

**Gujarat University**  
**Choice Based Credit System (CBCS)**  
**Syllabus for Statistics (UG)**  
**B. Sc. Semester I and II**  
**Effective from June, 2017**

Semester	Paper Number	Name of the Paper	Hours per Week	Credit
I	STA-101	Descriptive Statistics – I	4	4
	STA-102	Practical	6	3
II	STA-103	Probability Theory	4	4
	STA-104	Practical	6	3

**Semester I**

**Paper: STA-101 - Descriptive Statistics – I**

**4 hours per week**

**Credit: 4**

**Unit: 1 Data Types and Classification**

Types of data: Primary, Secondary, Internal and External data and their sources.

Designing a questionnaire schedule.

Classification of data: Qualitative, Quantitative: Discrete, Continuous; Chronological (Time series) data.

Nominal, Ordinal, Interval and Ratio data.

Frequency: grouped and ungrouped data; Construction of frequency and cumulative frequency distribution.

Presentation of qualitative data: Tabulation (up to four attributes).

**Unit: 2 Representation of Data**

Graphical representation of grouped data: Histogram, frequency curve, frequency polygon, ogives (cumulative frequency curves),

Diagrammatic representation of data: Bar diagrams- simple Bar, multiple bar, sub-divided bar and percentage bar diagrams.

Two dimensional diagrams: Rectangles and Pie diagrams.

**Unit: 3 Measures of Central Tendency**

Concept of central tendency, various measures of central tendency and their inter relationship. Their merits and demerits. Empirical relation between mean, median and mode.

Properties and applications of measures of central tendency. Partition values.

#### **Unit: 4 Measures of Dispersion and Moments**

Concept of variation/dispersion, Absolute and relative measures of dispersion with their merits, demerits and applications.

Moments: raw moments, central moments, factorial moments and their interrelationship.

Skewness, Kurtosis and their measures.

Stem - Leaf plot and box plot.

#### **Reference Books for Paper STA-101:**

1. Statistical analysis: Graphs and diagrams, S. M. Nair and M. Garg, Spectrum books (P) Ltd, New Delhi.
2. Introduction to the Practice of Statistics, Moore, S. David; McCabe, P. George W. H. Freeman and Company, New York.
3. Basic Statistics, Agarwal, B. L., New Age International (P) Ltd.
4. Introduction to the theory of Statistics, Mood, A. M., Greybill, F.A., Boes, D.C., McGraw Hill.
5. Fundamentals of Mathematical Statistics, S. C. Gupta and V. K. Kapoor, Sultan Chand and Sons, New Delhi.

### **Semester I**

#### **Paper: STA-102 – Practical based on STA -101**

**6 hours per week**

**Credit: 3**

#### **Practical Paper STA – 102 Part-A (Manual)**

1. Classification of the variable/data into various category and tabulation.
2. Construction of frequency table (one way and two way).
3. Data visualization: Histogram, frequency curve, frequency polygon, ogives (cumulative frequency curves), Bar Diagrams, Pie Diagram, Stem - Leaf and box plot.
4. Problems based on measures of central tendency.
5. Problems based on measures of dispersion.

#### **Practical Paper STA – 102 Part-B (Computer)**

1. Classification of the variable/data in to various category and tabulation.
2. Construction of frequency table (one way and two way).
3. Data visualization: Histogram, Frequency curve, frequency polygon, ogives (cumulative frequency curves), Bar Diagrams, Pie Diagram, Stem - Leaf and box plot.
4. Problems based on measures of central tendency.
5. Problems based on measures of dispersion.

**Semester II**  
**Paper: STA-103 - Probability Theory**

**4 hours per week**

**Credit: 4**

**Unit: 1 Probability**

Random Experiment, trial, sample point, sample space, definition of equally likely, mutually exclusive and exhaustive events.

Definition of probability: classical, relative and axiomatic approach and its properties.

Conditional probability, multiplicative law of probability, independence of events, law of total probability, Bayes theorem and its applications.

**Unit: 2 Random Variable and Generating Functions**

Random Variable (rv) with its types, probability mass function (pmf), probability density function (pdf), cumulative distribution function (cdf) with illustrations.

Expectation of Random variables with properties, moments, factorial moments, measures of location, skewness, kurtosis, probability generating function (pgf), moment generating function (mgf), cumulant generating function (cgf), factorial moment generating function (fmgf) with their properties and uses.

**Unit: 3 Probability Inequalities**

Boole's inequality, Bonferroni's inequality, Markov's inequality, Chebyshev's inequality (one sided and two sided), concept of convex and concave functions, Jensen's inequality, Cauchy- Schwarz inequality.

**Unit: 4 Joint Distribution**

Concept of Joint Distributions, Joint probability mass function and Joint probability density function.

Marginal and conditional distributions, independence of random variables, conditional expectation and conditional variance. Product moments.

**Reference Books for Paper STA-103**

1. Introduction to the Practice of Statistics, Moore, S. David; McCabe, P. George W. H. Freeman and Company, New York.
2. Basic Statistics, Agarwal, B. L., New Age International (P) Ltd.
3. Introduction to the theory of Statistics, Mood, A. M., Greybill, F.A., Boes, D.C., Mc Graw Hill.
4. Fundamentals of Mathematical Statistics, S. C. Gupta and V. K. Kapoor, Sultan Chand and Sons, New Delhi.
5. Mathematical Statistics, P. Mukhopadhyay, New Central Book Agency (P) Ltd, Calcutta
6. An Introduction to Probability and Statistics, V. K. Rohatgi and A.K.Md. Ehsanes Saleh, Wiley Series.

**Semester II**  
**Paper: STA-104 – Practical based on STA -103**

**6 hours per week**

**Credit: 3**

**Practical Paper STA – 104 Part-A (Manual)**

1. Practical based on probability from the given data and bivariate table.
2. Practical based on Bayes theorem
3. Practical based on skewness and kurtosis.
4. Practical based on marginal and conditional distributions.
5. Practical based on moments of joint, marginal and conditional distributions.

**Practical Paper STA – 104 Part-B (Computer)**

1. Practical based on probability from the given data and bivariate table.
2. Practical based on Bayes theorem
3. Practical based on skewness and kurtosis.
4. Practical based on marginal and conditional distributions.
5. Practical based on moments of joint, marginal and conditional distributions.