UNIT 1 NATURE AND SCOPE OF LOGIC

Contents

1.0 OBJECTIVES

This unit titled *Nature and Scope of Logic* aims at:

- introducing and familiarizing the definition, nature and scope of the subject exposing the students to various definitions of logic.
- discussing the question whether it is an art or a science, a positive science or a normative science
- discussing the extension and scope of logic

1.1 INTRODUCTION

"Reasons are the coin we pay for the belief we hold," so says Schipper in his monumental work on Model logic. But reasons given are not always good enough. With reasoning we produce arguments – some good, some bad – that often get converted in writing. Every argument confronted raises this question: Does the conclusion reached follow from the premises used or assumed? There are objective criteria with which that question can be answered, in the study of logic we seek to discover and apply those criteria.

Usually logic is associated with Greek tradition and philosophy. Most of us think logic as a branch of knowledge originated in ancient Greece. But this is not true since as a matter of fact almost all great civilizations developed logic as an academic discipline. Ancient Indians, Arabs, and Chinese made significant contributions to the growth and development of logic. However, our study is restricted logic developed by Europeans over several centuries.

1.2 VARIOUS DEFINITIONS OF LOGIC

The word 'logic' comes from the Greek word *logos*, literally meaning, word, thought, speech, reason, energy and fire. But in due course of time these literal meanings

were given up to make way for more accurate meaning hinting at what we actually learn when we do logic. This is how it came to be understood as a discipline dealing with thought, reasoning and argument at different points of time.

It is our experience that emotional appeal is sometimes effective. But it has no place in logic. Only appeal to reason pays effectively in the long run and which can be objectively verified and appraised. One needs to discern the criteria involved in rational method. The goal of the study of logic is to discover and make available those criteria that can be used to test the correctness of arguments. Against this background we shall evaluate various definitions of logic held at different times and their merits and demerits.

One of the definitions of logic states that it is the study of reflective thinking. This particular definition was proposed by Susan Stebbing in her work 'A Modern Introduction to Logic'. She, surely, made progress over H.W.B. Joseph who regarded thought in its unqualified sense as the main theme of logic when he wrote 'Introduction to Logic'. However, the fact is that one has to concede in both the cases that the content of logic is essentially psychological and what is psychological is invariably subjective. This position is unacceptable to any student of logic. A clarification is needed on this issue. One of the important topics of logic is what is known as 'Laws of Thought.' There are three laws of thought, law of identity, law of excluded middle and law of of contradiction. On this ground, it is possible to conclude that at least indirectly logic deals with thought. However, this is a mistaken notion. Laws of thought, in reality, have nothing to do with thought. They merely show or demonstrate the nature of statements. Therefore even in this sense thought cannot enter the domain of logic.

Another discarded definition of logic states that it is the study of the methods or principles which we use to distinguish good (correct) reasoning from bad (incorrect) reasoning. As it has been claimed 'All reasoning is thinking but all thinking is not reasoning'. There are many psychological processes that are different from reasoning, such as imagining, regretting, day dreaming and so on. There seems to be same laws governing all these activities, but they are not studied by logicians. Reasoning is a special kind of thinking in which problems are solved and conclusions are drawn from premises. The logician is primarily concerned with the correctness of the completed process of reasoning and only with this species of thinking.

This definition does not imply that only a student of logic can reason well. Nor does it imply that a student of logic necessarily does it. Just as an athlete need not be aware of the complex processes going on inside his body while he performs the athletic fete, people need not be conscious of the complex logical processes involved in reasoning when they scrupulously perform the task of reasoning. However, a person, who has studied logic, is more likely (there is no rule that he should do) to reason correctly than one who has never thought about the principles involved in logical activity. There are multiple reasons for it. To begin with, a student of logic will approach the discipline as an art as well as a science, and he or she will engage herself in doing exercises in all parts of the theory being learned. It is a continuous practice that will help the student fare better and make him perfect. Second, a significant part of the study of logic consists in the examination and analysis of fallacies, which may be viewed as quite natural mistakes in reasoning. Knowledge of such pitfalls gives an increased insight into the principles of reasoning in general and thereby we can avoid stumbling upon them. Finally, a study of this discipline empowers the student with techniques and methods for testing the correctness of many different kinds of reasoning, and when errors are detected, they are removed at once. Again, problem with this definition is that whatever may be its merit, it is also subjective

because reasoning depends upon the person who reasons. If there is no one who reasons, then there is no reasoning at all. Therefore this definition also does not take us far.

