UNIT: 1 FUNDAMENTAL IDEAS OF LOGIC

UNIT STRUCTURE

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1.1 LEARNING OBJECTIVES

After going through this unit you will be able to-

- define logic
- define argument
- discuss the nature of argument
- explain the distinction between truth and validity in logic

1.2 INTRODUCTION

Argument and argument forms, truth and validity are the fundamental notions of logic. A proposition is the statement which is either true or false. As for instance, Manmohan Sing is the present Prime Minister of India, Sachin Tendulkar is one of the best cricketers of the world and Men are four-footed animals etc. are the examples of propositions. The first two propositions are true, while the third one is false, because we know that men are not four-footed animals.

On the other hand an argument is either valid or invalid. An argument implies a logical relation of premise and conclusion. When a conclusion is necessarily derived from the premises, the argument is valid. On the other hand when a conclusion is not necessarily derived from the premises, the argument will be invalid. On the other hand an argument form is a symbolic representation of propositions. As for instance:

All historians are rationalists
Bipan Chandra is a historian
∴ Bipan Chandra is a rationalist

This is valid argument, because the conclusion is necessarily derived from the premises.

If he comes, I will go
He does not come
∴ I shall not go

This is invalid argument, because the conclusion is not necessarily derived from the premises. From the above examples it is clear that validity and invalidity are concerned with argument.

To be brief, truth and falsity are dealt with propositions and validity and invalidity are concerned with arguments.

1.3 LOGIC: WHAT IT IS

The word 'logic' is derived from the Greek word 'logos'. It means thought or reason or law. Logic is defined as the science of reasoning. This definition is not accepted as the real definition of logic because reasoning implies a special kind of inferring or inference. In inference we proceed from known to unknown. Just as we can draw the conclusion that 'there is fire in the hill' which is derived from the premise that 'there is smoke in the hill'. But the important issue is that logic does not include the act of inferring or inference within the subject matter of logic.

Again we can define logic as the study of the methods and principles used in distinguishing correct from incorrect arguments. This helps us to

make a distinction between correct and incorrect argument. That is why, it is clear that logic is a tool or strategy by which we can find out the distinction between good reasoning and bad reasoning. The study of logic, therefore, enhances our reasoning power to testify the arguments, whether they are valid or invalid. It also helps us in our domestic discourse to argue systematically with others.

Traditional logic is defined as the study of laws of thought. There are three of laws of thought which are indispensable for correct reasoning. These laws are: i) the law of identity, ii) the law of excluded middle iii) law of non-contradiction. Apart from these laws, there are other laws of inference and deduction, which are also equally indispensable for correct reasoning. These three laws of thought refer to mental process, but every mental process is not considered reasoning. As for instance, remembering, imagining, memory, day dreaming etc. are not considered as reasoning. They are only considered as mental states. As logic deals with correctness or incorrectness, so, logic is defined as the science of valid reasoning. Logicians deal with validity or correctness and invalidity or incorrectness of arguments, while psychologists concern with mental process. That is why the traditional definition of logic as the study of laws of thought is not satisfactory from the logicians' points of view.



CHECK YOUR PROGRESS

Q 1: State whether the following statements are true or false:

a. Logic is derived from the Greek word 'logos'.

b. Validity and invalidity are concerned with propositions.

c. Truth and falsity concern with arguments.

d. A proposition is either true or false.

e. There are five laws of thought.

f. Logic is the study of the methods and principles used in distinguishing correct from incorrect arguments.

g. Logic deals with the product of reasoning that is argument

Q 2: Answer short Questions.

a. What is argument?

b. Give an example of argument.

c. What is logic?

d. What are the three laws of thought in traditional logic?

e. What conclusion?

f. What is premise?

1.4 THE NATURE OF ARGUMENT

As it is said that logic deals with the correctness or incorrectness of argument, so the question naturally comes to enquire, what is argument? And what are its kinds?

Arguments consist of a group of proposition, of which one is the conclusion and others are premises which are regarded as providing support or grounds for the truth of the conclusion. Premises are those propositions from which conclusions are derived. On the other hand conclusions are those propositions which are drawn from the premises. There is a necessary relationship between premise and conclusion. It will be clear when we go through examples.

