

# MATHEMATICAL STATISTICS

Course Code: **MM24406DCE**

Semester: **MA/M.Sc. 4<sup>th</sup> Semester**

Continuous Assessment: **Marks 20, Theory: Marks 80**

Total Credits: **04**

Total Marks: **100**

Time Duration: **2½ hrs**

**Course objectives:** To provide and develop ideas about probability theory and mathematical statistics for stochastic processes and decision-makings.

**Course Outcomes:** After the completion of this course, the students can apply various statistical and probabilistic methods in exploring applications of various real life situations with stochastic behavior.

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## **UNIT -I**

Some Special Distributions, Bernoulli, Binomial, trinomial, multinomial, negative binomial, Poisson, gamma, chi-square, beta, Cauchy, exponential, geometric, normal and bivariate normal distributions.

## **UNIT -II**

Distribution of functions of random variables, distribution function method, change of variables method, moment generating function method, t and F distributions, Dirichlet distribution, distribution of order statistics, distribution of  $X$  and  $nS^2/\sigma^2$ , limiting distributions, different modes of convergence, central limit theorem.

## **UNIT -III**

Interval estimation, confidence interval for mean, confidence interval for variance, confidence interval for difference of means and confidence interval for the ratio of variances, point estimation, sufficient statistics, Fisher-Neyman criterion, factorization theorem, Rao- Blackwell theorem, best statistic (MvUE), Complete Sufficient Statistic, exponential class of pdfs.

## **UNIT -IV**

Rao-Crammer inequality, efficient and consistent estimators, maximum likelihood estimators (MLE's), testing of hypotheses, definitions and examples, best or most powerful (MP) tests, Neyman Pearson theorem, uniformly most powerful (UMP) tests, likelihood ratio test, chi-square test.

## **Recommended Books**

1. Hogg and Craig, An Introduction to Mathematical Statistics, Pearson, 7<sup>th</sup> Edition, 2012.
2. A. Mood and F. Grayball, An Introduction to Mathematical Statistics, McGraw Hill, 3<sup>rd</sup> Edition, 2017.
3. C. R. Rao, Linear Statistical Inference and its Applications, Wiley 2<sup>nd</sup> Edition, 2009.
4. V. K. Rohatgi, An Introduction to Probability and Statistics, Wiley 2<sup>nd</sup> Edition, 2008.