Unit 1

Methods of Natural and Social Sciences

What is science?

Science is a methodical approach to study the natural and social world. Science asks basic questions such as how does the world work? How did the world come into existence? What was the world in the past, what is it like now and what will it be in future? These questions are answered with the help of observation and experiments. The data received is analyzed and interpreted with the help of logic. Scientific knowledge is systematic, unified and organized. Science attempts to bring particular facts under general laws forming parts of a consistent whole. It collects as many facts as possible and then seeks to unify them by finding out their mutual relations and inter connections. Science employs special means and methods to render true and exact knowledge.

The task of a scientist is to discover facts but a haphazard collection of facts cannot be said to constitute a science. A geographer, for example, may be interested in describing the exact configuration of a particular coastline or a geologist in more precise nature of rock strata in a particular locality, but in more advance science basic descriptive knowledge of this or that particular fact is of little importance. The scientist is eager to search out more general truths, of which particular facts are instances and for which they constitute evidences. Isolated particular facts may be known by direct observation but the scientist seeks more than a mere record of phenomena. He seeks to formulate general laws which state the patterns of all such occurrences in a systematic way. A scientist is engaged in a search of the natural laws according to which all particular events occur. Particular facts challenge the scientist to unify and explain them by discovering their lawful connections, and plurality of general laws challenge the scientist to unify and explain them by discovering a still more general principle that subsumes the several laws as special cases. This can be made clear by the following examples:

The Italian Physicist - Galileo Galilei (1564- 1642) formulated the laws of falling bodies which gave a general description of the behavior of bodies near the surface of the earth.

The German Astronomer - J.Kepler (1571-1630) formulated the laws of planetary motion describing the elliptical orbits travelled by the planets around the sun. Their discoveries were great achievements but were still separate and isolated.

Sir Isaac Newton (1642-1727) unified and explained celestial mechanics (Kepler) and terrestrial mechanics (Galileo) by the theory of gravitation and gave three laws of motion. He showed that both are deducible within the framework of a single more fundamental theory of gravitation. Thus, the scientists do not merely want to know the facts but also want to explain them by devising theories. The theories incorporate the natural laws that govern events, and the principles that underlie them.

1. Practical value of science

   Science may be said to have great value both as practical and theoretical persuits. Modern science has changed almost every aspect of our lives although it has been in existence for only a few hundred years. Improvements in farming, manufacturing, communication, transportation, health, hygiene and in our standards of living, are the direct results of practical application of the technology. Scientific progress in the understanding of the genetic make up of human beings promise new cures for terrible diseases. However, some of the practical results of science are not so cheerful. We have harnessed nuclear power but the destructive power of nuclear weapon has become a menace to civilization. Computers enhance our power yet threaten our privacy. The industrial pollution which accompanies industrial revolution threatens the very habitability of the globe. The practical value of science lies in the life made easier by technological advances based on the scientific knowledge

2. Theoretical value of science

   The laws and principles discovered in scientific investigations have a value apart from any practical utility they may possess. This intrinsic value is the satisfaction of curiosity, the fulfillment of the desire to know. Aristotle wrote long ago that "to be learning something is the greatest of pleasures not only to the philosopher but also to the rest of the mankind, however small their capacity for it" (Aristotle, Poetics 1448b). Scientific knowledge does not merely give its possessor power to satisfy his various practical needs, but also fulfills the desire to know. Science is not merely an instrument to control nature, it is also an instrument to know and understand the mysteries of nature as well.

Nature and Aim of Scientific Methods

How does a scientist work? What are his methods and what is his methodology? These are important questions and answers to these questions are equally important. In a very simple term one can say a scientist works like a detective. He (detective) uses all techniques, devices and means to solve his case. A detective is a dispassionate and keen observer. He uses empirical reasoning (induction) as well as formal reasoning (deduction) to reach to a testible and verifiable conclusion. The pattern of scientific inquiry is just the same.

As we have seen the aim of a scientist (natural as well as social) is to find general laws. For this he makes use of two logical processes Induction and Deduction. Induction and Deduction are not contradictory logical procedures but are rather complimentary to one another. We must then know what is a inductive procedure and what is a deductive procedure.

What is Induction?