As an alternative, logic was defined as the science of inference by some logicians. Though this definition is better than the older definitions, even this definition is not free from defect completely. Inference is a special form of mental activity. Its subjective nature becomes obvious when we notice that if there is some one who infers, then there is inference; not otherwise. However, very shortly we notice that inference is not banished altogether from the domain of logic and that it has a definite role to play in the development of logic.

If so what is an acceptable definition of logic? Logic concerns with distinction between good argument and bad argument. This itself constitutes the definition or essence of logic. An argument always points to a certain relation between two sets of statements or propositions. One set is called premise or premises and another is called conclusion. If the conclusion follows from the premises, then the argument is said to be good; otherwise bad. How do we know whether the conclusion follows from the premises or not? As in the case of games here also total adherence to rules makes an argument good. Even if one rule is violated the argument turns out to be bad. It only means that conclusion follows from the premises only when all rules are scrupulously followed.

At this stage, we introduce a technical word. We say that the premises imply the conclusion if the same follows from the given premises. Therefore implication is the desired relation between the premises and the conclusion. Implication is not something which is brought from outside. It is latent in the premises only. It is left to the intellect of human being to discover or to extract what is latent. Implication is objective and, therefore, man-independent because if it exists, it exists independent of any thinking mind. No amount of effort on the part of thinking minds can impose implication when it does not exist. It can only be discovered, but cannot be created. The process of discovering what is latent is known as inference. Logic is not concerned with the process as such, but with the end product of process, i.e., presence or absence of implication.

This will bring us to the crucial distinction to be made. Inference can be valid or invalid. If inference has its basis in implication, then it is valid. On the other hand, if it does not enjoy the support of implication, then it is invalid. However, there is nothing like valid or invalid implication. Either there is implication or there is no implication. That is all. Secondly, statements imply; they do not infer. On the contrary, humans infer; they do not imply. Therefore any error lies only in human activity. No error can be discerned in the relation between statements. In the third place, implication without inference (valid) is possible, but valid inference without implication is neither possible nor plausible.

This sharp distinction has its tell-tale impact. Contrary to inference which is man-dependent implication is man-independent. Suppose that logic is defined as a study of inference. Then it becomes subjective. If I infer then only there is logic; otherwise not. On the contrary, if implication replaces inference, then logic becomes man-independent and hence objective. Rivalry between subjective and objective elements now surfaces. If knowledge is to be viewed as objective, then logic, automatically, ought to remain objective. Therefore implication replaces inference when we are concerned with the subject matter of logic.

Though inference loses its place in this scheme, philosophers like Russell continued to use 'inference' only. Later we will learn that we have only rules of 'inference' but

not rules of implication. The point to be noted is that in all these cases inference, paradoxically, means implication only. It is very important that this point is borne in our mind throughout our study of logic.

1.3 TWO TYPES OF LOGIC: FORMAL AND MATERIAL

Traditionally logic has been classified into two types 1) Formal and 2) Material logic. Formal logic is otherwise known as deductive logic and material logic as inductive logic. Formal logic is concerned with the form or structure of argument whereas material logic is concerned with the matter or content of argument. When matter is irrelevant, material truth also is irrelevant. What matters in deductive logic is formal truth. By formal truth we mean logical relation between the premises and the conclusion. It is possible to know this kind of truth without knowing the content of the argument. In this case, it is sufficient if the argument follows the rules of the game. This whole explanation can be put in a nut-shell in this manner. An argument consisting of only true propositions can very well be invalid whereas an argument consisting of only false propositions can very well be valid. It also means that in our study of deductive logic it is possible to know whether an argument is valid or not without knowing the contents of the argument (and many times this is what precisely happens) provided we are in a position to decide whether the argument has followed all the rules are not. However, the case of material logic is different. In this case it is possible to judge the truth or falsity of the conclusion only when we know what the argument is all about. What is more important than the previous statement is the controversy surrounding the relevance of rules. The burning question is whether there is anything like rule or rules governing the structure of inductive argument (for more details see, 1.4 of block 2). Suppose that there are no rules regulating inductive arguments as maintained by some philosophers. Then inductive arguments are neither valid nor invalid. If so, what is its status? A question like this is easier asked than answered. Attempts to answer this question occupy a good deal of discussions on inductive logic.

