Ph.D. Entrance Examination Syllabus

Faculty: Commerce

Subject: Statistics

Unit 1: Data Collection and Classification

- Meaning and importance of data
- Types of data: primary and secondary data
- Methods of data collection: survey, observation, interview, questionnaire
- Classification of data: chronological, geographical, qualitative, quantitative
- Tabulation and presentation of data

Unit 2: Descriptive Statistics – Measures of Central Tendency

- Meaning and scope of statistics
- Measures of central tendency
- Arithmetic Mean (simple and weighted)
- Median and Mode
- Geometric Mean and Harmonic Mean
- Merits, limitations, and applications of each measure

Unit 3: Measures of Dispersion and Skewness

Measures of Dispersion

- Concept of dispersion and variability
- Range
- Quartile Deviation
- Mean Deviation
- Variance and Standard Deviation
- Coefficient of variation

Measures of Skewness

- Concept of skewness
- Types of skewness (positive, negative, symmetrical)
- Karl Pearson’s coefficient of skewness
- Bowley’s coefficient of skewness
- Interpretation of skewness

Unit 4: Correlation and Regression Analysis

- Meaning and types of correlation

- Methods of correlation: scatter diagram, Karl Pearson's correlation, Spearman's rank correlation
- Properties of correlation coefficient
- Concept of regression
- Regression lines (X on Y and Y on X)
- Regression equations and prediction
- Difference between correlation and regression

Unit 5: Probability Theory and Bayes' Theorem

- Concept and definition of probability
- Approaches to probability: classical, empirical, axiomatic
- Basic laws of probability
- Conditional probability
- Bayes' theorem and its applications in decision making

Unit 6: Probability Distributions

- Concept of probability distribution
- Binomial distribution: properties, mean, variance, applications
- Poisson distribution: properties, mean, variance, applications
- Normal distribution: properties, standard normal curve, applications
- Relationship among binomial, Poisson, and normal distributions

Unit 7: Sampling and Estimation Theory

- Concept of population and sample
- Sampling methods: probability and non-probability sampling
- Sampling distribution
- Central Limit Theorem
- Standard error and its importance
- Statistical estimation: point estimation and interval estimation
- Confidence intervals

Unit 8: Hypothesis Testing

- Concept of hypothesis testing
- Steps in hypothesis testing
- Z-test (large samples)
- T-test (small samples)

- ANOVA (analysis of variance)
- Chi-square test (goodness of fit and independence)
- Non-parametric tests:
  - Mann–Whitney U test
  - Kruskal–Wallis H test
  - Spearman rank correlation test
- Interpretation of results

Unit 9: Research Methodology

- Meaning and objectives of research
- Types of research: basic, applied, descriptive, analytical, exploratory, experimental
- Research process
- Research designs: exploratory, descriptive, diagnostic, experimental
- Hypothesis formulation in research

Unit 10: Report Writing

- Meaning and importance of research report
- Structure of a research report:
  - Title page
  - Abstract
  - Introduction
  - Methodology
  - Data analysis
  - Findings and interpretation
  - Conclusion and suggestions
  - References and bibliography
- Guidelines for effective report writing
- Citation and referencing styles

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