UNIT 4 PROPOSITIONS

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4.0 OBJECTIVES

As we know inference is the main subject matter of logic. The term refers to the argument in which a proposition is arrived at and affirmed or denied on the basis of one or more other propositions accepted as the starting point of the process. To determine whether or not an inference is correct the logician examines the propositions that are the initial and end points of that argument and the relationships between them. This clearly denotes the significance of propositions in the study of logic. In this unit you are expected to study:

- the nature
- the definition
- the types and forms of propositions
- the difference between propositions and sentences and judgments
- the description of various types of propositions viewed from different standpoints like, composition, generality, relation, quantity, quality, and modality.

4.1 INTRODUCTION

Classical logic concerns itself with forms and classifications of propositions. We shall begin with the standard definition of proposition. A proposition is a declarative sentence which is either true or false but not both. Also a proposition cannot be neither true nor false. A proposition is always expressed with the help of a sentence. For example - the same proposition "It is raining" can be expressed in English, Hindi, and Sanskrit and so on. It means that two or more than two sentences may express the same proposition. This is possible only when proposition is taken as the meaning of the sentence which expresses it. Therefore sentence is only the vehicle of or the means of expressing a proposition. It is the unit of thought and logic whereas sentence is the unit of grammar. A sentence may be correct or incorrect; the

grammatical rules determine this. A proposition may be true or false, the empirical facts determine the status. The primary thing about a sentence is its grammatical form, but the primary thing about a proposition is its meaning and implication.

The different types of sentences are not different types of propositions. Some types of sentences are not propositions at all. Sentences may be assertive, interrogative, and imperative. Only assertive types of sentences are propositions and rest of them are not (for more details, see below 4.3).

A set of proposition make up an argument. Let us see what role propositions play and how logicians will be concerned in logic by taking a simple example of an argument:

All men are mortal.	proposition1
All kings are men.	proposition2
Therefore all kings are mortal.	proposition3

Given these propositions as true or false, the logician will only find out whether the argument is valid or not by using certain rules that we shall learn later. Before we proceed further, it is of importance that we situate the discussion on "Proposition" in the whole context of the history of Logic itself.

4.2 HISTORY OF LOGIC AND PROPOSITION

Aristotle, the classical logician defines proposition as that which contains subject, predicate and a copula. "Rose is red" is a proposition. Here 'Rose' is the subject, 'red' is the predicate and 'is' is the copula. A subject is that about which something is said, a predicate is what is said about the subject and the copula is the link. Further, according to classical logicians copula should be expressed in the form of present tense only. That is why classical logicians talk of reduction of sentences into propositions. According to them all propositions are sentences but all sentences are not propositions. Subject-predicate logic ultimately gave rise to substance-attribute metaphysics in philosophy.

Aristotle classifies proposition into four types. They are as follows: Universal affirmative (A); Universal negative (E); Particular affirmative (I) and Particular negative (O). These propositions are called categorical or unconditional propositions because no condition is stated anywhere in the propositions. Letters within parentheses are standard symbols of respective propositions which are extensively used throughout our study of logic. "All men are mortal" is an example of 'A' proposition. "No men are immortal" is an instance of 'E' proposition. "Some men are intelligent" is an 'I' proposition and "Some men are honest" is an instance of 'O' proposition.

Aristotle was the first thinker to devise a logical system. He holds that a proposition is a complex involving two terms, a subject and a predicate. The logical form of a proposition is determined by its quantity (universal or particular) and quality (affirmative or negative). The analysis of logical form, types of inference, etc. constitute the subject matter of logic.

Aristotle may also be credited with the formulation of several metalogical propositions, most notably the Law of Noncontradiction, the Principle of the Excluded Middle, and the Law of Bivalence. These are important in his discussion of modal logic and tense logic. Aristotle referred to certain principles of propositional logic and to reasoning involving hypothetical propositions. He also formulated nonformal logical theories, techniques and strategies for devising arguments (in the Topics), and a

theory of fallacies (in the Sophistical Refutations). Aristotle's pupils Eudemus and Theophrastus modified and developed Aristotelian logic in several ways.

The next major innovations in logic are due to the Stoic school. They developed an alternative account of the syllogism, and, in the course of so doing, elaborated a full propositional logic which complements Aristotelian logic. They also investigated various logical antinomies, including the Liar Paradox. The leading logician of this school was Chrysippus, credited with over a hundred works in logic. There were few developments in logic in the succeeding periods, other than a number of handbooks, summaries, translations, and commentaries, usually in a simplified and combined form. The more influential authors include Cicero, Porphyry, and Boethius in the later Roman Empire; the Byzantine scholiast Philoponous; and alFarabi, Avicenna, and Averroes in the Arab world.

