BAYERO UNIVERSITY, KANO
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GSP 2205 PHILOSOPHY AND LOGIC
MODULE 5.

- LOGICAL TERMS
- LAWS OF THOUGHT
- NATURE AND FUNDAMENTAL PRINCIPLES OF LOGIC

BY

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What is Logic

- Logic is a non-empirical science of reasoning.
- As a science or study of careful reasoning by formal method (Longman).
- As a science of pure reasoning a way of reasoning or arguing (Webster).
- As a field of study dealing with criteria for the evaluation of an argument (Encyclopedia).
- As a science or art of making a distinction between straight and crooked reasoning (Irving Copi 1982).
- Is the study of the principles and methods used in distinguishing valid argument from those that are invalid.

What is a proposition

- Proposition is a declarative sentence which is either true or false but not both.
- Logical statement are propositional statement.
- Simple proposition

Ex 1 Kano is in Nigeria.

Ex 2 Jigawa is a local government in Kano.

Ex 3 2 +2 = 5

Ex 4 The sky is rich.

Ex 5 How are you Ali?

Ex 6 Come to our party!

Ex 7 BUK is in Nigeria.

Clearly Ex 1, 7 are True, and Ex 2, 3 are False while Ex 4, 5, 6 are **not** logical statement.

- Compound proposition : is a proposition constructed or formed by combining two or more simple proposition by using some logical terms.

What are logical terms

- The basic logical terms are

1. Negation (Not , ¬ or ~).
2. Disjunction (Or, V).
3. Conjunction (And, Λ).
4. Conditional (Implies, →).
5. Bi- Conditional (If and only if, ↔).

- All Logical terms are **Syncategorematic terms.**

DEFINITIONS

- **NAGETION**

Negation of P is symbolically represented as ~P and defined as

- If P is true, then ~P is false; If P is false, then ~P is true.
- The truth value of the negation statement is always the opposite of the original truth value statement.

- **DISJUNCTION**

P OR Q is symbolically represented as P V Q and defined as

- If P is true or Q is true or both P and Q are true, then P V Q is true otherwise P V Q is false.
- The disjunction of two statement is false only if each component is false.

- **CONJUNCTION**

P AND Q is symbolically represented as P Λ Q and defined as

- If P is true AND Q is true, then P Λ Q is true otherwise P Λ Q is false.
- The conjunction of two statement is true only if each component is true.

DEFINITION CONT`

- **CONDITIONAL**

Any statement of the form “If P then Q” or “P implies Q”.

Conditional statement are symbolically represented as P → Q

- The Conditional P → Q is true unless P is true and Q is false.
- The word P → Q state that a true statement can not imply a false statement.

- **Forms of conditional statements**

- Converse (Q → P)
- Inverse (~ P → ~ Q)
- Contrapositive (~ Q → ~ P)

DEFINITION CONT`

- **BI-CONDITIONAL**

Any statement of the form “P if and only if Q” or “P iff Q”.

Bi-conditional statement are symbolically represented as $P \leftrightarrow Q$

- If P and Q have the same truth values, then $P \leftrightarrow Q$ is true. If P and Q have opposite truth values, then $P \leftrightarrow Q$ is false.
- The biconditional statement can also be defined $(P \rightarrow Q) \Lambda (Q \rightarrow P)$.

- **TAUTOLOGY, CONTRADICTION AND CONTINGENCY**

- A TAUTOLOGY is a compound statement that is always **True (T)** no matter what the truth value of the proposition that occur in it.
- A CONTRADICTION is a compound statement that is always **False (F)** no matter what the truth value of the proposition that occur in it.
- A CONTINGENCY is a proposition which is neither a tautology nor a contradiction.

LAWS OF THOUGHT

- Laws are considered as the rule that guide everyone`s thinking thought, expression and decision.
- Aristotle gives necessary conditions for thought.
- **The law of identity** The law states that, A is A. In other words, everything is the same as itself. For example, human is human. Further, 3-2=1, if what the number 3 represents have the same identity with what the number 2 represents.
- **The law of non-contradiction** The law states that nothing can both be and not be at the same time and in the same sense. For example, the statements: “Ali is Nigerian” and “Ali is not Nigerian” cannot both be true in the same context.
- **The law of excluded middle** The law states that every statement is either true or false. In-fact this law is the principle for every proposition.

NATURE AND FUNDAMENTAL PRINCIPLES OF LOGIC

- Is the study of the principles and methods used in distinguishing valid argument from those that are invalid.
- Argument is simply defined as the collection of statements and a conclusion.
- The statements are called premises,
- where the premises and the conclusion are separated by either phrase or mark.

For example:

If you study hard, then you will pass GSP2205 (premise) You study hard (premise) So, you pass GSP2205 (conclusion)

- Some words that identified conclusion are therefore, hence, so and in conclusion etc

FUNDAMENTAL PRINCIPLES OF LOGIC

- Since not all arguments are valid, we need to identify the principles that will ensure the validity of an argument.
- For an argument to be valid,
- it must satisfy the laws of thought and in addition, an argument needs to satisfy the following fundamental principles of logic:

- No argument with all true premises but has a false conclusion is valid.
- If an argument has all true premises but has a false conclusion, then it is invalid.
- If an argument is valid, then every argument with the same form is also valid.
- If an argument is invalid, then every argument with the same form is also invalid.

NATURE OF AN ARGUMENT

- The nature of every argument is either valid or invalid.
- It is possible for a valid argument to have:
  - All true premises and a true conclusion
  - Some false premises and true conclusion
  - All false premises and a true conclusion
  - All false premises and a false conclusion.

Note: that it is not possible for a valid argument to have all true premises and a false conclusion.

Thanks

- **For listening.**