

Chapter - 1

Argument

Four(4) marks allotted by H.S.Council for this chapter

MCQ-1X3=3

SAQ-1X1=1

CONTENT: (a) Nature of Argument: Logic may be defined as the science of reasoning or inference as expressed in language. Inference or reasoning is the mental process of passing from one or more given propositions to another new proposition justified by them. In inference we pass from the known to the unknown. An inference when expressed in language is called an Argument. According to I.M.Copi, 'an argument ... is any group of propositions of which one is claimed to follow from the others, which are regarded as providing support or grounds for the truth of that one'. So in an argument we proceed from given proposition or propositions to a new proposition. The given propositions are called the *premises* and the proposition which is drawn from them is called the *conclusion*.

Thus in the argument, 'All men are mortal', 'Ram is man', therefore, 'Ram is mortal', the first two propositions are called the *premises* and the third proposition is called *conclusion*.

(a) Distinction between deductive and inductive argument

with illustrations: A deductive argument is a form of argument in which the conclusion is drawn from one or more premises and in which the conclusion can never go beyond the premises. For example, 'All men are mortal, Ram is a man, therefore, Ram is mortal' – is an example of Syllogism. The first two are major premise and minor premise respectively and the last is the conclusion.

Besides, an Inductive argument is one in which a general real proposition or a proposition regarding a particular case is inferred on the basis of some observed facts in reliance on the Principle of the Uniformity of Nature and Law of Causation. For example, 'Ram is mortal, Shyam is mortal, Jadu is mortal,

Madhu is mortal, therefore, all men are mortal' – this argument is inductive. The last one is called conclusion and rest other propositions are called premises.

Following are the important distinctions between deductive and inductive arguments:

(i) In deductive argument the conclusion cannot go beyond the premises, but in induction the conclusion always goes beyond the collected premises. The conclusion of an inductive argument does not remain confined within the instances gathered through observation. In that case the conclusion says something more than what is said in the premises. In deductive argument the conclusion cannot contain anything which is not given in the premises. A review of the above two examples of both types of argument will make this point clear.

(ii) If a deductive argument is valid then its conclusion will necessarily follow from its premises. For example, Ram is taller than Shyam and Shyam is taller than Jadu – these two premises lead necessarily to the conclusion – ram is taller than Jadu. In such a case addition of a new premise will not make any change in the conclusion. The validity of this argument will neither increase nor decrease. Validity has no variation in degree. But an inductive argument differs in this point from deductive argument:

We have seen that most of the uneducated or half-educated religious men are very conservative.

Jadubabu is found to be an uneducated religious man.

So, it is likely that Jadubabu is very conservative.

This argument is an inductive argument. Here if the premises are true, the conclusion is more likely to be true than false.

In induction the addition of a new premise may strengthen or weaken the conclusion according to the nature of the new premise. For example, if with the given premises we add these two statements: (a) Jadubabu is a member of Calcutta Youth Club and (b) No member of that club is conservative, our conclusion will have to be revised and the opposite of it will be drawn with a greater probability. But if we add these with the given premises: (a) Jadubabu strongly opposed the co-education system and (b) he is also strongly against widow-remarriage, then the original conclusion will be stronger. The probability of inductive argument varies in degree.

(iii) In deductive argument the truth of the premises is taken for granted without examining their material truth, but in inductive argument the premises are derived from experience.

(iv) A valid deductive argument provides complete proof for its conclusion. Here the conclusion cannot be false, if the premises are true. In inductive argument, on the contrary, there is no claim of providing complete proof. In it the premises give only a partial support for the conclusion. A deductive argument is either valid or invalid. But an inductive argument is either good or bad, strong or weak, according to the strength of its premises.

(b) Argument and Argument form: We can make a distinction between the form and the matter of an argument. By the form of an argument we understand the structure of an argument, i.e. the way the argument has been presented and the matter of the argument to its contents. Let us take two examples:

1) If the sun rises, we get light

The sun rises

Therefore, we get light.

2) If it rains, the ground is wet

It rains

Therefore, the ground is wet.

The subject matter of the above two arguments differ, but they agree in form. Both of them have same form as shown below:

If p then q

p

Therefore, q

Both the arguments have the same form. Both the arguments are Hypothetical-Categorical Syllogisms which are in Modus Ponens.

The question may crop up: **What is the necessity of exhibiting the form of an argument?** What Logic wants to determine is the valid form of an argument and if a particular argument is consistent with the valid form which Logic determines, the argument is valid and if it is invalid.

Let us explain it with the help of an example:

If p then q

p

Therefore, q

It is in the form of a valid Hypothetical-Categorical Syllogism. Now if we see that a Hypothetical-categorical syllogism contains the same form as above, we shall consider it to be valid. In the case of a valid syllogistic argument, if the two premises are true, the conclusion must be true. So if in the case of a particular argument, we find that the premise or premises are true but the conclusion is false, then that argument must be invalid.

If we substitute two different propositions in place of p and q, in the above argument form, then the argument will be as follows:

If Ram takes poison, Ram dies

Ram takes poison

Therefore, Ram dies.

The argument is valid as its form is valid.

Logic is interested in the form of an argument. The validity or invalidity of an argument which contains contingent propositions depends entirely on its form. The validity of an argument does not at all depend on its contents.

All P is M (A)

No S is M (E)

Therefore, No S is P (E)

This is the form of a valid argument and the validity of this argument will not be affected by the terms we substitute in place of P, S and M. A valid argument is valid for its form only. So if a given argument is valid, then any argument having the same form must be valid. On the contrary, if a particular argument is invalid, any argument which contains the same form must be invalid:

Let us take an example:

All M.A.'s are highly educated persons (A)

Some poets are highly educated persons (I)

Therefore, Some poets are M.L.'s (I)

This argument is invalid as it involves the Fallacy of Undistributed Middle. Now, in order to prove that this argument is invalid we may construct another argument having the same form, whose invalidity will be immediately apparent, for example,

All dogs are animals (A)

Some tigers are animals (i)

Therefore, Some tigers are dogs (I)

The invalidity of this argument is immediately apparent, because the conclusion of the above argument is false though its premises are true. This is never possible in a valid argument. So the first argument i.e., argument number 1, having the same form as the second argument, must also be invalid.

The form of the argument is this:

All P is M (A)

Some S is M (I)

Therefore, Some S is P (I)

Any argument with the above form is invalid. So now we can understand how important it is to determine the form of an argument in Logic.

(c) Validity of Arguments: Propositions are true or false. We do not consider propositions as valid or invalid. 'The properties of validity and invalidity can belong only to deductive arguments.

A deductive argument is valid owing to its form. If an argument is valid, then its form is valid and all the arguments having that form must be valid, i.e., all the substitution instances of that form of argument are valid. For example, if p, then q; p, therefore, q. This argument-form is valid. That means all its substitution instances are valid. If we get an argument by substituting separate simple propositions in places of p and q, then that argument must be valid. An argument will be valid, if it is impossible for its premises to be true and the conclusion is false, then at least one of its premises must be false. Such a relation between the premise and the conclusion of a valid argument is known as the relation of implication.

The form of an argument is valid when we cannot obtain from that form any argument in which all the premises are true, but the conclusion is false.

For example, 'if p, then q; this is not the case that q; therefore, this is not the case that p' is a valid form of argument. We may substitute any proposition, we like, in places of p and q, but we cannot get from this form any argument having true premises and false conclusion. So this form is valid.

(d) Validity and Truth: The question is: what is the relation between the validity of an argument and the truth of its premise or premises and conclusion. If an argument is valid, does the validity of that argument guarantee the truth of its conclusion? Certainly not, there are valid arguments which have false conclusions. A valid argument may have a true conclusion or a false conclusion. As for example:

Valid Argument with a true conclusion:

All men are mortal
All kings are men
All kings are mortal

Valid argument with a false conclusion:

All men are immortal
All kings are men
All kings are immortal

We must note that if an argument is valid and its premises are true, the conclusion must be true; in no case it can be false.

So if an argument is valid, there is no guarantee that its conclusion must be true. The conclusion will be true provided its premises are true.

If we assume that the premises of a valid deductive argument are false, what can be concluded about the truth or falsity of the conclusion? The conclusion may be true or false. For example,

1) If Saratchandra is a scientist, then he will be a novelist (False)

Saratchandra is a scientist (False)

Therefore, Saratchandra is a novelist (True)

2) If there is fire, there is smoke (False)

There is fire in the lake (False)

Therefore, there is smoke in the lake (False)

These two arguments are examples of Hypothetical-categorical arguments and are valid, because the rules which make such arguments valid have been rightly followed in each case. But in the first instance we find though the premises are false the conclusion is true and in the second instance we find the premises and the conclusion are all false. So, the validity of an argument does not always guarantee the truth of its conclusion.

(e) Invalidity of Arguments: The form of a deductive argument is invalid if any substitution instance having true premises and false conclusion can be obtained from the said form. If an argument-form is invalid, all arguments of that form are invalid.

So, invalidity also depends on argument-form, and not on the contents of arguments. Even an argument which has true premises and true conclusion will be invalid, if its form is invalid. That is, if we can construct from that argument-form an argument having true premises, but false conclusion, then the

argument-form, and so the original argument possessing that form, will be invalid. For example,

- (1) Some boys are not labourious persons. (True)
Therefore, Some labourious persons are not boys. (True)
- (2) Some men are not scientists. (True)
All poets are men. (True)
Therefore, Some poets are not scientists. (True)

The first argument is an example of Conversion and the second is a case of Syllogism. Both arguments are invalid, as their forms are invalid, though all their constituent propositions are true. The form of argument 1 is:

Some S is not P.
Therefore, Some P is not S.

And the form of argument 2 is:

Some M is not P.
All S is M.
Therefore, Some is not P.

We can construct an argument in the form (1) whose premise is true, but the conclusion is false.

Some men are not workers. [True]
Some workers are not men. [False]

Again, in the form of second argument we may construct this argument:

Some animals are not mammals. [True]
All cows are animals. [True]
Some cows are not mammals. [False]

In this way we can prove the invalidity of both argument-forms. [1] and [2], and so the arguments having these forms are proved invalid. This method of proving the invalidity of an argument is known as Refutation by Logical Analogy. For the application of this method we have to find out first the form of the given argument and then to construct in that form an argument whose premises are true and the conclusion false. That will prove the invalidity of the given argument. So it is clear that the invalidity of a deductive argument does not depend on the truth or false of its premise and conclusion.

Exercises

Find out the correct alternative from the following:

1. The main subject matter of _____ is argument or inference.
(a) Metaphysics (b) Epistemology (c) Logic (d) Ethics
2. In ordinary language argument and inference are considered _____.
(a) Equivalent (b) Identical (c) Different (d) Contradictory
3. _____ is a mental process from which we go to unknown from known.
(a) Argument (b) Inference (c) Premise (d) Conclusion
4. In _____ inference the truth of the conclusion necessarily depends upon the combination of the premises.
(a) Mediate (b) Immediate (c) Inductive (d) Analogical
5. When inference is expressed in language it is called _____.
(a) Argument (b) Premise (c) Conclusion (d) Copula
6. In deductive argument the conclusion _____ follows from the premise(s).
(a) Necessarily (b) Probably (c) Really (d) Identically
7. In deductive argument the conclusion never becomes _____ than/ with the premise(s).
(a) more wide (b) less wide (c) equally wide (d) totally contradictory
8. In deductive argument we consider _____ validity of the argument.
(a) Formal (b) Material (c) Logical (d) Causal
9. In deductive argument there is _____ relation between the premise and conclusion.
(a) Entailment (b) Empirical (c) Regular (d) Interactive
10. In Inductive argument the conclusion is drawn from the observation of _____ particular premise(s).
(a) One (b) Two (c) Three (d) Many
11. By the _____ of argument we mean the formal structure or analysis.
(a) Form (b) Matter (c) Instance (d) Validity
12. In case of _____ argument the premise and conclusion are categorical proposition.
(a) Categorical (b) Hypothetical (c) Disjunctive (d) Inductive
13. In case of _____ argument the conclusion follows only from one premise.
(a) Immediate (b) Mediate (c) Analogical (d) Inductive
14. Conditional argument is a kind of argument where _____ premise(s) is conditional proposition.
(a) One (b) Two (c) All (d) No
15. In pure hypothetical argument _____ component(s) is hypothetical proposition.
(a) One (b) Two (c) All (d) No
16. By the term '_____ ' we mean consistency with the reality or actuality.
(a) Validity (b) Invalidity (c) Truth (d) Falsity

17. Like validity, invalidity is also a _____ feature of argument form.
(a) Necessary (b) Sufficient (c) Necessary-sufficient (d) Inefficient
18. The term 'validity' can only be applied in case of _____.
(a) Sentence (b) Proposition (c) Argument form (d) Conclusion
19. If an argument is valid then the argument form is also _____.
(a) Valid (b) Invalid (c) Probable (d) Certain
20. If the form of an argument is invalid then _____ argument(s) following that form will be invalid.
(a) One (b) Two (c) All (d) No

Answer in one or two sentences:

1. What is Logic?
2. How can we classify Logic?
3. What type of relation prevails between the premise and conclusion of deductive argument?
4. Which term between 'truth' and 'validity' can be applied in case of inductive argument?
5. Mention one feature of deductive logic.
6. Mention one feature of inductive logic.
7. Which type of sentence can be called proposition?
8. What is the meaning of premise?
9. What is the meaning of conclusion?
10. Give example of premise and conclusion with the help of an argument.
11. What is the meaning of validity?
12. What is the meaning of truth?
13. Give one feature of valid deductive argument.
14. What is the relation of truth and validity?
15. What is the meaning of truth?
16. What is the meaning of invalidity?
17. Give one feature of Invalid argument.
18. Give an example of a deductive argument in which the premise(s) is false and the conclusion is true.
19. Give one feature of inductive argument.
20. How can we classify deductive argument?

Chapter – 2

Proposition

10(Ten) marks allotted by H.S.Council for this chapter

MCQ-1X2=2

DAQ-8X1=8

Content: (a) Sentence and Proposition: A sentence is a group of words with a complete meaning. It has two parts: subject and predicate and predicate. At the same time there must be the proper use of a verb. For example, 'Ram goes to school daily' is a sentence because it has its subject 'Ram' and predicate 'goes to school daily' and there is also a verb 'goes'. But in logic we use arguments and as the part of those arguments we use 'sentences'. But we call them 'Proposition' in logic. There some differences between Sentence and Proposition. **Firstly**, sentence has two parts: subject and predicate; but proposition has four portions: subject, predicate, quantifier and copula. **Secondly**, sentence has different types: assertive, interrogative, optative, exclamatory, imperative; but proposition can only be assertive sentences. **Thirdly**, in case of sentence we the use of present, past and future tense of the verb; but in case of proposition we find the use of present form of be-verb as copula. **Fourthly**, in case of sentence we find the structure 'subject – verb – object'; but in case of proposition we find the structure 'quantifier – subject – copula –object'. Notwithstanding these differences we occasionally use these two terms as synonymous in logic.

(b) Classification of Propositions according to Quality, Quantity and Relation: (i) By the term 'quality' of a proposition the relation of inclusion or exclusion of a term is expressed about the other term. On this basis categorical propositions can be divided into two types: Affirmative and Negative.

A Categorical proposition is affirmative when it expresses a relation of complete or partial inclusion between two classes expressed in that proposition. For example, the proposition, 'All scientists are men' declares that the subject-class is totally included in the predicate-class. Every scientist is also

a member of the class of men. Again, the proposition, 'Some fruits are sweet' asserts a relation of partial inclusion of the subject-class in the predicate-class. Both the propositions are affirmative, as they relate to the relation of inclusion or affirmation.

A Categorical proposition is negative if it expresses a relation of complete or partial exclusion between two classes. For example, the propositions 'No cuckoos red birds' and 'Some footballers are not Bengalees' are negative as each of them assert a relation of exclusion.

(ii) By the term 'quantity' we express the feature of universal inclusion or exclusion or particular affirmation or negation of a class about the other class. Depending on whether the subject-class is taken as a whole or in part, categorical propositions can be classified into universal and particular.

A categorical proposition is universal if it asserts that the subject-class as a whole is included in or excluded from the predicate class. For example, the proposition 'All cuckoos are black birds', asserts that the entire class of cuckoos is included in the class of black birds. Again, the proposition, 'No even numbers are odd numbers' expresses that the entire class of even numbers is excluded from the class of odd numbers. In both these propositions the subject-class is taken as a whole and so both of them are universal.

A categorical proposition is, on the contrary, is particular if it asserts that the subject-class is partially included in or excluded from the predicate class. For example, the propositions 'Some birds are yellow beings' and 'some birds are not swans' are particular. The first proposition asserts that the class of birds is included in part in the class of yellow beings. The second proposition declares that the subject-class, the class of birds, is partially excluded from the class of swans. In both propositions, the subject-class has been taken in part and so both are particular.

(iii) According to the relation, propositions can be divided into two types: (a) Categorical Propositions and (b) Non-categorical or Conditional Propositions.

The proposition in which the relation between the subject and predicate does not depend upon any condition is called Categorical Proposition. For example, 'All poets are men' – in this proposition the relation between the subject 'poets' and predicate 'men' does not depend upon any condition. So, it is called Categorical Proposition. The subject is unconditionally affirmed about

the predicate and the predicate is partially affirmed about the subject. So it is called Categorical Proposition.

On the other hand, the proposition in which the relation between the subject and the predicate depends upon any condition is called Conditional Proposition. For example, the propositions 'If it rains then we have good crops' and 'Either Rabindranath is a poet or he is a dramatist' are conditional because in both these sentences one part is dependent upon the other part.

Conditional Propositions are of two types: (a) Hypothetical Propositions and (b) Disjunctive Proposition.

(a) Hypothetical Propositions: The proposition which expresses a condition with word 'if' or similar then it is called Hypothetical proposition. It is expressed in the form of 'if – then – '. The portion starting from 'if' and ending before 'then' is called antecedent. The portion after the portion 'then' is called consequent. For example, the proposition 'If it rains, then there will be good crops' is an example of hypothetical proposition. The portion 'it rains' is antecedent and the portion 'there will be good crops' is called consequent.

(b) Disjunctive Proposition: The proposition which conjoins its portions with connective 'either-or' is called disjunctive proposition. The portion of this sentence is called 'disjunct'. For example, 'Either he is a poet or he is a philosopher' is an example of disjunctive proposition. It has two disjuncts 'he is a poet' and 'he is a philosopher'.

(c) Four-fold scheme of Categorical Propositions: Categorical propositions are divided into Affirmative and Negative according to quality and into Universal and Particular Propositions according to quantity. According to the joint principle of quality and quantity propositions can be divided into four types, viz.-

Quality-quantity	Example	Form/Structure	Signs
Universal Affirmative	All men are mortal	All S are P	A
Universal Negative	No men are god	No S are P	E
Particular Affirmative	Some men are tall	Some S are P	I

Particular Negative	Some men are not honest	Some S are not P	O
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(d) Proposition and Proposition form: Propositions have two aspects: formal side and material side. The subject matter about which the proposition is constructed or formed is called the matter of proposition. Besides, the structure of of proposition is determined by the terms and their positions in the propositions. This can be illustrated with the help of following examples:

1. (a) All men are mortal (A)
- (b) All poets are philosophers (A)

The subject matters of the above two propositions are different. The subject matter of the first proposition is the mortality of men and the subject matter of the second is the philosopher nature of the poets. But from the terms and their positions it is clear that the forms of these two propositions are same. By replacing the subject and predicate of these two propositions with S and P we can say that these two propositions are in the form of 'All S are P'.

2. (a) All smoky things are fiery (A)
- (b) If a hill has smoke, it has fire.

From the observation of the above two propositions it is clear that the subject matter of the two propositions are same. But the first is in the form of 'All S are P' and the second is in the form of 'If P then Q'. The first is unconditional and the second is conditional proposition.

3. (a) If a country is free then it is developing
- (b) All men are rational animals (A)

From the above two proposition it is clear that the matters and forms of the above two propositions are different.

The differences between proposition and proposition form are as follows:

(a) Propositions have both matter and form. But proposition form has only form, it does not have matter. For this proposition form is not proposition.

(b) As proposition form does not have matter or subject it cannot be true or false. From the view point of Modern Logic it can be said that proposition form does not have truth values. On the other hand, proposition has truth values. Propositions are either true or false. If the subject matter of the proposition have similarity or consistency with real situation it will be called true and if it does not have similarity it will be false. From the point of view of

similarity or consistency we can say that the proposition 'Some men are honest' is true and 'All men are god' is false.

(c) From the view point of Modern Logic it can be said that proposition has two parts: subject and predicate. But proposition form has always a 'form'; it cannot have term, it only has term variable.

(e) Distribution of terms: Every categorical proposition expresses a relation of inclusion or exclusion between two classes. The subject-class and the predicate-class of a categorical proposition may be taken wholly or partially. For example, in the proposition – 'All chess players are men' – we speak of all members of the class of chess players, but we do not take the predicate-class, men, as a whole. In this proposition we mean that every member of the class of chess players is also a member of the class of men. But it is not said that all chess players are all men. Such a proposition is called a universal affirmative proposition which is marked by the symbol A. The form of this proposition is: All S is P. Proposition of this form declares that all the members of the class of S are also members of the class of P. The proposition, however, does not say whether all the members of the class of P have been taken into consideration.

The term, 'Distribution', is used to mean whether the class indicated by the subject or the predicate is taken as a whole or in part. Here it does not mean division. A term of a categorical proposition is said to be distributed when the class referred to by that term is taken entirely. It is undistributed when the class indicated by it is taken partially.

Let us discuss the issue of distribution of term in four forms of Categorical Propositions – A, E, I and O.

'A' – Universal Affirmative Proposition: A proposition distributes its subject and undistributes its predicate terms. For example, 'All men are mortals' – in this proposition all members of the class denoted by the subject 'men' are universally affirmed about the predicate. But on the other hand the some members of the class denoted by the predicate 'mortals' are partially affirmed about the subject. So, the subject term is distributed and the predicate term is not distributed.

But in some cases A proposition distributes both its subject and predicate terms. These cases are: (i) proposition indicating definition, (ii) propositions with repetitive terms in subject and predicate and (iii) propositions with definite

singular terms. In all these cases the subject and predicate are of same extension.

‘E’ – Universal Negative Proposition: E proposition distributes both its subject and predicate terms. For example, ‘No triangles are squares’ – in this proposition all members of the class of ‘triangles’ are excluded about the class of ‘squares’. This is also true about the members of the class of ‘squares’. For this reason we say that both subject and predicate terms are distributed in E proposition.

‘I’ – Particular Affirmative Proposition: I proposition distributes neither subject nor predicate term. For example, ‘Some men are honest persons’ – in this proposition the members of the subject and predicate terms are partially included about the members of the classes of predicate and subject respectively. For this reason we say that none of the subject and predicate terms are distributed in I proposition.

‘O’ – Particular Negative Proposition: O proposition does not distribute subject term and distribute predicate term. For example, ‘Some men are not labourious persons’ – in this proposition the members of the subject are partially excluded about the members of the predicate term. Besides, the members of the predicate term ‘labourious persons’ are universally denied about the members of the subject ter. For this reason the subject term of O proposition is undistributed and the predicate term is distributed.

Rules of distribution of terms in categorical propositions: Therefore are two rules of distribution of terms of categorical propositions: (i) Universal propositions like A and E propositions distribute subject term and (ii) Negative propositions like E and O propositions distribute only predicate terms.

The distribution of term in categorical proposition can be shown with the following formula: $A_S E_B I_N O_P$

A proposition distributes Subject term;

E proposition distributes both Subject and Predicate terms;

I proposition distributes none of the Subject and Predicate terms;

O proposition distributes its Predicate term.