All men are mortal

Socrates is a man

∴ Socrates is mortal

The first two propositions are premises because the last one is drawn from the first two propositions. The last proposition is known as conclusion because it is drawn from the first two propositions. So, in an argument there is a necessary relationship between premise and conclusion. If we do not notice a necessary relationship between premise and conclusion, the argument will be invalid. As for instance-

A. All men are rational

Shibaji is a man

∴ Shibaji is rational

B. If rain comes, we will not go out

Rain comes

∴ We will not go out

C. Most actors are celebraties

Amir khan is an actor

∴ Amir khan is a celebraties

The first two examples show that premises imply the conclusion and which is necessarily derived from the premises. And in the third one premises support the conclusion.

Logic is concerned with the product of reasoning that is argument. It is dealt with the enquiry whether an argument is correct (sound) or incorrect (unsound). The task of the logician is to find out methods and techniques which are essential for making this distinction.

1.4.1 Kinds of Argument: Inductive and Deductive

According to traditional logicians, there are two kinds of argument- deductive argument and inductive argument. And accordingly logicians have classified logic into inductive logic and deductive logic.

In deductive argument the conclusion is necessarily derived from the premises. Generally, we proceed from general premise to particular

premise in case of deductive argument. So, the conclusion is less general than the premises.

As for instance:

All babies cry
Munmun is a baby
∴ Munmun cries

Here, the first proposition 'All babies cry' is a major premise. And the second proposition 'Munmun is a baby' is a minor premise. The last proposition 'Munmun cries' is the conclusion which is derived from the above two premises. So, this is called deductive reasoning. According to this reasoning, if the premises are true the conclusion must be true. It claims that premises provide absolutely conclusive grounds for the truth of the conclusion.The technical terms 'valid' and 'invalid' are used in place of correct and incorrect in characterising deductive argument. A deductive argument is valid when its premises and the conclusion are true and it is absolutely impossible for the premises to be true and the conclusion to be false.

On the other hand, In case of inductive argument the conclusion is derived only with probability from its particular premises. The premises serve as evidence for the conclusion. Inductive arguments involve the claim that the premises provide some grounds for the truth of the conclusion. Here, we proceed from particular premise to general premise. So, in inductive argument the conclusion is more general than the premises. Inductive arguments deal with inductive logic.

As for instance:

Pinky is a baby and it cries
John is a baby and it cries
Paul is a baby and it cries
∴ All babies cry

In this inductive argument the conclusion is derived from particular premises. The premises are collected from experience. Therefore, they serve as evidence or ground for the truth of the conclusion. The conclusion- 'All babies cry' is a general premise which is derived from the particular

premises like 'Pinky is a baby and it cries', 'John is a baby and it cries', 'Paul is a baby and it cries' etc. So, in inductive argument we derive a conclusion from particular premises. The argument is true because the premises provide some grounds or evidence for the truth of the conclusion. On the other hand inductive argument will be false when its premises do not provide some support or evidence for the truth of the conclusion.

1.4.2 Logic and Deductive Argument

Logic is specifically dealt with the enquiry into the deductive reasoning in which the conclusion is necessarily derived from the premises. We often use the terms reasoning or argument for logic. Deductive logic also known as exact logic or formal logic.

Logic deals with the enquiry whether an argument is correct (sound) or incorrect (unsound). The task of the logician is to find out methods and techniques to distinguish correct reasoning from incorrect reasoning. The correctness and incorrectness of argument is not dealt with the subject matter of reasoning.

For example,

(1) All cats are dog
Raja is a cat
∴ Raja is a dog

(2) All Abbas are Babbas
Raja is a Abba
∴ Raja is Abba

The above argument is valid or correct. The correctness or validity of the above arguments is not concerned with the subject matter. They are valid because of their form not because of their subject matter. The form of an argument implies the very structure of the argument. When we replace all the terms of an argument by letters of English Alphabet we get the form of the argument. For example, if we use the letters 'S' and 'P' in place of the

terms of the above argument and the letter 'a' for the proper name then we get the argument form-

All S are P

a is S

∴ a is P

Here, this argument form is valid. Therefore, any argument with any subject matter will be valid only if conforms with the form of the argument as mentioned above.