The next major logician of proposition is Peter Abelard, who worked in the early twelfth century. He composed an independent treatise on logic, the Dialectica, and wrote extensive commentaries. There are discussions of conversion, opposition, quantity, quality, tense logic, a reduction of de dicto to de re modality, and much else. Abelard also clearly formulates several semantic principles. Abelard is responsible for the clear formulation of a pair of relevant criteria for logical consequences. The failure of his criteria led later logicians to reject relevance implication and to endorse material implication.

Spurred by Abelard's teachings and problems he proposed, and by further translations, other logicians began to grasp the details of Aristotle's texts. The result, coming to fruition in the middle of the thirteenth century, was the first phase of supposition theory, an elaborate doctrine about the reference of terms in various propositional contexts. Its development is preserved in handbooks by Peter of Spain, Lambert of Auxerre, and William of Sherwood. The theory of obligations, a part of non-formal logic, was also invented at this time. Other topics, such as the relation between time and modality, the conventionality of semantics, and the theory of truth, were investigated.

The fourteenth century is the apex of mediæval logical theory, containng an explosion of creative work. Supposition theory is developed extensively in its second phase by logicians such as William of Ockham, Jean Buridan, Gregory of Rimini, and Albert of Saxony. Buridan also elaborates a full theory of consequences, a cross between entailments and inference rules. From explicit semantic principles, Buridan constructs a detailed and extensive investigation of syllogistic, and offers completeness proofs.

4.3 PROPOSITIONS AND SENTENCES

Propositions are stated using sentences. However, all sentences are not propositions. Let's look at a few examples of sentences:

1. Snakes are poisonous.
2. Some students are intelligent.
3. How old are you?
4. May God bless you!
5. What a car!
6. Vote for me.

The first two statements are assertions and we can say of these statements that they may either be true or false. Therefore they are propositions.

However, we cannot say whether or not the question, 'How old are you?' is true or false. The answer to the question, 'I am 16 years old' may be true or false. The question is not a proposition, while the answer is a proposition.

'May God bless you' is a ceremonial statement and it is neither true nor false. Therefore, such statements are not propositions.

'What a car!' is exclamatory and has nothing to do with being true or false. Exclamatory statements are not propositions.

'Vote for me' is an appeal or command. We cannot attribute truth or falsity to it. Therefore, evocative statements are not propositions.

We therefore need to distinguish between sentences and propositions. The differences are:

1. Propositions must be meaningful (meaningful in logical sense) sentences.
2. Propositions must have a subject, a predicate and a word joining the two, a sentence need not.
3. All propositions are either true or false, but sentences may or may not be.
4. Propositions are units of Logic, sentences are units of Grammar.

4.4 PROPOSITIONS AND JUDGMENTS

Till the nineteenth century, idealistic philosophers used the word, 'Judgment' instead of 'propositions'. Nowadays, a distinction is made between the two words. "Judgment" means 'pronouncing a formal decision'. "Proposition" means 'the result of judging'. Judgment is basically the attitude we take whereas proposition is that which we affirm or deny, accept or reject as true or false. Judgment is a mental act, a process, and an event in time. Proposition is time invariant.

When we say 'All kings are mortal', it is a proposition. When we assert 'We believe that all kings are mortal', we are in fact taking an attitude, making a judgment. Sometimes, a statement may appear by itself to be a proposition. However, if one knows the context in which the statement is made, it may turn out that the proposition is really a judgment made.

Consider the statement: 'All foreigners are unacceptable'. By itself, it looks like a proposition, but what, if a speech is made and at the end the speaker concludes logically why 'all foreigners are unacceptable'. In such a case the speaker is actually passing a judgment. Sometimes, therefore, we need the context to distinguish a proposition from a judgment.

It is only in the beginning of twentieth century that A.N. Whitehead and Bertrand Russell recognize varieties of propositions. According to them subject-predicate logic is only one form of propositions.

4.5. TYPES OF PROPOSITION

Propositions can be viewed from different standpoints and classified into different types:

STANDPOINT	TYPES OF PROPOSITIONS
Composition	Simple, Complex or Compound
Generality	Singular, General
Relation	Categorical, Conditional
Quantity	Universal, Particular
Quality	Affirmative, Negative
Modality	Necessary, Assertoric, Problematic
Significance	Verbal, Real

Composition - Simple Propositions

Examples: Love is happiness.

Tiger is ferocious.

All white men were dreaded by the red Indians.