Induction is a process of inference in which we draw universal statements or scientific laws on the basis of particular facts. Experiences furnish us with particular facts and not with universal truths. Experiences inform us that some men whom we know are dead. But on the basis of these few instances we draw a universal conclusion that all men are mortal. This is inductive procedure. For example :

Ram is mortal.
Shyam is mortal.
Gita is mortal.

Therefore, all men are mortal.

In the above argument conclusion is more general than the premises. One learns by experience the qualities of individual things and with inductive procedure we draw universal conclusions like, "All men are mortal", "In all cases water rusts iron", "All material bodies attract one another" and so on. In all these cases the number of instances observed is very small compared to the full number of which the statement is made.

Induction relies on two fundamental principles, viz., the Law of Uniformity of Nature and the Law of Causation. These laws are called the formal grounds of Induction.

Formal Grounds of Induction

(a) The Law of Uniformity of Nature

The Law of Uniformity of Nature has been expressed in various forms such as, "Nature is uniform", "The future resembles the past", "Nature repeats itself". These various expressions mean that Nature behaves in the same way under the similar circumstances.

If the same circumstances occur the same events will follow. In other words, if water quenched our thirst or fire burnt us in the past under certain circumstances, water will quench our thirst and fire will burn us in future under similar circumstances. Thus, relatively speaking the Law implies that there is no such thing as whim or caprice in Nature.

At first sight Nature does not appear to be uniform. It is true that in Nature various kinds of phenomena occur but all these phenomena depend for their occurrences on certain conditions and if these conditions occur then the phenomena will occur. Consequently, corresponding to the various departments of Nature, there are laws. There is not one uniformity or law governing the whole universe but there are various uniformities or laws governing the various departments of Nature. And these are not distinct but are parts of one system. Hence we speak of Unity of Nature. The law of Uniformity of Nature is a postulate or formal ground of induction. It forms the very basis of all inductive generalizations that from the particular facts we draw universal conclusion.

(b) The Law of Causation

The Law of Causation is second formal ground of inductive generalization. It states, "Every event has a cause" or as J.S. Mill puts it, "Every phenomenon which has a beginning must have a cause". It is the guiding principle of inductive generalizations. This Law guarantees the formal truth of inductive generalization. According to some logicians causation is a special kind of uniformity. According to certain other logicians Law of Causation and Law of Uniformity of Nature are two distinct laws and they together constitute the formal grounds of Induction.

Material Grounds of Induction

Induction is the process of establishing universal laws on the basis of particular facts. It must, therefore, begin with the observation of concrete phenomena. This is the only ultimate way of getting facts. These facts are supplied by observation and experiment.

1. The term observation literally means keeping something before the mind, and should be distinguished from careless perception. Observation involves perception but it should be distinguished from perception without a purpose. Observation is regulated perception. Before we

undertake observation, we have a definite object in view and we direct our attention accordingly. We withdraw our attention from what is not relevant to our purpose and concentrate on what is connected with the object in view. Hence observation is necessarily selective. Observation should not be confused with unconscious inference. We should always distinguish clearly between facts which we really observe and what we infer from the facts observed. Observation is regulated perception of natural events under natural conditions. For example, an astronomer observes an eclipse of the moon or sun in order to determine the cause of the phenomenon. He watches the eclipse as it occurs and cannot control the attendant circumstances, he can watch the phenomenon with his naked eye or through a telescope. In both cases it is observation.

2. Experiment is an artificial reproduction of events under controlled conditions pre-arranged and selected by ourselves, A scientist experiments. He manipulates a fact in certain ways, introduces or removes conditions to see what will happen. Experiment is a kind of observation, but it has very special advantages from the point of view of science. It is observation under controlled conditions which we ourselves have pre-arranged. We can vary the conditions at will and produce them as often as we like. In observation we wait for an event to happen in the ordinary course of nature. When it happens, it is surrounded by complicated set of circumstances and it is impossible to say which of these are essential to its production. In experiment we produce the event under conditions which we have ourselves prearranged and carefully selected. Thus, we interfere with Nature, and force it to answer our questions. The purpose of experiment is thus to eliminate what is irrelevant.

   There is no real opposition between observation and experiment. They are not different in kind. In both we study the nature of phenomena, ascertain their causes and explain the conditions of their happening. They differ only in degree. Observation precedes experiment and it has a wider scope than experiment. In observation we can proceed both from the cause to the effect and from effect to the cause but in experiment we can only proceed from the cause to the effect, On the other hand, experiment enables us to multiply our instances indefinitely whereas in observation we are at the mercy of Nature. Experiment often enables us to isolate the phenomenon we are studying which is not possible in observation.