1.4.3 Argument and Argument Form

In case of the discussion of the nature of argument we find a distinction between argument and argument form. We already know that argument contains propositions from which conclusion is necessarily derived from the premises. On the other hand argument form is a symbolic formulation of propositions which contain variables. We can go through examples:

A. All men are rational

Ram is a man

∴ Ram is rational

B. If P then Q

P

∴ Q

The first example is an example of argument, while the other is the example of argument form. It can be mentioned that logic is primarily concerned with the argument form. Argument form is nothing but the logical or symbolic structure of proposition.

Logic is concerned with the product of reasoning that is argument. It deals with the enquiry whether an argument is correct (sound) or incorrect (unsound). The task of the logician is to find out methods and techniques to distinguish correct reasoning from incorrect reasoning. The correctness

and incorrectness of argument is not dealt with the subject matter of reasoning.

1.5 TRUTH AND VALIDITY

Truth and falsity, validity and invalidity are the fundamental notions of logic. A proposition is true when it corresponds to reality. As for instance, 'Grass is green' is a true proposition because we see that grass is green in reality. We nowhere see that grass is white. On the other hand the proposition 'All animals are immortal' is a false proposition because we never perceive immortal animals.

On the other hand in case of argument we use the terms 'valid' or 'invalid'. A deductive argument is valid when the conclusion is necessarily derived from the premises. So, the term validity is not applied in case of propositions. In a valid argument, the propositions which are considered as premises may be true or false. Therefore, a valid argument can have true premises or false premises. If the conclusion in an argument is false, still the argument can be valid, because the premises may imply the conclusion. Again in a valid argument there can be false premises, yet the argument can be valid provided the conclusion follows from the premises. Truth and falsity are the attributes of propositions and validity and invalidity are the attributes of arguments.

The relations between true or false propositions and validity or invalidity of arguments are complex. We generally notice this relationship in deductive logic. An argument may be valid in spite of the fact that premises are false. Again an argument may be valid even when its conclusion and one or its premises are false. The validity or invalidity of argument depends only upon the relationship of the premises and the conclusion.

We can take some examples in order to show that a valid argument can have false premises and an invalid argument can have true premises.

A. All dogs are cats
All cats are horses
$\therefore$ All dogs are horses

This argument shows the premises are false but the argument is valid.

B. All dogs are animals
All cats are animals
∴ All cats are dogs

This argument is invalid, although premises are true.

C. All human beings are rich
All businessman are rich
∴ All businessman are human beings.

This is an invalid argument because the premises in the argument are false.

From the combination of false premises and true conclusion we can decide whether the argument is valid or invalid, depending on the arrangement of premises and conclusion. For example:

A. All men are rational
No cats are rational
∴ No cats are men

This is a valid argument. This argument shows that the premises and the conclusion are true.

The above discussion holds that truth and validity are the basic concepts of logic. Validity and invalidity of argument become independent of the truth and falsity of the premises. From the above mentioned examples it is clear that a valid argument can have false premises, similarly an invalid argument can have true premises. Again validity and invalidity of arguments are not concerned with whether the premises are empirically true or not. Irving M. Copy in this context clears that "To determine the truth or falsehood of premises is the task of scientific enquiry in general, since premises may deal with any subject matter at all. But determining the validity or invalidity of arguments is the subject of deductive logic." (Symbolic Logic p-5). Logicians are concerned with the question of validity and invalidity of arguments depending on the logical relation of the premises and conclusion.



CHECK YOUR PROGRESS

Q 3: Answer short questions:

a) What are the two kinds of argument?

b) What is deductive argument?

c) What is inductive argument?

d) Give an example of deductive argument?

e) What do you mean by argument form?

f) Give an example of argument form

Q 4: State whether the following statements are true or false

a) Deductive logic is also known as exact logic or formal logic.

b) In inductive argument we proceed from general premise to particular Premise.

c) The technical terms 'valid' and 'invalid' are used in inductive logic.

d) The correctness and incorrectness of argument is associated with the subject matter of reasoning.



ACTIVITY: 1.1

- Do you find any relationship between truth and falsity of propositions and validity and invalidity of arguments? Discuss

Ans .....