(f) Rules for transforming sentences into Logical Propositions: There are some rules in logic which should be followed for reducing sentences into logical propositions. But in some cases we are bound to follow our practical experience for their reduction. The rules are discussed below:

I. Propositions with 'All', 'Every', 'Any', 'Each', 'Always', 'Everywhere', 'Universally', 'Necessarily', 'Invariably', if added with affirmative sign will be A or Universal Affirmative propositions and if these propositions are added with negative signs then they will be E or Universal Negative propositions.

Every man is selfish = All men are selfish (A)

The honest are not always happy = Some honest men are not happy persons (O)

II. Propositions with 'Some', 'Several', 'Many', 'Most', 'A few', 'Almost', 'Generally', 'Usually', 'Frequently', 'Often', 'Mostly' and similar words if added with affirmative signs will be I or Particular affirmative propositions. If these propositions are added with negative signs they will be O or Particular Negative propositions.

Students are usually diligent = Some students are diligent persons (I)

Most green mangoes are sweet = Some green mangoes are not sweet fruits (O)

III. Propositions with 'Few', 'Hardly', 'Scarcely', 'Rarely', 'Seldom' without negative signs will be O or particular propositions. If these sentences are added with negative signs then these will be I or Particular Affirmative propositions.

Students are rarely indisciplined = Some students are not indisciplined persons (O)

Men are not hardly honest = Some men are honest persons (I)

IV. Propositions with 'No', 'Never', 'None', 'Nobody', 'Nowhere', 'By no means', 'In no case' will be E or Universal Negative propositions.

Men are never really happy = No men are really happy persons (E)

Triangular rectangles are never found = No rectangle is triangle (E)

V. Exclusive propositions, i.e. propositions with 'Only', 'Alone', 'None but', 'No one else but' will be A or Universal Affirmative propositions by transporting their subject and predicate terms.

Only the virtuous are happy = All happy persons are virtuous persons (A)

Honest alone are rewarded in life = All persons rewarded in life are honest (A)

VI. When a proposition excludes a portion of the denotation of the subject term then it will be Exceptive proposition. If the portion is definitely excluded then it will be universal proposition and if it is indefinitely excluded

then it will be particular proposition. These propositions contain words like 'except', 'except one' etc. For example,

Every metal except mercury is solid = All metals (except mercury) are solid (A)

All metals except one are solid = Some metals are solid (I)

VII. The proposition which has definite singular term as the subject is called Singular Proposition. In these propositions if the subject term is definite term then the proposition will be universal and the subject term of these propositions are indefinite term, then the proposition will be particular. For example,

Socrates was a philosopher = Socrates is a person who was a philosopher (A)

One philosopher was Greek = Some philosophers are persons who were Greek (I)

VIII. If the subject term of a proposition is pronoun or qualitative noun then the proposition will be universal proposition. For example,

I am wise = I am wise person (A)

Honesty is the best policy = Honesty is the best policy (A)

IX. When we cannot form the class of the subject and predicate then we have to add 'place', 'time' etc with them. If the sentence contains affirmative sign then it will be A proposition and if it contains negative sign then it will be E proposition. For example,

Where there is fire, there is smoke = All places of fire are places of smoke (A)

He cannot see his own his own shadow who faces the sun = No person who faces the sun are persons who can see his own shadow (E)

X. while converting the sentences into propositions we have to maintain the meaning of the sentences. If we do not find the mention of quantity of the subject term then we have to depend upon the meaning or sense of the sentences. For example,

Mangoes are sour = Some mangoes are sour (I)

Poets are not realists = some poets are not realists (O)

Exercises

Find out the correct alternative from the given options:

- The material component of the argument is called _____ in logic.
(a) Sentence (b) Proposition (c) Inference (d) Conclusion
- In logic the affirmation or negation of the relation of two terms is called _____.
(a) Sentence (b) Proposition (c) Inference (d) Conclusion
- The proposition in logic is _____ sentence.
(a) Assertive (b) Interrogative (c) Exclamatory (d) Imperative
- A categorical proposition has _____ parts.
(a) Two (b) Three (c) Four (d) Five
- _____ is a part of proposition which indicates quantity of the proposition.
(a) Subject (b) Predicate (c) Copula (d) Quantifier
- Words like 'All', 'No', 'Some' are called _____.
(a) Subject (b) Predicate (c) Copula (d) Quantifier
- _____ makes a relation between subject and predicate.
(a) Subject (b) Predicate (c) Copula (d) Quantifier
- Copula will always be any form of _____ tense.
(a) Present (b) Past (c) Future (d) Any
- According to quality Categorical proposition can be of _____ types.
(a) Two (b) Three (c) Four (d) Five
- According to _____, categorical propositions can be divided into two types: universal and particular.
(a) Quality (b) Quantity (c) Quality and quantity (d) Significance
- The meaning of "Some" in logic is _____.
(a) At least one (b) Many (c) More than one (d) Two
- According to relation, proposition can be divided into _____ types.
(a) Two (b) Three (c) Four (d) Five
- The condition is mention in the _____ portion of Hypothetical proposition.
(a) Antecedent (b) Consequent (c) Copula (d) Total

14. The main content is mentioned in the _____ portion of the Hypothetical proposition.

(a) Antecedent (b) Consequent (c) Copula (d) Total

15. According to Composition, proposition can be divided into _____ types.

(a) Two (b) Three (c) Four (d) Five

16. Compound propositions can be divided into _____ types.

(a) Two (b) Three (c) Four (d) Five

17. In all cases both subject and predicate terms are distributed in _____ propositions.

(a) A (b) E (c) I (d) O

18. _____ proposition cannot distribute any term.

(a) A (b) E (c) I (d) O

19. _____ proposition distributes only the predicate term.

(a) A (b) E (c) I (d) O

20. In some cases both subject and predicate terms are distributed.

(a) A (b) E (c) I (d) O

21. All metals except mercury are solid – this proposition is _____ proposition.

(a) Exclusive (b) Exceptive (c) Interrogative (d) Singular

22. There are _____ general rules of distribution of terms.

(a) Two (b) Three (c) Four (d) Five

23. Only philosophers are wise persons – this proposition is _____ proposition.

(a) Exclusive (b) Exceptive (c) Interrogative (d) Singular

24. The portion of a proposition which cannot be considered as independent proposition is called _____ proposition.

(a) Exclusive (b) Exceptive (c) Interrogative (d) Singular

25. Either p or q – the form of this proposition is the form of _____ proposition.

(a) Hypothetical (b) Disjunctive (c) Copula (d) Bi-conditional

Convert the following sentences into propositions and point out their subjects and predicates:

1) Men are not always philosophers.

2) Man cannot be God.

3) Only men are happy.

- 4) Men are not scarcely honest.
- 5) Men are generally labourious.
- 6) Uneducated persons may also be intelligent.
- 7) Where there is fear of tiger, there is dusk.
- 8) There are white tigers.
- 9) Few men are not selfish.
- 10) All is well that ends well.
11. Communists are revolutionary.
12. The Cārvakas are materialists.
13. None but the labourious persons are successful.
14. Stories are not always imaginary.
15. Many doctors are kind.
16. All stories are not true events.
17. Which mother does not love her child?
18. Who does not want economic freedom?
19. Doctors are rarely kind.
20. Traitors are enemies of the society.
21. Caste system does not bring unity.
22. Cārvakas do not believe in God.
23. Two and two do not make five.
24. Men are not perfect.
25. There are white roses.
26. Citizens are always with voting rights.
27. Wise persons are unsatisfied in many cases.
28. Who does not money?
29. Oranges are sour in many cases.
30. Ostrich cannot fly.
31. Many men do not like peace.
32. The Whales are mammals.
33. Soldiers never like peace.
34. Solid square does not exist.
35. If it is circle then it cannot be quadruped.
36. There is nothing permanent.
37. 90% students are attentive.
38. He cannot see his own shadow who faces the sun.

39. Poor persons generally do not become conscious.

40. All fiery things are not smoky.

Convert the following sentences into propositions and mention which terms are distributed:

1. Democracy loving people always cast their votes.

2. Students are generally gracious.

3. Wise persons do not always get honour.

4. Fairies never become without winged.

5. Who does not want to be rich?

6. All metals except mercury are solid.

7. All metals except one are solid.

8. Students do not read logic always attentively.

9) One philosopher was Greek.

10) Where there is will, there is way.

11) There is no white cuckoo.

12) Poets are necessarily realists.

13) Many poets are idealists.

14) Triangles are not with four angles.

15) Many fathers are not realistic.

16) Men are not always poets.

17) A few students are not realistic.

18) White cats with blue eyes generally do not listen to ears.

19) All are not saints that go to church.

20) Many men are sweepers.

21) Men err.

22) $7+5=12$

23) Mangoes from Malda are generally sweet.

24) All students except one are present in the school.

25) Many men are like God.

Convert the following sentences and find out their qualities and quantities:

1) Only fools consider themselves great.

2) Soldiers can never be peace loving.

3) There may not be smoke if there is fire.

4) There is no coin which is not made of metal.

5) There is no round square.

- 6) All that glitters are not gold.
- 7) Red flowers do not have fragrance.
- 8) Men always make mistake.
- 9) Poets may also be philosophers.
- 10) Rich people sometimes become dishonest.
- 11) Only women are fit to be appointed to this post.
- 12) Mathematicians can also be philosophers.
- 13) There are black tigers.
- 14) Honest persons sometimes feel pain.
- 15) Poets may also be emotional.
- 16) Two and two always make four.
- 17) Wise persons are unsatisfied in many cases.
- 18) I always take umbrella when I go out.
- 19) Only lady teachers are present in the meeting.
- 20) Men generally do not like disturbances.
- 21) Dishonest persons are dangerous for the society.
- 22) Mermaids are imaginary creatures.
- 23) Fairies are imaginary creatures.
24. Where there is smoke, there is fire.
25. Men never become perfect.

Answer the following questions (not more than 200 words):

1. What is Proposition? Mention the differences between sentence and proposition. Explain with instances.
2. What is Categorical proposition? Mention different parts of propositions with example.
3. Explain the nature and importance of Copula with example.
4. Discuss different classifications of propositions from the view point of quality, quantity and both quality and quantity.
5. Discuss different classifications of propositions from the view points of compositions.
6. What do you mean by quality and quantity of Categorical propositions? Explain the Four Fold Scheme of Categorical Propositions in this context.
7. What do you mean by Distribution of Terms? Explain and illustrate the issue of distribution of terms of Categorical propositions in this context.

Chapter – 3
Opposition of Proposition
Four (4) marks allotted by H.S.Council for this chapter

MCQ-1X2=2

SAQ-1X2=2

Content: (a) Concept of Opposition of Proposition: From the view point of traditional logic, Opposition of Proposition may be defined as the relation between two categorical propositions which have the same subject and predicate, but differing in quality or in quantity or in both. For example,

Some flowers are blue (I)

Some flowers are not blue (O)

These two propositions are corresponding particular propositions having same subject and predicate, but differing in quality. So, the relation can be called Opposition of Proposition. There are two conditions of Opposition of Proposition: (1) two propositions have same subject and predicate and (2) two propositions must differ either in quality or in quantity or in both.

There are four types of Opposition of Proposition: (a) Contrary Opposition, (b) Sub-contrary Opposition, (c) Sub-altern Opposition and (d) Contradictory Opposition. We can illustrate all these kinds in the following manner:

(a) Contrary Opposition: Contrary opposition is the relation between two universal propositions having same subject and predicate, but differing in quality. This relation is also called Contrariety. This relation prevails between A and its corresponding E proposition. For example,

All men are mortal (A)

No men are mortal (E)

These two corresponding propositions are universal, but they differ in quality. So, they can be said to be related by the way of Contrary Opposition.

(b) Sub-contrary Opposition: Sub-contrary Opposition is the relation between two particular propositions having same subject and predicate, but

differing in quality. It is also known as Sub-contrariety. This relation prevails between I and its corresponding O proposition. For example,

Some men are soldiers (I)

Some men are not soldiers (O)

These two particular propositions are corresponding to each other, but differing in quality. So, they can be related by the way of sub-contrary opposition.

(c) Sub-altern Opposition: Sub-altern opposition is the relation between two propositions having the same subject and predicate, but differing only in quantity. The relation prevails between A and its corresponding I and also between E and its corresponding O propositions. For example,

All good students are diligent (A)

Some good students are not rich (O)

These two propositions are corresponding to each other and they have same quality, but they differ in quantity. So, they can be said to be related by way of Sub-altern opposition. The corresponding propositions in the following pair are also related by sub-altern opposition:

No workers are rich (E)

Some workers are rich (I)

So, it is apparent that sub-altern Opposition is the relation that obtains between a universal proposition and its corresponding particular proposition of the same quality. The universal proposition is called Sub-alternant or Super-implicant or Sub-alternans; the corresponding particular is called Sub-alternate or Sub-implicant, while both propositions in relation to each other are called Subalterns. A and its corresponding I are subalterns to each other. Similarly E and its corresponding O are also subalterns to each other.

(d) Contradictory Opposition: Contradictory opposition is the relation between two categorical propositions having the same subject and predicate, but differing in both quality and quantity. This relation exists between A and its corresponding O and also between E and its corresponding I proposition. For example,

All footballers are players (A)

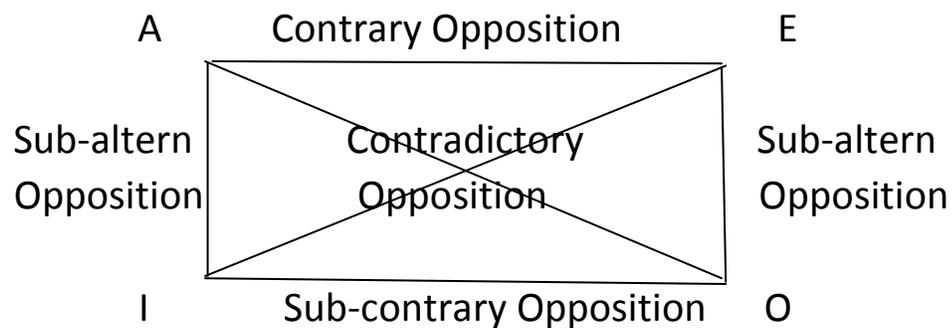
Some footballers are not players (O)

These two corresponding propositions differ both in quality and quantity. So they are related by way of Contradictory opposition. The same is the case with the following pair:

No religious men are dishonest (E)
Some religious men are dishonest (I)

So these are also two propositions related to Contradictory opposition because there are same subject and predicate, but difference in both quality and quantity.

(b) Traditional Square of Opposition: These four types of Opposition of Propositions can be represented with the help of the following diagram.



It is easier to remember four types of Opposition of Propositions. In this square the above portion is representation of Contrary Opposition between A and E proposition. The Sub-contrary Opposition is represented in the lower part of the diagram between I and O proposition. The two sides of the diagram are representing Sub-altern Opposition. The two diagonals of the diagram are representing Contradictory opposition. This kind of diagram is used traditionally to represent different oppositions. This is called traditional square of opposition.

(e) Inference by Opposition of Proposition: Inference by Opposition of Proposition is a kind of immediate inference in which from the truth or falsity of one proposition we infer either the truth or falsity of its opposed propositions. Four kinds of Opposition of propositions are ordinarily recognized in logic, viz. Contrary Opposition, Sub-contrary Opposition, Sub-altern Opposition and Contradictory Opposition. Corresponding to the four forms of Inference by opposition each having its own law or rule.

(f) Laws of different types of Opposition: Let us discuss the different forms of Oppositions separately in the following manner:

a) Law of Contrary Opposition: This opposition prevails between A and its corresponding E proposition. According to the rule of Contrary Opposition, the truth of one proposition implies the Falsity of the other proposition, but not the converse.

- i) If A is True then E is False.
- ii) If A is False then E is Doubtful.
- iii) If E is True then A is False.
- iv) If E is False then A is Doubtful.

b) Law of Sub-contrary Opposition: This opposition prevails between I proposition and its corresponding O proposition. According to the law of Sub-contrary Opposition, the Falsity of one proposition implies the Truth of the other proposition, but not the converse.

- i) If I is True then O is Doubtful.
- ii) If I is False then O is True.
- iii) If O is True then I is Doubtful.
- iv) If O is False then I is True.

c) Law of Sub-altern Opposition: This opposition prevails between two sets of propositions. This prevails between pairs of A and I and E and O propositions. This opposition has two laws of truth or falsity. According to the first law, the Truth of the universal implies the Truth of the particular proposition, but not the converse.

- i) If A is True then I is True.
- ii) If A is False then I is Doubtful.

According to the second law, the falsity of the particular proposition implies the falsity of the universal, but not the converse.

- i) If I is False then A is False.
- ii) If I is True then A is Doubtful.

d) Law of Contradictory Opposition: This opposition prevails between two pairs of propositions. This opposition prevails between A and O and E and I propositions. According to the law of Truth or falsity of this Opposition, if a proposition is True then the other will be False; if one proposition is False then the other is True.

- i) If A proposition is True then O is False and if A is False then I is Doubtful
- ii) If O is True then A is False and if O is false then A is True.
- iii) If E is True then I is False and If E is False then I is True.

iv) If I is True then E is False and If I is False then E is False.

The issue of the Truth or Falsity of Opposition of Proposition can be represented with the help of the following Table:

A	E	I	O
T	f	t	F
f	T	F	t
d	F	T	d
F	d	d	T

In this table capital letters indicate both data and conclusions and small letters represent only conclusions.

Exercises

Find out the correct alternative from the following:

- 1) Opposition of Proposition is a kind of _____ inference.
(a) Immediate (b) Mediate (c) Inductive (d) Analogical
- 2) There are _____ conditions of Opposition of Proposition.
(a) Two (b) Three (c) Four (d) Five
- 3) Opposition of Proposition can be of _____ types.
(a) Two (b) Three (c) Four (d) Five
- 4) If there is only qualitative difference between two universal propositions having same subject and predicate then the name of the opposition is _____.
(a) Contrary (b) Sub-contrary (c) Subaltern (d) Contradictory
- 5) If there is only qualitative difference between two particular propositions having same subject and predicate then the name of the opposition is _____.
(a) Contrary (b) Sub-contrary (c) Subaltern (d) Contradictory
- 6) There is only _____ difference between two propositions of Subaltern opposition.

(a) Qualitative (b) Quantitative (c) Both qualitative and quantitative (d) Logical
7) If there is both qualitative and quantitative difference between two propositions having same subject and predicate then the name of the opposition is _____.

(a) Contrary (b) Sub-contrary (c) Subaltern (d) Contradictory
8) Some logicians do not consider _____ opposition as real Opposition of proposition.

(a) Contrary (b) Sub-contrary (c) Subaltern (d) Contradictory
9) The name of the Opposition between A and E proposition is _____ opposition.

(a) Contrary (b) Sub-contrary (c) Subaltern (d) Contradictory
10) Subaltern Opposition prevails between _____ propositions.

(a) A and E (b) I and O (c) A and I (d) E and O
11) In case of Subaltern Opposition if the Universal proposition is True then the Particular proposition is _____.

(a) True (b) False (c) Uncertain (d) Certain
12) The name of the Opposition between A and O proposition is _____ opposition.

(a) Contrary (b) Sub-contrary (c) Subaltern (d) Contradictory
13) In case of Subaltern Opposition if the Particular proposition is True then the Universal proposition is _____.

(a) True (b) False (c) Uncertain (d) Certain
14) In case of Subaltern Opposition if the Particular proposition is False then the Universal proposition is _____.

(a) True (b) False (c) Uncertain (d) Certain
15) In case of Subaltern Opposition if the Universal proposition is False then the Particular proposition is _____.

(a) True (b) False (c) Uncertain (d) Certain
16) In case of Contrary Opposition if one proposition is False then the other proposition will be _____.

(a) True (b) False (c) Uncertain (d) Certain
17) In case of Contrary Opposition if a proposition is True then the other proposition will be _____.

(a) True (b) False (c) Uncertain (d) Certain

- 18) In case of Contradictory Opposition if a proposition is True then the other proposition will be _____.
- (a) True (b) False (c) Uncertain (d) Certain
- 19) In case of Contradictory Opposition if a proposition is False then the other proposition will be _____.
- (a) True (b) False (c) Uncertain (d) Certain
- 20) In case of Sub-contrary Opposition if a proposition is True then the other proposition will be _____.
- (a) True (b) False (c) Uncertain (d) Certain
- 21) In case of Contradictory Opposition if a proposition is False then the other proposition will be _____.
- (a) True (b) False (c) Uncertain (d) Certain
- 22) Two Contrary propositions cannot be _____ at the same time.
- (a) True (b) False (c) Uncertain (d) Certain
- 23) The Contrary proposition of E proposition is _____.
- (a) A (b) I (c) O (d) E
- 24) The diagonals of the Opposition of Proposition indicate _____ opposition.
- (a) Contrary (b) Sub-contrary (c) Subaltern (d) Contradictory
- 25) Two Contradictory propositions cannot be _____ at the same time.
- (a) True (b) False (c) Uncertain (d) Certain

Answer in one or two sentences:

1. What is opposition of proposition?
2. What are the necessary conditions of opposition of proposition?
3. Which kind of inference is opposition of proposition?
4. What are different types of opposition of proposition?
5. What is Contrary opposition?
6. Give one example of Contrary opposition.
7. What are the conditions of Contrary opposition?
8. What is the rule of truth or falsity of Contrary Opposition?
9. What kind of difference prevails between two propositions of Contrary opposition?
10. What is Sub-contrary opposition?

11. Give an example of Sub-contrary opposition.
12. What are the conditions of Sub-contrary opposition?
13. What is the rule of truth or falsity of Sub-contrary Opposition?
14. What kind of difference prevails between two propositions of Sub-contrary opposition?
15. What is the difference between Contrary and sub-contrary opposition?
16. What is Subaltern Opposition?
17. Give one example of Sub-altern Opposition?
18. What kind of difference prevails between two propositions of Subaltern opposition?
19. What is the rule of truth or falsity of Subaltern Opposition?
20. How many rules of truth or falsity of Subaltern Opposition are there?
21. What is Contradictory Opposition?
22. Give one example of Contradictory opposition?
23. What is the rule of truth or falsity of Contradictory Opposition?
24. What kind of difference prevails between two propositions of Contradictory opposition?
25. What can we infer about the truth or falsity of A, E and O proposition if I proposition is false?

Answer the following questions (only for practice):

1. Give the proposition of Opposition of the following propositions:
 (a) Men cannot be God. (b) Mangoes are not always sweet. (c) Only wise persons are happy. (d) Men are only rational animals.
2. Find out the relation of opposition of proposition among each proposition.
 (a) Only patriots are soldiers. (b) Soldiers are not patriots.
 (c) Soldiers are mostly patriots. (d) Soldiers are not all patriots.
3. Many sailors are patriots – if this proposition is true then what can be inferred about the truth or falsity about the following propositions?
 (a) Sailors are only patriots. (b) Sailors are scarcely patriots.
 (c) No person can be both sailors and patriots.
4. Reduce the following sentences into propositions and find out the logical relations among them:
 (a) Only P is S. (b) S can never be P. (c) S is sometimes P. (d) All S is not P.

Chapter – 4
Immediate Inference
Nine (9) marks allotted by H.S.Council for this chapter

SAQ-1X1=1

DAQ-8X1=8

Content: (a) Classification of inference into Immediate and mediate: Inference is a mental process in which we go to unknown from known. Inference can be divided into two types: Immediate and Mediate.

