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India's Number 1 Education App

## MATHS

## BOOKS - OBJECTIVE RD SHARMA MATHS VOL I

## (HINGLISH)

## MATHEMATICAL REASONING

Illustration

1. Given the truth table of $\sim p \vee q$
2. Given the truth table of $\sim p \vee q$

- Watch Video Solution

3. Write down the truth table of $\sim p \wedge q$

## D Watch Video Solution

4. Write down the truth table for the statement
$(\sim p \vee q) \wedge(\sim p \wedge \sim q)$

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5. Construst truth tables for the following statements :
$\sim(p \wedge \sim q) \quad(i i) \sim[(\sim p) \vee(\sim q)] \quad(i i i)(p \wedge q) \wedge(\sim p)$

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6. If $p$ and $q$ are two statements construct the truth table for
$(p \wedge q) \vee[(\sim p \wedge q)]$

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7. Write down the truth tables for the following statements :

$$
(p \wedge q) \Rightarrow \sim p \quad(i i)(p \wedge q) \Rightarrow(p \vee q)
$$

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8. If $p$ is any statement, then prove that
$\sim(\sim p) \equiv p$

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9. If p and q and q are two statements, prove that (i)
$\sim(p \vee q) \equiv(\sim p) \wedge(\mathrm{q}))^{" ~}(\mathrm{ii}) \sim\left(\mathrm{p}^{\wedge \wedge} \mathrm{q}\right)=(\sim \mathrm{p}) \mathrm{v}(\sim \mathrm{q})^{\wedge}$

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10. For any statements $p$, show that .
(i) $p \vee \sim p$ is a tautology, ( ii) $p \wedge \sim p$ is a contradiction

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11. Show that
(i) $\sim[p \wedge(\sim p)]$ is a tautology
(ii) $\sim[p \vee(\sim p)]$ is a contradication.

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12. Verify that the statement $P \vee \sim(p \wedge q)$ is a tautology.

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13. Show that $(p \vee q) \wedge(\sim p \wedge \sim q)$ is a contradion.
14. Write the duals of the following statements :
(i) $(p \vee q) \vee r$
(ii) $p \wedge q) \wedge r$
(iii) $(p \vee q) \wedge(r \vee s)$

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15. Write the duals of the following statements :
$[\sim(p \vee q)] \wedge[p \vee\{\sim q \wedge \sim s)\}] \sim p \vee[(\sim q) \vee(p \vee \sim q) \vee \sim r]$

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16. Write the duals of the following statements:
(i) $(p \vee q) \wedge t$ (ii) $p \vee t) \wedge r$ (iii) $(p \vee q) \vee c$

Where t denotes tautology and c denotes contradiction.

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17. use Venn-diagram to find examine the validity of the following arguments:
$S_{1}$ : All scholars are absent minded.
$S_{2}$ : john is a scholar .

S : John is absent minded.
(ii) $S_{1}$ : All scholars ar absent-minded.
(ii) $S_{1}:$ All scholars are absent- minded.
$S_{2}$ : John is not absent minded.
S : john is not absent minded.

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18. Use venn-diagram to check the validity of the following argument:
$S_{1}$ : if a man is a bachelor, he is unhappy.
$S_{2}$ : If a man is unhappy, he dies young .
S : All bachelors die young.

## - Watch Video Solution

19. Test the validity of the following argument :
$S_{1}$ : If two sides of a triangles are equal, then the opposite
angles are equal.
$S_{2}$ : Two sides of a triangle are not equal

S : Two opposite angles are not equal. `

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20. Use Venn-diagram to examine the validity of the following arguments:
(i) $S_{1}$ : Natural numbers are integers
$S_{2}: \mathrm{x}$ is an integer

S : x is a natural number.
(ii) $S_{1}$ : Natural numbers are integers.
$S_{2}: \mathrm{x}$ is an interger.
$S: x$ is not a natural number.
21. Construst a circuit for the statements
$(p \wedge q \wedge r) \vee[(\sim p) \wedge(\sim q)]$

- Watch Video Solution


## Illusration 1

1. Express the following circuit in sysmbolic form of logic.

D View Text Solution

1. Express the following circuit in symbolic form of logic.

Also, give an alternative arrangement of this circuit such the new circuit has minimkum number of switches.