1.4 LOGIC: SCIENCE OR ART?

Questions have been raised on the issue whether logic is a science or an art or both. Let us stay for a while on this problem. In ancient times science just meant a systematic study of anything. But today the term science has developed into a discipline distinct from several other activities of mankind. Science has been defined as that branch of knowledge which aims at explanation of phenomena. Used in this technical sense, logic is no science at all. Does this mean that logic is an art? Art is concerned with doing something. Logic, if defined as an art, is so only in derivative sense. In order to decide whether or not logic is an art we have to consider the aim of logic. Is the aim of logic to give us knowledge about valid argument forms or to make us better thinkers? No one will deny that a study of logic results in improving our reasoning ability. But there is a restriction. Just like a moralist who may not himself be moral as a person, a logician may not be logical in his reasoning. We can say that the effect of such a study is the acquisition of knowledge regarding valid argument forms. It is not for logic to consider whether or not this knowledge is put into practice. In view of this feature we can say that logic is a science and not an art. It is a science not in the technical sense, but in a general sense.

1.5 LOGIC: POSITIVE SCIENCE OR NORMATIVE SCIENCE?

Granted that logic is a science, what type of science is it? Science has been classified into two types, viz., 1) positive Science and 2) normative Science. Positive science describes what the case is. Normative science, on the other hand, tells us what ought to be the case. Let us now examine whether logic is a positive science or a normative science. Some logicians consider logic to be a formal science and regard it as a normative science. Just like object thought is made up of form and matter. According to Latta & Macbeath 'the form of thought is the way in which we think of things, the matter of thought is the various particular objects we think of. A form is something which may remain uniform and unaltered, while the matter thrown into that form may change and vary.

A normative science attempts to find out the nature of forms (standards) on which our judgments of value depend. Normative sciences have before them a standard with reference to which everything within the scope of science is to be judged. A normative science gives us judgments of value, i.e., it tells us what ought to be the case. Logic has an important normative aspect; but a norm or ideal in logic has a special meaning. The main business of logic is to discover the general conditions on which the validity of inference depends. In our discussion of logic we try to force these conditions on the way of arguing. We do so because there are certain objective relations between statements. This means that statements must possess a certain structure and there must be certain objective relations between them if our inferences are to be valid. These structures of statements and their mutual relations are pure forms, which serve as norms in logic. Traditional logicians while considering logic to be a normative science meant that it is a science concerned with those principles which ought to be followed in order to attain the ideal of truth.

Some other logicians consider logic to be a descriptive science or a positive science and not a normative science since it does not lay down any norm for thinking. Its nature is description as it aims at describing and classifying various types of arguments.

In fact the classification of sciences into positive and normative cannot be applied to logic. Logic cannot be characterized either as positive or as normative science. If logic were a positive science, it would merely describe different argument forms. Logic however, does not do so. The logician aims to build a deductive system whose elements are logically true propositions (tautologies). These propositions are purely formal and hence have no reference to context. Similarly, logic cannot be considered normative. It does not search for principles on which value judgments depend. In fact, the starting point for logic is our ability to distinguish between valid and invalid arguments. The logician only makes explicit the principles involved in valid arguments. This discussion reveals that positive-normative distinction is not relevant in the context of logic.

Check Your Progress I

Note: a) Use the space provided for your answer.

b) Check your answers with those provided at the end of the unit.

1) Bring out the various definitions of logic.

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2) Is logic a Positive science or a Normative Science? Substantiate your position.

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1.6 LOGIC AND OTHER DISCIPLINES

Logic as a discipline has wide scope and this will be clear if we examine its relationship to various empirical and social sciences. Logic is closely associated with almost all disciplines. Some are very significant. Therefore a cursory reference to some of them is desirable.

Logic and Epistemology:

Epistemology is that branch of philosophy which deals with theories of knowledge. It investigates the structure, conditions, sources as well as limitations of human knowledge. Epistemology, though, is not a formal science like logic since it must deal subjective entities like *belief* it does make use of logic and its methods widely to form theories about it. In fact there is a subdivision within epistemology called epistemic logic which specifies the limits of logical norms applicable in epistemic situations. Though logic and epistemology are interrelated, we cannot attribute any genus – species relation between the two. Logic is the science of reflective thinking in so far as implications are concerned. The province of logic is confined to certain formal methodologies. Epistemology consists of a number of cognitive affairs which goes beyond logic. Similarly logic too extends outside the concerns of epistemology.