Immediate inference is a form of deductive inference in which we get the conclusion only from a single premise. There is no additional premise between the first premise and the conclusion. For example,

All cats are animals (A)

Therefore, Some animals are cats (I)

In the above inference we draw the conclusion from the premise directly without the presence of any other premise. So, it is called immediate inference.

On the other hand mediate inference is a kind of deductive inference in which the conclusion is drawn from the combination of two or more premises. For example,

All men are mortal (A)

Ram is man (A)

Therefore, Ram is mortal (A)

The above inference is an example of mediate inference because in this case the conclusion is drawn from the combination of the two premises. So, both immediate and mediate inferences are deductive; they have following similarities and differences between them:

Similarities:

- (i) As both of them are deductive in nature, their conclusions can never be more general than the premises.

- (ii) In both these cases the conclusions follow necessarily from the premise or premises.
- (iii) In both these inferences we are concerned with the formal validity, not with the material truth of the premises or conclusion.
- (iv) In these inferences the conclusions make patent what remains latent in their premise or premises.

Differences:

- (i) In case of immediate inference we find only one premise; but in mediate inference we find the presence of two premises.
- (ii) In case of immediate inference the conclusion does not need any other premise to draw the conclusion; but in the mediate inference the conclusion needs at least two premises to follow the conclusion.
- (iii) In case of immediate inference we find the use of two terms, namely, subject and predicate; but in mediate inference we find the use of three terms, namely, major, minor and middle term.

(b) Conversion as a form of Immediate Inference: Conversion is a kind of deductive immediate inference in which there is admissible transposition of the subject and the predicate of a proposition. In this form of immediate inference the subject and predicate interchange their respective positions, i.e. the subject of the premise becomes the predicate of the conclusion and the predicate of the premise becomes the subject of the conclusion. The premise is called Convertend and the conclusion is called the Converse. For example,

Convertend: No men are perfect beings (E)

Therefore, Converse: No perfect beings are men (E)

This is an example of conversion because the subject and predicate of Convertend are interchanged into predicate and subject respectively in the conclusion.

(c) Rules of Conversion: Conversion follows following rules for its actualization:

- (i) The subject of the convertend becomes the predicate of the converse;
- (ii) The predicate of the convertend becomes the subject of the converse;
- (iii) The quality of the convertend and the converse will remain same. If the convertend is affirmative then the converse will also be affirmative and if the convertend is negative the converse is negative.
- (iv) No term in the converse will be distributed if it is not distributed in the convertend.

By applying these rules we can show conversion of different categorical propositions.

***Conversion of A proposition:** A proposition is converted to I proposition. Let us take an example.

All poets are imaginative persons (A)

Therefore, Some imaginative persons are poets (I)

As per the first two rules the subject and predicate terms of the premise are converted to predicate and subject respectively. The quality of the premise and conclusion are affirmative as per the third rule. The conclusion in this case cannot be A proposition because it will violate the fourth rule of distribution. In that case the predicate term of the premise 'imaginative persons' will be undistributed but it will become distributed in the conclusion for becoming the subject of the conclusion. For this reason we get I proposition from the conversion of A proposition.

***Conversion of E proposition:** E proposition is converted to E proposition. Let us take an example.

No square are triangles (E)

Therefore, No triangles are squares (E)

The subject (squares) and predicate (triangles) terms of the premise have become the predicate and subject of the conclusion according to the first two rules of conversion. As per the third rule of conversion the qualities of premise and conclusion are negative. The subject and predicate of the conclusion are distributed and these are also distributed in the premise.

*** Conversion of I proposition:** I proposition is converted to I proposition. Let us take an example.

Some students are diligent persons (I)

Therefore, Some diligent persons are students (I)

The subject (students) and predicate (diligent persons) terms of the premise have become the predicate and subject of the conclusion respectively as per the first two rules. As per the third rule the premise and the conclusion are affirmative. According to the fourth rule of distribution no term of the conclusion is distributed as they are not distributed in the premise.

*** Conversion of O proposition:** O proposition cannot be converted validly. Let us take an example.

Some philosophers are not logicians (O)

Therefore, Some logicians are not philosophers (O)

This example of conversion of O proposition is invalid because this violates the fourth rule of distribution. According to the rule, no term is distributed in the conclusion if it is not distributed in the premise. But in this case the subject term of the premise 'philosophers' is not distributed, but this is distributed in the conclusion. For this violation of rule the conversion of O proposition is considered invalid.

* **Conversion by negation of O proposition:** We know that O proposition cannot be converted validly because it violates the rule of distribution of O proposition.

But some logicians, e.g., Jevons make an attempt to convert of an O proposition in a different way. The process is known as Conversion by Negation. It first of all reduces an O proposition into I proposition by transferring the sign of negation to the predicate. Then I proposition is converted to I proposition. The process is as follows:

Some boys are not poor persons (O)

Therefore, Some boys are non-poor persons (I)

Therefore, Some non-poor persons are boys (I)

But this form of conversion is not regarded as a valid form of conversion because the rules of conversion are violated in this type of conversion. Firstly, the quality of the premise is negative, but the quality of the conclusion is affirmative. But as per the rule the quality of the premise and conclusion should be same. Secondly, in the given example we find the subject of the conclusion is not the predicate of the convertend, but its contradictory. So we find, the rules of the conversion have been violated.

(d) Simple Conversion: Conversion can be divided into two types: Simple conversion and conversion by limitation or limited conversion. In case of simple conversion the quantity will remain same, but in case of limited conversion the quantity will be different. The conversions of I and E proposition are examples of simple conversion. On the other hand the conversion of A proposition is limited conversion because we get I proposition from the conversion of A proposition. But in some cases we can simply convert A propositions. Let us explain the issue with the help of following example:

Convertend: All roses are flowers (A)

Converse: All flowers are roses (A)

This conversion is invalid because it violates the rule of distribution. The predicate term of the premise 'flowers' is undistributed, but it is distributed in the conclusion. For this violation simple conversion of A proposition is invalid.

But in some cases A propositions can be converted simply. In these cases the subject and predicate terms of A propositions have same denotation. Following are the cases of simple conversion of A proposition:

- (i) A propositions with logical definitions can be converted simply:
All men are rational animals (A)
Therefore, All rational animals are men (A)
- (ii) A proposition with tautologous terms can be converted simply:
All trees are plants (A)
Therefore, all plants are trees (A)
- (iii) A propositions with definite singular terms can be converted simply:
The Tajmahal of Agra is the seventh wonder of the world (A)
Therefore, The seventh wonder of the world is the Tajmahal (A)

(e) Obversion as a form of Immediate Inference: Obversion is a form of deductive mediate inference in which the quality of the given proposition is changed and the contradictory of the original predicate is made the predicate of the conclusion. The given proposition is called Obvertend and the conclusion is called Obverse. For example,

Obvertend: All men are mortals (A)

Obverse: No men are non-mortals (E)

The quality of the premise and the conclusion are different. Besides, the contradictory term of the predicate of the premise has become the predicate of the conclusion. So, this is an example of Obversion.

(f) Rules of Obversion: Following are the rules of Obversion which are necessary for making valid Obversion: (i) The subject term of the premise will be the subject of the conclusion; (ii) the contradictory term (non-main term) of the predicate of the premise will be the predicate of the conclusion; (iii) the quality of the premise and the conclusion are different. If the premise is affirmative then the conclusion is negative. This is called the rule of quality of Obversion; (iv) the quantity of the premise and the conclusion will be same. If the premise is universal then the conclusion will be universal and if the premise is particular

then the conclusion will be particular. This is called the rule of quantity of Obversion.

In the following way we can explain the Obversion of different categorical propositions:

***Obversion of A proposition:**

Obvertend: All men are mortal beings (A)

Obverse: No men are non-mortal beings (E)

As per the first rule the subject (men) of the premise and the conclusion are same. The contradictory of the predicate (mortal beings) of the premise is the predicate of the conclusion. The premise is affirmative and the conclusion is negative. This is following the rule of quality of Obversion. As per the rule of quantity of Obversion the premise is universal and the conclusion is also universal.

***Obversion of E proposition:**

Obvertend: No birds are beasts (E)

Obverse: All birds are non-beasts (A)

As per the first rule the subject (birds) of the premise and the conclusion are same. The contradictory of the predicate (beasts) of the premise is the predicate of the conclusion. The premise is negative and the conclusion is affirmative. This is following the rule of quality of Obversion. As per the rule of quantity of Obversion the premise is universal and the conclusion is also universal.

***Obversion of I proposition:**

Obvertend: Some students are intelligent (I)

Obverse: Some students are not non-intelligent (O)

According to the first rule the subject (students) of the premise and the conclusion are same. The contradictory of the predicate (intelligent) of the premise is the predicate of the conclusion. The premise is affirmative and the conclusion is negative. This is following the rule of quality of Obversion. As per the rule of quantity of Obversion the premise is particular and the conclusion is also particular.

***Obversion of O proposition:**

Obvertend: Some men are not saints (O)

Obverse: Some men are non-saints (I)

As per the first rule the subject (men) of the premise and the conclusion are same. The contradictory of the predicate (saints) of the premise is the predicate of the conclusion. The premise is negative and the conclusion is affirmative. This is following the rule of quality of Obversion. As per the rule of quantity of Obversion the premise is particular and the conclusion is also particular.

Exercises

Answer in one or two sentences:

1. What is immediate inference?
2. Give one example of immediate inference.
3. Write one feature of immediate inference.
4. What is mediate inference?
5. Give one example of mediate inference.
6. Write down one difference between immediate and mediate inference.
7. What is conversion?
8. Which kind of inference is conversion?
9. What kind of quantitative relation prevails between premise and conclusion in case of conversion?
10. What kind of qualitative relation prevails between premise and conclusion in case of conversion?
11. What are the types of conversion?
12. What is simple conversion?
13. Mention two rules of conversion.
14. Write down the rule of quality of conversion.
15. Write down the rule of distribution of conversion.
16. In cases of which propositions does simple conversion take place?
17. What is limited conversion or conversion by limitation?
18. Give one example of conversion by limitation.
19. Give an example of simple conversion of A proposition.
20. In which cases does simple conversion of A proposition take place?
21. Why cannot A proposition be converted simply?

22. Why cannot we convert O proposition?
23. What are convertend and converse?
24. Find out convertend and converse with an example.
25. What is Obversion?
26. Give an example of Obversion.
27. What is a contrary term?
28. What are obvertend and obverse?
29. Give one example obvertend and obverse with an example.
30. Mention any two rules of validity of Obversion.
31. Mention the rule of quality of Obversion.
32. Mention the rule of quantity of Obversion.
33. What is contradictory term?
34. What is the difference between contrary and contradictory term?
35. What is material Obversion?
36. Give an example of Material Obversion.
37. What is the basis of Material Obversion?
38. Who has forwarded the concept of Material Obversion?
39. Mention a cause of invalidity of Material Obversion.
40. Which type of order of conversion and Obversion is followed in case of contraposition?

Make the Conversion of the following propositions:

- 1) Honest men are not always happy.
- 2) Fictitious stories are never true.
- 3) What is red cannot be blue.
- 4) If anybody is man then he is mortal.
- 5) Inflammable articles cause combustion.
- 6) Coins are always made of metals.
- 7) Uneducated persons may also be intelligent.
- 8) Communists are not oppressors.
- 9) Only labourious persons become successful in life.
- 10) There is no round triangle.
- 11) Green mangoes become sweet many times.
- 12) Gods are not mortal.
- 13) Poets can also be philosophers.
- 14) Philosophers are always wise.

15) Intellectuals are not always honoured.

Make the Obversion of the following propositions:

- 1) Men are never perfect.
- 2) Only graduates are fit for this post.
- 3) Tigers cannot be herbivorous.
- 4) All that glitters are not gold.
- 5) Many mangoes are sour.
- 6) Men are not rarely honest.
- 7) All are not friends who seem so.
- 8) Many books are not readable.
- 9) Men are generally truthful.
- 10) Men are not naturally labourious.
- 11) Who does not want economic freedom?
- 12) Few women are good logicians.
- 13) There are no green swans.
- 14) Green mangoes are generally sour.
- 15) Only birds can fly.

Give the Obverse of the Converse of the following propositions:

- 1) Many poets become realistic.
- 2) Valuable books are rarely read.
- 3) The Cārvakas are materialists.
- 4) Only the ministers are happy.
- 5) Children are not scarcely simple.
- 6) Many stories do not depend upon imagination.
- 7) Wicked persons sometimes become sweet tongued.
- 8) Dead persons do not talk.
- 9) Caste system does not bring unity.
- 10) Men are only rational animal.
- 11) Indian philosophers are not all idealists.
- 12) Doctors are sometimes kind.
- 13) Voters are all citizens.
- 14) Students are not all poor.
- 15) Learned persons are not always realists.

Give the Converse of the Obverse of the following propositions:

- 1) Poets are all imaginative.

- 2) Horses do not have wings.
- 3) Many men are rational.
- 4) Marxists are always revolutionary.
- 5) Learned persons may also be money lenders.
- 6) Many Hindus do not worship Lord Shiva.
- 7) Men are generally reliable.
- 8) Children are not rarely dishonest.
- 9) Men are generally reliable.
- 10) Many poems are not readable.
- 11) Many mangoes are sweet.
- 12) Indians are mostly religious.
- 13) Thieves are never honest.
- 14) Only children can play in this garden.
- 15) Red flowers do not have fragrance.

Test the validity of the following arguments:

- 1) Rich people are always happy. Therefore, poor people are always unhappy.
- 2) Summer is painful. Therefore, winter is comfortable.
- 3) All roses are not red. Therefore, all red flowers are not roses.
- 4) All men are mortal. Therefore, all mortal beings are men.
- 5) All men are rational animal. Therefore, all rational animals are men.
- 6) War is ominous. So, peace is good.
- 7) No men are God. Therefore, some non-God is men.
- 8) All voters are citizens. Therefore, all non-citizens are non-voters.

Answer the following questions (not more than 200 words):

- 1) Explain and illustrate the differences between Immediate and Mediate Inferences.
- 2) Discuss the nature of Conversion as a kind of immediate inference. Mention the rules of validity of Conversion in this context.
- 3) Why cannot the conversion of O proposition be valid? Explain the nature and validity of Conversion by Negation in this context.
- 4) Distinguish between Simple conversion and conversion by limitation or limited conversion. Why cannot the conversion of simple conversion of A proposition be valid? Is there any case at all where A proposition can be converted simply?

5) Discuss the nature of Obversion as a kind of immediate inference. Mention the rules of validity of Obversion in this context.

Chapter – 5
Categorical Syllogism
Ten(10) marks allotted by H.S.Council for this chapter

MCQ-1X2=2

DAQ-8X1=8

Content: (a) Nature of Categorical Syllogism: Syllogism is a kind of mediate deductive inference in which the conclusion is drawn from the combination of the two premises. For example,

All men are mortal beings (A) – Major premise

Ram is man (A) – Minor premise

Therefore, Ram is mortal being (A) -- Conclusion

From the analysis of the above example and definition we can analyse the following features of syllogism:

(i) Every syllogism has three propositions. These are major premise, minor premise and conclusion.

(ii) Every syllogism has three terms and these terms are to be used twice in the syllogism.

(iii) The conclusion of syllogism is the necessary result of the combination of the two premises.

(iv) The conclusion of syllogism never becomes wider than any of the premises. Either it is equal or it is less from the view point of extension.

(v) In case of syllogism only formal validity is considered, no material truth of the premises or conclusion is taken in consideration.

(b) Structure of Categorical Syllogism: For getting the structure or form of syllogism we can substitute the Minor, Major and Middle terms of syllogism with S, P and M respectively. Thus we can get the form or structure of the above syllogism in the following way:

All M is P (A)

S is M – (A)

Therefore, S is P (A)

From the above example it is clear that the conclusion is necessarily drawn from the combination of the two premises. We get three terms in this syllogism which is used twice. The subject term of the conclusion is known as Minor term,

the predicate term of the conclusion is called Major term. The term which does not appear in the conclusion, but appears in both the premises is called the Middle term. Major term is indicated with P, Minor term is indicated with S and Middle term is indicated with M.

The role of Middle term in syllogism is very much important. It does not appear in the conclusion, but appears in both the premises. This term make a relation between the two premises and in this way it makes the conclusion to follow necessarily from the two premises. Besides, this term differentiates syllogism from other immediate inferences because in these arguments we do not get the mention of Middle term. Only in case of syllogism we get the use of this term.

(c) Figures of Categorical Syllogism: The middle term is used once in both the premises. This middle term is seen to be used to appear in both the premises either as Subject-Predicate, or as Predicate-Predicate, or as Subject – Subject or as Predicate – Subject. For these different positions of the middle term the form of syllogism will vary in different cases.

Figure of a syllogism is different form obtained from different positions of the middle term in the premises. As there are four different positions of the middle term we get four figures can be there in syllogism.

First Figure: In this figure the middle term appears as the subject term in the major premise and as the predicate term in the minor premise. For example,

All M is P – (A) – Major premise – All men are mortal beings (A)

All S is M – (A) – Minor premise – All poets are men (A)

Therefore, All S is P -- (A) – Conclusion – All poets are mortal beings (A)

Second Figure: In this figure the middle term appears as the predicate of both major and minor premises. For example,

All P is M – (A) – Major premise – All men are mortal beings (A)

All S is M – (A) – Minor premise – All poets are mortal beings (A)

Therefore, All S is P -- (A) – Conclusion – All poets are men (A)

Third Figure: In this figure the middle term appears as the subject of both major and minor premises. For example,

All M is P – (A) – Major premise – All men are mortal beings (A)

All M is S – (A) – Minor premise – All men are poets (A)

Therefore, All S is P -- (A) – Conclusion – All poets are mortal beings (A)

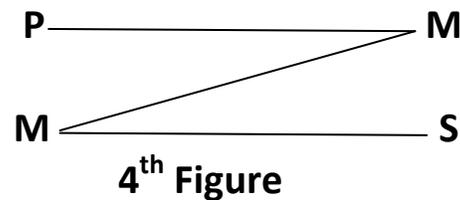
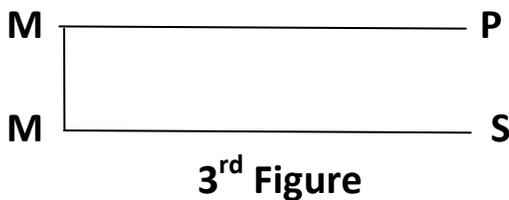
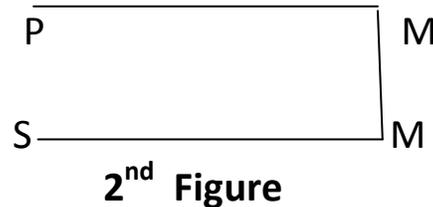
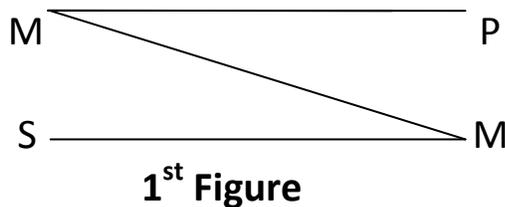
Fourth Figure: In this figure the middle term appears as the predicate term in the major premise and as the subject term in the minor premise. For example,

All P is M – (A) – Major premise – All men are mortal beings (A)

All M is S – (A) – Minor premise – All mortal beings are poets (A)

Therefore, All S is P -- (A) – Conclusion – All poets are men (A)

Though there are discussions of figure in the book of Aristotle, in the later stage we find this discussion in the book of Carveth Read with the help of following diagram:



(d) Moods of Categorical Syllogism: The quality and quantity of the constituent propositions of a syllogism can be different. Moods of syllogism are different forms of syllogisms which we get from different qualities and quantities of the constituent propositions. At most we can get 256 moods by arranging different qualities and quantities of different component propositions. But in the narrow sense we get 19 valid moods in four figures:

1st Figure: BARBARA (AAA), CERLARENT (EAE), DARII (AII), FERIO (EIO)

2nd Figure: CESARE (EAE), CAMESTRES (AEE), FESTINO (EIO), BAROCO (AOO)

3rd Figure: DARAPTI (AAI), DATISI (AII), DISAMIS (IAI), FELAPTON (EAO), BOCARDO (OAO), FERISON (EIO)

4th Figure: BRAMANTIP (AAI), DIMARIS (IAI), CAMENES (AEE), FESAPO (EAO), FRASISON (AIO)

(e) General rules of Syllogism: There are ten general rules of validity of syllogism. Among them some rules are fundamental and some rules are

subsidiary. The rules of validity of syllogism can be illustrated in the following manner:

First rule: **Every syllogism must contain three terms, neither more nor less.** If this rule is violated in any syllogism then the syllogism will be invalid and it will involve the **Fallacy of Four Terms**. For example,

The President is person who rules the country (A)

The wife of the President is person who rules the President (A)

Therefore, The wife of the President is person who rules the country (A)

The above syllogism is invalid because it violates the above rule of validity. This argument has four terms: (a) the President, (b) person who rules the country, (c) the wife of the president and (d) person who rules the president.

Second rule: **Every syllogism must have only three propositions. These are major premise, minor premise and conclusion.**

Third rule: **The middle term must be distributed at least once in the premises.** If this rule is violated in any syllogism then the syllogism will be invalid and there will be **Fallacy of Undistributed Middle**. For example,

All dogs are animals (A)

All men are animals (A)

Therefore, All men are dogs (A)

This syllogism is invalid because it violates the above rule of validity of syllogism. The middle term 'animals' is not distributed in any of the premises as in both the premises the term appear as the predicate of A propositions and A proposition distributes its subject term.

Fourth rule: **No term can be distributed in the conclusion if it is not distributed in the premises.** This rule can be applied in cases of major and minor terms. If this rule is violated in case of major term then it will involve the Fallacy of Illicit Major. If this rule is violated in case of minor term then it will involve the **Fallacy of Illicit Minor**.

Fallacy of Illicit Major: All men are mortal beings (A)

No dogs are men (E)

Therefore, No dogs are mortal beings (E)

In the above argument the major term 'mortal beings' is not distributed in the major premise, but distributed in the conclusion. For this violation the argument is invalid and it involves the **Fallacy of Undistributed Major**.

Fallacy of Illicit Minor: No dog is man (E)

All dogs are animals (A)

Therefore, No animals are men (E)

In the above argument the minor term 'animals' is not distributed in the minor premise as it is the predicate of A proposition, but it is distributed in the conclusion. For this violation the argument is invalid and it involves the **Fallacy of Illicit Minor**.

Fifth rule: **No conclusion can be drawn from two negative premises.** If the two premises are negative the middle term cannot make any relation between the two premises. If this rule is violated then the argument will be invalid and it will involve the **Fallacy of Two Negative Premises**. For example,

Fallacy of Two Negative Premises: No men are totally honest (E)

Ram is not totally honest (E)

Therefore, Ram is not man (E)

The above argument is invalid because the two premises of the argument are universal negative propositions and the conclusion is drawn from them. For this violation of rule the argument involves the **Fallacy of Two Negative Premises**.

Sixth rule: **If one premise is Negative, the Conclusion must be negative and vice-versa.**

Proof: If one premise is negative then the other premise will be affirmative because according to the rule of syllogism, no conclusion can be drawn from two negative premises. Now if the major premise is negative then there will be no relation between the major term and middle term and there will be relation between the minor term and the middle term as the minor term is affirmative. But if the middle term is to be related with major and minor then the middle term has to become related with major and minor in both the premises. As this does take place in this case so it will not be possible to make the relation between the major and minor in the conclusion. So, in this case the conclusion must be negative.

