PROBABILITY AND STATISTICS

III Semester: ME								
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
AHSB12	**Foundation**	3	1	-	4	30	70	100
Contact Classes: 45	**Tutorial Classes: 15**	**Practical Classes: Nil**				**Total Classes: 60**		

COURSE OBJECTIVES:
The students will try to learn:

I	The Principles of probability, the theory of random variables, basic random variate distributions and their applications.
II	The Methods and techniques for quantifying the degree of closeness among two or more variables and linear regression analysis.
III	The Estimation statistics and Hypothesis testing which play a vital role in the assessment of the quality of the materials, products and ensuring the standards of the engineering process.
IV	The statistical tools which are essential for translating an engineering problem into probability model.

COURSE OUTCOMES:
After successful completion of the course, students will be able to:

CO 1	**Determine** the conditional probability of interdependent events by using Bayes theorem.
CO 2	**Explain** simulation of random events by using the concept of random variables
CO 3	**Calculate** the expected values, variances of the discrete and continuous random variables for making decisions under randomized probabilistic conditions.
CO 4	**Interpret** the Probability distributions such as Binomial, Poisson andNormal distribution by using their probability functions and parameters.
CO 5	**Apply** the concepts of discrete and continuous probability distribution and CLT for solving real time problems under probabilistic conditions.
CO 6	**Interpret** the results of Bivariate and Multivariate Regression as well as Correlation Analysis for statistical forecasting.
CO 7	**Identify** the role of types of statistical hypotheses, types of errors, sampling distributions of means and confidence intervals in hypothesis testing
CO 8	**Apply** tests of hypotheses for both large and small samples in making decisions over statistical claims.
CO 9	**Test for** the assessment of goodness of fit of the given probability distribution model by using Chi-square distribution.
CO 10	**Make Use of** R software package in computing confidence intervals, Regression analysis and hypothesis testing.
CO 11	**Select** appropriate statistical methods for solving real-time engineering problems governed by laws of probability.

MODULE-I	PROBABILITY AND RANDOM VARIABLES

Probability, Conditional Probability, Baye's Theorem; Random variables: Basic definitions, discrete and continuous random variables; Probability distribution: Probability mass function and probability density functions; Mathematical expectation.

MODULE-II	PROBABILITY DISTRIBUTION

Binomial distribution; Mean and variances of Binomial distribution, Recurrence formula for the Binomial distribution; Poisson distribution: Poisson distribution as a limiting case of Binomial distribution, mean and variance of Poisson distribution, Recurrence formula for the Poisson distribution; Normal distribution; Mean, Variance, Mode, Median, Characteristics of normal distribution.

MODULE-III	CORRELATION AND REGRESSION

Correlation: Karl Pearson's Coefficient of correlation, Computation of correlation coefficient, Rank correlation, Repeated Ranks; Properties of correlation.
Regression: Lines of regression, Regression coefficient, Properties of Regression coefficient, Angle between two lines of regression; Multiple correlation and Regression.

MODULE-IV	TEST OF HYPOTHESIS - I

Sampling: Definitions of population, Sampling, Parameter of statistics, standard error; Test of significance: Null hypothesis, alternate hypothesis, type I and type II errors, critical region, confidence interval, level of significance. One sided test, two-sided test.
Large sample test: Test of significance for single mean, Test of significance for difference between two sample means, Tests of significance single proportion and Test of difference between proportions.

MODULE-V	TEST OF HYPOTHESIS - II

Small sample tests: Student t-distribution, its properties: Test of significance difference between sample mean and population mean; difference between means of two/ small samples. Snedecor's F-distribution and its properties; Test of equality of two population variances Chi-square distribution and it's properties; Chi-square test of goodness of fit.

Text Books:

1. Erwin Kreyszig, "Advanced Engineering Mathematics", JohnWiley&SonsPublishers,9th Edition, 2014.
2. B. S. Grewal, "Higher Engineering Mathematics", Khanna Publishers, 43rd Edition, 2012.

Reference Books:

1. N. P. Bali, "Engineering Mathematics", Laxmi Publications, 9th Edition, 2016.
2. S. C. Gupta, V. K. Kapoor, "Fundamentals of Mathematical Statistics", S. Chand & Co., 10th Edition, 2000.
3. Richard Arnold Johnson, Irwin Miller and John E. Freund, "Probability and Statistics for Engineers", Prentice Hall, 8thEdition, 2013.