



GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

PROBABILITY AND STATISTICS

Course Code: GR15A2011
II Year II Semester

L:2 T:1 P:0 C:3

Prerequisites: Fundamentals in Basic Mathematics.

Course Objectives: At the end of the course the student is expected to

- Know the fundamentals of Probability and Statistics.
- Understand and apply the Tests of Hypothesis, Correlation & Regression
- Understand simple Queuing models.

Course Outcomes: Students will learn

- Strong basics of Probability.
- Application of regression analysis to analyse a problem.
- Application of inferential statistics.
- Application of Stochastic processes.

Unit-I

Probability: Basic concepts in Probability - Conditional probability–Addition and Multiplication theorems for two events, (Concepts without derivations)- Bayes theorem.

Random variables: Definition of random variable, discrete and continuous random variables –Distribution function and statement of its properties. Probability mass function, probability density function with illustrations -Joint, marginal and conditional distributions with illustrations - Mathematical expectation and variance of a r.v with examples and statement of their properties.

Unit-II

Distributions: Binomial, Poisson, Uniform, Normal and Exponential distributions (definition, real life examples, Statements of their Mean, Mode and Variance and problems).fitting of Binomial and Poisson distributions. Sampling distribution: Definition of Population and sample, Overview of types of sampling(Purposive, Random, SRS with and without replacement cases, Stratified and Systematic random samplings) - Sampling distribution, standard error, statements of sampling distribution of mean(s) (Population variance(s)known and unknown) and proportion(s) (Population proportion(s)known and unknown) with examples.

Unit-III

Estimation &Testing of Hypothesis: Definitions of Point and Interval estimation. Confidence intervals for single mean, difference of two means, single proportion and difference of two proportions. Concepts of Null and Alternative hypotheses,



Critical region, Type I and Type II errors, one tail and two-tail tests, Level of significance and power of a test.

Large Samples Tests: Tests of hypothesis for mean(s) (single and difference between means), Tests of hypothesis for proportion(s) (single and difference between proportions), Chi-square test for testing goodness of fit, independence of attributes and single population variance.

Unit-IV

Small samples: Student's t-test for testing the significance of single mean, difference of means (independent samples and paired samples), F-test for equality of variances (Concepts and problem solving). Correlation & Regression: Product moment correlation coefficient, Spearman's rank correlation coefficient and Statements of their properties – Simple linear regression, Lines of Regression, Regression coefficients and Statements of their properties, Multiple regression for three variables only.

Unit-V

Stochastic Process: Definitions of stochastic process, parameter space and state space. Classification of stochastic processes and stochastic matrices. Definitions of a Markov chain, transition probability matrix, initial probability distribution, joint distribution and n-step TPM. Classification of states in a Markov chain and limiting distribution.

Queuing theory: Queue description, characteristics of a queuing model, Poisson process, concept of Birth and death process, steady state solutions of (M/M/1: ∞ /FIFO) and (M/M/1: N/FIFO), (Concepts and problem solving).

Teaching Methodologies

1. Chalk & Talk
2. ppts

Text Books

1. Probability and statistics for engineers (Erwin Miller and John E. Freund), R.A Johnson and C.B.Gupta, Pearson education.
2. Fundamentals of Stochastic process-Medhi (for Unit-V), New age international publications.
3. Probability and Statistics, Dr. T. K. V. Iyengar, Dr. B. Krishna Gandhi et.al, S. Chand.

Reference Books

1. Fundamentals of Mathematical Statistics, S. C. Gupta, V. K. Kapoor, S. Chand.
2. Probability, Statistics and Queuing Theory with computer applications-Arnold O. Allen, Academic press.
3. Introduction to Probability and Statistics, 12th edition, W. Mendenhall, R. J. Beaver and, B. M. Beaver, Thomson. (Indian edition)