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Final Term Exam

Question No. 1 What is Aristotelian logic? Discuss the four kinds of categorical propositions with at least five examples of each.

Solution

What is Aristotelian logic?

In philosophy, **Aristotelian logic**, also known as **traditional logic**, **syllogistic logic** or ,**term logic** is a free name for a way to deal with rationale that started with Aristotle and that was predominant until the coming of current predicate rationale in the late nineteenth century. This section is a prologue to the term rationale expected to comprehend theory messages composed before it was supplanted as a conventional rationale framework by predicate rationale. Perusers coming up short on a grip of the fundamental phrasing and thoughts of term rationale can experience issues seeing such messages, in light of the fact that their creators normally accepted an associate with term rationale.

Aristotle's logical work is collected in the six texts that are collectively known as the Organon. Two of these texts in particular, namely the Prior Analytics and De Interpretation, contain the heart of Aristotle's treatment of judgements and formal inference, and it is principally this part of Aristotle's works that is about term logic. Modern work on Aristotle's logic builds on the tradition started in 1951 with the establishment by Jan Lukasiewicz of a revolutionary paradigm. The Jan Lukasiewicz approach was reinvigorated in the early 1970s by John Corcoran and Timothy Smiley – which informs modern translations of Prior Analytics by Robin Smith in 1989 and Gisela Striker in 2009.

four kinds of categorical propositions

Absolute recommendations are the basic components, the structure squares of contention, in the old style record of deductive rationale. Think about the contention

No competitors are veggie lovers.

All football players are competitors.

In this way, no football players are veggie lovers.

This contention contains three all out suggestions. We may debate reality of its premises, obviously, yet the relations of the classes communicated in these suggestions yields a contention that is positively substantial: If those premises are valid, that end must be valid. What's more, it is plain that every one of the premises is without a doubt unmitigated; that is, each reason asserts, or denies, that some class S is remembered for some different class P, in entire or to a limited extent. In this illustrative contention the three all out suggestions are about the class all things considered, the class everything being equal, and the class of all football players.

The basic initial phase in building up a hypothesis of conclusion dependent on classes, in this way, is to distinguish the sorts of all out suggestions and to investigate the relations among them.

The Four Kinds of Categorical Propositions

There are four and only four kinds of standard-form categorical propositions.

Here are examples of each of the four kinds:

1. All politicians are liars.
2. No politicians are liars.
3. Some politicians are liars.
4. Some politicians are not liars.

We will examine each of these kinds in turn.

1. **Universal affirmative propositions.** In these we assert that the whole of one class is included or contained in another class. "All politicians are liars" is an example; it asserts that every member of one class, the class of politicians, is a member of another class, the class of liars. Any universal affirmative proposition can be written schematically as

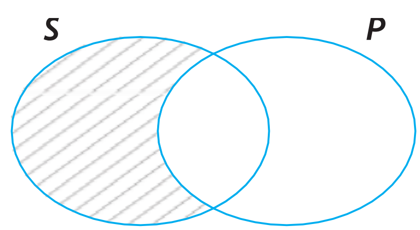
   All S is P

   where the letters S and P represent the subject and predicate terms, re-sportively. Such a proposition affirms that the relation of class inclusion

   holds between the two classes and says that the inclusion is complete, or universal. All members of S are said to be also members of P. Propositions in this standard form are called universal affirmative propositions. They are also called A propositions.

Categorical propositions are often represented with diagrams, using two interlocking circles to stand for the two classes involved. These are called Venn diagrams, named after the English logician and mathematician, John Venn (1824–1923), who invented them. Later we will explore these diagrams more fully, and we will find that such diagrams are ex- ceedingly helpful in appraising the validity of deductive arguments. For the present we use these diagrams only to exhibit graphically the sense of each categorical proposition.