Seventh rule: **If both the premises are affirmative, the Conclusion must be Affirmative and vice-versa.**

Proof: If both the premises are affirmative then it has to be understood that the major term is connected to the middle term in the major premise and the minor term is connected to the middle term in the minor premise. Thus it can be said jointly from both the premises that there must be relation between

the major term and minor term. So, the conclusion in that case must be affirmative.

Conversely, if the conclusion is affirmative then it has to be understood that two premises can never be negative at the same time or one premise cannot be negative. In case of the first the rule 'no conclusion will follow from two negative premises' will be violated. In the second case the rule 'if one premise is negative then the conclusion will be negative' will be violated.

Eighth rule: **No conclusion will follow from two Particular premises.**

Proof: if the two premises of a syllogism are particular then there may be following pairs: II, IO, OI and OO. We can prove the rule by explaining these pairs.

- 1) If the major and minor premises are I proposition or particular affirmative propositions then the Middle term cannot be distributed in any of the premises. For this there will be **Fallacy of Undistributed Middle** and the argument will be invalid.
- 2) If the two premises are O propositions or particular negative propositions then the argument will be invalid and it will involve the **Fallacy of Two Negative Premises.**
- 3) If the major premise is I proposition and if the minor premise is O proposition then as per the rule of distribution the predicate of the conclusion or the major term will be distributed. To avoid the fallacy of illicit major it has to be distributed in the major premise. But as the major premise is I proposition it cannot be distributed there. So for this violation the argument will be invalid and there will be **Fallacy of Illicit Major.**
- 4) If the major premise is O proposition and the minor premise is I proposition then the conclusion will be O proposition. Only the predicate term or the major term will be distributed there. For avoiding the **Fallacy of Illicit Major** it has to be distributed in the major premise. But in that case there will be **Fallacy of Undistributed Middle.** If we consider the only distributed term in the premises as middle term we can avoid the **Fallacy of Undistributed Middle.** But in that case there will be **Fallacy of Illicit Major.**

Ninth rule: **If one premise is particular, the Conclusion must be particular.**

Proof: If one premise is particular then the other will be universal and the probable pairs will be AI, IA, AO, OA, EI, IE, EO and OE. Let us examine these pairs one by one:

In both the pairs AI and IA only one term is distributed. For avoiding the Fallacy of Undistributed Middle it has to be the middle term. In that case neither the major nor the minor will be distributed in the premises and for avoiding the Fallacy of Illicit Major and Fallacy of Illicit Minor the conclusion must be made I proposition because I proposition distributes none of its terms.

In the pairs AO, OA, EI and IE the conclusion will be negative as one premise is negative in each pair. In cases of each pairs two terms will be distributed. For avoiding the Fallacy of Undistributed Middle one distributed term will be middle term. The other distributed term must be made either major or minor. For this reason the conclusion must be O proposition.

From the pairs EO and OE we do not get any valid conclusion because in these cases the two premises are negative and there will be Fallacy of Two Negative Premises.

Tenth rule: **No conclusion will follow from a particular major and a negative minor.**

Proof: If the major premise is particular then the minor premise must be universal because as per a rule of syllogism no conclusion can be drawn from two particular premises. Besides, if the minor premise is negative then according to the rule of syllogism the major premise will be affirmative and the conclusion will be negative. According to the rules of syllogism, no conclusion will be drawn from two negative premises and if one premise is negative then the conclusion will be negative. In that case the form of the syllogism will be major premise is I proposition, minor premise is E proposition and the conclusion is O proposition. As in that case the predicate of the conclusion is distributed it has to be distributed in the major premise. But the major premise is I proposition. So the term will not be distributed. For this there will be Fallacy of Illicit Major. From this it is proved that if the major premise is particular and minor premise is negative then there will be no valid conclusion.

(f) Fallacies: Categorical syllogism has ten rules of validity. Among these rules some rules are used for constructing the form of syllogism and some rules are used to test the validity or invalidity of syllogism. If we find that a syllogism has followed all the rules of validity of syllogism then we can find the syllogism as

valid. If we find violation of any one of the rules of syllogism then the syllogism is called invalid and there will be fallacies. Following are different fallacies which take place due to the violation of different rules in different cases.

(i) Fallacy of Illicit major: In a rule of validity of Categorical syllogism it is stated that 'No term will be distributed in the conclusion if it is not distributed in the premise'. This rule is applied in cases of both Major term and Minor term. If in case of major term if there is violation of this rule then the syllogism will be fallacious and invalid. The name of the fallacy is fallacy of Illicit Major. Let us take an example:

Some poets are intelligent persons (I)

All poets are men (A)

Therefore, Some men are not intelligent persons (O)

This syllogism is invalid because it violates the quoted rule of validity. The major term 'intelligent persons' is not distributed in the major premise as it is the predicate of I proposition. But this term is distributed in the conclusion as it is the predicate of O proposition. This is a clear violation of rule of validity. For this violation of rule the syllogism involves the Fallacy of Illicit major.

(ii) Fallacy of Illicit Minor: In a rule of validity of Categorical syllogism it is stated that 'No term will be distributed in the conclusion if it is not distributed in the premise'. This rule is applied in cases of both Major term and Minor term. If in case of minor term if there is violation of this rule then the syllogism will be fallacious and invalid. The name of the fallacy is Fallacy of Illicit Minor. Let us take an example:

No winged creatures are horses (E)

All horses are fast runners (A)

Therefore, No fast runners are winged creatures (E)

This syllogism is invalid because the minor term 'fast runners' is distributed in the conclusion and it is not distributed in the minor premise. For this violation of rule the syllogism is invalid and the name of the fallacy is Fallacy of Illicit Minor.

(iii) Fallacy of Undistributed Middle: In a rule of validity of Categorical syllogism it is stated that 'The Middle term must be distributed at least once in the premises'. This rule is applied in case of the Middle term. The name of the fallacy is Fallacy of Undistributed Middle. Let us take an example:

All poets are imaginative persons (A)

All philosophers are imaginative persons (A)

Therefore, All philosophers are poets (E)

This syllogism is invalid because the middle term 'imaginative persons' is not distributed in any of the premises because in both these premises term appears as the predicate of A proposition. For this violation of rule the syllogism is invalid and the name of the fallacy is Fallacy of Undistributed Middle.

(iv) Fallacy of Four Terms: In a rule of validity of Categorical Syllogism it is said that 'A Syllogism must contain three and only three terms'. If a syllogism contains more than three terms then the argument will be invalid and the name of the fallacy is Fallacy of four Terms. Let us take an example:

Kamal is the friend of Bimal (A)

Amal is the friend of Kamal (A)

Therefore, Amal is the friend of Bimal (A)

This syllogism is invalid because it has four terms in place of three. These four terms are 'Amal', 'Kamal', 'the friend of Kamal' and 'the friend of Bimal'. For this violation of rule the argument is invalid and it involves the Fallacy of Four Terms.

(v) Fallacy of Two Negative Premises: In a rule of syllogism it is said that 'No conclusion can be followed from two negative premises'. If the two premises are negative then the relation between the two premises will not be established. The argument in this case will be invalid and it will involve the Fallacy of Two Negative Premises. Let us take an example:

Some men are not doctors (O)

Some men are not meritorious persons (O)

Therefore, Some meritorious persons are not doctors (O)

This argument is invalid because this has violated the above rule of syllogism. Both the premises of this syllogism are particular negative proposition and from these two propositions the conclusion is drawn. This is a violation of the rule and this violation the syllogism is invalid and it involves the **Fallacy of Two Negative Premises.**

(g) Enthymeme: In some cases all the component propositions of syllogism are not stated clearly. Any one of its proposition will remain implicit or underlined. These syllogisms are called Enthymeme. I.M.Copi in his book An Introduction to Logic has mentioned three orders of Enthymeme. These are illustrated in the following manner:

1) Enthymeme of the First Order: In this order of Enthymeme the major premise does not remain explicit, but the minor premise and the conclusion are stated explicitly. For example, 'he is a revolutionary because he is a Marxist' – is an example of the Enthymeme of the first order. The logical form of the syllogism is as follows:

All Marxists are revolutionary (A)
He is Marxist (A)
Therefore, He is revolutionary (A)

2) Enthymeme of the Second Order: In this order of Enthymeme the minor premise does not remain explicit, but the major premise and the conclusion are stated explicitly. For example, the syllogism 'he will certainly become successful, because hard work brings success' is an example of this order. The logical form of the syllogism is as follows:

All hard working persons are successful persons (A)
He is hard working person (A)
Therefore, he is successful person (A)

3) Enthymeme of the Third Order: In this order of Enthymeme the major and minor premises are stated explicitly, but the conclusion is not stated clearly. For example, the argument 'Hari is man and all men are mortals' is an example of Enthymeme of the Third Order. The logical form of the Enthymeme is as follows:

All men are mortals (A)
Hari is man (A)
Therefore, Hari is mortal being (A)

In addition to these three types we have a fourth type of Enthymeme in which the syllogism is implicitly expressed in the form of a complex sentence. This is the Fourth kind of Enthymeme. The argument 'the news is too good to be true' is an example of enthymeme of the fourth order. The logical form of this syllogism is as follows:

No too good news is true news (E)
This news is too good news (A)
Therefore, This news is not true news (E)

For testing the validity of these Enthymemes we have to state the argument explicitly and after that we have to apply the rules of validity of syllogism on by one.

(h) Testing the validity of Syllogism. For testing the validity of Syllogism we have to present the syllogism into its logical form. For this we will find out the conclusion at first. The proposition after the words 'therefore', 'so' and similar words becomes the conclusion. Besides, the proposition before the words 'because', 'as' and similar words becomes the conclusion. After getting the conclusion we will get the major term in the predicate of the conclusion and we will get the minor term in the subject position of the conclusion. With the help of these terms we will find out the major and minor premises. Let us test the validity of two syllogisms: one valid and one invalid.

(i) Bats are certainly birds because they can fly and all birds can fly.

Ans: Logical form of the syllogism:

All birds are flying creatures (A)

All bats are flying creatures (A)

Therefore, All bats are birds (A)

This syllogism is invalid because it has violated a rule of validity of syllogism. As per the rule it is stated that 'the middle term must be distributed at least once in the premises'. But in this syllogism the middle term 'flying creatures' appears in the predicate position of the premises. For this reason the term is not distributed in any of the place. So, the syllogism is invalid and it involves the Fallacy of Undistributed Middle.

(ii) Sonali is too good to do such work.

Ans: Logical form of the argument:

No too good person is person to do such work (E)

Sonali is too good person (A)

Therefore, Sonali is not person to do such work (E)

This syllogism is valid because all the rules of validity are properly followed here. The middle term 'too good person' is distributed in the major premise. The major and minor terms 'person to do such work' and 'Sonali' are distributed in both major and minor premises. For this reason the syllogism is invalid and it is a valid mood of first figure, named CELARENT.

EXERCISES

Find out the correct alternative from the following:

1) Syllogism is a kind of _____ inference.

- (a) Immediate (b) Mediate (c) Inductive (d) Unscientific

- 2) In syllogism the conclusion _____ follows from the combination of the two premises.
(a) Necessarily (b) Probably (c) Empirically (d) Rationally
- 3) In each syllogism we find the presence of _____ propositions.
(a) Two (b) Three (c) Four (d) Five
- 4) Each syllogism has _____ terms.
(a) Two (b) Three (c) Four (d) Five
- 5) Syllogism can be divided into _____ types.
(a) Two (b) Three (c) Four (d) Five
- 6) In case of unmixed syllogism _____ propositions are categorical proposition(s).
(a) One (b) Two (c) Three (d) Four
- 7) In each syllogism the three terms are seen to be used _____.
(a) Once (b) Twice (c) Thrice (d) Four times
- 8) In syllogism the predicate of the conclusion is called _____ term
(a) Major (b) Minor (c) Middle (d) Any
- 9) In syllogism the subject of the conclusion is called _____ term
(a) Major (b) Minor (c) Middle (d) Any
- 10) In syllogism the term which does not remain in the conclusion, but remains present in both the premises is called _____ called.
(a) Major (b) Minor (c) Middle (d) Any
- 11) The Minor term of syllogism is denoted by _____.
(a) S (b) P (c) M (d) N
- 12) The Major term of syllogism is denoted by _____.
(a) S (b) P (c) M (d) N
- 13) The Middle term of syllogism is denoted by _____.
(a) S (b) P (c) M (d) N
- 14) In syllogism the _____ term appears in both the premises and makes relation between the premises.
(a) Major (b) Minor (c) Middle (d) Any
- 15) In syllogism the different forms of syllogism which we get from the different position of Middle term is called _____.
(a) Figure (b) Mood (c) Enthymeme (d) Validity
- 16) In _____ figure the middle term appears in the subject of the major premise and in the predicate term of the minor premise.

- (a) First (b) Second (c) Third (d) Fourth
- 17) In _____ figure we get six valid moods.
 (a) First (b) Second (c) Third (d) Fourth
- 18) In the fourth figure of Syllogism we get _____ valid moods.
 (a) Four (b) Five (c) Six (d) Seven
- 19) CELARENT is a valid mood of _____ figure.
 (a) First (b) Second (c) Third (d) Fourth
- 20) _____ is a valid mood of second figure.
 (a) CESARE (b) CELARENT (c) CAMENES (d) DISAMIS
- 21) If a syllogism has four terms in place of three then the syllogism will involve the Fallacy of _____.
 (a) Undistributed Middle (b) Illicit Major (c) Illicit Minor (d) Four Terms
- 22) In a syllogism if the Middle term is not distributed in any proposition then there will be the Fallacy of _____.
 (a) Undistributed Middle (b) Illicit Major (c) Illicit Minor (d) Four Terms
- 23) If the major term is not distributed in the major premise and undistributed in the conclusion then there will be Fallacy of _____.
 (a) Undistributed Middle (b) Illicit Major (c) Illicit Minor (d) Four Terms
- 24) As per a rule of validity of syllogism if a premise is _____ then the conclusion will be particular.
 (a) Universal (b) Particular (c) Affirmative (d) Negative
- 25) A proposition can only be the conclusion of _____ figure.
 (a) First (b) Second (c) Third (d) Fourth

Test the validity of the following arguments:

- 1) Only liberal persons are intelligent because only philosophers are liberal and only intelligent persons are philosophers.
- 2) Rahul Drabir is a successful cricketer, because like all other successful cricketers he is also labourious.
- 3) Son obeys father and father obeys his superior officer. Therefore, son obeys his superior officer.
- 4) Any glittering thing is not gold. Iron is not glittering. So, Iron is not gold.
- 5) He is not intelligent because he is not educated.
- 6) How will you be promoted to H. S. examination? Because you are not labourious and only labourious persons can be promoted to H.S. examination.
- 7) Man is God, because Gods are intelligent like men.

- 8) Some politicians are teachers, because Radhakrishnan is a teacher.
- 9) Men are not perfect and men are not God. Therefore, God is not perfect.
- 10) Sonali is too good to do this work.
- 11) I am not you. I am man. Therefore, you are not man.
- 12) Scientists are rational and some scientists are Physicists; therefore, all Physicists are rational.
- 13) The Earth moves round the Sun; the Moon moves round the Earth; therefore, the Moon moves round the Sun.
- 14) All soldiers are patriots. As women are not soldiers, they cannot be said patriots.
- 15) Bank officers are sometimes professors because they are M.A. and all professors are M.A.
- 16) All men are not meritorious, all men are not doctors; therefore, some meritorious persons are not doctors.
- 17) Bats are surely birds, because they can fly and all birds can fly.
- 18) Amal is the friend of Bimal, because Kamal is the friend of Bimal and Amal is the friend of Kamal.
- 19) Only truthful persons are honest and all truthful persons are respectable. Therefore, all respectable persons are honest.
- 20) He is honest, as only wise persons are teachers and he is not wise person.
- 21) Swami Vivekananda is a philosopher and patriot. So, some philosophers are patriots.
- 22) Colour cannot be visible, because colour is not sound and sound cannot be visible.
- 23) The news is too good to be true.
- 24) I am not what you are. I am man. Therefore, you cannot be man.
- 25) Gods are not men, because Gods are not mortals like men.
- 26) He is not ignorant, because he is not superstitious.
- 27) He is a revolutionary because he is a Marxist and Marxists are only revolutionary
- 28) Poets are wise. Rambabu is wise as he is a poet.
- 29) Ram is too weak to walk.
- 30) This syllogism is valid because like all other valid syllogisms it has three terms.

Point out which rules are violated and which fallacies take place in the following arguments:

(a) AAE – 1 (b) AAA – 3 (c) AOO – 3 (d) OAA – 4 (e) IAO -- 3 (f) AEE – 3 (g) EOO -- 1

Answer the following questions (not more than 200 words):

1. What is Categorical syllogism? What are its features? Explain the structure of categorical Syllogism with example.
2. What is the Figure of categorical Syllogism? Elucidate different kinds of figures of syllogism.
3. What is the Mood of Categorical Syllogism? Elucidate different kinds of moods of syllogism.
4. What is Enthymeme? Explain different kinds of Enthymemes with proper example.
5. Prove that: (a) If the conclusion is Universal then prove that the Middle term can only be distributed once in the premises. (b) Prove that, if the Middle term is distributed in both the premises then the conclusion cannot be Universal.
6. Write short notes on: (i) Fallacy of Four Terms; (ii) Fallacy of Undistributed Middle; (iii) Fallacy of Illicit Major; (iv) Fallacy of Illicit Minor; (v) Fallacy of Two Negative Premises.

Chapter – 6
Hypothetical and Disjunctive Syllogism
Four (4) marks allotted by H.S.Council for this chapter

MCQ-1X2=2

SAQ-1X2=2

Content: (a) Compound Arguments: A compound argument is such a form of deductive argument in which there will be at least one compound proposition, be it premise or conclusion. For example,

1. If the sun rises, there is light. – Major premise
The sun rises. – Minor premise
Therefore, There is light. – Conclusion
2. Either Ram is a poet or Ram is a player. - Major premise
Ram is not a poet. - Minor premise
Therefore, Ram is a player. - Conclusion

The first argument is an example of Compound Argument. Here the argument consists of three propositions, the major premise is a compound proposition (Hypothetical) and the minor premise and conclusion are simple (Categorical) propositions.

The second argument is also an example of Compound Argument. Here the first premise is a compound proposition (Disjunctive) and the minor premise and the conclusion are simple (Categorical) propositions.

(b) Hypothetical-Categorical Syllogism: Hypothetical-Categorical Syllogism is a form of mixed syllogism in which the major premise is a hypothetical proposition and the minor premise and conclusion are categorical propositions. This is also called Mixed Hypothetical Syllogism. This must be distinguished from Pure Hypothetical Syllogism. When all the three constituent propositions of a Hypothetical Syllogism are Hypothetical then the argument is called Pure Hypothetical Syllogism. Let us take examples of both kinds of arguments in the following way:

Pure Hypothetical Syllogism	Mixed Hypothetical Syllogism
If it rains, then the ground is wet.	If it rains, the ground is wet.

If the ground is wet, the ground becomes slippery	It rains.
So, if it rains, the ground becomes slippery.	So, the ground is wet.

The argument of the left side is Pure Hypothetical Syllogism. In this case all the constituent propositions are Hypothetical propositions. But the argument of the right side is called Mixed Hypothetical Syllogism because in this case the major premise is Hypothetical and the minor and the conclusion are categorical propositions.

(c) Rules of Hypothetical-Categorical Syllogism: In order to become valid, Hypothetical-Categorical Syllogism should conform to the following two rules. The first is the rule of affirmation and the second is the rule of negation.

(i) If we affirm the antecedent, we may affirm the consequent, but not conversely, i.e., if we affirm the consequent, we cannot affirm the antecedent.

(ii) If we deny the consequent, we may deny the antecedent, but not conversely, i.e., if we deny the antecedent, we cannot deny the consequent.

(d) Testing the validity of Hypothetical-Categorical Syllogism: For testing the validity of Hypothetical-Categorical Syllogism we have to place the argument into its logical form. Then we have to apply the rule of validity of the argument. If the rules are properly followed then the argument is valid and if the argument fails to follow the rules of validity then the argument will be invalid and fallacious.

(e) Disjunctive-Categorical Syllogism: A disjunctive categorical syllogism has disjunctive proposition as major premise and the minor premise and the conclusion are categorical propositions. For example,

Either Ram is a poet or Ram is a philosopher. – Major premise

Ram is not a poet. – Minor premise

Therefore, Ram is a philosopher. – Conclusion

The above disjunctive categorical syllogism is valid because this affirms the first disjunct in the minor premise and the second disjunct is affirmed in the conclusion.

(f) Rules of Disjunctive-Categorical Syllogism (Strong sense of disjunction included): According to the rule of validity of Disjunctive Categorical syllogism, a disjunct has to be denied in the minor premise and the other disjunct has to be affirmed in the conclusion. If this is followed then the argument will be valid. It will be D.S. form of Disjunctive categorical syllogism. The above example is an example of valid form of Disjunctive syllogism. But when one disjunct is affirmed in the minor premise and the other disjunct is denied in the conclusion then the

argument will be invalid and it will involve the fallacy of affirming the disjunct. For example,

Either Ram is a poet or Ram is a philosopher.- Major premise

Ram is a poet. – Minor premise

Therefore, Ram is a philosopher. – Conclusion

This argument is invalid because the first disjunct is affirmed in the minor premise and the other disjunct is denied in the conclusion. This argument involves the fallacy of affirming a disjunct.

(g) Testing the validity of Disjunctive-Categorical Syllogism: For testing the validity of Disjunctive-Categorical Syllogism we have to formulate the argument into its logical form. Then we have to apply the rule of validity. If the rule is properly followed then the argument will be valid and it will be D.S. form of the Disjunctive-Categorical Syllogism. But the argument will be invalid if the rule is violated in any argument. That argument will involve that fallacy of affirming the disjunct. Let us consider one valid and one invalid argument:

(i) Either the dog is dead or the dog has been run over by a car. The dog is run over by a car. Therefore, the dog is not dead.

Ans: Logical form of the argument:

Either the dog is dead or the dog is run over by a car. – Major premise

The dog is run over by a car. – Minor premise

Therefore, The dog is not dead. - Conclusion

The argument is invalid because the rule of validity is violated in this argument. The second disjunct of the major premise is affirmed in the minor premise and the first disjunct is denied in the conclusion. This is a violation of the rule of validity of disjunctive categorical Syllogism. For this violation the argument involves the fallacy of affirming the disjunct.

(ii) Either Mr. Das has bought sugar or he has bought chicken. Mr. Das has not bought chicken. Therefore, he has bought sugar.

Ans: Logical form of the argument:

Either Mr. Das has bought sugar or Mr. Das has bought chicken. Major premise

Mr. Das has not bought chicken. - Minor premise

Therefore, Mr. Das has bought sugar. - Conclusion

This argument is valid because this argument has followed the rule of validity of Disjunctive Categorical Syllogism. In this argument the second disjunct is denied in the minor premise and the first disjunct is affirmed in the

conclusion. For this reason the argument is valid and the argument is in D.S. form Disjunctive Categorical Syllogism.