A simple proposition has only one subject and one predicate. Note that the subject 'All white men' is one subject though it has many words. Similarly 'Red Indians' is one predicate.

Composition – Complex or Composite Propositions

Examples: Violence does not pay and leads to unhappiness.

She is graceful but cannot act.

Either he is honest or dishonest.

If John comes home, then you must cook chicken.

'She is graceful' is a simple proposition. 'Cannot act' can be written as 'She cannot act', which is a simple proposition again. These simple propositions are connected by a conjunction 'but'. When two or more simple propositions are combined into a single statement we get a complex or composite proposition.

Generality: Singular proposition

Examples: The dog wags its tail.

George is my friend.

Kapil Dev is a good cricketer.

When in a proposition the subject refers to a definite, single object, the proposition is said to

be singular proposition. A proper noun or a common noun preceded by a definite article

'the' forms the subject of such a proposition.

Generality - General Propositions

Examples: Children like chocolate.

All hill stations are health resorts.

Some people are funny.

Few bikes come with fancy fittings.

When in a proposition the subject refers to many objects, the proposition is said to be a general proposition. A common noun forms the subject of such propositions. When it is singular, the indefinite article 'a' is used. 'A dog' means any dog. It generalizes across all dogs. Words like 'some', 'few' refer to more than one object.

Relation - Categorical Propositions

Examples: The pillows are soft

Junk food is not good for health

Music is the food of love.

A proposition that affirms or denies something without any condition is called a categorical proposition. Recall that a proposition has a subject, a predicate and a joining word. The joining word relates the two together. In the first example the subject, "the pillows" is joined to the predicate "soft" by the joining word "are'. In this proposition the softness of the pillow is asserted or affirmed. In the second example it is denied that junk food is good for health.

Simple and general propositions are categorical in nature. In the above examples there are no conditions relating the subject and the predicate. Therefore they are called categorical propositions.

Relation: Conditional Propositions

Examples: If you study hard, then you will do well.

Robert is either an athlete or a carpenter.

A conditional proposition consists of two categorical propositions that are so related to each other that one imposes a condition that must be fulfilled if what the other asserts is to be acceptable.

There are three types of conditional propositions:

1. Hypothetical proposition
2. Alternative proposition
3. Disjunctive proposition

1. Hypothetical Proposition

Examples: If (you are hungry), then (you can eat chocolates.)

If (it doesn't rain), then (the harvest will be poor.)

A hypothetical proposition consists of two categorical propositions. They are put within parentheses. The first part is called antecedent and the second part is called consequent. These two propositions are related in such a way that if the first is true then the second must be true if the second is false, then the first also is false. However, if the first part is false, the second part may be true or may be false.

Example: If the sun shines then there is light

antecedent consequent

2. Alternative Proposition

Examples: John is either a professor or a musician

Either we play football or we play cricket

John is either a doctor or the author of this book.

An alternative proposition consists of two simple categorical proposition connected by 'either –or' and thus suggesting that any one of these two proposition may be true or both may be true. John may be a professor or may be a musician. It is also likely that John is both a professor and a musician. The two parts of an alterative proposition are known as alternant. Either alternant may be true or both may be true. The alternative proposition will be false only when both the alternant are false (see for details block 3, 2.3).

Either (Alternant)	***Or (Alternant)***	***Proposition***
John is a professor	John is a musician	
TRUE	TRUE	TRUE
TRUE	FALSE	TRUE
FALSE	TRUE	TRUE
FALSE	FALSE	FALSE

3. Disjunctive Proposition

Examples: It is not the case that both he is honest and he is dishonest.

It is not the case that both the meat is boiled and roasted

A disjunctive proposition consists of two simple categorical propositions (alternant) which are so related that both cannot be simultaneously true.

Note: The fact that both cannot be true at the same time is the only difference between an alternative and disjunctive proposition. Thus there may be examples which are common to both. In symbolic logic we use disjunctive for alternative and the third variety is called negation.

Examples: Either he is in the class or he is in the playground.

Either (Alternant)	***Or (Alternant)***	***Proposition***
	John is in class	John is in playground
FALSE	TRUE	TRUE
TRUE	FALSE	TRUE

Modality: Assertoric Proposition:

Examples: The earth moves round the sun.

Objects far away appear small to the eyes.

At zero degree centigrade water turns into ice.

Eleven players form a cricket team.

The earth is not perfectly round.

When the claim or assertion made in a proposition is verifiable it is called an assertoric proposition. The assertion that the earth moves round the sun can be verified by scientific methods. If the result of such verification is true then the proposition is true.

Modality: Necessary Proposition:

Examples: Bachelors are unmarried male.

