SYLLABUS FOR Ph.D. ENTRANCE TEST IN STATISTICS

PART-A

Part-A shall consist of 50 objective type compulsory questions of 1 mark each based on research methodology. It shall be of generic nature, intended to assess the research aptitude of the candidate. It will primarily be designed to test reasoning ability, data interpretation and quantitative aptitude of the candidate.

PART-B

Part-B shall also consist of 50 objective type compulsory questions of 1 mark each based on the syllabus of the subject at Masters Level as follows:

(i) Statistical Methods

Measures of location, Dispersion, Skewness and Kurtosis, Moments about the mean and central moments, Factorial and Absolute moments, Measures of association and contingency, Correlation, Regression: Simple linear Regression, curvilinear regression, multiple linear regression, partial and multiple correlation coefficients.

Discrete Distributions: Bernoulli, Binomial, Poisson, Geometric, Negative Binomial, Hypergeometric, Multinomial Distribution and its Marginal and Conditional Distributions.

Continuous Distributions: Normal, Uniform, Lognormal, Exponential, Laplace, Pareto, Beta, Gamma, Cauchy.

(ii) Probability and Distribution Theory

Definitions, Limitations and constraints of various definitions, Theorems, Additive, Multiplicative laws, conditional probability, Bayes Theorem with Applications, Central limit theorems, Laws of large numbers, convergence in probability, Convergence almost surely, Convergence in distribution.

Distribution Theory (Distribution function, continuous and discrete distributions, cdf, pdf, pmf, properties thereof, obtaining cdf from pdf/pmf and vice versa). Joint, marginal and conditional distribution, Expectation, Independence of random variables, Distributions of sums of iid random variables.Chi-square, t, F and Z distribution and tests based on them.

(iii) Statistical Inference:

Properties of good estimators: Unbiasedness, efficiency, Sufficiency, consistency CAN, BAN,

Estimation: Method of least squares, Method of Maximum Likelihood, Method of moments, Method of percentiles Interval Estimation: Confidence Intervals (CI), Shortest CI.

Tests of Hypothesis: Types of hypotheses

Parametric: Tests Neymann Pearson tests for simple and composite Types of errors, size of Test, power of test and their calculation hypothesis; alternative Distribution with monotone likeyhood ratio properly.

Likelihood ratio tests.
Nonparametric: Sign test, Run tests, Rank tests, median test, Chi-squae Kolmogorov Smirnov Tests

(iv) Design of Experiments:

Linear models and complete designs (CRD, RBD, LSD) under fixed, mixed and random effects model, factorial experiments, confounding in 2^n factorial experiments, Incomplete Block designs ,BIBD, PBIBD, Properties and applications.

(v) Operations Research:

Scope and limitations, general OR model linear Programming Problems,Non-Linear Programming problems, Integer Linear Programming Problems, Inventory models, Replacement models, Game Theory: Two Person games and their solutions, Queuing Theory: Poisson Queues, M/Ek queues