lecture 14:-

Contrapositive:- If Ahmad is Knight and Kamran is Knave then Ahmad is Knave or Kamran is Knave.

$q \rightarrow p \wedge q$

Contrapositive:-

$p \wedge q \rightarrow q$ $\qquad$ $\neg q \rightarrow \neg p$.

Implication:- $\neg q \rightarrow \neg (p \wedge q)$. $\qquad$ $p \rightarrow q$

$\neg q \rightarrow \neg p \vee \neg q$

Inverse:- $q \rightarrow p \wedge q$. $\qquad$ $\neg p \rightarrow \neg q$

Converse:- $\neg (p \wedge q) \rightarrow \neg q$ $\qquad$ $q \rightarrow p$.

$\neg p \vee \neg q \rightarrow \neg q$.

Question 2:-

p

$p \rightarrow q$

$q \rightarrow \neg \gamma$

$C \; ? \; \neg \gamma$.

C1	p	✓
C2	$\neg p \vee q$	✓
C3	$\neg q \vee \neg \gamma$	✓
C4	q	✓ from C1, C2.
C5	$\neg \gamma$	✓ from C3, C4.
C6	γ	✓ " C5, C6.
C7	$\square$	

Conclusion = $\neg \gamma$ = Chohan will not get a Job.

Question 3:- $\neg \forall x \neg \forall y \; P(x,y)$. $\qquad$ $x, y \in \{1,2\}$.

$\neg \forall x \exists y \neg P(x,y)$.

$\exists x \neg \exists y \neg P(x,y)$.

$\exists x \forall y P(x,y)$.

$\exists x (P(x,1) \wedge P(x,2))$.

$\exists x P(x,1) \wedge \exists x P(x,2)$.

$(P(1,1) \vee P(1,1)) \wedge (P(1,2) \vee P(2,2))$.

Question 4:-

p : A is a Knight
$\neg p$: A is a Knave.

A says "I am Knight and I am not a Knave".

$p \wedge \neg(\neg p) = p \wedge p \equiv p$.

CASE 1:- Knight

p	$=$	T
T	$\equiv$	T

Holds.

$p \equiv T$
$\neg p \equiv F$.

CASE:- Knave

p	$=$	F
F	$\equiv$	F

Holds.

$p \equiv F$
$\neg p \equiv T$.

Inconclusive.

Q5:-

$p \rightarrow \neg q \equiv T$
$q \rightarrow r \equiv T$
$\neg r \rightarrow \neg p \equiv T$

p	q	$\neg q$	$p \rightarrow \neg q$
T	T	F	F
T	F	T	T
F	T	F	T
F	F	T	T

Inconclusive.

In Case of Issues.

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Question # : Issue	