EXERCISES

Find out the correct alternative from the given alternatives:

1. There are _____ components of a hypothetical proposition.
(a) Two (b) Three (c) Four (d) Five
2. Hypothetical Syllogism can be of _____ types.
(a) Two (b) Three (c) Four (d) Five
3. In case of Pure Hypothetical Syllogism _____ proposition(s) (is/are) Hypothetical proposition.
(a) One (b) Two (c) Three (d) No
4. In the _____ portion of Hypothetical proposition the condition is mentioned.
(a) Antecedent (b) Consequent (c) Conjunction (d) Disjunctive
5. There are _____ rule(s) of validity of Hypothetical-Categorical Syllogism.
(a) One (b) Two (c) Three (d) Four
6. If the consequent is affirmed after affirming the antecedent in a Hypothetical Categorical Syllogism then the Syllogism will be of _____ form.
(a) M.P. (b) M.T. (c) D.S. (d) H.S.
7. If the consequent is denied in the major premise and the antecedent is denied in the minor premise then the argument will involve the fallacy of _____.
(a) Affirming the antecedent (b) Affirming the Consequent
(c) Denying the antecedent (d) Denying the Consequent
8. If the consequent is denied after the denial of antecedent then the Hypothetical Categorical argument will involve the fallacy of _____.
(a) Affirming the antecedent (b) Affirming the Consequent
(c) Denying the antecedent (d) Denying the Consequent
9. If the antecedent is affirmed after the affirmation of consequent then the Hypothetical Categorical argument will involve the fallacy of _____.

- (a) Affirming the antecedent (b) Affirming the Consequent
 (c) Denying the antecedent (d) Denying the Consequent
10. A disjunctive proposition may have _____ disjuncts at most.
 (a) Two (b) Three (c) Four (d) Innumerable
11. If a disjunct is affirmed in the minor premise and the other disjunct is denied in the minor then the Disjunctive Categorical syllogism will involve the fallacy of _____.
 (a) Affirming the Disjunct (b) Denying the Disjunct
 (c) Affirming the Antecedent (d) Denying the Consequent
12. If a disjunct is affirmed after the denial of the other disjunct then the Disjunctive Categorical Syllogism will follow _____ valid form.
 (a) M.P. (b) M.T. (c) D.S. (d) H.S.
13. In case of disjunctive proposition there will be _____ types of disjuncts.
 (a) Two (b) Three (c) Four (d) Innumerable
14. In case of Disjunctive Categorical syllogism _____ proposition is disjunctive proposition.
 (a) Major (c) Minor (c) Conclusion (d) All
15. The main object or content of Hypothetical proposition is mentioned in the _____ portion.
 (a) Antecedent (b) Consequent (c) Disjunct (d) Conjunct

Answer the following questions in one or two sentences:

1. What is hypothetical proposition?
2. What is the antecedent of hypothetical proposition?
3. What is the consequent of hypothetical proposition?
4. How many rules of validity of Mixed Hypothetical Syllogism are there?
5. What is the first rule of affirmation of the validity of Mixed Hypothetical syllogism?
6. What is the second rule of negation of the validity of Mixed Hypothetical syllogism?
7. What is the name of the fallacy due to the violation of the first rule of affirmation of the Mixed hypothetical syllogism?
8. What is the name of the valid form when the first rule of validity of Mixed hypothetical syllogism?
9. What is the M.P. form of the Constructive Hypothetical syllogism?

10. What is the name of the fallacy due to the violation of the second rule of affirmation of the Mixed hypothetical syllogism?
11. What is the name of the valid form when the second rule of validity of Mixed hypothetical syllogism?
12. What is the M.T. form of the Destructive Hypothetical syllogism?
13. What is the rule of Disjunctive Categorical syllogism?
14. What is the name of fallacy due to the violation of the rule of validity of Disjunctive Categorical syllogism?
15. What is the name of the valid form of Disjunctive Categorical syllogism?
16. Give an example of Constructive Hypothetical syllogism.
17. Give an example of fallacy of affirming the consequent.
18. Give an example of Destructive Hypothetical syllogism.
19. Give an example of fallacy of denying the antecedent.
20. What is fallacy of affirming the disjunct?

Chapter –7

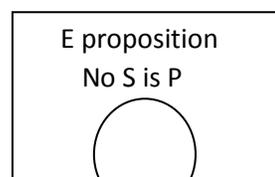
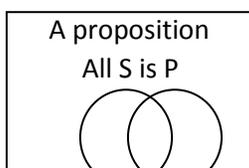
Boolean interpretation and Venn diagram

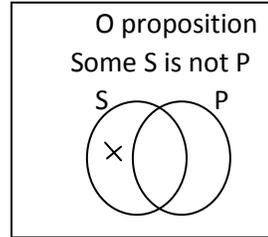
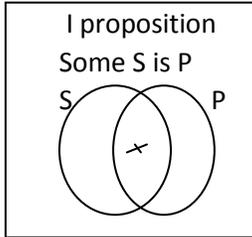
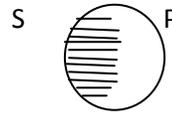
(This chapter contains 4 marks)

- In deductive logic we consider four kinds of categorical propositions. These propositions are obtained on the basis of the joint principle of quality and quantity. These propositions are indicated by A, E, I and O. Among these propositions the first two propositions are Universal and the last two propositions are Particular.
- George Boole, an English logician, has given an alternative explanation of these propositions from the view point of the concept of 'Existential Import'. It indicates the existence of at least one member of a class of a proposition.
- When a proposition includes a term which indicates such a class which has at least one member then the proposition is called existential proposition. I and O propositions are called existential propositions or non-empty propositions. But when a proposition includes a term which indicates such a class which does not have any member then the proposition is called non-existential proposition. A and E propositions are called non-existential propositions or empty propositions. Two non-empty propositions have existential import and two empty propositions do not have existential import.
- According to George Boole we cannot draw any particular conclusion from universal one premise or from two premises. If this thing is found in any argument then the argument will be invalid and there will be Fallacy of Existential Import or Existential Import.
- Four categorical propositions are represented by George Boole in the following way:

Symbolic form	Symbol	Boolean interpretation
All S is P	A	$\overline{S}P=0$
No S is P	E	$SP=0$
Some S is P	I	$SP \neq 0$
Some S is not P	O	$\overline{S}\overline{P} \neq 0$

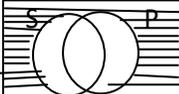
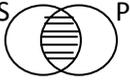
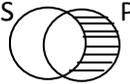
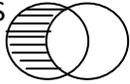
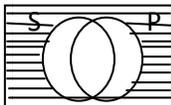
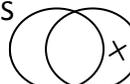
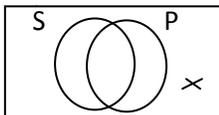
- If the Boolean interpretation of categorical propositions is admitted then some inferences of traditional logic are not admitted. We cannot admit the contraposition of E proposition and conversion of A proposition. We can only admit contradictory opposition. Rests of the other oppositions are invalid according to Boolean interpretation of categorical propositions. Among the 19 valid moods of categorical syllogism 4 moods are invalid. In all these cases we draw particular conclusion from universal premise or premises and these cases involve the Fallacy of Existential Import or Existential Fallacy.
- John Venn is a mathematician who represented four categorical propositions with the circle. In this explanation one class is represented by a circle. According to this explanation four different propositions are represented in the following way:





EXERCISES

• **Find out the correct alternative from the given alternatives:**

- George Boole was a _____ logician.
(i) English (ii) Russian (iii) Greek (iv) German
- Logician _____ introduced the term 'existential import' in case of categorical proposition.
(i) Aristotle (ii) George Boole (iii) John Venn (iv) I. M. Copi
- Logician _____ introduced the term 'Null Class' in case of categorical proposition.
(i) Aristotle (ii) George Boole (iii) John Venn (iv) I. M. Copi
- The Boolean interpretation of the proposition 'All S is P' is _____.
(i) $SP = 0$ (ii) $\bar{S}P = 0$ (iii) $S\bar{P} = 0$ (iv) $\bar{S}\bar{P} = 0$
- The Boolean interpretation of the proposition 'Some S is P' is _____.
(i) $SP \neq 0$ (ii) $\bar{S}P \neq 0$ (iii) $S\bar{P} \neq 0$ (iv) $\bar{S}\bar{P} \neq 0$
- The Boolean interpretation of the proposition 'Some S is not P' is _____.
(i) $SP \neq 0$ (ii) $S\bar{P} = 0$ (iii) $\bar{S}P \neq 0$ (iv) $\bar{S}\bar{P} = 0$
- The Boolean interpretation of the proposition 'No S is P' is _____.
(i) $SP = 0$ (ii) $\bar{S}P \neq 0$ (iii) $S\bar{P} = 0$ (iv) $S\bar{P} \neq 0$
- _____ propositions are called existential propositions by George Boole.____
(i) A and I (ii) E and I (iii) A and E (iv) I and O
- _____ propositions are called empty propositions by George Boole.
(i) A and I (ii) E and I (iii) A and E (iv) I and O
- What will be the Venn diagram of 'All S is P'?
(i)  (ii)  (iii)  (iv) 
- What will be the Boolean interpretation of 'All non-S is P'?
(i) $SP = 0$ (ii) $S\bar{P} = 0$ (iii) $\bar{S}P = 0$ (iv) $\bar{S}\bar{P} = 0$
- What will be the Venn diagram of 'All non-S is P'?
(i)  (ii)  (iii)  (iv) 
- What is the Venn diagram of 'Some S is P'?
(i)  (ii)  (iii)  (iv) 

13. The class of 'rectangular triangle' is a _____ class.
 (i) empty (ii) non-empty (iii) special (iv) general
14. If we draw a particular conclusion from a universal premise then our argument will involve the fallacy of _____.
 (i) Existential import (ii) undistributed middle
 (iii) Illicit major (iv) illicit minor
15. As per the Boolean interpretation of Categorical proposition the simple conversion of _____ proposition cannot be admitted.
 (i) A (ii) E (iii) I (iv) O
16. According to the Boolean interpretation of Categorical proposition only _____ opposition of proposition can be admitted.
 (i) Contrary (ii) Sub-contrary (iii) Sub-altern (iv) Contradictory
17. According to the Boolean interpretation of categorical proposition _____ moods of categorical syllogism are considered invalid.
 (i) four (ii) six (iii) eight (iv) ten
18. According to the explanation of John Venn we need _____ circles to diagram a categorical proposition with two terms.
 (i) two (ii) three (iii) four (iv) five
19. As per the explanation of George Boole universal propositions are _____ propositions by nature.
 (i) hypothetical (ii) disjunctive (iii) conjunctive (iv) analytic
20. As per the explanation of George Boole universal propositions are _____ propositions by nature.
 (i) hypothetical (ii) disjunctive (iii) conjunctive (iv) analytic

Answer the following questions (use one or two sentences):

1. What is the Boolean interpretation of categorical proposition?
2. What is the meaning of the term 'existential import'?
3. What is the meaning of the term 'Null Class' or "Empty Class"?
4. What is the meaning of the term 'Class product'?
5. What is the meaning of the term 'Complementary Class'?
6. What is the Boolean interpretation of four categorical propositions?
7. Which propositions are called Empty propositions in Boolean logic?
8. Why do we call universal propositions empty propositions according to the Boolean interpretation of categorical propositions?
9. Which propositions are called non-empty propositions in Boolean logic?
10. Why do we call Particular propositions non-empty propositions according to the Boolean interpretation of categorical propositions?
11. Why are universal propositions called empty propositions?
12. Why are particular propositions called non-empty propositions?
13. Which opposition of propositions is not admitted in modern logic?
14. Which kind of Conversion is not admitted in modern logic?
15. Why cannot we make the simple conversion of A proposition according to Boolean interpretation of categorical proposition?
16. How many moods of categorical syllogism are denied in modern logic?
17. Which moods of categorical syllogism are denied in modern logic?
18. Give the symbolic representation of the categorical proposition from the given Boolean interpretation.
 $S\bar{P}=0$
19. Give the symbolic representation of the categorical proposition from the given Boolean interpretation.

$$\overline{S} \overline{P} = 0$$

20. What will be the Venn diagram of 'There are no ghosts'?
21. What will be the Venn diagram of 'There are ghosts'?
22. What will be the Venn diagram of 'All non-S are P'?
23. What is the name of the fallacy which occurs from the deduction of particular conclusion from universal premise?
24. What is the meaning of Universal Square?
25. How many overlapping circles do we require to make the Venn diagram of a proposition with two terms?
Ans: We require two overlapping circles to make the Venn diagram of a proposition with two terms.
26. When do we require three overlapping circles to make the Venn diagram?
27. When do we use a cross mark to make the Venn diagram?
28. When do we use shade to make the Venn diagram?
29. In which case of categorical proposition cannot we make the contraposition?
30. Convert the following statements into propositions and give their Boolean interpretations and give their Venn diagram.
 - a) All are not friends that seem so.
 - b) Circle can never be rectangle.
 - c) There are white elephants.
 - d) There is no round square.
 - e) White cats with blue eyes do not generally hear through ears.
 - f) S is only P and P is sometimes S.
 - g) All S is non-P and Some non-S are P.
 - h) There is no soul.
 - i) There is ghost.
 - j) Only philosophers are wise.

Chapter – 8
Truth Functional Connectives
Five (5) marks allotted by H.S.Council for this chapter

MCQ-1X3=3

SAQ-1X2=2

Content: (a) Variable and Constant: Symbols are used in Modern logic for many reasons: (i) symbols help us to get the forms of arguments and to judge their validity; (ii) symbols help us to get short and specific forms of complex arguments; (iii) symbols help us to ward of the ambiguity, complexity and vagueness of ordinary language.

Variables are used in modern logic. Two kinds of variables are used in logic: Term Variable and Proposition Variable. Variables are s, p, q, r etc.

Constants are also used in Modern logic. Words like ‘and’, ‘either ___ or ___’, ‘if ___ then ___’ etc., are used as constants. These are also called Truth Functional connectives. On the basis of the truth values of the components we can get the truth values of the compound propositions.

(b) Truth Functional Propositions: Negation or Negative proposition: A Negative proposition is a compound proposition which we get if we deny or negate the content of a proposition. The form of this proposition is ‘It is not the case that p ’. The sign of negation is \sim (curl). The rule of truth or falsity of Negative proposition is: If the main proposition is True then its negative will be False and if the main proposition is false then the negative will be True. The Truth Table of negation is:

p	$\sim P$
T	F
F	T

- Hypothetical Proposition:** When two component propositions are combined in the form of 'if p then q' then it will be called Hypothetical proposition. This proposition has two component portions: Antecedent and Consequent. The portion starting after 'if' and ending at 'then' is the antecedent and the portion after 'then' is the consequent. These two components are joined with the symbol 'Null' (\supset) or Horse-shoe. The rule of truth or falsity of hypothetical proposition is: If the antecedent is True and the consequent is False then only the whole Hypothetical proposition is False. For any other truth values of the component the proposition will be True. The Truth Table of Hypothetical proposition is :

p	q	$p \supset q$
T	T	T
T	F	F
F	T	T
F	F	T

- Conjunction or Conjunctive Proposition:** The compound proposition which is formed by conjoining two or more component propositions with the word 'and' is called Conjunctive proposition. The form of this proposition is 'p and q'. The component propositions are called conjuncts and the sign which connects these conjuncts is called 'Dot' (.) or conjunction. The rule of truth or falsity of Conjunctive proposition is: If a conjunct of a Conjunctive proposition is False then the whole conjunctive proposition is False and if all conjuncts are True then the conjunct proposition is True. The Truth Table of Conjunctive proposition is:

p	q	$p \cdot q$
T	T	T

T	F	F
F	T	F
F	F	F

- Disjunction or Disjunctive proposition:** The compound proposition which is formed by combining two or more component propositions with the word 'or' is called Disjunctive proposition. The form of this proposition is 'p or q'. The component propositions are called disjuncts and the sign with which these components are connected is called 'Vel' (V) or disjunction. The rule of truth or falsity of Disjunctive proposition is: If only one disjunct of a disjunctive proposition is True then the whole proposition is True and if all the disjuncts are False then the disjunctive proposition is False. The Truth Table of Disjunctive proposition is:

p	q	$p \vee q$
T	T	T
T	F	T
F	T	T
F	F	F

- Proposition of Material Equivalence:** When two components are related in the form of 'p if and only if q' then the proposition will be called proposition with Material Equivalence. The symbol of this proposition is 'Triple Bar' (\equiv). The rule of truth or falsity of this proposition is : If two component propositions have same truth value then the material equivalent proposition will be True and if the two components have different truth values the material equivalent proposition will be False. The Truth Table of Material Equivalent proposition is:

p	q	$p \equiv q$
T	T	T
T	F	F
F	T	F
F	F	T

(c) Truth Values: Tautology, Self-Contradictory, Contingent: Truth or Falsity is the feature of propositions. Only propositions can be true or false. Modern Logicians use features like truth or falsity to explaining the term 'Truth value'. The Truth values of Compound propositions depend upon the truth values of component propositions. On this basis propositions can be classified into three types: Tautology, Contingent and Self-contradictory. These propositions are discussed below:

Tautologous Propositions: The proposition which is formally or necessarily true and there is no possibility of becoming false is called Tautologous Proposition. For example, 'Red flowers are red', 'If it is a triangle then it must be a plane figure bounded with three straight lines' etc. are examples of Tautologous propositions. All the substitution instances of these propositions are True. For example, 'It is p or not p', 'If p then p' are examples of Tautologous propositions because the truth values of these propositions are true whatever may be the truth value of p.

Self-contradictory Propositions: The propositions which are formally or necessarily false and there is no possibility of becoming these propositions false are called Self-contradictory propositions. For example, 'The flower is red or not red', 'If it is a triangle it is not a plane figure bounded with three straight lines' are examples of Self-contradictory propositions. All the substitution instances of propositions are False. For example, 'It is not the case that p and not p' is self-contradictory because the truth value of this proposition is false whatever may be the truth value of p.

Contingent Propositions: The propositions which are sometimes true and sometimes false are called Contingent propositions. For example, 'The flower is red' is an example of Contingent proposition because in some cases it becomes true and it becomes false. Some of the substitution instances of these

propositions are true and some are false. For example, 'If p then q', 'p or q' etc. are examples of Contingent Propositions because these propositions become true or false depending upon the truth values of p and q.

(d) Truth table method for testing Proposition-forms and Argument-forms (Not more than 2 variables): Truth Table is a method for testing the validity of arguments or judging the truth or falsity of propositions by imposing different truth values on its different component propositions. In case of this method the rows which we get by the application of different truth values in different components are called Substitution instances. The right hand column of the Table is called Result Column. All the columns except the right are called Guide Column. For example,

p	q	$p \equiv q$
T	T	T
T	F	F
F	T	F
F	F	T

The right hand column of ' $p \equiv q$ ' is called Result Column. The rest two other Columns of p and q are called Guide Columns. The instances obtained by the application of different Truth values of 'p' and 'q' are called Substitution Instances.

We can take the help of the following example for explaining the topic of determining the truth and falsity of propositional form:

$$(p \cdot q) \cdot (p \supset q)$$

p	q	$(p \cdot q)$	$(p \supset q)$	$(p \cdot q) \cdot (p \supset q)$
T	T	T	T	T
T	F	F	F	F
F	T	F	T	F

F	F	F	T	F
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In this way we can determine the truth or falsity of the proposition form '(p.q).(p \supset q)' and say that proposition is Contingent because some of the Substitution instances are true and some are false.

With the help of the following example we can explain the topic of testing the validity or invalidity by applying the method of Truth Table:

$$(p \equiv q), p \quad / \therefore q$$

p	q	(p \equiv q)
T	T	T
T	F	F
F	T	F
F	F	T

The above argument is valid because in none of the substitution instances we find the premises true and conclusion false.

EXERCISES

- **Find out the correct alternative from the given alternatives:**

- _____ is a modern logician.
(i) Aristotle (ii) Francis Bacon (iii) J. S. Mill (iv) George Boole
- Symbolic Logic is also called _____ logic.
(i) Aristotelian (ii) Mathematical (iii) Traditional (iv) Propositional
- The symbol of '~'(curl) is used to indicate _____ statement.
(i) Implicative (ii) Disjunctive (iii) Negative (iv) Conjunctive
- The symbol of ' \supset '(implication) is used to indicate _____ statement.
(i) Hypothetical (ii) Disjunctive (iii) Negative (iv) Conjunctive
- 'p \vee q' is an example of _____ propositional form.

- (i) Hypothetical (ii) Disjunctive (iii) Negative (iv) Conjunctive

6. The symbol of ' \vee ' (vee) is used to indicate _____ statement.

- (i) Hypothetical (ii) Disjunctive (iii) Negative (iv) Conjunctive

7. The symbol of ' \equiv ' (triple bar) is used to indicate _____ statement.

- (i) Hypothetical (ii) Disjunctive (iii) Bi-conditional (iv) Conjunctive

8. The symbol of ' \cdot ' (dot) is used to indicate _____ statement.

- (i) Hypothetical (ii) Disjunctive (iii) Negative (iv) Conjunctive

9. In a _____ proposition we find only two component propositions.

- (i) Hypothetical (ii) Disjunctive (iii) Negative (iv) Conjunctive

10. In a Truth Functional Argument _____ component is Truth functional proposition.

- (i) One (ii) at least one (iii) two (iv) all

11. The component of a Conjunctive proposition is called _____ .

- (i) Conjunctive (ii) Conjunct (iii) Conjunction (iv) Conjunctivity

12. In case of _____ propositions we find the use of 'also', 'yet', 'however', 'nevertheless'.

- (i) Hypothetical (ii) Disjunctive (iii) Bi-conditional (iv) Conjunctive

13. The Conjunctive proposition will be true if _____ conjunct(s) is/are true.

- (i) One (ii) two (iii) three (iv) all

14. The Conjunctive proposition will be false if _____ conjunct(s) is/are false.

- (i) One (ii) two (iii) three (iv) all

15. The component of a Disjunctive proposition is called _____ .

- (i) Disjunctive (ii) Disjunct (iii) Disjunction (iv) Disjunctivity

16. The Disjunctive proposition will be true if _____ disjunct(s) is/are true.

- (i) One (ii) two (iii) three (iv) all

17. The Disjunctive proposition will be false if _____ disjunct(s) is/are false.

- (i) One (ii) two (iii) three (iv) all

18. In case of Disjunctive proposition we may find _____ disjuncts at most.

- (i) Two (ii) three (iii) four (iv) innumerable

19. In case of Disjunctive proposition we may find at least _____ disjuncts.

- (i) Two (ii) three (iii) four (iv) innumerable

20. If we find the use of the word 'unless' in a compound proposition it will be a _____ proposition.

- (i) Hypothetical (ii) Disjunctive (iii) Negative (iv) Conjunctive

21. The proposition ' $(p \vee q) \supset r$ ' is a _____ proposition.

- (i) Hypothetical (ii) Disjunctive (iii) Negative (iv) Conjunctive

22. Among all the compound propositions we find two components in _____ propositions.

- (i) Hypothetical (ii) Disjunctive (iii) Negative (iv) Conjunctive

23. If we find two component propositions in a Hypothetical proposition we find _____ options of different Truth values.

- (i) Two (ii) three (iii) four (iv) five

24. In the Truth table of a proposition if we find all the substitutions as True it will be considered as _____ proposition.

- (i) Tautologous (ii) Self-contradictory (iii) Contingent (iv) Logical

25. ' $p \vee \sim p$ ' - is a _____ form of compound statement.

- (i) Tautologous (ii) Self-contradictory (iii) Contingent (iv) Logical

26. ' $p \cdot \sim p$ ' - is a _____ form of compound statement.

- (i) Tautologous (ii) Self-contradictory (iii) Contingent (iv) Logical

27. ' $p \supset q$ ' - is a _____ form of compound statement.

- (i) Tautologous (ii) Self-contradictory (iii) Contingent (iv) Logical

28. If we find eight Substitution instances in the Truth table of a statement we can say that there are _____ variables in the statement.

