Lec #3:- Implication. $p \to q$

Converse:- $q \to p$

Contrapositive:- $\neg q \to \neg p$

Inverse:- $\neg p \to \neg q$.

Ex 9:- (P8) Find Contrapositive, Inverse & Converse of.

(the home team wins) whenever (it is raining).

Let p_2 the home team wins.
q_2 it is raining.

$p \to q$.
(q) whenever (p)

$=$ p whenever q.
$q \to p$.

Contrapositive $\neg p \to \neg q$.

if the home team does not win then it is not raining.

Converse:- H.W.

Inverse:- H.W.

"Session 1"

Bi-Conditional:- $\leftrightarrow$

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

T	F	F
F	T	F
F	F	T

"You can take flight iff you buy Air ticket".
p q.

p is necessary & Sufficient for q.
شرط كافي

if p then q & Conversly.
p iff q.

Compound Propositions.

$(p \vee \neg q) \rightarrow (p \wedge q)$.

p	q	$\neg q$	$p \vee \neg q$	$p \wedge q$	$(p \vee \neg q) \rightarrow (p \wedge q)$
T	T	F	T	T	T
T	F	T	T	F	F
F	T	F	F	F	T
F	F	T	T	F	F

Precedence.
1. $\neg$
2. $\wedge$
3. $\vee$
4. $\rightarrow$
5. $\leftrightarrow$.

Applications of Propositional logic.

1- System Specification.
2- Puzzles.
3- Searching.

System Specification:-

Ex15 :- P12

p.
"the diagnostic message is stored in buffer
(or) it is retransmitted"
q.

P12

(or) it is retransmitted" q.

" - the diagnostic message is (not) stored in buffer"

" (If) then the diagnostic message is stored in buffer it is retransmitted".

→ p ∨ q.

→ ¬p

→ p → q.

$p \vee q = T$ — ① X.

$\neg p = T$ — ② X.

$p \to q = T$ — ③

$F \to T = T$ — ✓

From ② we have $p = F$ — ④ X.

From ④ & ① we have $q = T$ — ⑤

from 5 & 3 it holds.

p	q	p ∨ q
T	T	T
T	F	T
F	T	T
F	F	F

X.

p	¬p
T	F
F	T

p	q	p → q
T	T	T
T	F	F
F	T	T
F	F	T

X.

p	q	p ∨ q
T	T	T
T	F	T
F	T	T
F	F	F

Ex 16. "the diagnostic message is stored in buffer"

Ex 16. "The diagnostic message is stored in buffer or it is retransmitted"

q.

" - the diagnostic message is (not) stored in buffer"

" (If) the diagnostic message is stored in buffer then it is retransmitted".

" The diagnostic message is not retransmitted".

$p \vee q = T$ — ①

$\neg p = T$ — ② X.

$p \to q = T$ — ③

$\neg q = T$ — ④ X.

from ② $p = F$ — ⑤

from ④ $q = F$ — ⑥

from 5, 6 & ① $F \vee F \neq T$.

HW P 20 Ex 49-55

Quiz # 1 29-08-2023.

the glasses are on the coffee table or it is inside desk.

- the glasses are not on the coffee table.

if the glasses are on the coffee table then it

is inside the desk.

The glasses are inside the desk.

Where are the glasses?