Mathematical Logic / Propositional Logic
x———x ———x ———x

Propositional Logic:

Logic is concerned with methods of reasoning.

Proposition/statement:→ A Proposition or statement is a declarative Sentence which is either true or false but not both.

example : 1. The Sun rises in the east — Statement (Yes)

   2. The Sun rises in the west — Statement (Yes).

   3. Mumbai is the capital of Bihar — Statement (Yes)

   4.

$$x + 4 > 8 \text{ , Statement (No)}$$, because for some value of x expression will be true and also for some value of x expression become false.

   5. Close the door — Not a statement, It is a command

   6. What a hot day! — Not a statement, It is exclamation.

Compound statement :→ A Proposition obtained from the Combinations of two or more Proposition using Connectives is called Compound Proposition.

Connectives : → The words and Phrases (or symbols) used to form Compound Propositions are called Connectives.

There are five basic connectives.

  ↳ Negation

  ↳ Conjunction

  ↳ Disjunction

  ↳ Implication / Conditional

  ↳ Equivalence / Bi-conditional.

Connectives Name	Connective word	symbol used	Symbolic form
Negation	not	$\neg, \sim$	$\neg P$
Conjunction	and	$\wedge$	$P \wedge q$
Disjunction	or	$\vee$	$P \vee q$
Implication/ Conditional	If --- then	$\Rightarrow, \rightarrow$	$P \rightarrow q$
Equivalence / Bi-conditional	if and only if	$\Leftrightarrow, \leftrightarrow$	$P \Leftrightarrow q$.

↳ Negation: if P is any proposition, the negation of P, denoted by $\sim P$ or $\neg P$ and read as not P,

 example: P: Paris is in France

     $\neg P$: Paris is not in france

Truth Table:

P	$\neg P$
T	F
F	T

↳ Conjunction: → If P and q are two statements, then Conjunction of P and q is the compound statement denoted by P∧q and read as " P and q"

example: P : Ram is healthy

q : He has blue eyes.

P∧q : Ram is healthy and he has blue eyes.

Truth Table

P	q	P∧q
T	T	T
T	F	F
F	T	F
F	F	F.

↳ Disjunction: → If P and q are two statements, the disjunction of P and q is the compound statement denoted by P∨q and read as " P or q "

example: P : Ram is an intelligent

q : Ram is hardworking

P∨q : Ram is an intelligent or hardworking.

Truth Table :

P	q	P∨q
T	T	T
T	F	T
F	T	T
F	F	F