of populations by sample statistics – known populations parameters and unknown population parameters, paired comparisons	7	15%
II	Importance of experiments, experimental strategies, basic principles of design, terminology, steps in experimentation, sample size, normal probability plot, linear regression model.	7	15%
FIRST INTERNAL EXAMINATION			
III	Hypothesis testing – z-test, t-test, chi-square test and F-test, Single factor experiments – ANOVA, model adequacy testing	7	15%
IV	Completely randomized design, Randomized block design, Latin square design. Statistical analysis, estimation of model parameters, model adequacy testing and interpretation of results	7	15%
SECOND INTERNAL EXAMINATION			
V	Two and three factor full factorial experiments, 2^K factorial Experiments, confounding and Blocking designs.	7	20%
VI	Fractional factorial designs, Introduction to Response Surface Methodology, theory of experiments with random factors,	7	20%

introduction to Taguchi design method. Use of software packages in design of experiments.		

END SEMESTER EXAM

Question Paper Pattern:

Examination duration: 3 hours   Maximum Marks: 100

Part A (Modules I and II):

Candidates have to answer any 2 questions from a choice of 3 questions. Each full question carries a total of 15 marks and can have a maximum of 4 sub questions (a, b, c, d). No two full questions shall be exclusively from a single module. All three questions shall preferably have components from both modules. Marks for each question/sub question shall be clearly specified. Total percentage of marks for the two modules put together as specified in the curriculum shall be adhered to for all combinations of any two questions.

Part B (Modules III and IV): (Same as for part A marks)

Part C (Modules V and VI):

(Same as for part A, except that each full question carries 20 marks)

Note: If use of tables and charts are permitted for the university examination for this course, proper direction of the same should be provided on the facing sheet of the question paper.