Logic and Metaphysics:

Traditionally, the subject matter of metaphysics is regarded as the nature of Being or Reality. Since Greek times metaphysics has been conceived as the mother of all knowledge and it is this subdivision of philosophy which examines every presupposition of various sciences. For instance, physics assumes the existence of matter, motion, force, time and space. It is metaphysics which takes upon itself this task of examining these presuppositions of various sciences. The basic assumption of logic is that thought gives knowledge. It is necessary that we enquire into this very presupposition. In this endeavour metaphysics comes to our aid. Again it is common to make a distinction between real and unreal. But inquiry into the basic nature of this distinction is not common. Metaphysics deals with this problem as well. Not only does it analyse the basis of all sciences, but also provides a criterion of reality. Logic in fact stands between metaphysics and science. Abstraction of the bases of the principles of science is done through logic which bridges the gap between metaphysics and sciences.

Logic and Psychology: Tradition stipulates that logic and psychology are related on the basis of the assumption that thought is a common factor to them. However, a crucial point is missing in this correlation. The traditional approach is something like this. Psychology takes up the study of origin and evolution of thought process by examining the functions of animals, infants, abnormal persons, criminals etc. Its main concern is mind and thought is a mental process. Logic gets confined to the study of

inferential thinking of only normal adult human beings. Again while logic attempts to abstract the forms in which human mind thinks, psychology studies the actual process of thinking. The forms of thinking which logic abstracts from our thought processes are not events in our mind and, therefore, are not of interest to psychologists. Being a formal science, logic looks upon those principles as regulative elements of reflective thinking. Psychology is concrete because its subject – matter is concrete, i.e., actual psychological events. Logic is abstract because its subject matter is abstract, i.e., forms of reflective thinking. Therefore in one sense they are related and in some other sense they are poles apart.

Ironically, this is just a matter of history of psychology as well as logic because today psychology does not regard mind as the topic of its concern and thought is no longer reckoned as mental. It is at once transformed into a sort of neurological process though its subjective nature remains unaltered. Only in this sense psychology studies thought. And logic is anything but a study of thought. Hence it is really obsolete to relate logic and psychology. Therefore logic and psychology are distinct disciplines and have nothing in common. However, we can remark that there is something logical in psychology though there is nothing psychological in logical enterprise. This is so because no science can afford to be illogical and, admittedly, at least some sciences can progress without recourse to psychological elements.

A question is frequently asked; which one has wider application; logic or psychology? This is an unanswerable question. In one sense the province of psychology is wider than that of logic since the former studies the entire activities of the human mind. In a different sense logic is wider than psychology because the latter follows logical principles while dealing with its own subject matter. The two sciences are mutually complementary.

Logic and Language:

Language is only a means of expression, yet the nature of language affects logical thinking. Just as the success of an operation depends upon the quality of surgical instruments apart from the skill of the surgeon, the quality of the argument depends upon not merely the validity of the forms of thinking the agent resorts to, but on the language in which the arguments are expressed as well.

Natural language performs multiple functions, like conveying information, evoking emotions, stimulating action, making reference and so on. The structure of natural language is so constituted that it enables the language to perform these diverse functions. However, language of logic needs to convey only information. Hence it calls forth the use of emotively neutral language. Logicians take extra care in using plain and non-sophisticated language so that they just convey information, which is either true or false. Logical statements pronounce that something is or is not the case. For instance, 'Atom has been split' is a factual statement which carries a definitive truth-value. Logic demands statements which convey exact information through a neutral use of language.

Language is so subtle and complicated an instrument that we often lose sight of the multiplicity of its uses. But there is real danger in our tendency to over simplify. On the staggering variety of uses of language some order can be imposed by diving them into very general categories: the *informative*, the *expressive* and the *directive*. Among these three uses, logic is concerned only with the informative use of language. Many philosophers, however, have claimed that the structure of logic and language are identical. Therefore, a better understanding of logic depends upon the elimination of ambiguity and vagueness of language.

Logic and Physical Sciences:

Of late, science and scientific culture seem to shape human life. The goal of science is to study the natural events of various types and discover generalization regarding them. The generalisations are utilized to yield comprehensive theories about the working of nature. The procedure of science involves both observation of facts and reflective thinking. The principles of logic help science to analyse the observed facts and draw valid conclusions from them.

