

lecture 7:-

$$((P_1 \wedge P_2 \wedge \dots \wedge P_N) \rightarrow C) = \text{tautology.}$$

↓
Valid.

≠ tautology.
fallacy.

Ex 7:-

P1	$P \rightarrow Q$ ✓
P62	$P2 \quad \neg P \rightarrow \neg Q$ ✓
P3	$Q \rightarrow S$ ✓

C. $\therefore \neg Q \rightarrow S$.

from (P1) $\neg Q \rightarrow \neg P$ by CP. (4) ✓
 from (4, P2) $\neg Q \rightarrow \neg Q$ by HS (5) ✓
 from (5, P3) $\neg Q \rightarrow S$ by HS. (6) ✓
 which is Conclusion.

$\neg Q \rightarrow \neg P$	$\neg Q \rightarrow \neg Q$ ✓
$\neg P \rightarrow \neg Q$	$\neg Q \rightarrow S$ ✓
$\therefore \neg Q \rightarrow S$	HS $\therefore \neg Q \rightarrow S$

Problem 1:-
 Observation:- You need to remember all previous logical equivalences.

Example 8:-

P1:-	$T \rightarrow (M \vee E)$ ✓
P2:-	$S \rightarrow \neg E$ ✓
P3:-	$T \wedge S$ ✓

$\therefore M$.

from (P3) T by Simplification (4) ✓
 " " S " " (5) ✓
 from (P1, 4) $M \vee E$ " " MP (6) ✓
 from (P2, 5) $\neg E$ " " MP (7) ✓
 from (6, 7) M which is Conclusion.

Problem 2:-
 Sequencing problem.

P	Q
$\begin{pmatrix} T \\ T \end{pmatrix}$	$\begin{pmatrix} M \vee E \end{pmatrix}$
$\neg P$	$\neg Q$

$\therefore M \vee E$.

$S \rightarrow \neg E$
S

$\therefore \neg E$

$M \vee E \rightarrow$	$\begin{pmatrix} \cancel{M \vee E} \vee \cancel{M \vee E} \\ \cancel{M \vee E} \vee \cancel{M \vee E} \\ \therefore M \end{pmatrix}$
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P	P	$P \vee P$
T	T	T

P	P	P ∨ P
T	T	T
F	F	F

Proof by Resolution:-

Clause:- A disjunction of literals.

Step 1:-

P1:- $P \wedge Q \wedge R \rightarrow$ C1:- P
C2:- Q
C3:- R.

P2:- $P \rightarrow Q \rightarrow \neg P \vee Q$.

P3:- $P \vee Q \rightarrow P \vee Q$.

Step 2:- Take Negation of Conclusion & make clauses.

Step 3:- Repeatedly apply PR Until you get empty clause.

Ex P1:- P
P2:- $P \rightarrow Q$
C:- $\therefore Q$

C1:- P ✓
C2:- $\neg P \vee Q$ ✓
C3:- $\neg Q$ ✓

$P \vee Q$
 $\neg Q \vee \neg Q$
 $\therefore P \vee \neg Q$

from C1, C2 Q. — (4) ✓
from C3, 4 □ — (5)

$P \rightarrow Q = \neg P \vee Q$.

Ex 4:- P1:- $T \rightarrow M \vee E$
P5 P2:- $S \rightarrow T \vee E$
P3:- $T \wedge S$
 $\therefore M$

C1:- $\neg T \vee M \vee E$ ✓
C2:- $\neg S \vee T \vee E$ ✓
C3:- T ✓
C4:- S ✓
C5:- $\neg M$ ✓

from C1, C2 $\neg T \vee M \vee T \vee S$ — (6) ✓
from C3, 6 $M \vee T \vee S$ — (7) ✓
from C4, 7 M — (8) ✓

from CS18 \square

Ex 6 :-
p62

P1	$\neg P \wedge Q$
P2	$\delta \rightarrow P$
P3	$\neg \delta \rightarrow S$
P4	$S \rightarrow t$
C.	$\therefore t.$

C1	$\neg P$	\checkmark
C2	Q	?
C3	$\neg \delta \vee P.$	\checkmark
C4	$\delta \vee S.$	\checkmark
C5	$\neg S \vee t.$	\checkmark
C6	$\neg t.$	\checkmark

from	C1, C3.	$\neg \delta.$	(7) \checkmark
from	C4, 7	S	(8) \checkmark
4	C5, 8	t	(9) \checkmark
4	C6, 9.	\square	