We label one circle S, for subject class, and the other circle P, for predicate class. The diagram for the A proposition, which asserts that all S is P, shows that portion of S which is outside of P shaded out, indicating that there are no members of S that are not members of P. So the A proposition is diagrammed thus:



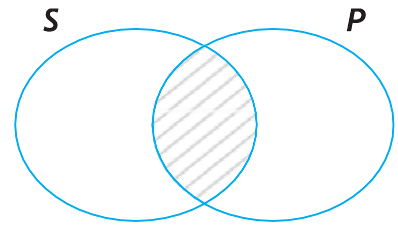
All S is P

2. **Universal negative propositions.** The second example above, "No politicians are liars," is a proposition in which it is denied, universally, that any member of the class of politicians is a member of the class of liars. It asserts that the subject class, S, is wholly excluded from the predicate class, P. Schematically, categorical propositions of this kind can be written as

No S is P.

where again S and P represent the subject and predicate terms. This kind of proposition denies the relation of inclusion between the two terms, and denies it universally. It tells us that no members of S are members of P. Propositions in this standard form are called universal negative propositions. They are also called **E** propositions.

The diagram for the **E** proposition will exhibit this mutual exclusion by having the overlapping portion of the two circles representing the classes S and P shaded out. So the E proposition is diagrammed thus:



No S is P

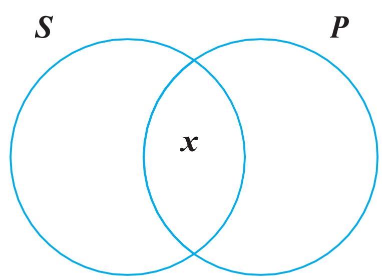
3. **Particular affirmative propositions**. The third example above, “Some politicians are liars,” affirms that some members of the class of all politicians are members of the class of all liars. But it does not affirm this of politicians universally. Only some particular politician or politicians are said to be liars. This proposition does not affirm or deny any- thing about the class of all politicians; it makes no pronouncements about that entire class. Nor does it say that some politicians are not liars, although in some contexts it may be taken to suggest that. The literal and exact interpretation of this proposition is the assertion that the class of politicians and the class of liars have some member or members in common. That is what we understand this standard form proposition to mean.

   “Some” is an indefinite term. Does it mean “at least one,” or “at least two,” or “at least several”? Or how many? Context might affect our understanding of the term as it is used in everyday speech, but logicians, for the sake of definiteness, interpret “some” to mean “at least one.” A particular affirmative proposition may be written schematically as

Some S is P.

which says that at least one member of the class designated by the subject term S is also a member of the class designated by the predicate term P. The proposition affirms that the relation of class inclusion holds, but does not affirm it of the first class universally but only partially, that is, it is affirmed of some particular member, or members, of the first class. Propositions in this standard form are called particular affirmative propositions. They are also called I propositions.

The diagram for the I proposition indicates that there is at least one member of S that is also a member of P by placing an x in the region in which the two circles overlap. So the I proposition is diagrammed thus:



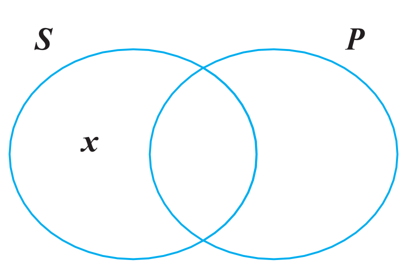
Some S is P

4. **Particular negative propositions**. The fourth example above, “Some politicians are not liars,” like the third, does not refer to politicians universally, but only to *some* member or members of that class; it is *particular*. Unlike the third example, however, it does not affirm the inclusion of some member or members of the first class in the second class; this is precisely what is *denied*. It is written schematically as

Some *S* is not *P*.

which says that at least one member of the class designated by the subject term *S* is excluded from the whole of the class designated by the predicate term *P*. The denial is not universal. Propositions in this standard form are called *particular negative propositions*. They are also called **O** propositions.

The diagram for the **O** proposition indicates that there is at least one member of *S* that is not a member of *P* by placing an *x* in the region of *S* that is outside of *P*. So the **O** proposition is diagrammed thus:



Some S is not P.