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1.6 LET US SUM UP

From the above discussion it becomes clear that the concepts of Argument and Argument forms, truth and validity are the fundamental concepts of logic. These concepts of logic are interdependent. The concepts of argument and argument form without the concepts of truth and validity will be answerless. And again, the concepts of truth and Validity without the concepts of argument and argument form will be contentless discussion. That is why, the subject matter of logic starts with the discussion of argument and argument form and truth and validity. So, these two inter-related concepts are considered as fundamental concepts in logic.

The most important points discussed in this unit are:

- Logic is derived from the Greek word 'Logos'. It means thought or reason or law.
- Logic is defined as the study of the methods and principles used in distinguishing correct from incorrect arguments.
- There are three laws of thought. They are respectively: The law of identity, the law of excluded middle and the law of non-contradiction.
- Argument consists of propositions from which conclusion is necessarily derived from the premises. Argument implies a relation between premise and conclusion.
- An argument form is a symbolic representation of propositions.
- Arguments are generally divided into kinds: Deductive and inductive argument
- Truth and falsity are dealt with propositions and validity and invalidity are concerned with arguments.



1.7 FURTHER READING

1. Copi, Irving M. (2006). Symbolic Logic (fifth edition). New Delhi: Prentice Hall of India Private Ltd.
2. Jain, Krishna.(1998). A textbook of logic. (fourth Revised Edition)
3. Singh, S. Shyam Kishore. Modern Logic (Vol.1) Lamyana Press

4. Copi, Irving M., Cohen, Carl., Jetli, Priyedarshi., & Prabhakar, Monica.(2006). Introduction to Logic (Twelfth edition).Delhi: Dorling Kindersley (India) Pvt. Ltd.

1.8 ANSWERS TO CHECK YOUR PROGRESS

Ans to Q No 1:

a) Ans: True

b) Ans: False

c) Ans: False

d) Ans: True

e) Ans: False

f) Ans: True

g) Ans: True

Ans to Q No 2:

a) Ans : An argument implies a logical relation between premise and conclusion.

b) Ans : All Philosophers are rationalists
Radhakrishnan is a philosopher
∴ Radhakrishnan is a rationalist

c) Ans : Logic is the study of the methods and principles used in distinguishing correct from incorrect arguments.

d) Ans : Conclusion is that proposition which is drawn from the premises.

e) Ans : Premises are those propositions from which conclusions are derived.

Ans to Q No 3:

a) Ans: Inductive and deductive argument

b) Ans: Inductive argument is that argument in which the conclusion is drawn with probability from particular premises

c) Ans: Deductive argument is that argument in which the conclusion is necessarily derived from premises.

d) Ans: All international cricketers are rich man
Sachin Tendulkar is a international cricketer
∴ Sachin Tendulkar is a rich man

e) Ans: An argument form is a symbolic formulation of propositions which contain variables.

f) Ans: If P then Q
P
∴ Q

Ans to Q No 4:

a) Ans: True

b) Ans: False

c) Ans: False

d) Ans: False

1.9 MODEL QUESTIONS

A. Objective Questions

Q 1: What is logic?

Q 2: Give an example of valid argument

Q 3: What are the three laws of thought?

Q 4: What are the kinds of arguments?

Q 5: Define inductive argument

Q 6: Give an example of deductive argument.

Q 7: What is the other name of deductive logic?

Q 8: What do you mean by argument form?

Q 9: What are three fundamental laws of thought?

B. Short Questions

Q 1: What is the nature of valid argument? Briefly explain

Q 2: Write short notes on Argument

Q 3: Write short notes on Argument form.

Q 4: Write short notes on Laws of thought

Q 3: Distinguish between truth and validity

Q 4: Distinguish between Deductive and inductive argument

C. Long Questions

Q 1: What is logic? Discuss the different definitions of logic and state which one you do accept more.

Q 2: What is argument? Explain the nature of argument with suitable examples.

Q 3: Do you find any relationship between truth and falsity and validity and invalidity of arguments? Illustrate with suitable examples.

Q 4: Are truth and validity the fundamental concepts in logic? What do you think? Discuss with suitable examples.

Q 5: What do you mean by the nature of argument? Explain the distinction between argument and argument form with suitable examples.

Q 6: Is there any relation between logic and deductive argument? Discuss.

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