Lecture 3 Implication. $p \rightarrow q$. $(p \rightarrow q) \rightarrow r$.

1) Converse $q \rightarrow p$.
$r \rightarrow (p \rightarrow q)$

2) Contrapositive. $\neg q \rightarrow \neg p$.
$\neg r \rightarrow \neg(p \rightarrow q)$.

3) Inverse. $\neg p \rightarrow \neg q$.

For Complicated Expressions how to Compile truth table.

P10 EX11:- $(p \vee \neg q) \rightarrow (p \wedge q)$. $2^{\text{Variables}}$

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

Applications of propositional logic.

1- System Specification. (1 Question from Here).
2- Puzzles
3- Reasoning.

P12 | EX15:- "The diagnostic message is stored in buffer or it is retransmitted".

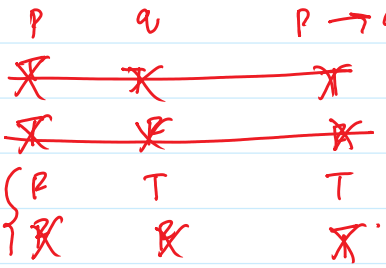
"The diagnostic message is not stored in buffer".

" If the diagnostic message is stored in buffer Then it is retransmitted".

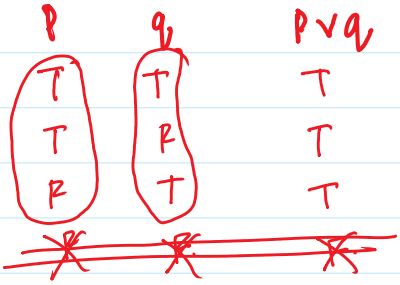
Let: p = The diagnostic message is stored in buffer
q = The diagnostic message is retransmitted"

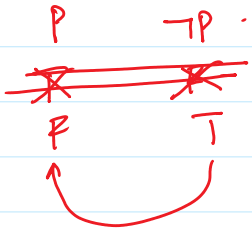
$p \vee q = T$ — (1) ✓
$\neg p = T$ — (2) ✓
$p \to q = T$ — (3) ✓

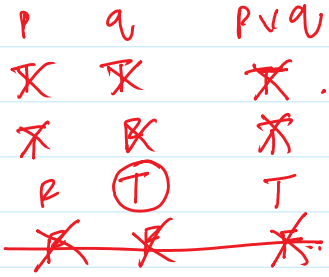
from (2) $p = F$. — (4) ✓
from (1)(4) $q = T$ — (5) ✓
from (5,2)(3) $F \to T = T$
which hold.



Rough work.







Ex 16 / P 12:- "The diagnostic message is stored in buffer or it is retransmitted".

" 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".

Let: p : The diagnostic message is stored in buffer
q : The diagnostic message is retransmitted"

$p \vee q = T$ — (1) ✓
$\neg p = T$ — (2) ✓
$p \to q = T$ — (3)
$\neg q = T$ — (4) ✓

from (2) $p = F$ — (5)
from (4) $q = F$ — (6)
from (5)(6) & (1) $F \vee F = T$.
$F \neq T$.

p	q	$p \vee q$
~~T~~	~~T~~	T
~~T~~	~~F~~	T
~~F~~	~~T~~	~~T~~
(F)	(F)	(F) $\neq T$.

p 20 p 49 - 54.
HW.

Quiz # 1.

if $2+3 \neq 5$ then I will not teach you.
Contrapositive. (given form).

a) Implication.
b) Contrapositive.
c) Inverse.
d) Converse.