DPP
DAILY PRACTICE PROBLEMS

CLASS : XIth
DATE :

Solutions

SUBJECT : MATHS
DPP NO. :3

Topic :-MATHEMATICAL REASONING

1 **(c)**

We know that the contrapositive of $p \to q$ is $\sim q \to \sim p$. Therefore, contrapositive of $(\sim p \wedge q) \to \sim r$ is $r \to \sim (\sim p \wedge q)$ or, $r \to p \vee \sim q$

2 **(d)**

p	q	$\sim p$	$\sim p \wedge q$	$q \to p$	$\sim(q \to p)$
T	T	F	F	T	F
T	F	F	F	T	F
F	T	T	T	F	T
F	F	T	F	T	F

From the table

$\sim p \wedge q \equiv \sim(q \to p)$

3 **(b)**

Clearly, $(p \wedge q) \wedge r \cong p \wedge (q \wedge r)$

4 **(c)**

The symbolic form of given statement is $\sim (p \vee q)$

5 **(a)**

$(p \wedge q) \wedge (\sim (p \vee q))$

$\cong (p \wedge q) \wedge (\sim p \wedge \sim q)$

$\cong q \wedge (p \wedge \sim p) \wedge \sim q$

$\cong q \wedge c \wedge \sim \cong c$

So, statement in option (a) is a contradiction

8 **(b)**

p	q	$\sim p$	$\sim q$	$p \wedge \sim q$	$\sim p \wedge q$	$(p \wedge \sim q) \wedge (\sim p \wedge q)$
T	T	F	F	F	F	F
T	F	F	T	T	F	F
F	T	T	F	F	T	F
F	F	T	T	F	F	F

It is clear from, the table that $(p \wedge \sim q) \wedge (\sim p \wedge q)$is a contradiction.

10 **(d)**

Since p is true and q is false

$\therefore p \to q$ has truth value F

Statement r has truth value T

$\therefore (p \to q) \wedge r$ has truth value F. Also, $(p \to q) \wedge \sim r$ has truth value F

$p \wedge q$ has truth value F and $p \vee r$ has truth value T

$\therefore (p \wedge q) \wedge (p \vee r)$ has truth value F

As $p \wedge r$ has truth value T. Therefore, $q \to (p \wedge r)$ has truth value T

11 **(b)**

Dual of $(x' \vee y')' = x \wedge y$ is $(x' \wedge y') = x \vee y$

13 **(a)**

We have,

$(\sim p \vee \sim q) \vee (p \vee \sim q) = \sim p \vee (\sim q \vee (p \vee \sim q))$

$= \sim p \vee (p \vee \sim q) = (\sim p \vee p) \vee \sim q = t \vee \sim q = t$

14 **(b)**

$\sim (p \vee q) \vee (\sim p \wedge q)$

$\equiv (\sim p \wedge \sim q) \vee (\sim p \wedge q)$

$\equiv \sim p \wedge (\sim q \vee q)$

$\equiv \sim p$

15 **(d)**

p	q	$\sim p$	$\sim q$	$p \vee (\sim q)$	$(\sim p) \wedge q$	$p \vee q$	$\sim (p \vee q)$	$(\sim p) \vee (\sim q)$	$(p \vee q) \vee (\sim p)$
T	T	F	F	T	F	T	F	F	T
F	T	T	F	F	T	T	F	T	T
T	F	F	T	T	F	T	F	T	T
F	F	T	T	T	F	F	T	T	T

It is clear from the table that columns 8 and 9 are not equal, ie, $\sim (p \vee q)$ is not equivalent to$(\sim p) \vee (\sim q)$. Hence, option (e) is false statement.

16 **(c)**

p	q	$p \leftrightarrow q$	$\sim[p \leftrightarrow q]$
T	T	T	F
T	F	F	T
F	T	F	T
F	F	T	F

It is clear from the table that, it is neither tautology nor contradiction.

19 **(c)**

Consider the following statements:

p : We control the population growth

q : We become prosper

The given statement is $p \rightarrow q$ and its negation is $p \wedge \sim q$

i.e. We control population but we donot become prosper

20 **(c)**

Mathematics is interestring is not a proposition.

ANSWER-KEY										
Q.	1	2	3	4	5	6	7	8	9	10
A.	C	D	B	C	A	C	D	B	A	D
Q.	11	12	13	14	15	16	17	18	19	20
A.	B	D	A	B	D	C	B	C	C	C