51
Statistics

B.A./B.Sc.: Elective and Optional

Outlines of Tests

Paper	Title of Course	Marks
A		75
B		75
C	Practical)	50
	Total:	**200**

Syllabi and Courses of Reading

PAPER A

Candidates are required to attempt at least two questions from each Section

Section – I

DESCRIPTIVE STATISTICS (weight 2/10)

Meaning of Descriptive and inferential Statistics. Population and Sample. Types of variables, Measurement Scales, Sources of Statistical data in Pakistan. Description of data by frequency tables and graphs. Stem and Leaf Plots and Box Plots. Measures of Central Tendency A.M., H.M., G.M Mode, Median, Quanties, Properties of Mean with Proofs. Weighted Arithmetic Mean. Empirical Relation between Mean, Median and Mode. Relative Merits and Demerits of various averages. Measures of Dispersion: Absolute and Relative Measures, Range, Semi-Inter Quartile Range, Mean Deviation, Coefficient of Quartile Deviation, Properties of variance and Standard Deviation with Proofs. Standardized Variables. Moments, moment ratios, sheppards Correction, Kurtosis and skewness.

INDEX NUMBERS AND TIME SERIES (Weight 2/10)

Index Number:

a. Construction and application of wholesale price Index numbers. Fixed and chain base methods. Weighted Index Numbers (Lasperyre's Passche's Fisher's Ideal and Marshall-Edgeworth Indices). Tests for consistency of Index Numbers Construction of Consumer Price Index Numbers. Sensitive Price Indicator.
b. Time Series: Components of a time series. Analysis of time series, Measurement of secular trend and seasonal variations by various methods. Deseasonalization of data.

SIMPLE REGRESSION AND CORRELATION (Weight 1/10)

Logic of regression and correlation. Scatter diagram, Simple linear regression model, least square estimators and their properties, standards error of estimate, Meaning and application of linear correlation coefficient. Properties of correlation coefficient correlation for bi-variate frequency distribution. Meaning derivation and application of Rank Correlation, tied ranks.

Section – II

PROBABILITY (Weight 2/10)

Random experiments, Sample Space and events, Counting Techniques, Definitions and axioms of probability. Basic laws of Probability. Independence of events. Bayes Theorem (proof not required) and its application.

DISCRETE RANDOM VARIABLE AND DISCRETE PROBABILITY DISTRIBUTIONS (Weight 2/10)

Random variable, Distribution Function, Discrete random variable. Probability distribution of a discrete random variable. Joint Distribution of two discrete random variables, marginal and conditional distributions, mathematical expectation and it properties, mean, variance and moments. Concept of m.g.f and its properties. Uniform, Bernoulli, Binomial, Hyper geometric and poisson distributions, mean, variance and shape of these distributions and their properties. Application of these distributions with examples from various fields, Multinomial distribution (only application)

CONTINUOUS RANDOM VARIABLES AND CONTINUOUS PROBABILITY

DISTRIBUTIONS (Weight 1/10)

Continuous random variables. Probability distribution of a single continuous random variable, probability density function and distribution function. Mean, variance and moments of continuous random variables. Uniform and Normal Distributions. Mean, Variance and shape of these distributions and their properties. Application of these distributions. Normal approximation to the Binomial and Poisson Distribution (only application). Fitting of Normal Distribution by area method

PAPER B

Candidates are required to attempt at least two questions from each section

Section – I

SAMPLING AND SAMPLING DISTRIBUTION (Weight 2/10)

Sampling designs of Simple random, Stratified, Systematic and Cluster sampling. Judgment and Quota sampling. Random Numbers and their uses in sampling. Advantages of sampling. Probability and non-probability sampling, sampling and non-sampling errors, Calculation of sample mean, proportion and variance of simple random samples and stratified random samples. Sampling distribution of a statistic and its standard error. Distribution of sample mean, sample proportion, difference between two proportions and means. Central limit theorem with illustration (proof not required).

STATISTICAL INFERENCE (Weight 2/10)

Nature of statistical inference, point and interval estimation of parameter, properties of point estimator, confidence interval and its interpretation. Null and alternative hypothesis, simple and composite hypothesis. Type I and Type II errors. Level of significance. P-value and power of test (only concept and definition). Acceptance and rejection regions, one sided and two sided tests for paired and un paired observations. Inference about proportion and difference between two proportions. Determination of sample size. (Application of Normal distribution and t-distribution)

INFERENCE ABOUT VARIANCE (Weight 1/10)

Introduction and application of Chi-square distribution: Interval estimation and test of hypothesis about population variance (interval estimation for variance-single sample) Introduction and application of F-distribution: Test of Hypothesis for equality of two variances.

Section – II

ANALYSIS OF COUNT DATA (Weight 1/10)

Chi-square test of independence, Chi-square test of goodness of fit, Chi-square test of homogeneity.

REGRESSION AND CORRELATION ANALYSIS (Weight 2/10)

Multiple Linear regression with two regressors, Coefficient of multiple determination, Partial and multiple correlation up to three variables. Inference of simple correlation and regression, partial and multiple correlation. Interval estimates and tests of hypothesis about parameters, mean prediction and individual prediction.

ANALYSIS OF VARIANCE AND BASIC EXPERIMENTAL DESIGNS(Weight 2/10)

Analysis of variance for one-way classification and two way classification. Multiple comparison tests, least significant difference and Duncans multiple range test. Basic principles of experimental design. Complete randomized, randomized completely Block and Latin Square Designs. Descriptions, Layout, Statistical analysis, advantages and limitations of these designs. Application of these designs (Analysis of all these designs for single Observation in each Cell).

PAPER C: PRACTICAL

Each Question of 18 marks	36 Marks
Practical Note Book	5 Marks
Viva Voce	9 Marks
Total:	50 Marks

Candidates are required to attempt one question from each section

Section – I

One question from each section of Paper A should be set.

Section – II

One question from each section Paper B should be set.

STATISTICS : OPTIONAL

Outlines of Tests

Paper	Title of Course	Mark
	Optional Statistics	100

Syllabi and Courses of Reading

1. **Introduction:**
   Definition, characteristics and limitations of statistics, collection, classification and tabulation of data.
2. **Graph and Diagrams:**
   Bar and pie diagrams. Graphs of frequency distribution *viz.* Histogram, frequency polygon, frequency curve, cumulative frequency curve, Graphic interpolation.
3. **Averages:**
   Elementary knowledge and numerical illustrations of arithmetic mean, median, mode and weighted average.Time series: Smoothing of fluctuations by moving average method.
4. **Dispersion:**

Elementary knowledge and numerical illustrations of range, fractiles, quartile deviation, standard deviation, co-efficient of skewness and co-efficient of variation.

5. Attributes and Chi-Square:

Concept of attribute, idea of independence and association, dichotomy, co-efficient of association, contingency table. Chi-square.

6. Correlation:

Concept of regression, simple correlation and rank correlation with numerical illustrations.

7. Sampling:

Concept of sampling. Definition of population and sampling unit. Purposive and random sampling. Drawing of a random sample without replacement from finite population.

Books Recommended:

1. Zia-ud-Din, M., Practical Statistics with Fundamentals of Theory, 8th edition. The Punjab Educational Press, Lahore.
2. Chambers, E.G., Statistical Calculations for Beginners. Cambridge University Press, London.