**Theory 1**

**Q1 What is the difference between Descriptive and Inferential Statistics?**

**Inferential: -**

* It makes inferences about the population using data drawn from the population.
* It allows us to compare data, and make hypotheses and predictions.
* It attempts to reach the conclusion about the population.
* Examples include: confidence intervals, hypothesis testing, regression models, p-values.
* It can be achieved by probability.
* Used for predicting trends, testing hypotheses, generalizing data from sample to population.

**Description: -**

* It gives information about raw data which describes the data in some manner.
* It helps in organizing, analysing, and to present data in a meaningful manner.
* It explains already known data and is limited to a sample or population having a small size.
* Examples include: mean, median, mode, range, variance, histograms, pie charts.
* It can be achieved with the help of charts, graphs, tables, etc.
* Used for describing trends, organizing data for presentation.

**Q2 Define:**

* **Population: - Population** refers to the entire group of individuals, items, or data that share a common characteristic relevant to a study.  
  It includes every possible observation of interest in the research.  
  For example, all citizens of India can be a population for a national survey.
* **Sample**: - A sample is a smaller subset of the population selected for analysis.  
  It represents the population and is used to draw conclusions about it.  
  For example, 1,000 citizens chosen from India for the survey form a sample.

**Q3 Define mean, median, and mode. How are they different from each other?**

* **Mean: -** The arithmetic average, calculated by adding all values and dividing by the number of values. It is only used for numeric value.

**X = sum of the terms/number of terms**

* **Median: -** The middle value of a dataset. It is only used for numeric value.

It is ordered from lowest to highest value.

For even terms: -

M=((n/2) th term + ((n/2) +1) th term)/2

For odd terms: -

M=((n+1)/2) th terms

* **Mode: -** The value that appears most frequently in a dataset. It is the only measure of central tendency that can be used for numeric and categorial data.

**Q4** **What is a Random Variable? What are its types?**

A Random variable is a variables whose value is unknown or a function that assigns values to each of an experiment’s outcomes.

There are two types: - Quantitative and Qualitative.

* **Quantitative: -** Quantitative variables are any variables where the data represent amounts.

For ex: - Height, Age etc.

There are two types: - **i) Continuous: -** A continuous random variable can take on any value within a given interval or range of real numbers (floating numbers).

For ex: - The height of a person, which can be any value within a range (5.5 feet to 6.0 feet).

The time it takes for a light bulb to burn out.

**ii) Discrete: -** These variables have a finite or countably infinite number of possible outcomes.

For ex: - The number of heads when coin is flipped (0,1,2 ,3 heads).

The number of cars passing a certain point in an hour.

* **Qualitative Variable: -** A qualitative variable, also known as a categorical variable, describes characteristics or qualities rather than numerical amounts.

There are two types: - **i) Nominal Variable: -** These variables have categories that are simply names or labels without any inherent order or hierarchy.

For ex: - Name of person: - Bhumika, Gungun, Shreya etc.

**ii) Ordinal Variable: -** These variables also represent categories, but these categories have a natural order or ranking.

For example: - Levels of education (like high school, bachelor’s degree and master’s degree).