The Inductive Procedure - its different steps or stages.

Logicians have recognized certain well defined steps or stages in our progress from particular facts to general Laws. Broadly speaking, there are following well marked stages, viz., Observation (including Experiment, Analysis and Elimination), Formation of Hypothesis, Generalization and Verification.

1. The first stage in the inductive inquiry consists in observation; observation is well regulated perception of circumstances for a certain definite purpose. Before proper observation begins we should have an idea as to what the fact is which we seek to explain. Hence observation presupposes definition. As observation is undertaken for a definite purpose, therefore, it necessarily involves Analysis and Elimination. Analysis means breaking up a complex fact into its constituent factors. Analysis reveals that some factors of the complex whole are merely accidental and irrelevant, having no bearing on the subject matter, while others are essential factors relevant to the enquiry.

The next step is Elimination. Elimination means exclusion or rejection of accidental and irrelevant circumstances, as distinguished from essential circumstances which point to a causal connection.

2. Formation of Hypothesis. A hypothesis means a provisional supposition. At first it appears that there are several possible explanations of the phenomenon under investigation. The real explanation is to be sought for among those possible explanations. That which appears to be the most probable is provisionally selected for further investigation and others are rejected or held in reserve.

3. Generalization: The next step is Generalization or inference of a general proposition on the basis of observation of particular instances. When we find that a particular hypothesis explains the phenomenon under investigation in several instances, we infer that it will be an adequate explanation in all similar cases under all circumstances. This generalization is made possible by the employment of the Experimental Methods which enable us to establish a causal connection when it is already suggested by a hypothesis.

4. Verification: Verification means examining whether the general proposition which is arrived at is really true by appealing to known facts. It involves deducing consequences from the general proposition and examining whether they agree with actual facts.

Let us attempt to illustrate the application of the Inductive Method in its different states, with reference to a concrete instance of scientific inquiry. Suppose the scientist wants to find out the cause of a particular disease, say, malaria fever.

To start with we define what malaria fever is. Before any investigation is undertaken we must have an idea of what we seek to explain. We note its symptoms, viz., high temperature, headache, a thirst for water, nausea etc. Now proper observation begins. It is observed that persons of different ages, different habits, living in different places, under different climatic conditions, in different seasons are subject to the attack of the disease. We attempt to observe conditions and circumstances which precede, accompany and follow the attack of the disease. We observe what different places are visited by the person suffering, what food he eats, his physical constitution, clothes he wears etc. The field of our observation should be large so that all possible conditions are investigated. In other words, we vary the circumstances. Then we analyze the conditions and mark the relevant conditions and discard the irrelevant or accidental conditions. For example, age of the person is not essential and what he eats is not relevant factor. We eliminate accidental circumstances. Next we frame a hypothesis. This disease may be due to some bacilli absorbed through food, drink or breathed through nostrils or infection may be carried by insects like mosquitoes, flies or bugs.

The most probable hypothesis may be that the infection is carried by mosquitoes. We, then, generalize and say, "All cases of material fever are due to mosquito bite". Then we verify the general proposition by observing that people having this disease have been living in mosquito infected places. The breed of mosquitoes is further verified and we reach the conclusion that "Anopheles mosquitoes are the cause of malaria fever".

Types of Induction

- Induction
  - Proper Induction
    - Scientific Induction
    - Unscientific Induction or Induction by Simple Enumeration
    - Analogy
  - Improper Induction
    - Perfect Induction or Complete Enumeration
    - Parity of Reasoning
    - Colligation of Facts

Proper Induction

Proper Inductions follow the inductive procedure in establishing the general statement. The ideal form of induction is known as Scientific Induction.

(1) Scientific Induction establishes a general proposition, based on observation of particular instances, in reliance on the principles of the Uniformity of Nature and the Law of Causation. It establishes a proposition. A proposition explicitly states a relation between two terms. The inductive proposition seeks to prove a connection between two terms. For example, we prove the connection between 'Man' and 'Mortality' and establish the inductive general statement, "All men are mortal."

(2) The proposition established is a general proposition in which the predicate is affirmed or denied of an indefinite multitude number of individuals, e.g., "All men are mortal". Here the term 'mortal' is affirmed of all men who constitute an indefinite number of individuals.