- (i) Two (ii) three (iii) four (iv) five

29. The Negative proposition of 'Ram is a good boy' is _____.

(i) It is not the case that Ram is a good boy (ii) It is false that Ram is a good boy

(iii) It is not true that Ram is a good boy (iv) all the three

30. In case of Disjunctive propositions the word 'Or' is used in _____ senses.
- (i) Two (ii) three (iii) four (iv) five
31. The negative of the Disjunctive proposition is _____ proposition.
- (i) Hypothetical (ii) Disjunctive (iii) Negative (iv) Conjunctive
32. The negative of the Conjunctive proposition is _____ proposition.
- (i) Hypothetical (ii) Disjunctive (iii) Negative (iv) Conjunctive
33. If two conjuncts of a Conjunctive proposition are True then the Conjunctive proposition will be _____.
- (i) True (ii) false (iii) Self-contradictory (iv) Tautologous
34. What is the symbol of a Bi-conditional statement?
- (i) 'v' (ii) '.' (iii) '⊃' (iv) '≡'
35. If we find the use of 'if and only if' in a compound statement it will be _____ statement.
- (i) Hypothetical (ii) Disjunctive
(iii) Material equivalent (iv) Conjunctive
36. ' $(p \supset q) \vee \sim q$ ' - is a form of _____ statement.
- (i) Hypothetical (ii) Disjunctive
(iii) Negative (iv) Conjunctive
37. If a conjunctive statement is False then _____ conjunct(s) will be False.
- (i) One (ii) two (iii) no (iv) all
38. If a disjunctive statement is False then _____ disjunct(s) will be False.
- (i) One (ii) two (iii) no (iv) all
39. In case of _____ statement 'if two components are True then the compound statement will be True and if the two components are False then the compound statement will be True'.
- (i) Conjunctive (ii) Disjunctive
(iii) Hypothetical (iv) Bi-conditional

40. If 'P' is True and 'P \supset Q' is False then the Truth value of Q will be _____.

- (i) True (ii) False (iii) Probable (iv) Self-contradictory

• **Answer the following questions(use one or two sentences):**

1. Who are the writers of 'Principia Mathematica'?
2. Why is modern logic called symbolic logic?
3. Give one reason for using symbols in logic.
4. What are propositional variables?
5. What is the meaning of Truth-functional Logic?
6. Why do we call symbolic logic mathematical logic?
7. How many truth values are considered in Truth-functional logic?
8. What are Truth functional propositions?
9. What are Truth Functional Connectives?
10. What is Truth Functional Argument?
11. What are five Compound Propositions discussed in Modern or symbolic Logic?
12. What is a Negative Proposition?
13. What is the rule of Truth-value of Negative proposition?
14. What is the Truth Table of Negative Propositions?
15. What is 'negation of negation'?
16. What is Conjunctive proposition?
17. What are the components of a Conjunctive Proposition?
18. What is the rule of truth or falsity of Conjunctive Propositions?
19. How many minimum and maximum conjuncts can a Conjunctive Proposition have?
20. Form the Truth Table of Conjunctive Propositions.
21. Give some conjunctive words used in the sentences for making Conjunctive Propositions.
22. What is a Disjunctive Proposition?
23. What are the components of a Disjunctive Proposition?

24. What is the rule of truth or falsity of Disjunctive Propositions?
25. How many minimum or maximum disjuncts can a Disjunctive Proposition have?
26. Form the Truth Table of Conjunctive Propositions.
27. What is a Hypothetical Proposition?
28. What are the components of a Hypothetical proposition?
29. What is the antecedent of a Hypothetical proposition?
30. What is the consequent of a hypothetical proposition?
31. Why do we call hypothetical proposition a conditional proposition?
32. Which kind of relation is expressed in hypothetical proposition?
33. When will a hypothetical proposition be false?
34. Form the Truth Table of Hypothetical Propositions.
35. What is the relation of Material equivalence?
36. What is the other name of Bi-conditional proposition?
37. Form the Truth Table of Bi-conditional Propositions.
38. What is a Tautologous proposition?
39. What is a Contingent proposition?
40. What is a Self-contradictory proposition?
41. What is the result column of a Truth table?
42. What is the guide column of a Truth table?
43. What is statement variable?
44. What is term variable?
45. What is the meaning of Substitution instances?
46. How can we form the rows in a truth table?
47. Give one example of a Tautologous statement and show how.
48. Give one example of a Contingent statement and show how.
49. Give one example of a Self-contradictory statement and show how.
50. Construct the Truth table of $(p \cdot q) \supset p$ and point out the nature of the statement.
51. Construct the truth table of $(p \vee q) \supset \sim q$ and mention the nature of the statement.

52. Construct the Truth table of $\{(p \vee \sim q) \supset q\}$ and mention the nature of the statement.
53. Test the validity of the argument form: $(p \vee q) \supset \sim q, (p \vee q) \therefore (p \equiv q)$
54. Test the validity of the argument form: $(p \cdot q) \supset q, (p \vee q) \therefore q$
55. Test the validity of the argument form: $(m \vee n) \supset n, (m \supset \sim n) \therefore (m \cdot n)$
56. Test the validity of the argument: 'Socrates was a great philosopher. Therefore, either Socrates was a great philosopher or he was a great moralist.'
57. Test the validity of the argument:
- (a) 'If Descartes is a rationalist then he believes in innate ideas. In reality Descartes was a rationalist. So, he believes in the theory of innate ideas.'
- (b) 'If America is a leader then he should guide all other countries and if he is not the leader then he would exploit other countries. America is a leader. Therefore, he should either guide all countries or he would exploit other countries.'

58. Symbolize the following statements:

- a) If Ram is a man and he is a saint, then he is honest.
- b) Either Calcutta is populous or it is cultural and spiritual.
- c) Either it is not the fact that Ram is a poet or he is a doctor.
- d) Ram will be safe if and only if he is not attacked.
- e) Either New Delhi is not the capital of London or it is not the case that Patna is the capital of Bihar and Patna is not the capital of Calcutta.
- f) Iran has increased the price of oil but Libya has not done so.
- g) Both Iran and Libya did not increase the price of oil.
- h) Russia will attack India only if Stalin is alive.
- i) Parna will stand first if and only if she studies well.
- j) We will catch fish if there is rain and we will swim if it does not.
- k) Either Iran or Libya will increase the price of oil or none will increase the price.

I) Either Iran will increase the price of oil and Pakistan has scarcity of food or it is not the fact that Jordan will seek help from America and Saudi Arab will buy plain.

59. If A and B are True and X and Y are False and if the truth values of P and Q are unknown then what will be the truth value of the following statements:

- (i) $(P \cdot A) \vee (X \supset B)$
- (ii) $(P \cdot X) \supset (\sim A \vee P)$
- (iii) $(Q \supset A) \equiv (Q \supset X)$
- (iv) $(P \supset \sim \sim A) \supset (\sim B \vee X)$
- (v) $\{A \supset (B \supset Y)\} \supset X$

Group – B
Chapter – 1
Nature of Inductive Inference
Six (6) marks allotted by H.S.Council for this chapter

MCQ-1X3=3

SAQ-1X3=3

Content:

(a) Grounds of Induction: Induction is a kind of inference in which we a universal conclusion on the basis of our observation of some particular instances. In case of induction we find a process of generalization. The conclusion of induction always surpasses the premises. In case of induction there is no relation of entailment between the premises and conclusion. For the establishment of such conclusion we have to keep two objects in mind. We take the help of observation and experiment and at the same time we take the help of rules or laws. These are called the basis or grounds of Induction. Induction has two grounds: (i) formal grounds and (ii) Material grounds.

(i) Formal Grounds – Law of Uniformity, Law of Causation: Though the formal aspect is not so important in case of induction, we have to follow two rules or principles for the establishment of universal conclusion. These laws are law of Causation and law of Uniformity of Nature.

According to law of Uniformity of Nature, nature behaves in the same manner under same circumstances. For example, a farmer is given developed manure, proper irrigation, improved seeds etc and he harvested and after some times he received bumper crops. If he is again provided all these conditions in future then it can be expected that he would get same type of bumper crops. This is the application of the law of Uniformity of Nature.

According to the law of Causation, every event has a cause, nothing occurs without any cause. We may not know the cause of an effect. But it is not proved from this that the effect occurred without any cause. In future the cause would certainly be known. For example, the cause of cancer is not known still today, but from this it cannot be concluded that it is an effect without any cause. Rather we can say that its cause would be known in future.

(ii) Material Grounds – Observation, Experiment: The material basis or grounds of Induction are Observation and Experiment. Material grounds are very much important in cases of induction. We observe many instances on the basis of our real experience and under necessity we consider the similarities and differences among these instances and we employ experiment in these cases. In reality these two aspects of observation and experiment are very much important in case of induction. These are called the material grounds of induction. In reality these two things are very much important in case of the establishment of the conclusion of induction.

In our real experience we observe Ram, Shyam, Jadu, Madhu and many others as mortals. By comparing and contrasting these instances we conclude that all men are mortals. In induction we sometimes take the help of observation and sometimes we take the help of both observation and experiment. In case of unscientific induction we take the help of observation only and we take the help of both observation and experiment in case of scientific induction. For this reason observation and experiment are called the material grounds of induction.

(b) Scientific and Unscientific Induction: Proper Induction can be divided into three types: (a) Scientific Induction, (b) Unscientific Induction and (iii) Analogical Argument or argument by Analogy.

Scientific Induction: Scientific induction is a kind of induction in which we draw a Universal Synthetic conclusion with the help of observation and experiment of many instances under the guidance of law of Uniformity of nature and law of causation. According to Carveth Read, the universal synthetic conclusion which we draw by relying upon the law of uniformity of nature and on the basis of observation is called induction. From the analysis of the above definition of scientific induction we can find the following features of scientific induction: (i) this induction establishes universal synthetic proposition as conclusion; (ii) scientific induction depends upon the observation and experiment of some particular events or objects; (c) the main feature of induction is inductive leap of hazard; (d) Law of Causation or law of Uniformity of Nature are the material are the postulates of induction.

Unscientific Induction: Unscientific Induction is a kind of induction in which we draw a universal synthetic conclusion only on the basis of uncontradicted experiences and without considering the establishment or proof

of causal relation. The other name of this induction is Imperfect induction because the universal conclusion is established only on the basis of our observation of some particular instances. This kind of induction is also called popular induction because in the common activities of our daily life we observe this type of induction in many instances. For example, the crows which we have observed in our daily life are all black and from this we conclude that 'all crows are black'.

The above conclusion is a universal synthetic proposition. While drawing such conclusion we do not observe all probable instances. So it is called unscientific or Induction per Simple Enumeration. In this the issue of going from particular to universal or the event of inductive leap is present. But the law causation is not applied and the law of uniformity of nature is considered very loosely. Only on the basis of our observation of some instances of 'crows' and 'blackness' to appear together we conclude the same about all other unperceived crows and say 'All crows are black'.

On the basis of the above discussion we can make a comparative study between the two. At first we will consider the similarities between scientific and unscientific induction.

There are following similarities between the two: (i) in both these cases we go to unknown from known, that means from particular to universal.

(ii) in both these cases we try to establish a universal synthetic conclusion.

(iii) in both these cases we apply the law of uniformity of nature for drawing the universal conclusion.

(iv) in both these cases observe some particular facts or events to establish for establishing the universal conclusion.

There are following differences between scientific induction and unscientific induction: (i) scientific induction takes the help of both the laws of causation and uniformity of nature. On the other hand, unscientific induction loosely considers only the law of uniformity of nature, but does not consider the law of causation for establishing the universal conclusion.

(ii) scientific induction considers both positive and negative instances. But unscientific induction considers only the positive instances. But it does not put stress upon the negative instances.

(iii) scientific induction involves some steps which include definition, observation and analysis, elimination, generalization etc. On the basis of

observation some particular instances when we try to establish the general conclusion we have to take the help of these above steps. On the other hand, unscientific induction does not follow these steps. It only depends upon the uncontradicted positive instances. For this it can be said that the scientific induction is a complex process.

(iv) as the conclusion of scientific induction is based upon the law of causation its conclusion becomes more probable than the conclusion of unscientific induction. On the other hand, the conclusion of unscientific induction becomes less probable as it does not depend upon the law of causation.

(v) as the scientific induction is based upon experiment the cause-effect relation is established by eliminating irrelevant factors. But on the other hand, unscientific induction mainly is based upon experience and for that it is not possible to eliminate irrelevant events in this cause. So, causal relation cannot be properly established in this case.

(vi) though the conclusion of scientific induction is considered probable, but from actual view point this conclusion is almost certain. But the conclusion of unscientific induction becomes always probable, though there are variations of probabilities.

Value of Unscientific Induction or Induction per Simple Enumeration: In our daily life we apply unscientific induction for practical reasons. But the logical basis of this inference is very weak because only on the basis of uncontradicted experiences we cannot establish the truth of anything. The basis of unscientific induction is belief. The belief is whatever is true about some objects or persons of a class will be equally true about all members of the same class'. This belief cannot be naturally true. We have many experiences in our life which often become false. Belief cannot be proved true by hundreds of positive instances, but only one negative instance proves it false. It may be the case that all hawkers whom I observed are dishonest. But from this if I have the belief 'all hawkers are dishonest' then this belief cannot be correct. There may be many dishonest hawkers outside the scope of my experience and if I meet any one of them in future then my previous belief will become false. Many do not admit any kind of scientific value of these kinds of inferences. For this reason Bacon ridiculed this kind of inference as 'childish induction'. The conclusions of these

inferences are so weak that only a contradictory instance can make the conclusion false.

Though the logical basis of unscientific induction is weak, it has sufficient value in our daily life. In many cases of our daily life inferences we establish conclusion only on the basis of experiences without taking the help of the law of causation. So, we cannot ignore the importance of this kind of inferences.

Though unscientific induction cannot establish causal relation it can give indication of the causal relation. This is the value of this kind of inference. In these cases we observe these two events to appear together and naturally form the idea that there is probably a causal relation between these two events. For this reason this kind of inference is regarded as the subsidiary method of scientific induction. This type of inference helps us to form hypothesis for establishing causal relation. So, many logicians have considered this kind of inference as the starting point of scientific inference.

Criteria for evaluating Unscientific Induction: Though the value of unscientific induction is probable, it has variations of probability. Some inferences are more probable and some are less. But for this purpose we have to depend upon some criteria for evaluating such inferences:

(i) The first condition is the number of positive instances that occur in our experience. The greater the number of positive we meet in our experience, the greater the probability. The general proposition 'All crows are black' will possess a high degree of probability provided the number of positive instances, occurring in experience are greater in number. An instance which favours the conclusion is called a positive or confirming instance. The greater the number of confirming instances, the greater will be the probability of conclusion.

(ii) The absence of any negative instance or disconfirming instance increases the probability of conclusion. If we do not find crows of any colour other than black, then our conclusion – All crows are black – will have degree of probability. The likelihood of our having met with a negative instance, if there be any, will make our conclusion weak. We may, however, overcome this likelihood by making the range of our experience sufficiently wide.

(iii) Addition of any contradictory instance to the original instances on which the conclusion is based, will prove the conclusion to be false. A contradictory instance – 'that crow is white' – will falsify the conclusion – All crows are black.

(iv) The greater the number of differences among the instances mentioned in the premises, the more will be the probability of the conclusion. In the first example of Simple enumeration if it is found that Ram, Jadu, Madhu, Hari and Shyam differ among themselves in respect of their economic status, education, health, native residence and religion, then the probability of our conclusion will increase further.

(v) The more the instances mentioned in the premises resemble each other in respect of their class properties, the greater class, like the class of crows or the class of cows, resemble each other in certain essential properties. So if something is perceived to be true of some of them, then that can be regarded as true of all of them with a high degree of probability. But the case is different with an artificial class like, class of Bata shoes. Members of such a class have a very small number of common and essential properties. So in this case, the conclusion about all from the observation of some members is not sufficiently strong. For example, 'All crows are black' – this conclusion of an Induction per simple enumeration may not be certain but it is highly dependable, whereas the conclusion – all shoes of Bata are durable – is much less dependable.

(vi) If the properties in which the instances of premises agree are fundamental properties of those instances, then the conclusion drawn from them will be highly probable. Density, melting point, boiling point etc. are the fundamental properties of matter. So any conclusion relating to them will be more probable than the conclusion based on the resemblance of non-fundamental properties. For example, if the boiling point in a particular sample of water is found to be 100° and it is concluded that in all cases the boiling point will be 100° , then the conclusion will be highly dependable.

(c) Analogical Argument: In our daily life or in logic we use analogy. Generally when something is described or compared between two objects or when something is inferred on the basis of similarity then the form is called analogy.

In case of analogical argument we observe similarities between two objects and the presence of a new feature in any one of them. From this we infer the existence of the new feature in the other object. According to J. S. Mill, if two events are similar to one or more contexts and if a proposition is true about one event then it will be true to the other event.

Concrete example: There are similarities between Earth and Mars in respect to water, soil, heat, weather, gravitation etc. We also observe the presence of life on Earth. On the basis of these similarities we may conclude that there may probably be life on the Mars. This is an example of analogical argument.

Symbolic example: There are similarities between A and B in respect of c, d, f, g. A has one additional feature h. On the basis of these similarities if we infer the existence of h in B then it will be an application of analogical argument.

Analogical argument can be regarded as induction proper because in this case we need observation like induction proper and in this case the matter of going to unknown from known is present. But this kind of inference is different from scientific induction. In case of analogical argument we go to particular conclusion from particular instances considering some similarities. Besides, the conclusion of analogical argument always becomes probable, never becomes certain. The conclusion of this argument does not depend upon causal relation.

Features of Analogical argument: The main features of analogical argument are described in the following way:-

a) The basis of analogical argument is imperfect similarity; b) we go to particular truth from particular truth; c) analogical argument is a kind of Induction proper because it has 'inductive leap' as a main feature of induction; d) the probability of analogical argument depends upon the law of causation; e) analogical argument does not consider the law of causation; f) the conclusion of analogical argument never becomes certain, it always becomes probable.

Value of Analogical Argument: The logical basis of analogical argument is very weak. It can never be certainly said that on the basis of the similarities between two objects or persons there will be similarities in other respects. It can be only said that the conclusion of the argument is probable. But this probability can vary in different arguments. But we cannot ignore the value of this argument. In our daily life we apply this kind of argument under necessity. For example, clouds and rain were seen to appear together yesterday and after seeing the presence of cloud in the sky we can infer the occurrence of rain today. Analogical argument is also important in case of science. Scientists go forward with their inventions and discoveries on the basis of analogical argument. For reason this argument is regarded as the starting point of

scientific induction. In this context Mill has said that there is no analogical argument which does not help science in any way.

Criteria for Evaluating Analogical Arguments: The conclusion of analogical argument varies in the context of probability. But the question is: what are the conditions upon which the probability of analogical argument depends?

(i) The greater the number and importance of the agreeing points, the greater is the value of the analogical argument. Thus the points of agreement between the Earth and Mars are more numerous and important than those between the earth and the moon. Both the Earth and Mars possess some common properties viz. the possession of air, land, water etc. So the inference that 'Mars contains living beings' is more probable than the inference 'Moon contains living beings'.

(ii) The greater the number and importance of the differing points, the less is the value of the analogical argument. The differing points between the Earth and the Moon are more numerous and more important than those between the Earth and Mars. Both the Earth and Mars agree in having atmosphere which the Moon does not possess. As the presence of atmosphere is an indispensable condition of life, the absence of atmosphere is no doubt a very important point of difference. Hence the agreement, the Moon contains living beings' is less probable than the argument 'Mars contains living beings'.

(iii) The greater the number of unknown points, as compared with the number of known points, the less is the value of the analogical argument. Our knowledge about the properties of planet Saturn is much less than those of Mars. So our inference that Saturn possesses living beings is less probable than that Mars does so.

Our knowledge of the properties of Saturn is very small in comparison with our ignorance of them. So the unknown points being greater than the known points, the argument, 'Saturn is inhabited like the Earth' loses much of its strength.

(iv) The value of an analogical argument depends more on the importance of the points of resemblance than on their number. So in order to determine the strength of an analogical argument we must not put emphasis on the number of agreeing points alone. We must put equal emphasis on their importance. To take an example, two boys may belong to the same village,

may have the same name, height, complexion and body-weight. Now if we agree on the basis of the number of resembling points, that as one boy has sharp memory, the other boy may probably get it, then the analogical argument will be worthless. It is not at all an illustration of good analogy. Here the number of resembling points are not at all important, because they are superficial and not at all of an essential nature. But when on the basis of certain agreeing points, i.e., land, air, water, etc. we argue that Mars contains living beings as the Earth does, the analogical argument is an illustration of good analogy, as the points of resemblance are not superficial but essential and as such important. The reason for the weakness of the first argument is that the points of resemblance cited are strictly irrelevant to the matter with which the conclusion is concerned.

Good Analogy and Bad Analogy: The issues of increase of number of instances and the number of observed instances are very much important in case of evaluation of analogical argument because these aspects increase the possibility of the conclusion of the argument. But the most important event is the relevance of the observed similarities. If the observed similarities are very much important in case of the establishment of the conclusion of the analogical argument then the probability of the conclusion to become true will increase.

Now the question is: what are events upon which the issue of relevance depends? If there is causal relation or universal concomitant relation between the observed features and the features expressed in the conclusion then the feature of the conclusion will become relevant for the observed feature. From this analysis we can say that if the similarities are relevant for drawing the conclusion then the argument will be called good analogy. On the other hand, if the observed similarities are not at all relevant for drawing the conclusion then the argument will be regarded as Bad or False Analogy.

When we observe different similarities between Earth and Mars in respect to air, water, weather, temperature etc and also we observe the presence of life on Earth. From this observation of similarities and from the presence of life on Earth we can infer the probable existence of life on Mars. This argument is an example of Good Analogy because the observed similarities are important or significant for drawing the conclusion.

But in some cases we find insignificant or unimportant similarities while drawing conclusion. These cases are called Bad or False Analogy. In these cases

the similarities are superficial, accidental, external, less important or irrelevant for drawing the conclusion. For example, there are similarities between dogs and chair in respect to weight, shape, size etc. If we observe a dog to bite and if on the basis of these similarities we conclude that the chair will also probably bite then the argument will be Bad or False Analogy because these similarities are totally irrelevant for drawing the conclusion.

Relation between Analogy and Simple Enumeration: In analogical argument two particular things resemble in certain respects, it is inferred that they will resemble in other respects. In induction per Simple Enumeration, when a large number of instances belonging to a particular class are observed to possess a particular attribute, it is inferred that all the members of that class will exhibit that attribute.

The two above mentioned forms of arguments differ from each other in the following respects: (i) In Analogical Argument we pass from one particular case to another, but in Induction per simple enumeration we pass from particular to universal

(ii) The basis of analogical argument is incomplete similarity; the basis of Induction per Simple enumeration is uncontradicted experiences.

(iii) Analogy depends on the number of points of resemblance and their importance. Induction per Simple Enumeration depends on the number of particular instances present for observation.

(iv) Induction per Simple Enumeration does not involve any process of deduction but in analogy, the conclusion is drawn both on the basis of Induction and Deduction.

(v) Analogy involves analysis but induction per simple Enumeration is altogether unanalytical. As in analogy we have to compare two things, to determine how they agree in certain respects, we have to analyse the two things into their constituent attributes.

(vi) According to an eminent logician, Induction per Simple Enumeration deals with the denotation of a term, while analogy deals with the connotation of a term.

Though Analogy and induction per Simple Enumeration differ in many respects, they also agree in many points. Both fail to prove causal relation. As inductions, both are incomplete. In both cases, the conclusion is probable, not

certain. Both being great sources of hypotheses have suggestive power. Both forms of arguments belong to Induction proper.

