Lecture:2
Logic: Part II
Five Basic Logical Connectives Based on Precedence of Operators

(1) Not

NEGATION

$\neg$

TRUTH TABLE

p	$\neg p$
T	F
F	T

EXAMPLES

1. P : 2+5>1 (T)
   ¬ p:2+5≤1 (F)
2. q: it is hot(T)
   ¬q:it is hot (F)

(2) AND

CONJUNCTION

$\wedge$

TRUTH TABLE

P	q	$P \wedge$ q
T	T	T
T	F	F
F	T	F
F	F	F

[BOTH `T → T]

EXAMPLES

1. p:3<5 (T)
   q:2+3=6 (F)
   $p \wedge$ q: 3<5 and 2+3=6 (F)
2. p: it is raining (T)
   q: I am getting cold (T)
   $p \wedge$ q : It is raining and I am getting cold

(3) OR

DISJUNCTION

$\vee$

TRUTH TABLE

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

[BOTH 'F' → F]

EXAMPLES

1. p: 3+5=8 (T)
   q: 5<3 (F)
   $P \vee$q : 3+5 =8 or 5<3 (T)
2. P: 3 is a +ve Integer (T)
   q: √3 is a rational (T)
   $p \vee$ q :3 is a +ve integer no. or √3 is a rational number (T)

(4) IF…..Then

CONDITIONAL

$\rightarrow$

TRUTH TABLE

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

[If ' TF' →F]

EXAMPLES

1. p: I do not get the money (F)
   q: I shall buy the car (T)
   $P \rightarrow$q : if I do not get the money ,then I shall buy the car (T)
2. P:3+b=10 (F)
   q:2+b=9 (F)
   $P \rightarrow$q: if 3+b=10 then 2+6=9 (T)

(5) IF and only If

BICONDITIONAL

$\leftrightarrow(\rightarrow \leftarrow)$

TRUTH TABLE

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

[BOTH T ı F→ T]

EXAMPLES

1. P: 2 > 5 (F)
   q: 3 < 4 (T)
   $p \leftrightarrow$ q: 2>5 iff 3< 4 (F)
2. P: you can take the flight (T)
   q: you buy a ticket (T)
   $P \leftrightarrow$ q :you can take the flight iff you buy a ticket (T)