

## MTH302:PROBABILITY AND STATISTICS

L:3 T:0 P:0 Credits:3

**Course Outcomes:** Through this course students should be able to

CO1 :: recall the concept of random variables and its distribution functions.

CO2 :: recognize relationships among the variables through correlation and regression.

CO3 :: apply probability distributions to find the solution of different engineering problems.

CO4 :: describe sample, population and statistical inference.

CO5 :: understand hypothesis testing and its applications.

### Unit I

#### **Random Variables and Probability**

**Distributions** : discrete and continuous random variables and their distribution functions, joint probability distributions, mean, variance and covariance of random variables, Chebyshev's theorem( without proof)

### Unit II

**Correlation and Linear regression** : scatter plots, correlation coefficient and its properties, Karl Pearson's correlation coefficient, Spearman's rank correlation coefficient, Linear regression and its properties

### Unit III

**Special Discrete Distributions** : the Bernoulli process, binomial distribution and its moment generating function (mgf), negative binomial distribution and its mgf, geometric distribution and its mgf, Poisson distribution and its mgf

### Unit IV

**Special Continuous Distributions** : normal distribution and its mgf, normal approximation to the binomial, gamma distribution and its mgf, exponential distribution and its mgf

### Unit V

**Point Estimation and the Central Limit Theorem** : unbiased estimator, consistent estimator, efficient and sufficient estimator, likelihood function and maximum likelihood estimation, the central limit theorem(without proof)

### Unit VI

**Hypothesis Testing** : Types of Error, F-test, Student t-test for single mean and difference of means, Z-test for single mean and difference of means, Chi-square test for goodness of fit

### Text Books:

1. PROBABILITY AND STATISTICS FOR ENGINEERS AND SCIENTISTS by RONALD E. WALPOLE, RAYMOND H. MYERS, SHARON L. MYERS, AND KEYING YE, PEARSON

### References:

1. PROBABILITY STATISTICS AND RANDOM PROCESSES by T VEERARAJAN, MCGRAW HILL EDUCATION

2. FUNDAMENTALS OF MATHEMATICAL STATISTICS by S.C.GUPTA AND V.K.KAPOOR, SULTAN CHAND & SONS (P) LTD.

