

**KERALA PUBLIC SERVICE COMMISSION**  
**SYLLABUS FOR THE POST OF**  
**RANGE FOREST OFFICER IN**  
**KERALA FOREST & WILDLIFE DEPARTMENT**

**Optional subject- Statistics**

**Total Marks: 200**

**Module 1: Descriptive Statistics and Data Summarization (20 Marks)**

Types of data: qualitative, quantitative, cross-sectional, Data collection and classification. Graphical representation: bar charts, pie charts, histograms, boxplots, Measures of central tendency: mean, median, mode, Measures of dispersion: range, variance, standard deviation, coefficient of variation, Skewness and kurtosis.

**Module 2: Probability Theory and Distributions (20 Marks)**

Sample space, events, axioms of probability, Conditional probability, Bayes' theorem, Discrete and continuous random variables, Expectation, variance, moments, Probability distributions: binomial, Poisson, uniform, exponential, normal.

**Module 3: Sampling Theory and Estimation (20 Marks)**

Population and sample, census vs. sampling, Probability sampling: SRSWR, SRSWOR, stratified, systematic, Non-probability sampling: quota, judgmental, Sampling distributions of mean and proportion, Point estimation: unbiasedness, consistency, efficiency, Interval estimation

**Module 4: Statistical Inference and Hypothesis Testing (20 Marks)**

Null and alternative hypotheses, Type I and Type II errors, level of significance, p-value, z-test: mean, proportion, t-tests: one sample, two sample, paired, Chi-square tests: goodness of fit, independence, F-test for equality of variances, One-way ANOVA

**Module 5: Correlation and Regression Analysis (20 Marks)**

Scatter plots, Pearson's correlation coefficient, Simple and multiple linear regression, Estimation and interpretation of regression coefficients, R-squared, adjusted R-squared, Assumptions of regression, Multicollinearity, residual analysis

#### **Module 6: Non-Parametric Statistical Methods (15 Marks)**

Sign test, Wilcoxon signed rank test, Mann-Whitney U test, Kruskal-Wallis H test, Spearman rank correlation.

#### **Module 7: Design of Experiments (15 Marks)**

Principles of experimental design: randomization, replication, local control, Completely randomized design (CRD), Randomized block design (RBD), Latin square design (LSD), Analysis of variance for these designs, Applications in forestry and ecological experiments

#### **Module 8: Multivariate and Environmental Data Analysis (20 Marks)**

Multivariate data analysis, Principal component analysis (PCA), Cluster analysis: hierarchical, k-means, Discriminant analysis, Shannon diversity index, Simpson's index, Applications in biodiversity and wildlife studies

#### **Module 9: Time Series Analysis and Forecasting (15 Marks)**

Components of time series: trend, seasonal, cyclical, irregular, Moving averages, exponential smoothing, Stationarity and autocorrelation, Basics of ARIMA models, Applications: forest fire forecasting, rainfall prediction

#### **Module 10: Statistical Computing and Applications (15 Marks)**

Basics of R for statistical analysis (no coding required), Data input, cleaning, summarization, Software applications in wildlife and ecological data analysis, GIS data integration, Case studies: forest resource estimation, wildlife population analysis