## - View Text Solution

## Section I Solved Mcqs

1. Which of the following is a proposition?
A. I am an advocate
B. A half open door is half closed
C. Delhi on the jupiter
D. none of these

## Answer: C

## D Watch Video Solution

2. Let p and q be two propositions given by p : The sky is blue, $q$ :milk is white.

Then $p \wedge q$ is
A. The sky is blue or milk is white.
B. The sky is blue and milk is white
C. The sky is white and milk is blue
D. If the sky is blue, then milk is white

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3. Let p and q be two propositions given by
p : I play cricket during the holidays.
$\mathrm{q}:$ I just sleep throughout the day.
Then, the compound statement $p \vee q$ is
A. If I play cricket during the holidays, I just sleep
throughout the day
B.I play cricket during the holidays and just sleep throughout the day
C. I just sleep during the holidays and only if I play cricket during the holidays.
D. I play cricket during the holidays or I just sleep throughout the day.

## Answer: D

## - Watch Video Solution

4. Let p and q be two propositions given by
p : It is hot, q : He wants water
Then the vebal meaning of $p \rightarrow q$ is
A. It is hot or he wants water
B. It is hot and he wants water.
C. If is is hot , then he wants water.
D. If and only if it is hot, he wants water.

## Answer: C

## - Watch Video Solution

5. Let there be two propositions :
p : I take only bread and butter in breakfast.
$\mathrm{q}:$ I do not take any thing in breakfast.

Then, the compound proposition " I take only bread and butter in breakfast or I do not take any thing " is represented by
A. $P^{\wedge} q$
B. $p \vee q$
C. $p \rightarrow q$
D. $p \leftrightarrow q$

## Answer: B

## - Watch Video Solution

6. Consider the following propositions :

P:I take medicine , q : I can sleep

Then , the compound statement $\sim p \rightarrow \sim q$ means
A. If I do not take medicine, then I cannot sleep
B. If I do not take medicine, then I can sleep
C. I take medicine iff can sleep

## D. I take medicine if I can sleep

## Answer: A

## D Watch Video Solution

7. Consider the following propositions : p : To become on airfore officer one should be a graduate. q: one should have good health propositions:- To become an airfore officer one should be a graduate and should have good health " is represented by
A. $p \vee q$
B. $p \rightarrow q$
C. $\mathrm{p}^{\wedge} \mathrm{q}$

## Answer: C

## - Watch Video Solution

8. Conider the following is statements :
p : A parallelogram is a rhombus.
q : the diogonals are at right angle.
The compound proposition " A parallelgram is a rhombus iff its diagonals are a right angle " is representd by
A. $p \vee q$
B. $\mathrm{p}^{\wedge} \mathrm{q}$
C. $p \rightarrow q$
D. $p \leftrightarrow q$

## Answer: D

## - Watch Video Solution

9. Consider the following statements
$P$ : I have the raincoat $q$ : I can walk in the rain.

The propositions " If have the raincoat, then I can walk in the rain " is represented by
A. $p \rightarrow q$
B. $p \vee q$
C. $\mathrm{p}^{\wedge} \mathrm{q}$
D. $p \leftrightarrow q$

Answer: A

## - Watch Video Solution

10. Which of the following is true for the propositions $p$ and q ?
A. $p^{\wedge} q$ is true when at least one of $p$ and $q$ is true
B. $p \rightarrow q$ is true when p is true and q is false
C. $p \leftrightarrow q$ is true only when both p and q are ture
D. $\sim(p \vee q)$ is true only when both p and q are false

## Answer: D

11. Consider the following propositions:
$P$ : It rains , $q$ : Then street gets flooded.
the propostion " If it does not rain, then the street not get flooded," is represented by
A. $p \rightarrow \sim q$
B. $\sim p \rightarrow q$
C. $p \leftrightarrow q$
D. $\sim p \rightarrow \sim q$