The examples we have used in this section employ classes that are simply named: politicians, liars, vegetarians, athletes, and so on. But subject and predicate terms in standard-form propositions can be more complicated. Thus, for example, the proposition "All candidates for the position are persons of honor and integrity" has the phrase "candidates for the position" as its subject term and the phrase "persons of honor and integrity" as its predicate term. Subject and predicate terms can become more intricate still, but in each of the four standard forms a relation is expressed between a subject class and a predicate class. These four—**A, E, I**, and **O** propositions—are the building blocks of deductive arguments.

This analysis of categorical propositions appears to be simple and straightforward, but the discovery of the fundamental role of these propositions, and the exhibition of their relations to one another, was a great step in the systematic development of logic. It was one of Aristotle's permanent contributions to human knowledge. Its apparent simplicity is deceptive. On this foundation—classes of objects and the relations among those classes—logicians have erected, over the course of centuries, a highly sophisticated system for the analysis of deductive argument. This system, whose subtlety and penetration mark it as one of the greatest of intellectual achievements, we now explore in the following three steps:

A. In the remainder of this chapter we examine the features of standard-form categorical propositions more deeply, explaining their relations to one another. We show what inferences may be drawn *directly* from these categorical propositions. A good deal of deductive reasoning, we will see, can be mastered with no more than a thorough grasp of **A, E, I,** and **O** propositions and their interconnections.

B. In the next chapter, we explain *syllogisms*—the arguments that are commonly constructed using standard-form categorical propositions. We explore the realm of syllogisms, in which every valid argument form is uniquely characterized and given its own name. And we develop powerful techniques for determining the validity (or invalidity) of syllogisms.

C. In Chapter 7 we integrate syllogistic reasoning and the language of argument in everyday life. We identify some limitations of reasoning based on this foundation, but we also glimpse the penetration and wide applicability that this foundation makes possible.

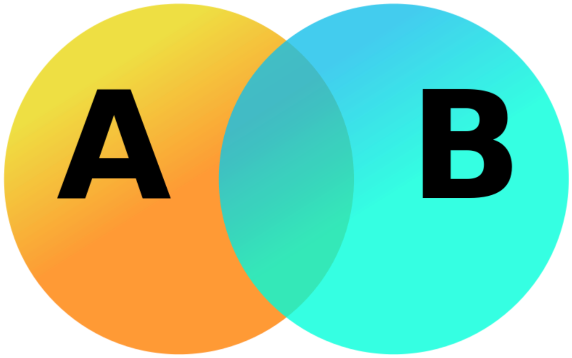
A	All cats have four legs.	All S is P.
E	No cats have eight legs.	No S is P.
I	Some cats are orange.	Some S is P.
O	Some cats are not black.	Some S is not P.

Q. No. 2 Discuss the Venn Diagram technique for testing syllogism with the help of examples.

Solution

Discuss the Venn Diagram technique for testing syllogism

- A **Venn diagram** (also called **primary diagram**, **set diagram** or **logic diagram**) is a diagram that shows all possible logical relations between a finite collection of different sets. These diagrams depict elements as points in the plane, and sets as regions inside closed curves. A Venn diagram consists of multiple overlapping closed curves, usually circles, each representing a set. The points inside a curve labelled S represent elements of the set S, while points outside the boundary represent elements not in the set S. This lends to easily read visualizations; for example, the set of all elements that are members of both sets S and T, S ∩ T, is represented visually by the area of overlap of the regions S and T. In Venn diagrams the curves are overlapped in every possible way, showing all possible relations between the sets. They are thus a special case of Euler diagrams, which do not necessarily show all relations. Venn diagrams were conceived around 1880 by John Venn. They are used to teach elementary set theory, as well as illustrate simple set relationships in probability, logic, statistics, linguistics, and computer science.
- A Venn diagram in which the area of each shape is proportional to the number of elements it contains is called an a**rea-proportional** or **scaled Venn diagram**.
- We have used two-circle Venn diagrams to represent standard-form categorical propositions. In order to test categorical syllogism by the method of Venn diagrams, one must first represent both of its premises in one diagram. That will require drawing three overlapping circles, for the two premises of a standard-form syllogism contain three different terms-minor term, major term, and middle term.



