

Syllabus for Ph.D. Entrance Test in Statistics  
**Paper-1 (Objective)**

Duration:- 01 hr.

Maximum mrks:-100

Probability (4) : Probability Distribution : Binomial, Poisson and Normal (6), Test of significance : Large sample tests (2), small sample tests : t-test (1), F-test (1) and Chi-square test (2), Correlation and Regression: Simple , rank, Partial, Multiple correlation and regression (6), Sampling and Design of Experiments: Random Sampling Stratified Sampling (4), RBD, CRD, LSD (4), Linear Programming : simplex method, Methods of findings BFS for the transportation problems (4), Inference : Testing of hypothesis , simple against simple, properties of good estimators (4), Time Series: Methods of measuring : linear trend , seasonal variations (4), Vital Statistics: Measures of fertility and Mortality(4), Queues and Stochastic Processes : Basics of queues : Markovchain ; Markov Process -(4)

Note:- The number shown in the brackets stand for the number of questions to be set from that very preceding topic.

# Syllabus for Ph.D. Entrance Test in Statistics

## Paper-II ( Subjective)

Duration :- 02 hours

Maximum Marks: 100

### Unit-1

Borel-contelli Lemma, Tchebycheff's and Kolmogorov's inequalities, Various modes of convergence: in probability, almost sure, in distribution and in mean square and their inter-relationship.

Properties of a good estimator, Concept of likelihood function, Cramer-Rao inequality, Bhattacharya Bounds, Minimum mean square estimation, Rao-Black well theorem.

### Unit-II

Binomial, Poisson, Geometric, Normal, Exponential, Beta and Gamma distributions. Sampling distributions; Student-t distribution, F-distribution and Chi-square distribution. Simple tests based on t, f, Chi-square and normal variate z.

### Unit-III

Probability sampling. Sampling with equal and unequal probabilities : pps sampling with replacement and without replacement sampling. Stratified sampling. Proportional allocation, optimum allocation.

Basic principles of experimental design. Construction and analysis of completely randomized, randomized blocks and Latin-square designs. Factorial experiments: symmetrical factorials. Factorial experiment with each factor at two levels

### Unit-IV

Multivariate normal distribution Marginal and Conditional distributions. Estimation of the mean vector and covariance matrix, maximum likelihood estimator of the parameters of multivariate normal distribution. The distribution of the sample mean vector and sample dispersion matrix. Hotteling's  $T^2$  and Mahalanobis- $D^2$  Statistic; distribution and uses. Principal components and Canonical correlation in the population.

### Reference:

1. Kingman, J F C & Taylor, S.J. (1966). :Introduction to Measure and Probability. :Cambridge University Press.
2. Bhat, B.R. :Modern Probability Theory, Wielely, Eastern
3. Kendall and Stuart : Advanced Theory of Statistics Vol.-II
4. Kaley, B.K. : A first course on Parametric Inference.

5. Kapur, J.N. Sexena, H.C. : Mathematical Statistics & S. Chand & Co.
6. Goon, A.M., Gupta, M.K. : Fundamental of Statistics, Vol.II ed. VI  
and Dasgupta, B. word Press Calcutta 1988.
7. Cochran W.G. : Sampling Techniques (3<sup>rd</sup> Edition, 1977), Wiley.
8. Des Raj and Chandak (1988) : Sampling Theory, Narosa.
9. Das M.N. and Giri N (1979) : Design and Analysis of Experiments, Wiley  
Eastern.
10. Anderson T.W. (1983) : An Introduction of Multivariate Statistical  
analysis, second Edition John Wiley.
11. Bhuyan, K.C. : Multivariate Analysis and its applications.
12. Das, M.N. Giri N. (1979) : Design and Analysis of experiments, Wiley  
Eastern.

Note: - Total number of questions to be set are eight. A candidate will be required to attempt four questions selecting one from each unit.