

STATISTICS (STAT)

Class –XI

Full Marks - 100

THEORY (Full Marks –70)

Descriptive Statistics

Introduction: Meaning and definition of statistics, Nature of statistics, Importance and Scope of statistics, Relation with some allied subjects, Uses of statistics, Misuses of statistics.

Types of data: Primary and Secondary data, Time series and Cross-sectional data, Ordinal and Nominal data, Quantitative and Qualitative data, Discrete and Continuous data. Illustration with examples.

Collection of data: Designing a questionnaire and a schedule.

Scrutiny of data: Checking internal consistency and detection of errors in recording.

Presentation of data: Tabular presentation and diagrammatic presentation of data. Line diagram (Simple line diagram, ratio chart, multiple-axis-chart, multiple line diagram.). Bar diagram (Horizontal bar diagram, Vertical bar diagram, Multiple bar diagram, Divided bar diagram.) Pie diagram.

Frequency distributions, cumulative frequency distributions and their graphical representations. {Column diagram, Step diagram (discrete variable), Histogram, Frequency polygon, Ogive}.

Measures of Central Tendency: Mean, Median, Mode.

Measures of Dispersion: Range, Mean deviation, Standard deviation, Coefficient of variation. Quantiles and Percentiles, Quartile deviation.

Moments: Raw and Central moments up to fourth order and their conversions.

Measures of Skewness and Kurtosis: Different measures based on moments and quantiles. (associated inequalities involving b_1 and b_2 coefficients.)

Mathematics

Inequalities: Some fundamental inequalities such as the square of a real quantity is non-negative, A.M.e” G.M.e” H.M. for a set of positive quantities, Cauchy-Schwarz’s inequality – this topic must be extended to this limit.

SYLLABUS

Concept of Polynomials and Number Theory: Divisor of an Integer, Greatest Common Divisor, Concept of (mod n). Prime and Composite number. Fermat's number and Fermat's theorem (without proof). Different forms of n^{th} degree polynomial relating to three interpolation formulae as per syllabus. Remainder Theorem. Roots of n^{th} degree equation. Relations connecting the roots and coefficients with simple examples.

Differencing: Concept of 'Delta'-operator required for interpolation.

Simple interpolation: Newton's forward, backward and Lagrange's interpolation formulae. (Derivation of error terms is excluded)

Probability

Random Experiment: Sample Space, Notion of events and operations with events.

Definition of Probability: Classical and Relative-frequency approach to Probability, limitations of classical definition, axiomatic definition (statement only).

Theorem of Total Probability. Bonferroni's inequality. Boole's inequality.

Compound Probability, Conditional Probability and Bayes' theorem.

Statistical Independence of events (no. of events not more than three) and problem sums.

Application of statistics

Index Number:

Definition of Index Number. Types of Index Number: Price, Quantity and Value indices. Construction of Price Index Number and its uses. Various price index formulae; (Laspeyres', Paasche's, Edgeworth-Marshall and Fisher). Tests of consistency (Time Reversal test and Factor Reversal test).

Population Statistics:

Introduction; Vital events, Sources of Data on Vital events, Rates and Ratios of Vital events. Measurements of Mortality: Crude Death Rate, Specific Death Rate, Standardized Death Rate.

Measurements of Fertility: Crude Birth Rate, General Fertility Rate, Age Specific Fertility Rate, Total Fertility Rate.

Measurement of Population Growth: Crude Rate of Natural Increase and Vital Index.

Complete Life Table: Description and its uses.

Class—XI

PRACTICAL (Full Marks –30)

(Problems: 18; Laboratory Note Book: 4; VIVA- Voce: 4; Project Work: 4)

List of Problem Sets

1. Tabular Representation of data.
2. Diagrammatic Representation of Data. (Non-Frequency type)
3. Construction of Frequency distribution and Graphical Representation.(Univariate data only ,both discrete and continuous)
4. Measures of Central Tendency.(Problems involving Open-end classes, Missing frequencies, Pooling of two sets of data, Checking, empirical relations etc. are also to be included.)
5. Measures of Dispersion. (Problems involving Open-end classes, Missing frequencies, Pooling of two sets of data, Checking, empirical relations etc. are also to be included.)
6. Moments and Measures of Skewness & Kurtosis. (Verification of inequalities between b_1 and b_2 is desirable.)
7. Interpolation: Newton's Forward, Backward and Lagrange's Formula.
8. Different types of Index Number.
9. Mortality Rates, Fertility Rates and Life Table.
10. Project Work : It will be based on Descriptive Statistics