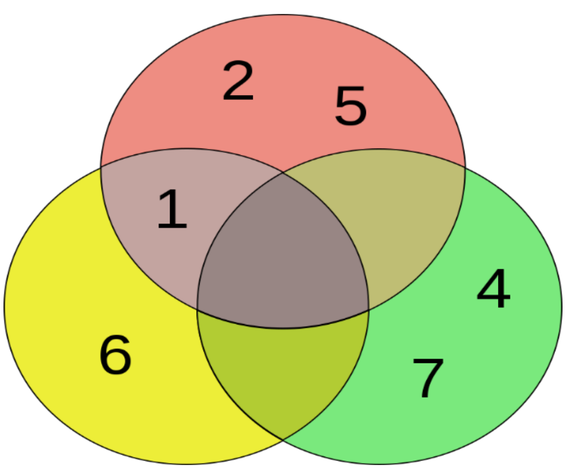
This example involves two sets, A and B, represented here as coloured circles. The orange circle, set A, represents all living creatures that are two-legged. The blue circle, set B, represents the living creatures that can fly. Each separate type of creature can be imagined as a point somewhere in the diagram. Living creatures that both can fly and have two legs—for example, parrots—are then in both sets, so they correspond to points in the region where the blue and orange circles overlap. It is important to note that this overlapping region would only contain those elements (in this example creatures) that are members of both set A (two-legged creatures) and are also members of set B (flying creatures.)

Humans and penguins are bipedal, and so are then in the orange circle, but since they cannot fly they appear in the left part of the orange circle, where it does not overlap with the blue circle. Mosquitoes have six legs, and fly, so the point for mosquitoes is in the part of the blue circle that does not overlap with the orange one. Creatures that are not two-legged and cannot fly (for example, whales and spiders) would all be represented by points outside both circles.

The combined region of sets A and B is called the union of A and B, denoted by A ∪ B. The union in this case contains all living creatures that are either two-legged or that can fly (or both).

The region in both A and B, where the two sets overlap, is called the intersection of A and B, denoted by A ∩ B. For example, the intersection of the two sets is not empty, because there are points that represent creatures that are in both the orange and blue circles.

An another of Venn diagrams can be seen in the following example



Q.No 3. Discuss symbolic logic in terms of negation, conjunction and disjunction supplemented by examples. Also state the different symbols used in symbolic logic.

<u>Solution</u>

<u>Discuss s</u>

<u>Discuss symbolic logic</u>

- Symbolic logic is the method of representing logical expressions through the use of symbols and variables, rather than in ordinary language. This has the benefit of removing the ambiguity that normally accompanies ordinary languages, such as English, and allows easier operation.
- There are many systems of symbolic logic, such as classical propositional logic, first-order logic and modal logic. Each may have separate symbols, or exclude the use of certain symbols.

<u>symbolic logic in terms of negation</u>

- We deny the truth of a sentence by asserting its negation. For example; if we think, ‘Sugar causes tooth decay.’ is false, then we can assert, ‘Sugar does not cause tooth decay’.
- Denial….simply means, it is not the case that p, and may be read as “not-p”
- We attached not to the main verb by asserting the negation of the statement.
- The assertion of negation of compound sentence is a bit complicated. For example, ‘Sugar causes tooth decay and whiskey cause ulcer’
- ~(Sugar causes tooth decay)   ~P or ~P

<u>TRUTH TABLE FOR NEGATION</u>

p	~p
T	F
F	T

symbolic logic in terms of Conjunction

- We use ‘and’ to join two sentences to make a single sentence, which in logic is called, Conjunction of two sentences.
- For example, ‘Marry loves John and John loves Marry’ is the conjunction of ‘Marry loves John’ and ‘John loves Marry’.
- We use the ampersand sign ‘&’ for conjunction.
- Now the above sentences can be written as;
- P&Q; where P is statement 1 and Q is statement 2
- Conjunction of two statements: “…and…”
- Each statement is called a conjunct
- “Hamza is neat” (conjunct 1) (Proposition 1)
- “Hamza is sweet” (conjunct 2) (Proposition 2)
- The symbol for conjunction is a dot •
- (Can also be “&”)
- p • q
- P and q (2 conjuncts)

