Syllabus for M.Phil. (Statistics) Entrance Examination

Part-I

Research Methodology


Part-II

Statistics

Unit 1: Additive and countably additive set functions. Counting measure-examples. Measurable functions and properties. Sequences of measurable functions. Convergence in measure, convergence in mean, convergence a.e and convergence in pth mean. Metric space-Metric in R^n, open set, closed set, limit point of a set, Cauchy sequence, Vector spaces- basis and dimensions, orthogonal basis-Gram Schmidt orthogonalization- Linear transformation, eigen values and eigen vectors, Cayley-Hamilton theorem, canonical form, diagonal form, triangular form, Jordan form, Quadratic forms, reduction of quadratic forms, derivative of a function with respect to a vector, with respect a matrix.

UNIT 2: Random variables and distribution function. Univariate discrete and continuous distributions, Bivariate distributions- Joint, conditional and marginal distributions, p.g.f. and m.g.f. of bivariate random vector, Multinomial and multivariate normal distributions, Sampling distributions and applications. Distributions of functions of random variables, Order statistics, Distributions of order statistics, Distribution of quadratic forms in normal variables. Tests of hypotheses-one sample and two sample problems, Tests of hypothesis about mean vector of a multivariate normal distribution, Hotelling’s T^2 and Mahalanobi’s D^2. Classification problem, classifications to one of k multivariate normal populations.


UNIT 5: Estimation of population mean and population variance under various methods of probability sampling designs with or without replacement, simple random sampling, PPS sampling, Stratified random sampling, systematic sampling, IPPS sampling, Midzuno-Sen scheme of sampling, Cluster sampling and two stage sampling. Various methods of allocation in stratified random sampling, post-stratification, applications of double sampling for stratified random sampling, Estimation using auxiliary information in survey sampling-ratio estimator, regression estimator, double sampling for ratio and regression method of estimation. General linear models, estimability of linear parametric functions, Gauss-Markov theorem, ANOVA-one-way classification, two-way classification with equal and unequal number of observations per cell, Standard designs: CRD, RBD, LSD, GLSD. Efficiency of design and comparison. Statistical analysis of symmetrical factorial designs. Total and partial confounding in $2^a$, $3^n$ and $p^n$ experiments. Incomplete block designs, BIBD, PBIBD. Split-plot and split-split plot designs, strip-plot design, missing and mixed plot analysis in RBD, LSD, GLSD.