Syllabus for Ph.D Entrance-Test 2018

UNIT- 01   PROBABILITY AND DISTRIBUTION THEORY

Standard Univariate discrete distributions: Discrete Uniform, Bernoulli, Binomial, Poisson, Negative Binomial, Geometric, Hyper geometric, Logarithmic series distribution, Power series and generalized power series distributions and their structural properties and applications. Univariate Continuous distributions: Uniform, Beta, Gamma, Exponential, Pareto, Weibull, Laplace, Normal, Cauchy, Logistic and Lognormal distributions and their structural properties and applications. Modes of convergence, weak and strong laws of large numbers, central limit theorem (i.i.d case)


UNIT- 02   SAMPLING THEORY

Simple Random Sampling, expected value and sampling variance of the sample mean, expected value of the sample mean square and estimation of the variance. Stratified random Sampling: Estimation of the population mean/total and its variance, choice of sample sizes in different strata, variance under different allocations. Comparison with unstratified sampling. Estimation of the gain in precision due to stratification, construction of strata.


Recommended by Departmental Committee (Statistics):

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UNIT- 03     LINEAR MODELS & DESIGN OF EXPERIMENTS

Gauss Markov set up, Model classification, Normal equations and least squares estimates, Error and estimation space, Variance and covariance of least square estimates, Estimation of error variance, estimation with correlated observations, least square estimates with restriction on parameters. Test of hypotheses for one and more than one linear parametric functions, Tests of linear hypotheses, estimable linear hypotheses. Fixed, random and mixed effect model, simple and multiple regressions. Design of experiments: Introduction to basic designs and their analysis, Balance Incomplete Block Design. Intra block analysis, Inter block analysis, recovery of inter block information; General factorial experiments, factorial effects; best estimates and testing the significance of factorial effects; study of 2 and 3 factorial experiments in randomized blocks; complete and partial confounding.

UNIT- 04     STATISTICAL INFERENCE


Recommended by Departmental Committee (Statistics):

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(Prof. & Head)  (Associate Professor)  (Sr. Assistant Professor)  (Sr. Assistant Professor)
UNIT-05 : MULTIVARIATE ANALYSIS


UNIT-06 INDUSTRIAL STATISTICS & RELIABILITY THEORY

Consumer and producer’s risk, Operating Characteristic curve/function (OC). Corrective Sampling Plan (CSP), Average Sample Number (ASN), Average outgoing Quality (AOQ), Graphical method of drawing AOQ, Average outgoing Quality Limit (AOQL), Single Sampling Plan, Methods of finding n and c, Double

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Sampling Inspection Plan, Sequential Sampling Plan. Plans for Inspection by Variables for one-sided specification. Sequential Analysis: Definition of Sequential Probability Ratio Test (SPRT). Fundamental relations among $\alpha$, $\beta$, A and B. Reliability concepts, hazard rate, distribution of longevity and moments, common life distributions, exponential, Weibull, normal distributions. Type I and Type II censored samples with replacement. Reliability of a system with independent units connected in (a) series and (b) Parallel systems.

**UNIT- 07 OPERATIONS RESEARCH**

Simplex method, Revised Simplex Method, Transportation, duality theorems, Complementary Slackness theorem and conditions, Dual Simplex Method, Sensitivity Analysis. Sequencing and scheduling problems, 3 machine n-job problems with identical machine sequence for all jobs; 2-job n-machine problem with different routings. Project management; PERT and CPM. Decision Making in the face of competition, two-person, Zero sum games, Games with mixed strategies, existence of solution and uniqueness of value in zero-sum games, finding solutions in mxn games, Equivalence between game theory and linear programming problem. Multistage decision processes and Dynamic Programming, Multi Criterion and Goal Programming. EOQ problem with and without shortages with (a) production is instantaneous, Dynamic rogramming. Queuing models specifications and effectiveness measures. Steady-state solutions M/M/1 and M/M/c models with associated distributions of queue-length and waiting time. M/G/1 queue. Steady-state solutions of M/Ek/1. Nonlinear programming, Formulation, Lagrange multiplier Technique, Kuhn-Tucker necessary and sufficient conditions for optimality of an NLPP, Quadratic Programming problems, Wolfe’s and Beal’s algorithms for solving quadratic programming problems.

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Members of DRC:

Dr. Sheikh Parvaiz Ahmad (Sr. Assistant Professor)
Dr. Tariq Rashid Jan (Sr. Assistant Professor)
Dr. Anwar Hassan. (Prof. & HOD)