The result of any number multiplied by zero is zero.

A point has no dimension.

Propositions which are always true by definition are called necessary propositions.

Modality: Problematic Proposition:

Examples: Perhaps he is a rich man.

She may be happier off with him.

There may be famine this year.

In a problematic proposition we only guess the truth or falsity and make no definite assertion.

Quantity - Universal Proposition:

Examples: All boys in the team are educated.

No politicians are honest.

Shillong is a hill station.

When the predicate tells something about the entire class referred to by the subject term, it is called a universal proposition. The predicate term 'educated' refers to the entire class referred to by the subject term 'all boys in the team'.

Quantity - Particular Proposition:

Examples: Some girls are beautiful.

Some songs are classical.

Some men are religious.

When the predicate term tells something about an indefinite part of the class referred to by the subject term, it is called particular proposition.

Quality:

The early discussion on proposition from the standpoint of quantity was based on the subject class being quantified by the word all, some, no etc. When we discuss proposition from the standpoint of quality our focus will be on the 'copula' between the terms. A copula relates the two terms and is of some form of the verb 'to be'- 'is', 'are', 'is not', 'are not'

The copula either affirms or denies the relation between two terms

Quality: Affirmative Proposition

Examples: Some fruits are sweet.

All computers are fast.

Mr.John is bald.

If the relation between the subject term and the predicate term is positive (or affirmative), the proposition is said to be affirmative. In this case the copula is of the form 'is' or 'are'.

Quality: Negative Proposition:

Examples: Some fruits are not sweet.

All computers are not fast.

Mr. John is not bald.

If the relation between the subject term and the predicate term is negative (or denied), the proposition is said to be negative. In this case the copula is of the form 'is not' or 'are not'

4.6 QUALITY AND QUANTITY

So far we have viewed a proposition from various standpoints like composition, relation, modality and so on. More important of these are the standpoints of quality and quantity in viewing categorical propositions. Recall that:

Quantity: Universal

Particular

Quality: Affirmative

Negative

If we view a proposition from a combined stand point of quality and quantity, we get the following classification as in Aristotle's logic:

Quality	Classification	Forms of Proposition	
1. Universal+	Affirmative	A	All (…) are/is (…)
2. Universal+	Negative	E	No (…) are/is (…)
3. Particular+	Affirmative	I	Some (…) are (…)
4. Particular+	Negative	O	Some (..) are not (..)

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) What is a proposition? Distinguish it from sentence.

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2) Mention Aristotelian classification of proposition.

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4.7 LET US SUM UP

In the above unit we have seen how important it is to reduce sentences to its logical form, namely propositions. However, while changing sentences to propositional forms the following points must be remembered.

1) The meaning of the original sentence must be faithfully preserved in the logical form too.
2) The proposition must express all its three parts in the proper order, viz. subject, copula and predicate.
3) The subject of the proposition can be found out by answering the question "Of what anything is being stated"
4) There must be a copula connecting subject and predicate.
5) When reducing a negative sentence to logical form. The sign of negation should go with the copula and with the predicate of the proposition.
6) Compound sentences must be split up in to simple sentences to construct propositions out of them.
7) The quantity of the propositions must be indicated clearly.

4.8 KEY WORDS

Evocation: Evocation is the act of calling or summoning a spirit, demon, god or other supernatural agent, in the Western mystery tradition. Comparable practices exist in many religions and magical traditions.

Reduction: Reduction in philosophy is the process by which one object, property, concept, theory, etc., is shown to be entirely dispensable in favor of another.

4.9 FURTHER READINGS AND REFERENCES

Copi, Irving M. and Cohen, Carl. *Introduction to Logic*. New Delhi: Prentice-hall of India Private Limited, 1997

Felice, Anne. *Deduction*. Coclin , 1982

King, Peter & Shapiro, Stewart. *The Oxford Companion to Philosophy*. Oxford: OUP, 1995.

Nath Roy, Bhola. *Text Book of Deductive Logic*. Culculta: S.C. Sarkar and sons Private Ltd, 1984.

4.10 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress I

1) A proposition is the unit of thought and logic and carriers a definite truth-value. A proposition is expressed with the help of a sentence. While proposition is the unit of thought, sentence is the unit of grammar. The primary thing about the proposition is its logical form while for a sentence its primary thing is its grammatical form.
2) Aristotle has classified proposition into 4 kinds. They are as follows:
    1) Universal affirmative (A Proposition)
    2) Universal negative (E Proposition)
    3) Particular affirmative (I Proposition)
    4) Particular negative (O Proposition)