**2, examine the components and properties of scientific research and analysis**

Scientific method entails vigorous procedures starting from selection of problems to be solved or analysed, followed by formulation of hypothesis, gathering of data and testing of hypothesis, and finally, the use of findings to refute, modify or support existing theories. To evaluate the findings of their own studies and of others, scientists employ a number of knowledge, to be scientific it must be characterised by verifiability; it must be systematic and must, have general applicability.

**Value-free Analysis**: This refers to the quest for objectivity and neutrality in analysis. To be scientific, the analyst must analyse facts (data) as they are rather than as they ought to be. As much as possible, personal likes and dislike, interest or values must be kept out of any analysis.

**Empirical Analysis**: This analysis is concerned with‘what is’rather than ‘what ought to be’. It focuses its emphasis on direct observation to discover things as they really are as well as their relationships with other things, and the regularisation of theiroccurrence. It is on these observed regularities that we base our explanations and predictions.

**Explanation,** Scientific explanations appeal to generalisationsand theories in explaining specific occurrence. If these generalisations and the particular conditions of the occurrence are true, then the conclusion(s) must be true.

**Prediction:** This takes the same logical form as explanation, butit is different because it is forward-looking, and involves specifying conditions under which certain occurrences are likely to take place. However, because of the unpredictability of man’s actions and behaviour, predictions in political science cannot be absolutely certain, no matter how adequate the explanations on which such predictions are based may be. To this extent, in political science, it is convenient and more realistic to talk of the probabilities of events actually taking place. For example, we may say that if human beings are deprived of the satisfaction of their basic needs, there is a high probability that they will resort to violence. Words like “most likely”, “tend to” and “most probably” convey the probabilistic nature of predictions in political science (Osaghae, 1988).

**Theories**: A scientific theory is a set of generalisations whichspecify the direction of relationship among variables. Theories are therefore the major ingredients of explanations. But for them to be really helpful in this regard, they should be general and not restrictive. Finally, a good theory should be open to further empirical tests.

**Clearly distinguished between the following statistical concepts**

**1, Descriptive statistics and inferential statistics**

Descriptive Statistics refers to a discipline that quantitatively describes the important characteristics of the dataset. For the purpose of describing properties, it uses measures of central tendency, i.e. mean, median, mode and the measures of dispersion i.e. range, standard deviation, quartile deviation and variance, etc. The data is summarized by the researcher, in a useful way, with the help of numerical and graphical tools such as charts, tables, and graphs, to represent data in an accurate way. Inferential Statistics on the other hand is all about generalizing from the sample to the population, i.e. the results of analysis of the sample can be deduced to the larger population, from which the sample is taken. It is a convenient way to draw conclusions about the population when it is not possible to query each and every member of the universe. The sample chosen is a representative of the entire population; therefore, it should contain important features of the population. Inferential Statistics is used to determine the probability of properties of the population on the basis of the properties of the sample, by employing probability theory

**2 parameter and statistics**

A fixed characteristic of population based on all the elements of the population is termed as the parameter. Here population refers to an aggregate of all units under consideration, which share common characteristics. It is a numerical value that remains unchanged, as every member of the population is surveyed to know the parameter. It indicates true value, which is obtained after the census is conducted. Parameter implies a summary description of the characteristics of the target population. On the other extreme, the statistic is a summary value of a small group of population i.e. sample. The parameter is drawn from the measurements of units in the population. As against this, the statistic is drawn from the measurement of the elements of the sample. While studying statistics it is important to the concept and difference between parameter and statistic, as these are commonly misconstrued. A statistic is defined as a numerical value, which is obtained from a sample of data. It is a descriptive statistical measure and function of sample observation. A sample is described as a fraction of the population, which represents the entire population in all its characteristics. The common use of statistic is to estimate a particular population parameter. From the given population, it is possible to draw multiple samples, and the result (statistic) obtained from different samples will vary, which depends on the samples.

**3 briefly explain the following concepts**

**1 simple random sampling**

A simple random sample is a randomly selected subset of a [population](https://www.scribbr.com/methodology/population-vs-sample/). In this sampling method, each member of the population has an exactly equal chance of being selected. This method is the most straightforward of all the[probability sampling methods](https://www.scribbr.com/methodology/sampling-methods/#probability-sampling), since it only involves a single random selection and requires little advance knowledge about the population. Because it uses randomization, any research performed on this sample should have high [internal](https://www.scribbr.com/methodology/internal-validity/)and [external](https://www.scribbr.com/methodology/external-validity/)validity. For example, the [American Community Survey (ACS)](https://www.census.gov/programs-surveys/acs)uses simple random sampling. Officials from the United States Census Bureau follow a random selection of individual inhabitants of the United States for a year, asking detailed questions about their lives in order to draw conclusions about the whole population of the US. Simple random sampling is used to make statistical inferences about a population. It helps ensure high[internal validity](https://www.scribbr.com/methodology/internal-validity/): randomization is the best method to reduce the impact of potential [confounding variables](https://www.scribbr.com/methodology/confounding-variables/)[.](https://www.scribbr.com/methodology/internal-validity/) In addition, with a large enough sample size, a simple random sample has high [external validity](https://www.scribbr.com/methodology/external-validity/): it represents the characteristics of the larger population

**2 stratified random sampling**

Stratified random sampling is a method of sampling that involves the division of a population into smaller sub-groups known as strata. In stratified random sampling, or stratification, the strata are formed based on members' shared attributes or characteristics such as income or educational attainment. Stratified random sampling is also called proportional random sampling or quota random sampling. When completing analysis or research on a group of entities with similar characteristics, a researcher may find that the [population size](https://www.investopedia.com/terms/p/population.asp) is too large for which to complete research. To save time and money, an analyst may take on a more feasible approach by selecting a small group from the population. The small group is referred to as a [sample size](https://www.investopedia.com/terms/s/sample.asp), which is a subset of the population that is used to represent the entire population. A sample may be selected from a population through a number of ways, one of which is the stratified random sampling method