



Subject Code: 01CT0401

Subject Name: Probability and Statistics

B. Tech. Year – II (Semester IV)

Objective:

To provide a foundation in probability theory and statistical method in order to solve applied problems and to prepare for more advanced courses in probability and statistics.

Credits Earned: 04 Credits

Course Outcomes: After completion of this course, student will be able to:

1. Understand the basic concepts of probability and distribution
2. Understand the importance of random variable and joint probability distribution.
3. Derive the probability density function of transformations of random variables and use these techniques to generate data from various distributions Apply concept of Correlation and Regression in result analysis and Business forecasting using PHYTON.
4. Construct the probability distribution of a random variable, based on a real-world situation, and use it to compute various raw and central moments of higher order. Assess which distribution for summarizing a data set are most appropriate and highlight interesting features of the data
5. Perform Test of Hypothesis as well as calculate confidence interval for a population parameter for single sample and two sample cases also Learn non-parametric test such as the Chi-Square test for Independence as well as Goodness of Fit

Pre-requisite of course: Differential and Integral Calculus and Basic Integration

Teaching and Examination Scheme:

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial / Practical Marks		Total Marks
Theory	Tutorial	Practical		E	I		V	T	
				ESE	IA	CSE	Viva	Term Work	
3	2	0	4	50	30	20	25	25	150



Contents:

Unit	Topics	Contact Hours
1	Introduction to Probability Classical and axiomatic definitions of probability, sample space, probability of an event, addition rule and conditional probability, multiplication rule, total probability, Bayes' theorem and independence.	6
2	Random variable Introduction to the concept, Discrete and continuous random variable: definitions and examples, Probability density function and cumulative distribution functions of continuous random variables, Probability mass function of discrete random variables, expected values and variance of discrete random variable.	8
3	Probability distribution Moments, probability and moment generating functions, Some special probability distributions: Uniform, Exponential, Poisson, geometric, Binomial and Normal distribution.	6
4	Two – dimensional random variable Joint distributions – Marginal and Conditional distributions, Covariance, regression, correlation, Independence of random variables.	6
5	Transformation Transformation of random variables of two dimensions, Central limit theorem (for independent and identically distributed random variables), convergence in probability. Introduction to statistics, Measure of central tendency (mean, median, mode) and measures of dispersion (standard deviation, mean deviation, range, variance etc.)	4
6	Estimation Consistency, Unbiasedness, the method of moments and the method of maximum likelihood estimation, confidence intervals for proportions, confidence intervals for parameters in one sample and two sample problems of normal populations.	6
7	Testing of Hypotheses Null and alternative hypotheses, the critical and acceptance regions, two types of error, power of the test, tests for one sample and two sample problems for normal populations, tests for proportions the most powerful test and Neyman- Pearson Fundamental Lemma, Chi square goodness of fit test and its applications.	6
Total Hours		42



Suggested Text books / Reference books:

1. Introduction to Probability and Statistics for Engineers and Scientists, S. M. Ross, Academic Press, 2009.
2. Introduction to Probability and Statistics, J.S. Milton & J. C. Arnold, Cengage Learning, 2008
3. A First Course in Probability, S.M. Ross, Prentice Hall, 2001.
4. Introduction to Probability Theory and Statistical Inference, H.J. Larson, Wiley, 1982.

Suggested Theory distribution:

The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process.

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyze	Evaluate	Create
20%	20%	30%	15%	10%	5%