Exercises

Find out the correct alternative from the following:

- 1) Inductive inference draws conclusion from the observation of _____ instances.
(a) Two (b) Three (c) Four (d) Many
- 2) The conclusion of inductive inference is _____ proposition.
(a) Universal synthetic (b) Universal analytic
(c) Particular synthetic (d) Particular analytic
- 3) The main feature of induction is _____.
(a) Generalization (b) Specialization
(c) Observation (d) Experiment
- 4) In induction the process of drawing conclusion from the observation of particular instances is called _____.
(a) Law of causation (b) Law of uniformity of nature
(c) Generalization (d) Particularization
- 5) There is relation of _____ between the conclusion and premises of induction.
(a) Entailment (b) Succession (c) Experience (d) Rationality
- 6) Law of uniformity of nature is the _____ ground of induction.
(a) Logical (b) Formal (c) Material (d) Empirical
- 7) _____ has considered induction as 'leap in the dark'.
(a) Mill (b) Bain (c) Carveth Read (d) Copi
- 8) Observation and experiment are the _____ ground of induction.
(a) Logical (b) Formal (c) Material (d) Empirical
- 9) According to the _____, nature behaves in the same manner under same circumstances.
(a) Law of causation (b) Law of uniformity of nature
(c) Law of identity (d) Law of contradiction
- 10) In case of induction we cannot apply adjectives like _____.
(a) valid-invalid (b) just-unjust
(c) proper-improper (d) good-bad
- 11) The other name of popular induction is _____.

- (a) Scientific induction (b) Unscientific induction
(c) Logical induction (d) Material induction
- 12) In case of _____ we consider both positive and negative instances.
(a) Scientific induction (b) Unscientific induction
(c) Logical induction (d) Material induction
- 13) In case of _____ induction we find the use of steps like definition, observation, analysis, elimination, formation of hypotheses, generalization.
(a) Scientific induction (b) Unscientific induction
(c) Logical induction (d) Material induction
- 14) _____ induction is considered as the 'starting point' of scientific induction.
(a) Scientific induction (b) Unscientific induction
(c) Logical induction (d) Material induction
- 15) In case of Analogical argument we draw _____ conclusion from particular premises.
(a) Universal (b) Particular (c) Synthetic (d) Analytic
- 16) The basis of _____ is observation of imperfect similarities.
(a) Scientific induction (b) Unscientific induction
(c) Analogical argument (d) Material induction
- 17) The most important criterion of judging the conclusion of analogical argument is _____.
(a) Increase of instances (b) increase of similarities
(c) Relevance of observed similarities (d) Observation of personal differences
- 18) The basis of _____ uncontradicted experiences.
(a) Scientific induction (b) Unscientific induction
(c) Analogical argument (d) Material induction
- 19) The probability of the conclusion of _____ depends upon the number and importance of similarities.
(a) Scientific induction (b) Unscientific induction
(c) Analogical argument (d) Material induction
- 20) The material ground of induction is _____.
(a) Observation and experiment (b) Law of Uniformity of Nature
(c) Law of Causation (d) Law of Identity

Answer the following questions in one or two sentences:

- 1) What is Induction?
- 2) What is the problem of Induction?
- 3) Give two features of Induction.
- 4) What is the nature of the conclusion of Induction?
- 5) What type of truth is considered in case of Induction?
- 6) What are the grounds of Induction?
- 7) What is the material ground of Induction?
- 8) What is the formal ground of Induction?
- 9) What is the Law of Uniformity of Induction?
- 10) What is the Law of Causation?
- 11) What is Unscientific Induction?
- 12) Give one example of Unscientific Induction.
- 13) What is the ground of Unscientific Induction?
- 14) Give one difference between Scientific and Unscientific Induction.
- 15) What is Analogical argument?
- 16) Give one example Analogical argument.
- 17) How does Mill define Analogical argument?
- 18) What is the basis of Analogical argument?
- 19) Which type of Inductive argument does not consider Law of Causation?
- 20) Which type of Induction does not consider negative instances?
- 21) Which type Inductive argument draws particular conclusion from particular premises?
- 22) Give two features of Analogical argument.
- 23) What is the most important criterion for judging Analogical argument?
- 24) What is Bad Analogy?
- 25) Which kind of Induction is considered as the starting point of Scientific Induction?

Chapter – 2 Cause

Six (6) marks allotted by H.S.Council for this chapter

MCQ-1X3=3

SAQ-1X3=3

Content: (a) Nature of Cause: Cause and Effects are two inseparable events. These two terms are often used by us in our daily life. Different logicians have defined cause in different ways. Mill says, "We may define, therefore, the cause of a phenomenon to be the antecedent, or the concurrence of antecedents on which it is invariably and unconditionally consequent." According to Bain, "the cause must be regarded as the entire aggregate of conditions or circumstances requisite to the effect." On the basis of the definition of cause given by Mill, Carveth Read defines cause thus – "The cause of any event is, qualitatively the immediate, unconditional, invariable antecedent of the effect, and quantitatively is equal to the effect."

On the basis of the definition given by Carveth Read, we can mention the following marks of Cause.

(i) Qualitative marks of Cause: On the basis of following marks the term 'cause' is considered qualitatively.

(a) The cause is relative to a phenomenon called the effect; (b) the cause is always an event in time; (c) The cause is an antecedent to the effect; (d) The cause is the invariable antecedent of the effect; (e) The cause is the unconditional antecedent; (f) The cause is the immediate antecedent of the effect.

From the above analysis it can be said that cause of an event is qualitatively its invariable, unconditional, immediate antecedent.

(ii) Quantitative marks of Cause: Quantitatively it is said that the quantity of matter and energy in the cause is equal to that in the effect. The quantitative marks of a cause follow from two following rules: (a) According to the Law of Conservation of Matter, the total amount of matter in the universe is constant. It admits neither of increase nor of decrease, though it admits of a change in form. (b) According to the Law of Conservation of Energy, the total amount of energy in the world is constant. It can neither be increased nor

decreased. One form of energy may be transformed into another form but no energy is lost in the act of transformation.

From this analysis it can be said that the cause is equal to the effect quantitatively.

[Mill distinguishes a cause from a condition. The cause of an event is its invariable, unconditional, immediate antecedent. But, the antecedent is not a single antecedent circumstance, but a group of antecedent circumstances, each of which is necessary for the production of the effect. As each of these antecedent circumstances exercises some influences on the effect, it is called a Condition.

Carveth Read defines Condition as 'any necessary factor of the Cause: anything or agent that exerts, absorbs, transforms or deflects energy.' A Condition is a necessary factor of the Cause, as it exerts some influence on the effect. A Condition is a part of the cause. Conditions may be positive or negative. A positive condition is one, the presence of which is indispensable for the production of the effect; and a negative condition is one, the absence of which is indispensable for the production of the effect.

For example, a man while crossing a river in a small boat is all on a sudden overtaken by a violent storm and is drowned. Here the positive conditions of the man's death are circumstances like, crossing a river, the smallness of the boat, suddenness and violence of the storm etc.; while the negative conditions are circumstances, like any rescue-boat, life saving appliance in the boat, the man's inability to swim and any other help that could have saved his life and so on.]

(b) **Cause as necessary condition:** When two events (A and B) are so related that B does not occur unless A occurs and if A occurs B may or may not occur, then we may say that A is the necessary condition for B. necessary condition does not imply that there is a necessary condition between A and B. when we say, oxygen (A) is a necessary condition for fire (B) what we mean is this: If there is no oxygen present, there is no fire and though there is oxygen, there may or may not be fire. The event of Necessary condition can be illustrated in the following symbolic manner:

Antecedent

-- A

+ A

Consequent

-- B

+/-- B

Therefore, A is the necessary condition of B

If 'Cause' indicates necessary condition then the effect will not occur if the event identified as cause does not take place. But though the event identified as cause takes place the event of effect may or may not take place. So, if 'cause' indicates necessary condition then we can infer cause from effect. But we cannot infer effect from cause. We can infer the absence of effect from the absence of cause.

(c) **Cause as sufficient condition:** When two events (A and B) are so related that if one occurs then the second occurs and if the first does not occur then the second may or may not occur then the first event will be regarded as the sufficient condition of the second. For example we can say that rain is the sufficient condition of wetting of soil because if there is rain the soil will become wet; but if there is no rain the soil may become wet. The event of Sufficient condition can be illustrated in the following symbolic manner:

Antecedent	Consequent
+ A	+ B
-- A	+ / -- B

Therefore, A is the Sufficient condition of B

If 'Cause' is used in the sense of sufficient condition then it is said that Cause is such an event just immediately after the effect takes place. In this case we can infer effect from the cause. But in this case we cannot infer cause from effect because in this case there can be many causes of effect. So, in this sense we can infer the absence of cause from the absence of the effect; but we cannot infer the absence of effect from the absence of the cause. Therefore, in this sense we have to say that cause is not the universal antecedent of the effect, but effect is the universal consequent of the cause.

(d) **Cause as necessary and sufficient condition:** When two events (A and B) are related in such a way that if the first does not occur then the second does not occur and if the first occurs then the second occurs then the first event will be the Necessary-Sufficient condition of the second event. For example, burning fire with wet fuel is the necessary-sufficient condition of smoke because if there is no burning of fire with wet fuel then there will be no smoke and if there is contact of fire with wet fuel then there will be smoke.

The event of Necessary-Sufficient condition can be illustrated in the following symbolic manner:

Antecedent**Consequent**

-- A

-- B

+ A

+ B

Therefore, A is the Necessary-Sufficient condition of B

If 'Cause' is regarded as Necessary-Sufficient condition then in this view the previous views are combined. Those who consider 'Cause' in this sense consider 'cause' as universal antecedent to the effect. In this case we can infer effect from the cause and we can infer the cause from the effect.

(e) Doctrine of Plurality of Causes: The Doctrine of the Plurality of Causes means that the same effect may be produced by different causes in different cases. For example, death may be caused by disease in one case, by drowning, hanging, accident, poisoning, starvation, old age in other cases. Mill and Bain are the adherents of this doctrine. Mill says, "It is not true, that one effect must be connected with only one cause, that each phenomenon can be produced only in one way. There are often several independent modes in which the same phenomenon could have originated." Bain says, "In causation, the same cause always produces the same effect, but the converse does not hold; the same effect is not always produced by the same cause. There may be Plurality of Causes."

The Doctrine of Plurality of Causes is different from the Doctrine of the Composition of Causes. According to the former X may be produced by A, B, C, D or E acting singly, according to the later A, B, C, D, E combine to produce X.

Evaluation of the view: Though the doctrine of the Plurality of Causes is recognized to be a sound doctrine from popular viewpoint, it is considered untenable from scientific standpoint due to the following reasons:

(i) The doctrine can be proved to be false by specializing the effect, i.e. by taking the whole effect into consideration. The doctrine is untenable, because we take the entire cause, but a partial view of the effect into account. Just as the sumtotal of various antecedents, so is the effect the sumtotal of many consequents. So if in the case of the cause, we take all the antecedents into account, we should in the case of the effect take all take all the consequents into account. For example, Death produced by starvation is not the same kind of death as that produced by drowning. So if the whole effect is taken into consideration, it cannot be said that death can be produced by different causes. Death caused by starvation is different from death caused by

poisoning; again death caused by poisoning is different from death caused by disease and so on. So if there are different causes of death, there are also different kinds of death.

(ii) The doctrine can also be proved to be false by generalizing the cause, i.e. by taking into account the general or common characteristic of the cause. If we take a partial view of the effect, we should also take a partial view of the cause, i.e. we should also take into account some condition which is general or common to the cause. Thus if it is said that death is caused by various causes, such as starvations, drowning, poisoning, oldage etc., we may say that the different causes of death have only one condition which is general or common to all the cases of death, i.e. the failure of vital functions. So the doctrine of the Plurality of causes can be shown to be unsound by generalizing the cause.

(iii) The doctrine of the Plurality of Causes is inconsistent with the scientific conception of cause as an invariable antecedent.

If an effect can be produced by different causes, then the cause cannot be an invariable antecedent of the effect. For example, if death is caused in one case by fever, in other case by poison, and in a third case by starvation, none of these causes can be regarded as an invariable antecedent. If cause is defined as an invariable antecedent, there can be no Plurality of Causes.

Though the doctrine of Plurality of Causes is thought to be scientifically unsound, its practical value cannot be ignored. This will be evident from the stamen of Mellone in this regard: "The doctrine of plurality is only a practical working caution. In the absence of scientific knowledge of the immediate cause, we have to bear in mind that different combinations of circumstances may bring about the same event."

Exercises

Find out the correct alternative from the following:

- 1) The conclusion of Inductive inference is _____ proposition.
(a) Universal synthetic (b) Universal analytic
(c) Particular synthetic (d) Particular analytic
- 2) Observation and experiment are the _____ basis of Induction.
(a) Formal (b) Material (c) Logical (d) Natural

- 3) The Law of Causation and Law of Uniformity of Nature are the _____ basis of Induction.
(a) Formal (b) Material (c) Logical (d) Natural
- 4) Cause is _____ event to the effect.
(a) Antecedent (b) Consequent (c) Identical (d) Contradictory
- 5) From the view point of _____ cause is the antecedent to the effect.
(a) Quality (b) Quantity (c) Quality-quantity (d) Identity
- 6) According to _____, cause is the combination of positive and negative conditions.
(a) Mill (b) Bain (c) Copi (d) Read
- 7) According to _____, cause is not simple event in any cases; rather from the analysis of cause some conditions are obtained.
(a) Mill (b) Bain (c) Copi (d) Read
- 8) In logic 'cause' is divided into _____ types as the component of cause.
(a) Two (b) Three (c) Four (d) Five
- 9) The light of the Sun is the _____ condition of the growth of trees.
(a) Necessary (b) Sufficient (c) Logical (d) Necessary-sufficient
- 10) The presence of oxygen is the _____ condition of getting fire.
(a) Necessary (b) Sufficient (c) Logical (d) Necessary-sufficient
- 11) If we understand _____ condition as 'cause' then we can infer cause from effect.
(a) Necessary (b) Sufficient (c) Logical (d) Necessary-sufficient
- 12) If we understand _____ condition as 'cause' then we can infer the absence of effect from the absence of cause.
(a) Necessary (b) Sufficient (c) Logical (d) Necessary-sufficient
- 13) If two events are related in such a way if the first occurs then the second occurs and if the first does not occur then the second may occur then the first will be the _____ condition of the second.
(a) Necessary (b) Sufficient (c) Logical (d) Necessary-sufficient
- 14) If 'cause' indicates _____ condition then the absence of cause can be inferred from the absence of effect.
(a) Necessary (b) Sufficient (c) Logical (d) Necessary-sufficient
- 15) If 'cause' indicates _____ condition then it is said that cause is not the universal antecedent of effect, but effect is the universal consequent of the cause.

- (a) Necessary (b) Sufficient (c) Logical (d) Necessary-sufficient
- 16) Burning fire in wet fuel is the _____ condition of smoke.
 (a) Necessary (b) Sufficient (c) Logical (d) Necessary-sufficient
- 17) According to _____, cause is necessary-sufficient condition.
 (a) Mill (b) Bain (c) Copi (d) Read
- 18) If it is necessary to infer cause from effect and effect from cause then 'cause' is to be taken in the sense of _____ condition.
 (a) Necessary (b) Sufficient (c) Logical (d) Necessary-sufficient
- 19) The view of Mill about 'cause' is criticized by _____.
 (a) Hume (b) Bain (c) Copi (d) Read
- 20) The supporter of Doctrine of Plurality of Causes is _____.
 (a) Mill (b) Quine (c) Copi (d) Read
- 21) The supporter of Doctrine of Uniqueness of Cause is _____.
 (a) Mill (b) Bain (c) Copi (d) Read
- 22) If effect is taken _____ then the falsity of the Doctrine of Plurality of Causes can be shown.
 (a) Universally (b) Particularly (c) Affirmatively (d) Negatively
- 23) If cause is taken _____ then the falsity of the Doctrine of Plurality of Causes can be shown.
 (a) Universally (b) Particularly (c) Affirmatively (d) Negatively
- 24) According to Mill, cause is considered as _____ condition.
 (a) Necessary (b) Sufficient (c) Logical (d) Necessary-sufficient
- 25) According to the Doctrine of _____, one effect can have only one cause.
 (a) Plurality of Causes (b) Uniqueness of Cause
 (c) Combination of Causes (d) Empirical view of Cause

Answer the following questions in one or two sentences:

- 1) How does Mill define cause?
- 2) How does Bain define cause?
- 3) How does Carveth Read define cause?
- 4) What is the quantitative definition of cause?
- 5) From which lay of science do we get the quantitative definition of cause?
- 6) Which philosopher has considered cause as the combination of positive and negative conditions?

- 7) What type of condition is the presence of electricity in weir for the running of electric engine?
- 8) What is sufficient condition?
- 9) Give one example of sufficient condition.
- 10) What is necessary condition?
- 11) Give one example of necessary condition.
- 12) What is necessary-sufficient condition?
- 13) Give one example of necessary-sufficient condition.
- 14) Under which condition do we infer effect from cause?
- 15) Under which condition do we infer cause from effect?
- 16) In which sense do the Pluralists consider the term 'cause'?
- 17) Who is the supporter of Uniformity of cause?
- 18) Who are the supporters of Plurality of Causes?
- 19) What is the doctrine of Plurality of Causes?
- 20) What is the positive condition?
- 21) Give example of positive condition.
- 21) What is the negative condition?
- 22) Give example of negative condition.
- 23) 'If A occurs then B occurs and if A does not occur then also B may occur' – what is the relation between A and B?
- 24) What is the doctrine of Combination of Causes?
- 25) Mention two ways to solve the problem of Plurality of Causes.

Chapter – 3

Mill's Method of Experical Enquiry

Ten (10) marks allotted by H.S.Council for this chapter

MCQ-1X2=2

DAQ-8X1=8

Content: (a) Definition and Explanation, Symbolic and Concrete Instances, Characteristics, Advantages, Disadvantages, (b) Testing the Inductive Arguments by applying Mill's those methods.

(a) Principle of Elimination: Mill in his book 'A System of Logic' has given five Inductive Methods for determining cause and effect relation between two events. These Methods depend upon some principles of elimination. Mill said that these principles are obtained from the analysis of the Methods. There are three principles of elimination:

(i) Whatever antecedent can be left out without prejudice to the effect can be no part of the cause. For example, suppose, it is said that Malaria does not take place for drinking poisonous water. But if it is seen that Malaria takes place without drinking poisonous water, then it has to be concluded that there is no relation between Malaria fever and drinking poisonous water.

Qualitatively cause is unchangeable antecedent to the effect. The above principle of elimination is based upon this qualitative definition of cause. **According to Mill, the method of Agreement is based upon this principle of elimination.**

(ii) When an antecedent cannot be left out without the consequent disappointing, such an antecedent must be the cause or a part of the cause. For example, the bite of Anopheles mosquito is surely the cause of Malaria fever because where there is no bite of Anopheles mosquito, there is no Malaria fever.

Mill's method of Difference is based upon this second principle of elimination.

(iii) An antecedent and a consequent rising and falling together numerical concomitance are to be held as causally connected. For example, the mercury of the thermometer raises high with the rise of heat; besides, the mercury gets lower with the decrease of heat. From this it is inferred that the up-down of the mercury of the thermometer is causally connected with the up-down of heat.

This principle of elimination is based upon the quantitative definition of cause and effect. According to Mill, the method of Concomitant Variation is based upon this principle of elimination.

(b) Method of Agreement:

Definition and explanation: Mill in his book *A System of Logic* has defined the principle or canon of the Method of Agreement as “ *If two or more instances of the phenomenon under investigation have only one circumstance in common, the circumstance in which alone all the instances agree is the cause (or effect) of the given phenomenon*”.

The first Principle of Elimination, on which this method is based, implies that if a circumstance is left-out and yet the given phenomenon is found to remain present, then it may be concluded that there cannot be any causal connection between the two. This method is also based on a principle of selection according to which if a particular circumstance is always present, when the given phenomenon is present, they are causally connected.

In case of Method of Agreement we observe some instances in which we find one event in antecedent and consequent. On the basis of this similarity we find causal relation between the two events. This is a method of observation. So, the conclusion of this argument is probable.

Formal and concrete example of Method of Agreement:

(i) Formal example of the Method of Agreement is as follows:

Antecedent	Consequent
ABC	abc
ACD	acd
ADE	ade

Therefore, A is the cause of a.

(ii) Concrete example of the Method of Agreement: In some instances we may find the presence of cloud and rain to occur together in the sky. But there are differences among those in instances in many respects. From the similarity of these two events we can infer a causal relation between the cloud and rain.

Characteristics of Method of Agreement: (a) this method is applied even by the common people in daily life either consciously or unconsciously. (ii) this method considers only similar events or facts present in the observed instances.

Advantages of Method of Agreement: (a) the method being essentially a method of observation, shares in its advantages over experiment. (b) This method has a wide field of application. (c) This method enables us to proceed both from the cause to effect and from the effect to the cause. (d) This method

has a great suggestive value. It may suggest a hypothesis and thus in the discovery of causal connection.

Disadvantages of the Method of Agreement: (a) This method may be vitiated by the doctrine of Plurality of Causes. This defect is called by Mill the ‘characteristic imperfection’ of the method, because the defect is inherent in the very nature of this method. (b) The possibility of hidden or unknown antecedents may vitiate the Method of Agreement. This defect is called the ‘practical imperfection’ because such defect arises in course of the practical application of the method. (c) The Method of Agreement is incompetent to distinguish Causation from Co-existence.

(C) Method of Agreement and Difference:

Definition and explanation: Mill in his book A System of Logic has defined the principle or canon of the Method of Agreement as *“If two or instances in which the phenomenon occur have only one circumstance in common, while two or more instances in which it does not occur have nothing in common save the absence of that circumstance, the circumstance in which alone the two sets of instances differ is the effect or the cause or an indispensable part of the cause of the phenomenon”*.

In case of **Method of Agreement and Difference** or **Joint Method** we observe two sets of instances: one positive and one negative. From these instances we make a relation between the two events. This is a method of observation. So, the conclusion of this argument is probable.

Formal and concrete example of Method of Agreement and Difference:

Formal example of the Method of Agreement and Difference is as follows:

Set of Positive instances		Set of Negative instances	
Antecedent	Consequent	Antecedent	Consequent
ABC	abc	ABC	abc
ACD	acd	BCD	bcd
ADE	ade	CDE	cde

Therefore, A is the cause of a.

Concrete example of the Method of Agreement and Difference: It is observed that persons consuming adulterated mustard oil suffer from Beriberi,

but persons who do not consume it are free from the attack of this disease. Therefore, it is concluded that adulterated mustard oil is the cause of Beriberi.

Characteristics of Method of Agreement and Difference: (i) this method involves two sets of instances: positive and negative. (ii) this method is called 'method of double agreement' because it involves one 'agreement in presence in the set of positive instances and the other is agreement in absence in the set of negative instances. (iii) this method is an improved form of the method of Agreement because it considers the set of negative instances and makes the conclusion more probable.

Advantages of the Method of Agreement and Difference: (a) this method has a wide range of application. (b) this method helps us to proceed from cause to effect and from effect to cause. (c) this method is free from the effect of the Plurality of Causes, in cases where the negative set of instances is made Sufficiently exhaustive. (c) the Joint Method of Agreement and Difference, according to Mill, is a great extension and improvement of the 'Single Method of Agreement'. (d) the Joint Method may sometimes act as a good substitute for the Method of Difference.

Disadvantages of the Method of Agreement and Difference: (a) this method may fail to distinguish co-existence from causation. (b) this process is long and laborious. (c) if the negative instances are not made sufficiently exhaustive, the method does not remain free from the difficulty of the Plurality of Causes.

