UNIT - I: Probability and Random Variables


UNIT – II: Distributions

Introduction to Distributions: Marginal and conditional distributions – Generating functions: - MGF, PGF and CGF – Characteristic function.

Discrete distributions: Binomial, Poisson, Negative binomial and Hyper geometric distribution.

Continuous Distributions: Joint – Marginal – and conditional distributions. Uniform, Normal, Cauchy, Beta, Gamma, Log-Normal, Exponential, Chi-Square, t and F distributions and their properties.

UNIT- III: Estimation Theory

Introduction to Estimation Theory: Unbiasedness, Consistency, Efficiency, Sufficiency and Completeness.


Methods of Estimation: Method of moments, Method of Maximum Chi-Square, Method of Least Square, Bayesian Estimation (with example) – Confidence Intervals for Large and Small Samples.
UNIT – IV: Testing of Hypothesis and Non-Parametric tests


UNIT – V: Regression Analysis


UNIT – VI: Sampling Theory

Introduction to the theory of Sampling: Sampling designs – estimation procedures – properties of estimations – SRSWOR - Properties of SRSWOR

Systematic, Stratified, Ratio and Regression Sampling methods and Estimate of Double Sampling – Sampling and non – sampling errors – Cluster sampling – Two stage and Multistage sampling – sampling and sample survey organizations – CSO and NSSO.

UNIT – VII: Design of Experiments


Principles of CRD, RBD, LSD, $2^n$ and $3^n$ factorial experiments and split plot Design.

Partial and complete confounding – BIBD – Youden Square design – Lattice designs PBIBD: Construction and Analysis.
UNIT – VIII: Statistical Quality Control (SQC)

Introduction to statistical process and product control:

Control Charts – Shewart Control Charts for variables and attributes – X-bar, R, \( \sigma, p, np \) C and U, Charts – (Both fixed and variable sample size) – CUSUM charts – OC curve for control charts.

Sampling Inspection – 100% sampling Inspection – AOQL, LTPD, producers Risk and consumer, Risk Single, double, Multiple and Sequential sampling plans for attributes – variable sampling plan – OC, ASN, ATI and AOQ curves.

Implementing six sigma – over view and implementations – Examples.

UNIT – IX: Time series and Index numbers

Concepts of time series, additive and multiplicative models, resolutions into Components, determination of trend by free drawing, Moving averages, filling of mathematical Curves, seasonal indices and the estimate of the variance for random Components, Auto-regressive, Moving averages and ARIMA models.

Definition, Construction interpretation and limitations of index numbers, Lapeyre’s Paasche’s Marshall – Edgeworth, Fisher’s index number and their Comparisons for Good index Number. Construction for cost of living index number and Wholesale price index.

UNIT – X: Applied Statistics through MS-Excel and R – Language
