

Statistics

Class XII: Syllabus for Pre-test Examination

Theory Examination, Full Marks: 70, Time: 3 Hours

Unit I: Mathematics

Basic concept of Limit, Continuity, and Differentiability. First and second order derivatives of a variety of *non-trigonometric univariate functions*. Maximum and minimum of a variety of *non-trigonometric univariate functions*.

Integration of a variety of *non-trigonometric univariate functions* by substitutions, by partial fractions and by parts. Standard definition of gamma integral and results involving it (without derivatives).

Unit II: Correlation & Regression

Bivariate data. Scatter diagram. Correlation & Correlation coefficient. Properties of Correlation coefficient. Rank Correlation, Spearman's Rank Correlation coefficient (without tie).

Concept of Regression. Principle of Least squares. Fitting of Regression lines. Important results relating to regression lines.

Unit III: Probability & Probability Distributions

Random experiment, Trial, Sample space, Sample point and different types of events. Definition of Probability: Classical, Statistical and Axiomatic. Theorem on the probability of union of (two & three) events. Conditional probability. Theorem on conditional probability for two & three events. Independence of events. Bayes' theorem and its application.

Random variable (discrete and continuous) and its probability distribution. Cumulative distribution function. Probability mass function and Probability density function. Mathematical expectation.

Uniform (Discrete and Continuous), Bernoulli, Binomial, Poisson, Geometric, Exponential and Normal distributions.

Unit V: Population Studies

Vital events, rates and ratios. Measurement of Mortality: Crude, Specific and Standardised death rates, Infant mortality rate. Measurement of Fertility and reproduction: Crude birth rate, General, Specific and Total fertility rates. Gross and Net reproduction rates.

Unit wise Question Types with Marks Distribution of Pre-test Theory Examination

| Unit | Title | MCQ/Objective 1 Mark | SA-I 2 Mark | SA-II 3 Mark | LA 5 Mark | Total Marks |
|-------------------------------------|---|-------------------------|----------------|-----------------|--------------|----------------|
| I | Mathematics | 4 | 2 | 1 | 2 | 21 |
| II | Correlation & Regression | 1 | 2 | 2 | 1 | 16 |
| III | Probability & Probability Distributions | 2 | 1 | 3 | 3 | 28 |
| V | Population Studies | 3 | 1 | - | - | 05 |
| Question wise Marks distribution | | 10 | 12 | 18 | 30 | 70 |

Practical syllabus for Pre-test Examination

Three experiments to be given in the examination as follows:

1. Scatter diagram. Correlation coefficient and Linear Regression.
2. Spearman's Rank Correlation coefficient (without tie).
3. Applications and Fitting of Binomial Distributions.
4. Applications and Fitting of Poisson Distributions.
5. Applications and Fitting of Normal Distributions.
6. Calculation of different rates and ratios of fertility, mortality and measures of reproduction.

Marks Distribution of Pre-test Practical Examination

Full Marks: 30, Time: 3 Hours

1. Experiments (5 + 5 + 10) 20 Marks
2. Practical Note Book (PNB) 5 Marks
3. Viva-Voce 5 Marks

Syllabus for Test Examination

Theory Examination, Full Marks: 70, Time: 3 Hours

Unit IV: Sampling, Estimation & Testing of Hypotheses

Population & sample. Parameter & statistic. Census & Sample survey. Concepts of probability sampling and random number tables. Concepts of sampling distribution of statistic and its standard error. Simple random sampling with replacement (SRSWR) and Simple random sampling without replacement (SRSWOR).

Concept of Point estimation. Requirement of good estimator: Unbiasedness, Consistency, Efficiency. Elementary concept of MVUE & BLUE.

Statistical tests of Hypothesis- Null & alternative hypothesis. Simple & composite hypothesis, Critical region, Type-I and Type-II errors, Level of Significance and size of critical region, Power of a test. Tests of significance related to a single Binomial proportion, Poisson parameter and two binomial proportions using large sample approximations. Exact tests of hypothesis under normal set-up for a single mean, equality of two means and single variance. Frequency Chi-square test & Goodness of fit.

N.B.: Theory Syllabus of Pre-test examination is also included in Test examination.

Unit wise Question Types with Marks Distribution of Test Examination (Theory)

| Unit | Title of Unit | MCQ/Objective 1 Mark | SA-I 2 Mark | SA-II 3 Mark | LA 5 Mark | Total Marks |
|-------------------------------------|---|-------------------------|----------------|-----------------|--------------|----------------|
| I | Mathematics | 3 | 2 | 1 | 1 | 15 |
| II | Correlation & Regression | - | 1 | 1 | 1 | 10 |
| III | Probability & Probability Distributions | 2 | 1 | 2 | 2 | 20 |
| IV | Sampling, Estimation & Testing of Hypotheses | 2 | 1 | 2 | 2 | 20 |
| V | Population Studies | 3 | 1 | - | - | 05 |
| Total No. of Questions | | 10 | 6 | 6 | 6 | - |
| Question wise Marks distribution | | 10 | 12 | 18 | 30 | 70 |

Practical Examination syllabus of Test Examination

Three experiments to be given in the examination as follows:

1. Sampling distribution and estimation of population mean and its standard error under SRSWR and SRSWOR.
2. Large sample tests of a single mean, single proportion and difference of two proportions.
3. Pearson's Chi-square tests.
4. Exact tests of hypotheses under normal set-up for a single mean, difference of two means and single variance.
5. Drawing of random sample from Uniform and Normal distributions

N.B.: Syllabus of Pre-test practical examination is also included in Test examination.

Marks Distribution of Test Examination (Practical)

Full Marks: 30, Time: 3 Hours

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|------------------------------|----------|
| 1. Experiments (5 + 5 + 10) | 20 Marks |
| 2. Practical Note Book (PNB) | 5 Marks |
| 3. Viva-Voce | 5 Marks |