(D) Method of Difference:

Definition and explanation: Mill in his book A System of Logic has defined the principle or canon of the Method of Agreement as "*If an instance in which the phenomenon under investigation occurs, and an instance in which it does not occur, have every circumstance in common save one, that one occurring only in the former, the circumstance in which alone the two instances differ is the effect, or the cause, or an indispensable part of the cause of the phenomenon*".

In case of the **Method of Difference** we find two instances: one positive and one negative. On the basis of these two instances we make a relation

between the two events. This method is mainly a method of experiment. So, the conclusion of this argument is certain.

Formal and concrete example of Method of Difference:

Formal example of the Method of Difference is as follows:

Antecedent	Consequent
ABC	abc
BC	bc

Therefore, A is the cause of a.

Concrete example of the Method of Difference: A bell is rung in a jar full of air and it makes a sound. But it makes no sound when the jar is emptied of air. Other circumstances remain unaltered. We, therefore, infer that the presence of air in the jar is the cause of the sound of the bell.

Characteristics of Method of Difference: (i) this method is pre-eminently a method of experiment. It requires only two instances which differ only in one circumstance, while other circumstances remain the same. (ii) this Method is a method of proof. If the requirements of this method can be strictly followed, it can decisively prove a causal connection. (iii) this method is frequently applied in our daily life inferences. But we should however note that a loose application of this method gives rise to error.

Advantages of the Method of Difference: (a) this method can prove Causal connection certainly. (b) this method is very simple for it requires just two instances. So if this method is applied carefully in our daily life, it will give us certain conclusions. (c) this method can confirm the conclusion suggested by the Method of Agreement.

Disadvantages of the Method of Difference: (a) this method cannot be employed in the cases of permanent causes i.e. causes which cannot be completely eliminated, such as gravity, heat, etc.(b) this method does not enable us to proceed from effect to cause because it is not possible for us to add to or subtract from groups of causes.(c) this method cannot completely cope with the Plurality of Causes. (d) this method cannot distinguish a Cause from a Condition. (e) this method if loosely applied may lead to the fallacy of

post hoc ergo propter hoc. (f) if the antecedent is not immediate, this method may lead to wrong conclusion. (g) the application of this method is very difficult because this method requires two instances of a very special kind and as such the requirements of this method cannot be easily fulfilled.

(E) Method of Concomitant Variation:

Definition and explanation: Mill in his book A System of Logic has defined the principle or canon of the Method of Concomitant Variation as *“Whatever phenomenon varies in any manner, whenever another phenomenon varies in some particular manner, is either a cause or an effect of that phenomenon or is connected with it through some fact of causation”*.

In case of the **Method of Concomitant Variation** we consider the cause from the view point of quantity. In some instances of observation or experiment if we find two events to be connected or related quantitatively then we consider those two events as cause and effect to each other. In case of observation the conclusion is probable and in case of experiment the conclusion is certain.

Formal and concrete example of Method of Concomitant Variation:

Formal example of the Method of Concomitant Variation is as follows:

Antecedent	Consequent
ABC	abc
$A^+B^+C^+$	$a^+b^+c^+$
$A^{++}B^{++}C^{++}$	$a^{++}b^{++}c^{++}$

Therefore, A is the cause of a.

Concrete example of the Method of Concomitant Variation: As the atmospheric pressure increases, the column of mercury in a barometer increases. Therefore, it is concluded that the atmospheric pressure is the cause of its rise or fall.

Characteristics of Method of Concomitant Variation: this method can be applied to quantitative changes of phenomena, especially in cases of what Mill calls permanent, i.e. causes which cannot be totally eliminated, such as gravity, atmospheric pressure, heat etc. We cannot get an instance in which, for

example, atmospheric pressure is altogether absent. But though the complete elimination of these permanent causes is not possible, their partial elimination can be secured, as they vary in degrees.

Advantages of the Method of Concomitant Variation: (a) this method can be sometimes used as a substitute for the Method of Difference. (b) this method may sometimes be used as supplementary to the Method of Difference to enable us to determine the exact rate according to which the quantitative variation takes place. (c) this method may help discovery by suggesting causal connection particularly when the variation is of an extreme nature.

Disadvantages of the Method of Concomitant Variation: (a) this method cannot deal with qualitative variations. (b) this method holds good upto a certain limit of quantitative variations. (c) this method being a modification of the Method of Agreement or that of Difference is subject to the defects of these two methods.

(F) Testing the Inductive Arguments by applying Mill's those methods.

1) Scarlet flowers have no fragrance.

Ans: This instance is an application of the Method of Agreement. In this example there is a set of positive instances. In these instances we observe some 'Scarlet flowers' and 'absence of fragrance'. On the basis of the agreement of these instances we conclude that 'Scarlet flowers have no fragrance'. The conclusion of this argument is based upon experience. So the conclusion is not certain, it is probable.

2) Intermittent fever is found only in places where there are marshes, even though they differ in every other respect.

Ans: This inference is an application of the Joint Method of Agreement and Difference. In the positive set of instances we find the uniform presence of marshes and intermittent fever and in the negative set of instances we find the uniform absence of the two phenomena. From this we conclude, by the application of the above method, that marshes are the causes of intermittent fever. This inference of the Method of Agreement and Difference is based upon observation, so, the conclusion is probable.

3) If a particular portion of brain is removed, a particular part of the body is paralysed.

Ans: Here, we have an instance of the experimental application of the Method of Difference. We have just two instances of experiment. In one instance, the entire brain is there and all parts of the body are functioning normally. In another instance, which is obtained by experiment, a particular portion of the brain is removed with the result that a particular part of the body is paralysed, though all other circumstances remain exactly the same. Hence, a causal connection is established between 'the removal of a particular portion of the brain' and 'the paralysis of a particular part of the body' by the application of the Method of Difference. As the conclusion is derived from a method of experiment the conclusion is certain.

4) The greater the heat, the more quickly does ice melt.

Ans: The conclusion has been arrived at by the application of the Method of Concomitant Variation. Here through experiment we observe that the degree of heat and the rate at which ice melts vary concomitantly. So by applying the above method, we conclude that heat causes the melting of ice. As the instances of this inference have been supplied by experiment the conclusion is certain.

5) With the increase population, there is increase of crimes. Crimes, therefore, must be due to increase of population.

Ans: This inference is an application of the method of Concomitant Variation. In some instances of observation we find the unidirectional increase of 'population' and 'crimes' to appear together. On the basis of these instances we conclude that crimes must be due to the increase of population. This argument is an instance of observation. So, the conclusion is not certain, it is probable.

EXERCISES

Find out the correct alternative among the following:

1) The name of the method in which Mill has forwarded his Experimental Methods is _____.

(i) Introduction to Logic

(ii) System of Logic

(iii) Methods of Logic

(iv) Deductive and Inductive logic

2) The Method of Agreement of Mill is based upon the _____ principle of elimination.

- (i) First (ii) Second (iii) Third (iv) Fourth

3) The Method of _____ Variation is based upon the third principle of elimination.

- (i) Agreement (ii) Difference (iii) Concomitant Variation (iv) Residue

4) The Method of _____ of Mill is called Method of dual agreement.

- (i) Agreement (ii) Difference (iii) Concomitant Variation (iv) Residue

5) Mill's _____ is the improved form of the Method of Agreement.

- (i) Agreement (ii) Difference (iii) Concomitant Variation (iv) Residue

6) Method of _____ considers Cause from the view point of quantity.

- (i) Agreement (ii) Difference
(iii) Agreement and Difference (iv) Concomitant Variation

7) According to Mill, the Method of _____ is a method of discovery of Cause-effect.

- (i) Agreement (ii) Difference
(iii) Agreement and Difference (iv) Concomitant Variation

8) According to Mill, the Method of _____ is a method of proof of Cause-effect.

- (i) Agreement (ii) Difference
(iii) Agreement and Difference (iv) Concomitant Variation

9) If we observe the presence of mosquito and malaria together and consider the two causally connected then that will be an instance of the Method of _____.

- (i) Agreement (ii) Agreement and Difference
(iii) Difference (iv) Concomitant Variation

10) From the application of the Method of _____ we can go to effect from cause and to cause from effect.

- (i) Agreement (ii) Agreement and Difference
(iii) Difference (iv) Concomitant Variation

11) Method of _____ of Mill cannot distinguish causal relation from co-effect.

- (i) Agreement (ii) Agreement and Difference
(iii) Difference (iv) Concomitant Variation

12) In case of the Method of _____ we need only two instances.

- (i) Agreement (ii) Agreement and Difference
- (iii) Difference (iv) Concomitant Variation

13) Method of _____ is method of discovery, not method of proof.

- (i) Agreement (ii) Agreement and Difference
- (iii) Difference (iv) Concomitant Variation

14) Mill has considered Method of _____ as the best among the methods of proof.

- (i) Agreement (ii) Agreement and Difference
- (iii) Difference (iv) Concomitant Variation

15) Fallacy of _____ takes place from the careless application of the method of Difference.

- (i) Post Hoc Ergo Propter Hoc (ii) Mistaking a condition as Cause
- (iii) Mistaking co-effects as cause (iv) Mistaking irrelevant factor as Cause

16) Mill's method of _____ called Method of Dual Agreement.

- (i) Agreement (ii) Agreement and Difference
- (iii) Difference (iv) Concomitant Variation

17) In case of the Method of _____ we need two sets of instances.

- (i) Agreement (ii) Agreement and Difference
- (iii) Difference (iv) Concomitant Variation

18) Method of _____ can be applied in both cases of observation and experiment.

- (i) Agreement (ii) Agreement and Difference
- (iii) Difference (iv) Concomitant Variation

19) Mill's method of _____ considers cause from the view point of quantity.

- (i) Agreement (ii) Agreement and Difference
- (iii) Difference (iv) Concomitant Variation

20) Mill's method of _____ cannot eliminate permanent cause from its scope.

- (i) Agreement (ii) Agreement and Difference
- (iii) Difference (iv) Concomitant Variation

21) Mill's method of _____ can be applied upto a certain level of quantitative change.

- (i) Agreement (ii) Agreement and Difference
- (iii) Difference (iv) Concomitant Variation

22) 'Thunder causes lightning' is an application of the method of _____.

- (i) Agreement
- (ii) Agreement and Difference
- (iii) Difference
- (iv) Concomitant Variation

23) 'The sky is overcast with cloud. Therefore, it will be rain.'- is an application of the Method of _____.

- (i) Agreement
- (ii) Agreement and Difference
- (iii) Difference
- (iv) Concomitant Variation

24) The Method of _____ of Mill helps us to formulate hypothesis about cause or effect.

- (i) Agreement
- (ii) Agreement and Difference
- (iii) Difference
- (iv) Concomitant Variation

25) When the accompanying events change with the change of Antecedent and Consequent in case of the Method of Concomitant Variation then it is the application of the Method of _____.

- (i) Agreement
- (ii) Agreement and Difference
- (iii) Difference
- (iv) Concomitant Variation

Answer the following questions (not more than 200 words):

- 1) What is the Principles or Cannons of elimination? What are different Cannons used by Mill in cases of his Methods of Experimental Enquiry? Name the methods for the application of these Cannons.
- 2) Explain critically the Method of Agreement of Mill by giving the following specifications. (Definition and Explanation, Symbolic and Concrete Instances, Characteristics, Advantages, Disadvantages)
- 3) How does Mill define the Method of Difference? Give the symbolic and concrete example of this method. Mention two merits and demerits of this method.
- 4) Explain the definition of the Method of Agreement and Difference. Give one symbolic and one concrete example of this method. Mention two advantages and two disadvantages of this method.
- 5) What is the definition or canon of the Method of Concomitant Variation as given by Mill? What are the characteristics of this method? Mention two merits and two demerits of this method.

6) 'Whenever I go out for morning walk I catch cold and whenever I do not do so I do not catch cold. From this it can be concluded that morning walk is the cause of my catching cold.' – Which method of Mill is applied here in this instance? Give the canon of the method. Explain the method mentioning two advantages and two disadvantages.

7) 'A particular portion of brain is removed and a portion of our body is paralyzed. So, the removal of the portion of brain is the cause of paralyse.' – Which method of Mill is applied in the above example? Give the canon of the method. What are different features of Mill? Mention two advantages and disadvantages of this method.

Chapter – 4 Inductive Fallacies

Eight (8) marks allotted by H.S.Council for this chapter

DAQ-8X1=8

Content: (a) Illicit Generalization; (b) Post Hoc Ergo Propter Hoc; (c) Taking co-effects of the same cause as causes of one another; (d) Taking a necessary condition as the whole cause; (e) Taking an irrelevant factor as a cause; (f) Bad Analogy; (g) Testing Inductive Fallacies

Introduction: In case of Inductive inferences we try to draw universal synthetic conclusion from our observation of some particular instances. For drawing conclusions we have to depend upon different steps or processes. If these arguments fail to follow these steps or processes then those arguments will become fallacious. These fallacies are called Inductive Fallacies. The following fallacies are discussed with examples according to the syllabus of Higher Secondary.

(a) Illicit Generalization: When a universal conclusion hastily drawn on the basis of uncontradicted experience and without taking the help of causal relation then that generalization is called Illicit Generalization. If we make the generalization only on the basis of our observation some instances of co-existence of two events without taking the help of causal relation and without observing the negative instances then this fallacy will take place. Generalization will be valid only when we will take the help of the law of Causation and law of Uniformity of Nature. According to Mill, this fallacy can take place only in cases of our applications of inductive methods like Method of Agreement and Method of Concomitant Variation (cases of observation).

For example, when we go to Puri and see that the hotel has provided rotten meal, and from that if we conclude that all hotels of Puri provide rotten meals then the argument will be fallacious and the name of the fallacy is Fallacy of Illicit Generalization.

(b) Post hoc ergo propter hoc: Cause is an antecedent of the effect and effect is the consequent of the cause. But for that all antecedent events cannot be regarded as cause. In reality cause is the universal unconditional antecedent of the effect. But if any event is considered as the cause then the name of the fallacy is Fallacy of Post Hoc Ergo Propter Hoc. The meaning of the term is 'after

this, therefore, on account of this'. From the false or unconscious or misapplication of the Method of Difference this fallacy takes place. In case of this fallacy we find the application superstition, false belief etc.

For example, the palm fruit falls just after the flying of the crow from the palm tree. From this observation if I conclude that flying of the crow is the cause of fall of the palm fruit, then the argument will be fallacious. The name of the fallacy is Fallacy of Post Hoc Ergo Propter Hoc.

(c) Taking co-effects of the same cause as causes of one another: In our experience we can see that many effects are produced from a same cause. These effects are called Co-effects of each other. Among these co-effects if one is considered cause of the other, then there will be a fallacy in the argument. The name of the fallacy is Fallacy of Taking Co-effects of the Same Cause as Causes of One Another. For this fallacy causal relation cannot be established between two events. For the inappropriate application of the Method of Agreement and Method of Concomitant Variation this fallacy takes place.

When we observe two events day and night to appear together and conclude that day is the cause of night or night is the cause of day then the argument will be fallacious. In reality day and night are two co-effects originated from the event of rotation of earth. These two events cannot be causally connected in any way.

(d) Taking a necessary condition as the whole cause: Cause is the combination of some conditions. Among these conditions some are sufficient and some are necessary. Among these necessary conditions if a particular condition is considered as cause of an effect, then the argument will involve a fallacy. The name of the fallacy is Fallacy of Taking a Necessary Condition as the Whole Cause. In cases of the Method of Difference and Concomitant Variation and even in the cases of Method of Residue this fallacy can take place.

For example, if we consider the toughness of the question paper as the cause of failure of a student then there will be fallacy of taking a necessary condition as the whole cause. There are many conditions of the failure of the student like, the merit of the student, absence of regular study, absence of the home tutor etc. By ignoring these conditions if we consider the above condition as the total cause then the above fallacy will take place.

(e) Taking an irrelevant factor as a cause: Though the cause is the antecedent of an effect we cannot consider any antecedent as the cause. So, if we consider any

irrelevant or unnecessary event as cause without considering the real cause then the fallacy of causation which will take place is the Fallacy of Taking an Irrelevant Factor as a Cause. From the false application of the Method of Agreement and Concomitant Variation and from the analysis of sufficient condition this fallacy can take place.

A man takes liquor daily and becomes drunkard. When his friends complained against him he applied the Method of Agreement of Mill and observed that he consumed different types of liquors with same kind of soda water in different days and became drunkard. From such analysis he found the consumption of soda water as the cause of his becoming drunk. Under this situation he decided to take liquor without soda water. Though the Method of Agreement is properly applied in this case, there are defects of analysis of the events. In reality the consumption of soda water is totally irrelevant antecedent which is not the cause in any way.

(f) Bad Analogy: The value of the conclusion of analogical argument depends upon the importance and relevance of the observed similarities. When in case of an argument if the observed similarities are less in number or in importance then on the basis of those similarities if we draw the conclusion our conclusion become fallacious. The name of the fallacy is Fallacy of False or Bad Analogy. But if the conclusion is drawn from some instances of relevant similarities the conclusion will be justified and the argument will be good analogy.

Men and beasts are both animals. Beasts feel hunger, thirst etc like men. By observing the presence of rationality among men and on the basis of the previously observed similarities between men and beasts if we conclude that there will probably be the presence of rationality among beasts then the argument will involve a fallacy. The name of the fallacy is fallacy of false or Bad Analogy.

(g) Testing Inductive Fallacies.

(i) I have seen some men to die due to snake bite. So, I conclude that all snakes are poisonous.

Ans: The above argument is an application of the **Fallacy of Illicit Generalization**. This argument involves the false application of the Method of Agreement. I have seen many instances in which we find the occurrence of 'snake bite' and 'death of men' to appear together. On the basis of these similarities I hastily conclude that 'all snakes are poisonous'. But there are some instances which I have not perceived in which there are non-poisonous snakes

also. For overlooking these negative instances and for drawing this conclusion hastily the conclusion involves the Fallacy of Illicit Generalization.

(ii) Drought started in West Bengal just after the procession of a political party. Therefore, the procession of the party is the cause of drought.

Ans: The above argument is an application of the **Fallacy of Post Hoc Ergo Propter Hoc**. This argument involves the false application of the Method of Difference. This argument has two instances: one positive and one negative. In the negative instance we find the absence of 'drought in West Bengal' and 'procession of a political party'. In the positive instance we find the presence of the two. From these two instances we conclude that the procession of the party is the cause of drought. But these two events do not have causal connection in reality. So, for considering these events as causally connected it involves the **Fallacy of Post Hoc Ergo propter Hoc**.

(iii) High tide comes after low tide. Therefore, low tide is the cause of high tide.

Ans: This argument is an example of the Method of Agreement. This is an application of the Fallacy of taking Co-effects as Cause. In some instances we find 'high tides' and 'low tides' to occur together. But this cannot be said from these instances that these two events are causally connected. Actually these two Co-effects are caused from the attraction of the moon. But for considering these two Co-effects as cause and effect to each other the conclusion of the argument is fallacious and it involves the **Fallacy of Considering Two Co-effects as Cause and Effect**.

(iv) Cloud is the necessary condition of rain because there will be no rain if there is no cloud.

Ans: This argument is an example of the Method of Agreement. This is an application of the Fallacy of Considering a Condition as Whole Cause. In some instances we observe the presence of 'cloud' and 'rain' to occur together. But from these instances we cannot say that cloud is the cause of rain. Rather it can be said that this is a necessary condition of rain. For considering one condition as the total cause the conclusion of the argument becomes fallacious and it involves the **Fallacy of Considering a Necessary Condition as the Whole Cause**.

(v) Taking poison is the sufficient condition of death. Greek philosopher Socrates took death smilingly after taking poison. Therefore, smiling face is the cause of his death.

Ans: This argument is an application of the Method of Agreement. This is an example of considering an unnecessary condition as cause. Here in some instances, like one of Socrates we observe the presence of 'taking poison' and 'death'. But in this instance we have considered an irrelevant factor as cause when we consider the smiling face of Socrates as cause because we saw this smiling face of him as antecedent of the event of death. So the conclusion of this argument is fallacious and it involves the **Fallacy of Considering an Irrelevant Factor as Cause**.

(vi) The capital of a country is like the heart of a country. So, the increase of the volume of capital is harmful for the country.

Ans: This argument is an example of the fallacy of Bad or false Analogy. This is an application of argument by analogy. In case of analogical argument the conclusion depends upon the relevance of the observed similarities. In this argument we observe similarities between 'the capital of a country' and 'heart'. But the similarity which is perceived is not at all relevant for drawing the conclusion. For this reason the conclusion of the argument involves a fallacy and the name of the fallacy is **Fallacy of False or Bad Analogy**.

Exercises

Answer the following questions (not more than 200 words):

1. What is the meaning of inductive fallacies? Give the nature of these fallacies in short.
2. Write short notes:
(a) Illicit Generalization; (b) Post Hoc Ergo Propter Hoc; (c) Taking co-effects of the same cause as causes of one another; (d) Taking a necessary condition as the whole cause; (e) Taking an irrelevant factor as a cause; (f) Bad Analogy;
3. Discuss the following arguments and find out fallacies, if there is any:
a) Just after the appearance of the Comet on the sky the king died. Therefore, it is concluded that the appearance of the comet is the cause of death of the king.
b) A person committed suicide as his loan has become excessive in the market. So, the excess loan is the cause of his suicide.

- c) At the time of playing football the goalkeeper saw that in some matches he placed his torn boot at the right side of the goalpost and won. Therefore, he concluded that placing the torn boot at the right side is the cause of winning those matches.
- d) The ultimate destiny of a country is decay because country is a kind of human body and human body has old age and death.
- f) When the productivity of wheat increases in Russia then the birth rate is increasing in Kolkata. Therefore, the production of wheat in Russia is the cause of increase of birth in Kolkata.
- g) A man dies from his fall down the ladder. Therefore, falling down the ladder is the cause of his death.
- h) Night comes after day. So, day is the cause of night.
- i) Occasionally lightning comes before thunder. So, lightning is the cause of thunder.
- j) Give tractor to the farmers there will be good crop. So, tractor is the cause of good crop.
- k) I gave my examination after eating egg and banana and my examination becomes worse. Therefore, eating egg and banana is the cause of giving worse examination.
- l) In some cases we observe that telegram brings news of accidents or death. From this it is concluded that telegram always brings bad news.
- m) Many persons died from snake bites. So, all snakes are poisonous.
- n) I have come in contact with some educated persons and all of them are mad. From this I conclude that all educated persons are mad.
- o) The capital of a country is like the heart of a body. So, the increase of volume of the capital is harmful for the country.
- p) Do not give a deep bath in the water regularly because like a piece of rope your body may become rotten.
- q) The boy has fever after wearing his new dress. So, wearing his new dress is the cause of his fever.
- r) I have not seen good hand writing of the doctors. So, medical education is the cause of bad hand writing.
- s) Now-a-days the modern women are interested in household activities. So, woman education should not be encouraged.

- t) The day in which a saint cursed him he became ill. So, the curse of the saint is his illness.
- u) The call of owl is ominous because at the night before of fire everybody heard the call of owl.
- v) Morning dreams come true.
- w) We found some china dog ill tempered. We conclude that all china dogs are ill tempered.
- x) The Sun is certainly moving round the earth because it rises in the east and sets in the west.
- y) Many hawkers are seen dishonest. From these instances I conclude all hawkers as dishonest.
- z) Whenever Rambabu goes out for morning walk he meets accidents, but whenever he does not go he does not have such experience. Therefore, he concludes that going to morning walk is the cause of facing accidents.