(3) The inductive general proposition established is a proposition based on actual experience. It is not a mere analysis of the subject term but also adds something new to our knowledge.

(4) Scientific Induction is based on observation of facts of particular instances. For example, the general proposition "All men are mortal" is based on the observation of particular cases of death of persons we have come across. Thus, Induction aims at material truth. The general proposition established by Induction must conform to the actual state of things.

(5) In Scientific Induction there is an ‘Inductive leap’. In other words, there is a leap from the known to the unknown, from the observed cases to the unobserved cases. This passage from the known to the unknown, from the observed to the unobserved, involves some hazard or risk. According to Mill and Bain, this ‘Inductive leap’ or hazard constitutes the very essence of Induction. If this characteristic is not present then the process is not called Induction. This characteristic follows from the circumstances that Induction establishes a general proposition which embraces a large and indefinite number of unobserved facts. But the so-called unknown is partially known because it resembles the latter.

(6) Scientific Induction is based on two presuppositions viz. the Law of Causation and the Law of Uniformity of Nature. These two fundamental principles are called postulates or assumptions of Induction.

  (i) Law of Causation states "Every event must have a cause". In Scientific Induction, for example, a causal connection is proved between 'heat' and 'expansion' and the general proposition "All metals when heated expand" is established.

  (ii) Scientific Induction is also based on the principle of Uniformity of Nature. This principle states that under similar conditions, the same cause produces the same effect. Where we find that there is a causal connection between ‘heat’ and ‘expansion’, we further assume that this causal relation will be true in all cases, under similar circumstances in the future.

  Thus, Scientific Induction establishes general proposition, on the evidences of particular instances, in reliance on the Principle of Causation and the Uniformity of Nature. ‘Inductive leap’ or the leap from the known to the unknown is the essence to Scientific Induction.

Induction by Simple Enumeration / Unscientific Induction

Induction by simple enumeration is the establishment of a general proposition on the ground of mere uniform or uncontradicted experiences without any attempt at explaining a causal connection. For example, so far as our experience goes we have seen only white swans. We have never come across a swan of any other color, nor have we ever heard that anyone else ever has. On the strength of these uniform or uncontradicted experiences we arrive at the general proposition "All swans are white". The fact that we have not observed contrary instances does not prove that they are not there and that they may not come to light at any time. The moment black swans were sighted in Australia the proposition "All swans are white" became false. When we observe large number of positive cases, without any negative one, we start expecting that the next one would be like them. This is a psychological and not logical expectation. This is a general proposition based on observation of particular instances and there is an ‘Inductive leap’ from known to unknown, but this leap is based on a loose application of the principle of Uniformity of Nature, and not on the strength of a causal connection. We have not discovered or proved any causal connection between whiteness and swans. If we could do so, it would be an instance of Scientific Induction. However, we do believe that the unobserved cases will be like the observed ones.

This form of Induction is Proper Induction because there is in it an ‘Inductive leap’ from known to the unknown. But it is unscientific induction because there is no knowledge of any causal connection. It is called Induction by Simple Enumeration because the conclusion is drawn on the basis of mere enumeration or counting of instances. Our popular generalizations are often induction of this form.

Value of Induction by Simple Enumeration

It has been said that the conclusions of Induction by Simple Enumeration are merely probable, while those of Scientific Induction are certain. This is not true. All inductions give probable knowledge though probability is a matter of degrees. It can go from zero to what very nearly approaches scientific certainty.

The value of Induction by Simple Enumeration depends upon two considerations:

a. The more the number of instances greater the probability.

b. The absence of negative instances when experiences are of wide range shows that the conclusion possesses a high degree of probability.

Induction by Simple Enumeration is the starting point of Scientific Induction because in it we do have a vague belief that there is a necessary connection.

Analogy

Analogy is a weak form of Induction. Analogy is a kind of inference which proceeds from particular to particular. It is based on imperfect similarity and is only probable in character. The ground of inference in Analogy is resemblance.

A symbolic example:

A resembles B in certain properties, viz., x,y,z

B further possesses the property m

Therefore, A possesses the property m, even though no connection is known to exist between m and common properties x,y,z.