Answer: D

- Watch Video Solution

12. The logically equivalent proposition of $p \leftrightarrow q$ is
A. $(p \rightarrow q) \wedge(q \rightarrow p)$
B. $(p \rightarrow q) \vee)(q \rightarrow p)$
C. $(p \wedge q) \rightarrow(p \vee q$
D. $(p \wedge q) \vee(p \vee q)$

Answer: A

## - Watch Video Solution

13. $\sim(p \vee q) \vee(\sim p \wedge q)$ is logically equivalent to
B. $p$
C. $q$
D. $\sim q$

## Answer: A

## - Watch Video Solution

14. If the inverse of implication $p \rightarrow q$ is defined as $\sim p \rightarrow \sim q$, then the inverse of the proposition $(p \wedge \sim q) \rightarrow r$ is
A. $r \rightarrow \sim p \wedge q$
B. $\sim p \vee q \rightarrow \sim r$
C. $r \rightarrow p \wedge \sim q$
D. none of these

## Answer: B

## D Watch Video Solution

15. Logical equivalent propostion to the proposition $\sim(p \wedge q)$ is
A. $\sim p \wedge \sim q$
B. $\sim p \vee \sim q$
C. $\sim p \rightarrow \sim q$
D. $\sim p \leftrightarrow \sim q$

Answer: B
16. Which of the following is logically equivalent to ( $p^{\wedge} q$ ) ?
A. $p \rightarrow \sim q$
B. $\sim p \vee \sim q$
C. $\sim(p \rightarrow \sim q)$
D. $\sim(\sim p \wedge \sim q)$

Answer: D

- Watch Video Solution

17. Let p and q be two propostions. Then , the contrapositive of the implication $p \rightarrow q$ is
A. $q \rightarrow p$
B. $p \leftrightarrow q$
C. $\sim q \rightarrow \sim p$
D. $\sim p \rightarrow \sim q$

## Answer: C

## - Watch Video Solution

18. $(\sim p \vee \sim q)$ is logically equivalent to
A. $\sim p \rightarrow \sim q$
B. $\mathrm{p}^{\wedge} \mathrm{q}$
C. $p \rightarrow \sim q$
D. $p \leftrightarrow q$

## Answer: C

## - Watch Video Solution

19. The logically equivalent proposition of $p \leftrightarrow q$ is
A. $(p \wedge q) \vee(p \vee q)$
B. $(p \rightarrow q) \wedge(q \rightarrow p)$
C. $(p \rightarrow q) \vee(q \rightarrow p)$
D. $(p \wedge q) \rightarrow(p \vee q)$

Answer: B

## D Watch Video Solution

20. If $p \rightarrow q(q \vee r)$ is false, then the truth values of $\mathrm{p}, \mathrm{q}, \mathrm{r}$ are respectively
A. T,F,F
B. F,F,F
C. F,T,T
D. T,T,F

Answer: A
21. The compound statement $p \rightarrow(\sim p \wedge q)$ is false, then the truth values of $p$ and $q$ are respectively.
A. T, T
B. T, F
C. F,T
D. F,F

## Answer: B

## - Watch Video Solution

22. The false statement in the following is
A. $p \wedge(\sim p)$ is a contradiction
B. $(p \rightarrow q) \leftrightarrow(\sim q \rightarrow \sim p)$ is a contradiction
C. $\sim(\sim p) \leftrightarrow$ is a tautology
D. $P \vee(\sim p)$ is a tautology

## Answer: B

## - Watch Video Solution

23. Which of the following is not a proposition ?
A. 3 is a prime
B. $\sqrt{2}$ is irrational
C. Mathematics is interesting
D. 5 iis an even interger

## D Watch Video Solution

24. $(p \wedge \sim q) \wedge(\sim p \vee q)$ is
A. a tautology
B. a contradiction
C. both a tauology and a contradiction
D. neither a tauology nor a contradiction

