

**Scope of Logic:** Logical or valid thinking is the prime condition of any branch of knowledge. Without it, the correct forms of reasoning and judgement should have not emerged and further, the pointing of fallacies in the arguments should have been difficult. Logic is now recognised as the basis for the formation of right judgements by a valid process of reasoning.

As regarding the scope of Logic, it can be discussed under the following points

(a) One of the main objectives of Logic is to define the rules by which a valid reasoning is possible. The proper application of these rules gives rise to valid arguments. Any violation of these rules leads to a fallacy and invalidates the argument.

(b) The product of reasoning, ie, argument falls under the scope of Logic. An argument consists of propositions and a proposition in turn consists of terms. The propositions in the arguments must be in their logical forms and the terms be clearly demarcated, so that the arguments are precise. Logic specifies this.

(c) The studies in the formation of logical concepts, logical division of class terms providing a logical definition of terms, classifying the terms and propositions defining the relations between terms and also between propositions are some of the areas that fall under the scope of Logic.

(d) Logic is also concerned with the fundamental principles of thought. These principles guide our reasoning.

(e) Logic is concerned with the establishment of formal and material truth. While the deductive reasoning establishes the formal truth, the inductive reasoning generally establishes the material truth.

(f) By violating the rules governing the valid arguments, one may commit certain errors in reasoning. So the discussion of fallacies, both deductive and inductive fall within the scope of Logic.

(g) Logic also helps in the construction of deductive systems. By taking the fundamental principles, axioms, etc, more and more new relations are discovered which then take the form of principles, theorems, lemmas, etc.

(h) Logic is a formal science like Mathematics. Mathematical Logic is seen as a great development over the traditional logic. It makes the use of symbols constants and variables to construct a system, where even the much looking complicated problems, arguments, etc. are translated into a mathematical format to arrive at the required result with much ease and accuracy. Mathematical logic also incorporates the elements of modality in language to the mathematical format. The scope of mathematical and symbolic logic is widening with time.

(1) Of late, various new branches of Logic have emerged, viz, Modal Logic, Fuzzy Logic, etc. A sharp boundary concerning the scope of Logic cannot be drawn. It is growing day by day.

**Utility of Logic:** Logic as a science of laws of thought and an art of reasoning has a wide practical utility. Its utility can be highlighted as follows

1. Logic helps us to think or reason something validly or correctly.
2. It helps us to distinguish valid arguments from the invalid ones. By the application of the rules of logic, the fallacy(ies) in the invalid arguments can easily be detected.
3. Deductive logic helps us to infer appropriate conclusion(s) from the given statements or propositions.
4. Inductive logic is of great help in science in framing theories and laws for explaining the facts of the world.
5. Since logical thinking is valid thinking, logic has become a backbone of every field of inquiry. It helps us to study any subject, whatsoever, in a planned, precise and systematic manner.
6. Man has a natural tendency to reason and judge what is right or wrong. But the knowledge of logic helps him to sharpen his reasoning or judgement without any chance of an error or fault.
7. Logic helps us to establish the truth of a proposition from the truth of the given proposition(s) from which it is deduced.
8. Logic helps us to establish knowledge indirectly by the processes of inference and comparison.
9. There may be some propositions which we believe to be true and mutually consistent. But they may not be actually so. The consistency or inconsistency between a set of propositions can be tested by the application of the rules of deduction.
10. Logic helps us to formulate the techniques and mechanisms for a successful inquiry.
11. The knowledge of logic increases our intelligence quotient 12 Deductive logic helps to construct the formal proofs of validity of arguments. These proofs are certain.
13. Logic prevents us from taking a wrong step. It informs us in each step the appropriate rules for application to arrive at the desired results. Without the knowledge of Logic, one may take a wrong step and this error multiplies in the advancement of each step
14. Logic is employed in every act of our lives, though we are not conscious of it. To sit or stand, walk or run, stay or go, and all such acts where some or the other act needs to be performed involves logic. Even the act of refuting logic as useful involves logic.

Hence logic is indispensable in our day to day lives

## **Traditional and Modern logic:**

The Greek thinker, Aristotle has made a systematic presentation of logic commonly known as Aristotelian Logic or Traditional Logic. Modern Logic, on the other hand, is not different from the Traditional Logic; it is rather a development over the Traditional Logic. It is important to note that Modern Logic has Traditional Logic as its base. Traditional Logic, also known as Classical Logic is so important that even the emergence of Modern Logic could not fade away its relevance. The seeds of Modern Logic are contained in the

Traditional Logic as even Aristotle made the use of symbols like S, M and P to represent the minor, middle and major terms respectively in categorical syllogisms

Modern Logic is studied in the following forms: (a) Symbolic Logic, (b) Boolean Algebra, (c) Set theory (d) Modal Logic (e) Fuzzy Logic, etc.

Modern Logic is not only a development over the Traditional Logic, it could also overcome the shortcomings or limitations in Traditional Logic. The expressions and arguments, which under the shade of Traditional Logic looked so complicant are no more so with the advent of Symbolic Logic (Modern Logic). Symbolic Logic helps us todemonstrate the proofs of validity of arguments in a simple and indubitable manner like Mathematics. This makes the understanding of Logic much better.

Some of the chief features of Modern Logic can be stated as under

- (1) Modern Logic is more formal than material. It gives importance to the structure or the form of the arguments and does not attach importance to the meaning of the symbols, ie, for what the symbols stand.
- (ii) Modern Logic is concrete and constructive. It builds systems basing one system on the other.
- (ii) It is free from epistemological and metaphysical issues and problems.
- (iv) It is deductive in nature.
- (v) It is well-planned, precise and systematic.
- (vi) It has become more or less mathematical. Set theory, Boolean Algebra Quantification Theory, n-valued Logic, Fuzzy Logic, Mathematical Logic, etc are the various forms of Modern Logic. They make the use of mathematical notations in their own ways.
- (vii) Modern Logic has made the study of logic more comprehensive and it finds applicability in various branches of knowledge.