A concrete example :

Mars resembles the Earth in certain respects, viz., in being a planet, possessing similar atmosphere, land, sea, polar regions, temperature (neither too hot or too cold for life) revolving round the sun and borrowing light from the sun. The Earth possesses the further property of life. Therefore, Mars possesses the property of being inhabited.

According to logicians Analogy possesses the main characteristic of Induction, i.e., an 'Inductive leap' from the known to the unknown. Hence it is a sub-division of Proper Induction. But it differs from Scientific Induction in certain points. These differences are:

(a) In Analogy we proceed from particular to particular whereas Scientific Induction establishes a general proposition.

(b) Scientific Induction is based on knowledge of a causal connection, while in Analogy there is no such knowledge.

(c) But we can say Analogy is a stepping stone to Scientific Induction

Improper Induction

Induction improperly so-called are those processes of reasoning which differ from Induction Proper in essential characteristics, though superficially they have the same appearance. They can be called processes which simulate Induction. There are three types of these processes, viz.

(1) Perfect Induction or Complete Enumeration

Perfect Induction is the establishment of a universal proposition on an examination of all the particular instances covered by it. For example, January, February, March… December, each month contains less than 32 days. Therefore, all months of the English year contain less than 32 days each.

Perfect Induction is possible only when there are limited number of particulars. It is also called Complete Enumeration. In Perfect Induction, there is no 'Inductive leap' and hence there is no real inference. The proposition arrived at is general only in appearance.

It is said that Perfect Induction gives dependable conclusion because all instances are examined. But the question is, can enumeration like this furnish scientific certainty? It cannot. But it helps in sciences and common life. It helps us in making comprehensive statements which are essential to the progress of science.

(2) Induction by Parity of Reasoning

Induction by Parity of Reasoning is a process of inference in which we establish a general proposition on the ground that the same reasoning which established a particular case will establish every other similar case coming under the general proposition. In this similarity or parity is the ground of passing from a particular case to a general proposition. This is illustrated in Geometrical Proofs. For example, we draw ABC the diagram of a triangle on a piece of paper and prove that the sum of its three angles is equal to two right angles. Having proved this with the help of this diagram, we establish the general proposition - "All triangles have their three angles as equal to two right angles" - because the same reasoning which applies to this diagram will apply to every other diagram of a triangle which we may draw.

In Parity of Reasoning the essential characteristic of Proper Induction, i.e., reliance on observation of fact is not present. Geometrical figures are abstract conceptions. They are in no way inductive, they are purely deductive in character. In geometry we start with certain axioms and definitions and proceed deductively to draw conclusions from them. Thus the so-called Induction by Parity of Reasoning is not induction at all because it is a purely deductive process.

(3) Colligation of Facts

According to J.S. Mill, colligation of facts is another process which is improperly identified with Induction. To colligate literally means to bind together, and the expression 'Colligation of Facts' means the binding together or mental union of a number of observed facts by means of a suitable notion. For example, a navigator sailing in the midst of the ocean discovers land; he cannot at first determine whether it is a continent or an island. He coasts along it, and after a few days he finds he has completely sailed round it. He then declares it to be an island. This is colligation of facts because the navigator brings together, under the notion of an island, the set of facts observed by him. It is not correct to regard Colligation of Facts as Induction because colligation is practically the same as conception or the process of forming general notions while Induction establishes a general proposition. In colligation there is no inference at all. Certain facts are observed and brought together under a notion which we already possess. There is no 'Inductive leap' from the known to the unknown. In colligation we merely describe observed facts and there is no attempt at explanation by proving causal connection among them, whereas in Induction this connection is proved. Colligation is sometimes deductive. Thus, colligation may be called 'a process subsidiary to Induction' or 'a necessary preliminary to Induction'.

Besides Induction, Scientific Method includes deductive process of inference as well. Let us see what is deductive procedure?

What is Deduction?

In deduction we infer a conclusion from a given set of premises. Deduction begins with a given whole and infers from it the qualities of its parts. For example, All men are mortal.

Ram is a Man.

Therefore, Ram is mortal.

In Deduction we infer from given universal truth (premises), either particular conclusion or a conclusion of equal generalization as that of premises. But in no case the conclusion in deductive reasoning goes beyond premises.

Difference between Induction and Deduction

In Induction, as we have seen, we infer more comprehensive conclusion than the premises whereas in Deduction we infer less or of equal strength of conclusion as of our premises.