Answer: B
25. The proposition $(p \rightarrow \sim p) \wedge(\sim p \rightarrow p)$ is a
A. a tautology
B. a contradiction
C. neither a tauology nor a contradiction
D. a tautology and a contradition

## Answer: B

## - Watch Video Solution

26. Which of the following statements is a tautology?
A. $(\sim p \vee q) \sim(p \vee \sim q)$
B. $(\sim p \vee \sim q) \rightarrow p \vee q$
C. $(p \vee \sim q) \wedge(p \vee q)$
D. $(\sim p \vee \sim q) \vee(p \vee q)$

## Answer: D

## - Watch Video Solution

27. Negation of the statement $p \rightarrow(q \wedge r)$ is
A. $\sim p \rightarrow \sim(q \vee r)$
B. $\sim p \rightarrow \sim(q \wedge r)$
C. $(q \wedge r) \rightarrow p$
D. $p \wedge(\sim q \vee \sim r)$

## - Watch Video Solution

28. Negation of the statement $(p \wedge r) \rightarrow(r \vee q)$ is-
A. $(p \wedge r) \wedge(\sim r \wedge \sim q)$
B. $\sim(p \wedge r) \rightarrow \sim(r \vee q)$
C. $\sim(p \vee r) \rightarrow \sim(r \wedge q)$
D. $(p \wedge q) \vee(r \vee q)$

Answer: A

## D Watch Video Solution

29. The negation of $q \vee \sim(p \wedge r)$ is
A. $\sim q \vee \sim(p \wedge r)$
B. $\sim q \vee(p \wedge r)$
C. $\sim q \wedge(p \wedge r)$
D. $\sim q \wedge \sim(p \wedge r)$

## Answer: C

## D Watch Video Solution

30. Which of the following is always true ?
A. $(p \rightarrow q) \cong(\sim q \rightarrow \sim p)$
B. $\sim(p \vee q) \cong(\sim p \vee \sim q)$
C. $\sim(p \rightarrow q) \cong(p \vee \sim q)$
D. $\sim(p \wedge q) \cong(\sim p \wedge \sim q)$

Answer: A

## - Watch Video Solution

31. Negation of the statement $\sim p \rightarrow(q \vee r)$ is
A. $p \rightarrow \sim(q \vee r)$
B. $p \vee(q \wedge r)$
C. $\sim p \wedge(\sim q \wedge \sim r)$
D. $p \wedge(q \vee r)$

Answer: C
32. The negation of the propostion " if a quadrillatcral is a square, then it is a rhombus" is
A. if a quadrilateral is not a square, then it is a rhombus
B. if a quadrillateral is a square, then it is not a rhombus
C. a quadrillateral is a square and it is not a rhombus
D. a quadrillateral is not a square and it is a rhombus.

Answer: C

## D Watch Video Solution

33. The contrapositive of $(p \vee q) \rightarrow r$ is

$$
\begin{aligned}
& \text { A. } p \rightarrow(q \vee r) \\
& \text { B. } r \rightarrow(p \vee q) \\
& \text { C. } \sim r \rightarrow \sim(p \vee q) \\
& \text { D. } \sim r \rightarrow(\sim p \wedge \sim q)
\end{aligned}
$$

## Answer: C

## D Watch Video Solution

34. The contrapositive of $p \rightarrow(\sim q \rightarrow \sim r)$ is
A. $(\sim q \wedge r) \rightarrow \sim p$
B. $(q \wedge \sim r) \rightarrow \sim p$
C. $p \rightarrow(\sim r \vee q)$
D. $p \wedge(q \vee r)$

## Answer: A

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35. The contrapositive of the statement if $2^{2}=5$ then I get first class is
A. if I do not get a first class, then $2^{2}=5$
B. if I do not get a first class , then $2^{2} \neq 5$
C. If I get first class, then $2^{2}=5$
D. none of these