TRUTH TABLE FOR CONJUNCTION

p	q	p • q
T	T	T
T	F	F
F	T	F
F	F	F

symbolic logic in terms of Disconjunction

- Disjunction of two statements: "…or…"
- Symbol is " v " (wedge) (i.e. A v B = A or B)
- Weak (inclusive) sense: can be either case, and possibly both
- Ex. "Salad or dessert" (well, you can have both)
- We will treat all disjunctions in this sense (unless a problem explicitly says otherwise)
- Strong (exclusive) sense: one and only one
- Ex. "A or B" (you can have A or B, at least one but not both)
- The two component statements so combined are called "disjuncts"
- You will do poorly on the exam unless you study."
    - P="You will do poorly on the exam."

S="You study."

TRUTH TABLE DISJUNCTION

p	q	p v q
T	T	T
T	F	T
F	T	T
F	F	F

Q NO. 4 What are truth value, truth table and validity? Discuss and draw truth tables for negation, conjunction and disjunction.

What are truth value

Truth-value, in logic, truth (*T* or 1) or falsity (*F* or 0) of a given proposition or statement. Logical connectives, such as disjunction (symbolized ∨, for "or") and negation (symbolized ∼),

can be thought of as truth-functions, because the truth-value of a compound proposition is a function of, or a quantity dependent upon, the truth-values of its component parts.
The truth-value of a compound statement can readily be tested by means of a chart known as a truth table. Each row of the table represents a possible combination of truth-values for the component propositions of the compound, and the number of rows is determined by the number of possible combinations. For example, if the compound contains just two component propositions, there will be four possibilities and thus four rows to the table. The logical properties of the common connectives may be displayed by truth tables as follows:

What are truth Table

A **truth table** is a mathematical **table** used to determine if a compound statement is true or false. In a **truth table**, each statement is typically represented by a letter or variable, like p, q, or r, and each statement also has its own corresponding column in the **truth table** that lists all of the possible **truth** values.

A **truth table** is a mathematical table used in logic—specifically in connection with Boolean algebra, Boolean functions, and propositional calculus—which sets out the functional values of logical expressions on each of their functional arguments, that is, for each combination of values taken by their logical variables (Enderton, 2001). In particular, truth tables can be used to show whether a propositional expression is true for all legitimate input values, that is, logically valid.

draw truth tables for negation, conjunction and disjunction.

A truth table is used to determine when a compound statement is true or false.

TRUTH TABLE FOR NEGATION

p	~p
T	F
F	T

TRUTH TABLE FOR CONJUNCTION

p	q	p • q
T	T	T
T	F	F
F	T	F
F	F	F

TRUTH TABLE DISJUNCTION

p	q	p v q
T	T	T
T	F	T
F	T	T
F	F	F

Q. NO. 5 Discussion argument by analogy, casual connection and cause and effect with the help of examples.

Solution

Discussion argument by analogy, casual connection and cause and effect with the help of examples.

Discussion argument by analogy

o **argue by analogy** is to **argue** that because two things are similar, what is true of one is also true of the other. Such arguments are called "analogical arguments" or "arguments by analogy". Here are some examples : There might be life on Europa because it has an atmosphere that contains oxygen just like the Earth.

<u>casual connection</u>

formalif there is a **causal connection** or **relationship** between two events, one event causes the other. They long ago established a **causal** link between smoking and lung cancer. Synonyms and related words. - Causing something to exist or happen.

<u>Example of casual connection</u>

A **causal claim** is any assertion that invokes **causal** relationships between variables, for **example** that a drug has a certain effect on preventing a disease. **Causal claims** are established through a combination of data and a set of **causal** assumptions called a **causal** model.

<u>cause and effect</u>

A **cause and effect** relationship is when something happens that makes something else happen. ... **Cause and effect** relationships are also found in stories.

For **example**, if Mae is late to school, she might lose recess time. In that case, being late to school is the **cause** and the **effect**, or result, is her losing recess time