

Department of Statistics
Syllabus for M. Phil / Ph.D. Entrance - 2022

Distribution Theory

Random variables, Distribution function and its properties, joint, marginal and conditional distribution, continuous and discrete distributions, conditional expectation, simple, partial and multiple correlations and regression, some moments inequalities, order statistics, central t, F and χ^2 distributions.

Probability theory

Borel field, sigma field, limsup, liminf of a sequence of sets, probability measure, monotone convergence theorem, Fatou's lemma, Borel-Cantelli, Lemma, various types of convergence, WLLN, SLLN, characteristics function and related theorem, central limit theorems.

Linear Algebra and Matrices

Rank of a Matrix & its properties, inverse and generalized inverse of a matrix, solution of linear equations, characteristics roots and vectors, Cayley-Hamilton Theorem, Gram-Schmidt orthogonalisation process, quadratic forms, Matrix and vectors differentiation.

Real Analysis

Sets, Real number System, open and closed sets, compact set, Heine Borel Theorem, Sequence and Series, Uniform Continuity, Uniform Convergence, Maxima-minima, improper integrals, Leibnitz rule.

Sampling

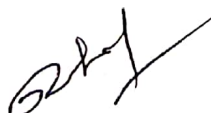
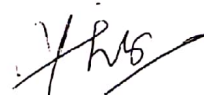
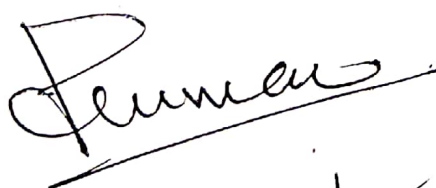
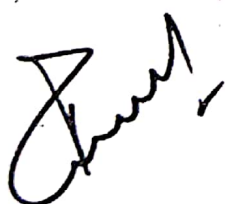
Simple Random Sampling Stratified Sampling, systematic sampling,, PPS Sampling, cluster and two stage sampling.

Multivariate

Multivariate normal distribution, Wishart Distribution, Hotelling T^2 . Discriminant analysis, principle component analysis, canonical correlation.

Design of Experiment

CRD, RBD, LSD, factorial experiment, confounding, BIBD, PBIBD.



Statistical Inference

Properties of good estimator, Factorization Theorem, Completeness, Bounded completeness, Cramer Rao and Chapman-Robbins-kiefer inequalities, Rao-Blackwell Theorem, Lehmann-Scheffe Theorem, MVUE, Methods of estimation and confidence intervals, Types of hypothesis, types of tests, likelihood ratio tests and its asymptotic distribution.

Non parametric tests: sign test, Wilcoxon signed rank test, run test for randomness, Mann-Whitney test, Kolmogrov- Smirnov test, Median test.

Operations research

Linear programming problem, Duality, Transportation problem, Assignment problem.

Stochastic Process

Stochastic Process and its classification, Markov Chains, Chapman-Kolmogrov equations, n-step transition probability, Random walk and Gambler's ruin problem, Poisson process, birth, death and Birth- Death process, Renewal process. branching process.

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