

③ Negation :-  $(\text{Not}, A \& \bar{A})$

Given any proposition ' $p$ '. The Negation of  $p$  is denoted by

$\neg p$  or  $\neg p$

It is not the case that ' $p$ '

✓  $p$ : Ice floats on water

$\neg p$ : It is not the case that ice floats on water  
or

Ice not floats on water  
or

It is false that ice floats on water.

Truth Table for Negation :-

P	<u><math>\neg p</math></u>
T	F
F	T

④ Conditional proposition :-  $(\text{If } p \text{ then } q)$

If  $p$  and  $q$  be two propositions then the Conditional proposition

b/w  $p$  and  $q$  is denoted by

$p \rightarrow q$

If  $p$  then  $q$ :

$p$  :-  $1+1=2$  @  $p \rightarrow q$  :- If  $1+1=2$ , then  $2+2=4$ .

$q$  :-  $2+2=4$

⑤ If you wash the boss car then you will get promotion.  
 If you work hard then you will pass the course.

T  
F

④ If (you took exam)  $\rightarrow$  Y  $\rightarrow$  T  
F

Truth Table for Conditional proposition

P	q	$P \rightarrow q$
T	T	T
T	F	F
F	T	T
F	F	T

Determine which conditional statement is false.

- (a) If  $1+1=2$ , then  $2+2=5$ .  $\rightarrow$  F
  - b) If  $1+1=3$ , then  $2+2=4$ .  $\rightarrow$  T
  - c) If  $1+1=3$ , then  $2+2=5$ .  $\rightarrow$  T
  - d) If monkeys can fly, then  $1+1=3$ .  $\rightarrow$  T
- ↓  
F

$P \rightarrow q$   
[If P then q]

P	q	$P \rightarrow q$
T	T	T
T	F	F
F	T	T
F	F	T

### ⑤ BiConditional proposition (if and only if)

If  $p$  and  $q$  be two propositions then the biconditional b/w them is denoted by

$p \leftrightarrow q$   
 $p$  if and only if  $q$ .

⑥  $1+1=2$  if and only if  $2+2=5$ .

Truth Table for BiConditional proposition

$p$	$q$	$P \leftrightarrow q$
T	T	T
T	F	F
F	T	F
F	F	T

Determine whether these biconditionals are true or false.

- a)  $2 + 2 = 4$  if and only if  $1 + 1 = 2$ .  $\rightarrow T$
- b)  $1 + 1 = 2$  if and only if  $2 + 3 = 4$ .  $\rightarrow F$
- c)  $1 + 1 = 3$  if and only if monkeys can fly.  $\rightarrow T$
- d)  $0 > 1$  if and only if  $2 > 1$ .  $\rightarrow F$

$p$	$q$	$P \vee q$	$P \wedge q$	$\neg P$	$P \rightarrow q$	$P \leftrightarrow q$
T	T	T	T	F	T ✓	T
T	F	T	F	F	F ✓	F
F	T	T	F	T	T ✓	F
F	F	F	F	T	T ✓	T

If the truth value of  $A \vee B$  is true, then truth value of  $\neg A \wedge B$  can be

- a) True if A is false
- b) False if A is false
- c) False if B is true and A is false
- d) None of the mentioned

$A \vee B \rightarrow \text{True}$	
✓	<del>FF</del>
<del>FA</del>	<del>FT</del>
<del>AT</del>	<del>TT</del>