Indeed like analysis and synthesis Deduction and Induction mutually imply each other. Neither gives a complete account of knowledge of any object without the other. The work of the one is not over before the other begins. The process of acquiring knowledge involves both Deduction and Induction. Induction first completes the work of establishing the universal propositions or premises and Deduction then explains the particulars in the light of that universal proposition. Not only do Deduction and Induction mutually involve one another they also proceed to the same ultimate principle. They differ in their starting point and not in their principle. Thus, the purpose of science is to explain, and we are said to explain a thing when either we show that it is an instance of a law or an element in the system, or the effect of a cause, or the means to an end etc. We cannot explain anything by itself. We have to connect it to other things within a system. The process involved in such explanation includes both Deduction and Induction.

The starting point is different in the two processes. In Deduction we start with general principles, while in Induction we start with the facts of observation. In Deduction we proceed from general principles to its consequences while in Induction we discover a general principle. In other words, the real process of inference in each case is the same, viz., an insight into the connection of facts according to some general principles. Scientific Method needs both Induction and Deduction.

Natural Sciences and Social Sciences

The natural sciences examine the natural phenomena. They study the structure and properties of non-living matter, from tiny atoms to vast galaxies. The natural sciences include physics, chemistry, astronomy, geology and meteorology etc. The social sciences, on the other hand, deal with the individuals, groups and institutions that make up human society. They focus on human relationships, interactions between individuals and their families, religious or ethnic communities, cities, governments, and other social groups. The main branches of the social sciences include anthropology, economics, political science , psychology, sociology etc. Social scientists attempt to develop general laws of human behaviour, but their task is difficult because it is hard to design controlled experiments involving human beings. Social scientists, therefore, rely heavily on careful observations and the systematic collections of data to arrive at their conclusions. The use of statistics and mathematical models is important in analysing information and developing theories in the social sciences.

Difference between Methods of Social Sciences and Natural Sciences

S. No.	Social Science	S. No.	Natural Science
1.	Social sciences investigate laws related to man or man's social behavior.	1.	Natural sciences search for laws in natural phenomena.
2.	Social sciences proceed on the assumption that man is the central figure of inquiry.	2.	There is no equivalent assumption in natural sciences
3.	The fundamental elements of social sciences are psychologically related.	3.	The fundamental elements of natural sciences have a physical relation.
4.	The basic elements of social sciences are man, his mental states and behavior.	4.	The basic elements of the natural sciences are the physical elements like hydrogen, oxygen, energy particles etc.
5.	The basic elements of the social sciences cannot be separated analytically.	5.	The basic elements of the natural sciences can be separated by analysis.
6.	Being related to the study of society the social sciences have comparatively less exactness.	6.	Because they study natural elements, the natural sciences possess greater exactness.
7.	Because of their lesser exactness social sciences can make comparatively fewer predictions.	7.	The natural sciences can make more prediction due to a higher degree of exactness.
8.	For this reason objectivity is achieved with difficulty in social sciences.	8.	Objectivity or objective truth can be attained easily in natural sciences.
9.	Social sciences provide comparatively lesser scope for measurement of subject matter.	9.	There is greater possibility of measurement in the study of natural phenomena
10.	It is difficult to construct laboratories for social sciences. Society is their laboratory. However, data can be collected from case study, observation and questionnaire.	10.	Natural sciences have their own laboratories to study natural objects.

Note : Phenomenon (singular) = A thing which is perceptible, that is, which can be seen, heard, touched, smelt or tasted

Phenomena (Plural of phenomenon)

Questions

1. What are the main features of science? Discuss both practical and theoretical values of studying science.
2. Explain and illustrate the different steps involved in the inductive process.
3. Inductive reasoning assumes that reality (nature) is uniform. Examine this statement.
4. Explain the Law of Causation. Examine its utility in establishing the scientific theories.
5. Point out the main characteristics of Scientific Induction
6. Induction by Simple Enumeration fall short of Scientific Induction. Examine this statement. Are we justified in saying that Induction by Enumeration is stepping stone for Scientific Induction?
7. Discuss with the help of suitable examples Analogy as a form of Induction.
8. In Perfect Induction there is no 'Inductive leap', hence there is no real Induction. Discuss.
9. What is meant by 'material' and 'formal' grounds of Induction? Distinguish between them very briefly.
10. The methods of natural sciences are different from the methods of social sciences. Discuss.