Logic and Mathematics:

Let us briefly dwell on the background before proceeding further. Though the beginnings of modern logic are found in the writings of Leibniz, it was not until the end of the nineteenth century that logic discovered new path of development. The shift in track was partly due to certain topics in mathematics which received the impetus and partly due to the discovery of paradoxes. These developments resulted not just in the overlapping of logic and mathematics, but at some point of time, it became 'extremely difficult to draw a non-arbitrary line between logic and mathematics'. In this section, only cursory reference can be made to important milestones which led to constant interplay between logic and mathematics.

The ball was set rolling by George Boole when his work on 'The Mathematical Analysis of Logic' was published in 1847. The essence of his work was with his treatment of the logic of classes. This was followed by George Cantor's investigations on theory of sets. What made Cantor's work on theory of sets significant were his studies in analysis in general, and theory of trigonometric series in particular. However, the required breakthrough was provided by Gottlob Frege when he attempted to base mathematics on pure logic. In his own words, arithmetic is only a development of logic. Not only arithmetic became an extension of logic, but also due to the discoveries of non-Euclidean schools of geometry and certain paradoxes by Russell, Cantor and others at a later stage, mathematics itself was regarded as an extension of logic and this thesis came to be known as Frege-Russell thesis. This extension was described by Russell and Whitehead in their preface to the '*Principia Mathematica*' as backward extension, thereby meaning extension to roots.

G. Peano tried a different route to connect mathematics and logic. Instead of trying to secure a sound base in logic to mathematics, he analysed the methods of mathematics which were structurally similar to the calculus of logic and in this way he tried to link the two.

None of these attempts aimed at 'mathematicising' logic so much as 'logicising' mathematics. Consequently, logic became the foundation of mathematics. Serious reservations against this theory came only from two quarters. Kronecker questioned the ideas of Cantor only to challenge the 'ostensible' essence of mathematics because he believed that Cantor's theory was not mathematics but sort of mysticism, a view partly endorsed by Cantor himself. Poincare was another philosopher who reacted in the same spirit to Zermelo's axiomatic set theory. Poincare' argued that the nature of natural number system is such that it is incapable of being reduced to logic. He was more emphatically opposed to 'reducing' mathematical induction to logic. Surprisingly, he argued that mathematical concepts should be built up inductively by proceedings from 'particular' to 'general'. Perhaps he subscribed to the view that induction is not logic.

A brief reference to of mathematical induction mentioned above is relevant. Mathematical induction is a misnomer because, in reality, there is no inductive element at all involved here, even though the principle proclaims that 'every natural number

has a successor', i.e., if n is a natural number, then n+1 is also a natural number. This is the essence of mathematical induction. This theorem involves rigorous logical proof which is essentially deductive in nature with no semblance of inductive inference. It should be mentioned that Poincare' did not oppose mathematics following deductive model. Following a certain logical method is not the same as reducing a certain science to logic. Poincare' was only against making the latter.

If we go by the modern definition of mathematics as the science of formal proof or logical demonstration, then the relation between logic and mathematics becomes very intimate. Both logic and mathematics are formal sciences. They deal with relations between propositions which are independent of the content of the propositions. In arithmetic, for instance, we may use numbers to count anything. What we actually count makes no difference to counting. Thus two plus two will be four whether we add books, balls, tables or anything else. Since the relations with which logic and mathematics deal are independent of content these sciences are able to use symbols in place of words. Also, both logic and mathematics deal with relations which are applicable to actual as well as possible objects.

Further, both logic and mathematics are deductive in character. They begin with certain axioms and deduce conclusions from them. Moreover, the method of both is *a priori*. Though both logical and mathematical operations may take place with reference to any empirical entity, knowledge of the principles of these disciplines is not gained by observation or sense experience. Such knowledge is called *'a priori'*, i.e., independent of experience.

1.7 DEDUCTIVE AND INDUCTIVE LOGIC

Traditionally arguments have been classified into two types, viz., deductive and inductive arguments. Accordingly there are two divisions of logic, viz., deductive logic and inductive logic. Deductive logic has arguments that consist of premise or premises and a conclusion. In a deductive argument the conclusion necessarily follows from the premises. Furthermore, it is the characteristic of the deductive argument that if one accepts the premises one has to accept the conclusion. Such arguments are available in mathematics and geometry. Deductive argument is not concerned with truth and falsity, but it is concerned with validity and invalidity or consistency and inconsistency of arguments. Validity and invalidity are characteristics of arguments whereas truth and falsity are characteristics of propositions.

