STATISTICS SYLLABUS

UNIT – I (Probability and Probability Distributions)

Definition–Classical and axiomatic approaches.Laws of total and compound probability, conditional probability, Bayes' theorem. Random variable and its distribution function, mathematical expectation, generating functions (moment generating, cumulant generating, characteristic and probability generating functions). Different modes of convergence, laws of large numbers, central limit theorem. Joint distribution of two random variables, marginal and conditional distributions. Discrete probability distributions– Binomial, Poisson and Negative Binomial distributions. Continuous probability distributions–Exponential, Normal, Uniform, Beta, Gamma, and Bivariate Normal distributions.

UNIT – II (Statistical Methods)

Frequency distribution, graphical and diagrammatic representation of data.Measures of location and dispersion, moments, skewness and kurtosis. Curve fitting, association of attributes. Simple correlation and regression, partial and multiple correlations and regressions, correlation ratio, rank correlation. Distribution of sample mean and sample variance,t, F and Chi-square distributions.

UNIT – III (Estimation and Testing of Hypothesis)

Characteristics of a good estimator.Estimation by the methods of maximum likelihood, moments and least squares, properties of maximum likelihood estimator, Cramer-Rao inequality, sufficient statistic and Rao-Blackwell theorem.Interval estimation.

Testing of simple and composite hypotheses, types of errors, critical region.Neyman-Pearson fundamental lemma, power function, MP and UMP tests. Likelihood Ratio tests, Non-parametric tests-Sign, median, run and Mann-Whitney U- tests, large sample tests, tests based on t, F and Chi-square distributions.

UNIT – IV (Sampling Techniques and Designs of Experiments)

Census versus sample surveys. Sampling and non-sampling errors, Simple random sampling, stratified sampling, systematic sampling, multistage and multiphase sampling, sampling with probability proportional to size. Ratio, product and regression methods of estimation.

Principles of designs of experiment. Lay out and analysis of completely randomized, randomized block and Latin square designs. Factorial experiments ($2^2, 2^3$ and 3^2 experiments), Confounding (total and partial), Balanced Incomplete Block Design, Split-plot and Strip-plot Design.

Unit- V(Industrial Statistics and Time- Series Analysis)

- Statistical Quality Control:

  Different Charts- $\bar{X}$ and R chart, p-chart, c-chart and their uses.
  Acceptance sampling plans – Single sampling and Double sampling plans – their OC, AQL, LTPD, AOQ, AOQL, ASN, ATI functions.

- Time Series Analysis – Components of a time series. Methods of measurement of trend – graphic, semi-average and moving average methods. Growth curves – modified and Gompertz curves. Measurement of trend by moving average method by curve fitting. Iterated averages and Spencer's 15- point and 21- point formula. Measurement of seasonal fluctuations – simple average, ratio to trend, ratio to moving averages and link relatives methods. Measurement of cyclic component, Harmonic analysis. Measurement of Irregular variation (Variate difference method).