

## DESCRIPTIVE STATISTICS & PROBABILITY

**Credits: 4**  
**Subject Code: BS19025**

**Semester: I**  
**No. of Lecture hours: 60**

**OBJECTIVE:** To prepare students for lifelong learning and successful careers using their statistical skills.

**Outcome:** Students will be able to compute descriptive statistics and probabilities from data, using the application of correct statistical notation and language.

**CO1: Organize**, manage and present data and Analyze statistical data using measures of central tendency

**CO2: Analyze** the statistical data using dispersion and location.

**CO3: Use** the basic probability rules, including additive and multiplicative laws, using the terms, independent and mutually exclusive events.

**CO4: Develop** the probability density function of transformation of random variables.

**CO5: Identify** probabilities, and derive the marginal and conditional distributions of bivariate random variables.

### UNIT I

**Descriptive Statistics:** **12hrs**

1. Concept of primary and secondary data 2
2. Methods of collection and editing of primary data 2
3. Designing a questionnaire and a schedule 2
4. Sources and editing of secondary data Classification and tabulation of data 2
5. Measures of central tendency (Mean, Median, Mode, Geometric mean and harmonic mean) with simple applications. 4

### UNIT-II

**12hrs**

1. Absolute and relative measures of dispersion (Range, Quartile deviation, mean deviation and standard deviation) with simple applications. 4
2. Importance of moments– Central and non central moments and their interrelationships. 6
3. Sheppard's corrections for moments for ungrouped data – Skewness and Kurtosis - Their measures including those based on quartiles and moments with real life examples. 2

### UNIT-III

**Probability:** **12hrs**

1. Basic concepts in Probability – Deterministic and random experiments – Trail, outcome, sample space, event and operation of events- Mutually exclusive and exhaustive events –Equally likely and favorable outcomes with examples. 3
2. Mathematical, Statistical and axiomatic definitions of probability with merits and demerits 3

Properties of probability based on axiomatic Definition conditional probability and independence of events.	2
3. Addition and multiplication theorems for 'n' events.	
4. Boole's inequality and Baye's theorem	2
5. Problems on probability using counting methods and theorems.	2
<b>UNIT-IV</b>	<b>12hrs</b>
<b>Random Variables:</b>	
1. Definition of Random Variable, Discrete and continuous random variables	2
2. Functions of random variables, Probability mass function and probability density function with illustrations	2
3. Distribution function and its properties	2
4. Transformation of one-dimensional random variable (simple 1-1 functions only) Notion of Bivariate random variable	2
5. Bivariate distribution and statement of its properties	2
6. Joint, Marginal and conditional distributions	1
7. Independence of random variables	2
<b>UNIT-V</b>	<b>12hrs</b>
1. Mathematical Expectation: Mathematical expectation of random variable, Moments – Raw and central moments	2
2. Covariance using Mathematical expectation with examples	2
3. Addition and multiplication theorems of expectation	1
4. Definition of moment generating function (m.g.f)	1
5. Cumulant generating function (c.g.f)	1
6. Probability generating function (p.g.f) and	1
7. Characteristic function (c.f) and statement of their properties with applications	2
8. Chebychev's and Cauchy-Schwartz's inequalities and their applications	2