There is another kind of argument which is known as inductive argument, the concern of inductive logic. According to one group of philosophers, inductive arguments are found in empirical sciences such as physics, sociology, psychology etc. This view is hotly debated. Law of causality constitutes the very basis of inductive arguments. Generalisations and predictions are the objectives of inductive arguments. Generalization is an important parameter of inductive logic. Therefore a brief description of what it means is necessary. Suppose that I observe ten crows which are black. Then I jump to the conclusion that all crows are black without observing other crows. Therefore the conclusion includes and goes beyond observation. Such conclusion is called generalization. Therefore mere acceptance of the truth of premises do not warrant acceptance of the truth of conclusion. The conclusion is rendered probable because it may be true or false. This is how probability enters the field of inductive logic.

Check Your Progress II

Note: a) Use the space provided for your answer.

b) Check your answers with those provided at the end of the unit.

1) State the relation between logic and language.

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2) Distinguish between deductive and inductive arguments.

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1.8 LET US SUM UP

Humans are endowed by nature with powers of reasoning. Logic is the study of the use of those powers. In the study of logic we come to recognize our own native capacities, and practice helps us to sharpen them. The study of logic helps one to reason well by illuminating the principles of correct reasoning. Correct reasoning is useful wherever knowledge is sought. Whether in science, politics or in the conduct of our private lives, we use logic in reaching defensible conclusions. In formal study we aim to learn how to acquire reliable information and how to evaluate competing claims for truth. Various definitions of logic were discussed and also types. Questions regarding the status of logic as an academic discipline were addressed subsequently. Arguments for and against logic as a science/ art, and logic as a positive science/ normative science, were discussed. The relevance scope of logic was examined by looking into the relation logic has with various other branches of knowledge. At the close of the unit, deduction and induction, the two major types of logic have been introduced to the student.

1.9 KEY WORDS

Logos: Logos is an important term in philosophy, analytical psychology, rhetoric and religion. Heraclitus (ca. 535–475 BCE) established the term in Western philosophy as meaning both the source and fundamental order of the cosmos. The sophists used the term to mean discourse, and Aristotle applied the term to rational discourse. After Judaism came under Hellenistic influence, Philo adopted the term into Jewish philosophy. The Gospel of John identifies Jesus as the incarnation of the Logos, through which all things are made. The gospel further identifies the Logos as divine (*theos*).

Positive Science: In the humanities and social sciences, the term positive is used in a number of ways. One usage refers to analysis or theories which only attempt to

describe how things are, as opposed to how they should be. In this sense, the opposite of positive is normative. An example for positive, as opposed to normative, could be economic analysis. Positive statements are also often referred to as descriptive statements.

1.10 FURTHER READINGS AND REFERENCES

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1.11 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress I

1) Bring out the various definitions attributed to logic?

   Logos – literal meaning: word, thought – eventually logic acquired a technical meaning – definition: Study of methods and principles which we use to distinguish good (correct reasoning) from bad (incorrect) reasoning – also defined as science of the laws of thought – again as science of reasoning.

2) Logic: is it a positive science or normative science? Substantiate your position.

   Positive science: describes what is the case – Normative science: tells us what ought to be the case – Formal science is that which takes up the form of the subject content for study – Normative science follows the norms – gives judgments of value – some logicians characterize it as positive science as well for its nature is description. It aims at describing and classifying various types of reasoning.

Check Your Progress II

1) What is the relation between logic and language?

   Language affects logic – Natural language is an inconvenient tool to operate logical functions – Natural language being endowed with potency to attend divergent functions cannot get confined to the single function of conveying information – hence it calls forth the use of emotively neutral language – three functions of language: informative, expressive and directive – of these only informative use is conducive to logic.

2) Distinguish between deductive and inductive logic

   Historically logic has been divided into two – deductive and inductive. In deductive logic an argument's conclusion necessarily follows from the premises. Such arguments are available in mathematics and geometry. In a deductive argument we are concerned with validity and invalidity. Inductive logic has arguments that are found in empirical and social sciences. Generalizations and predictions are the objectives of inductive arguments.