Answer: B

## - Watch Video Solution

36. If $x=5$ nad $y=-2$, then $x-2 y=9$, the contrapositive of this proposition is
A. If $\mathrm{x}-2 \mathrm{y}$ is not equal to 9 , then $x \neq 5$ or $y \neq-2$
B. if $x-2 y=9, x \neq 5$ and $y \neq-2$
C.
$x-2 y=9 \quad$ if $\quad$ and $\quad$ only $\quad$ if $x=5$ and $y=-2$
D. none of these

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37. The diagonals of a rhombus are perpendicular. The contrapositive of the above statement is
A. If the figure is not a rhombus, then its diagonals are not perpendicular .
B. If the diagonals are perpendicular,then the figure is a rhombus
C. If the digonals are not perpendicular, then the figure is a rhombus.
D. If the diagonals are not perpendicular, then the figure is not a rhombus

## Answer: D

## D Watch Video Solution

38. Which of the following is wrong?
A. $p \rightarrow q$ is logically equivation to $\sim p \vee q$
B. if The truth values of $p, q, r$ are T,F,R respectively, then
the truth value of $(p \vee q) \wedge(q \wedge r)$ is T
C. $\sim(p \vee q \vee r) \cong-\sim p \wedge \sim q \wedge \sim r$
D. the truth value of $p \wedge \sim(p \vee q)$ is always $T$

## - Watch Video Solution

39. The symbolic form of logic of the circuit given below is :
`(RDS_MATH_V01_C08_S01_066_Q01.png" width="80\%">
A. $[(p \wedge q) \vee p] \wedge q$
B. $[p \vee(q \wedge p)] \vee q$
C. $[(p \wedge p) \vee q] \wedge q$
D. $[p \wedge p)] \vee q$

## Answer: D

40. Which of the following statements is a tautology ?
A. $(\sim q \wedge p) \wedge q$
B. $(\sim q \wedge p) \wedge(p \wedge \sim p)$
C. $(-p \vee v q)^{\wedge \wedge}\left(-p^{\wedge \wedge} q\right)$
D. $(p \wedge q) \wedge((p \wedge q)$

## Answer: C

## D Watch Video Solution

41. The statement $p \rightarrow(q \rightarrow p)$ is equivalent to
A. $p \rightarrow(p \wedge q)$
B. $p \rightarrow(p \leftrightarrow q)$
C. $p \rightarrow(p \rightarrow q)$
D. $p \rightarrow(p \vee q)$

## Answer: D

## - Watch Video Solution

42. Let $S$ be non-empty subset of $R$. consider the following
statement:

P : There is a rational number $x \neq S$ such that $x>0$

Which of the following statements is the negation of the statement P ?
A. Every rational number $x \neq S$ such that $x \leq 0$
B. $x \in S$ and $x \leq 0 \Rightarrow x$ is not rational
C. There is a rational number $x \in S$ such that $x \leq 0$
D. There is no rational number $x \in S s u c h t \widehat{x} \leq 0$

## Answer: A

## - Watch Video Solution

43. Consider the following statements

P: Suman is brilliant

Q: Suman is rich
R: Suman is honest

The negation of the statement "Suman is brilliant and dishonest if any only if Suman is rich" can be expressed as
A. $\sim P \wedge(Q \leftrightarrow \sim R)$
B. $\sim(Q \leftrightarrow(P \wedge \sim R))$
C. $\sim Q \leftrightarrow \sim P \wedge R)$
D. $\sim(P \wedge \sim R) \leftrightarrow Q$

## Answer: B

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44. The only statement among the following i.e. a tautology is
A. $A \vee(A \vee B)$
B. $[A \wedge(A \rightarrow B)] \rightarrow B$
C. $B \rightarrow[A \wedge(A \rightarrow B)]$
D. $A \wedge(A \vee B)$

## Answer: B

## - Watch Video Solution

45. Let p and q be two statements. Amongst the following, the statement that is equivalent to $p \rightarrow q$ is
A. $p \wedge \sim q$
B. $\sim p \wedge q$
C. $\sim p \vee q$
D. $p \vee \sim q$

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46. The statement $\sim(p \leftrightarrow \sim q)$ is
A. a tautology
B. a fallocy
C. equivalent to $p \leftrightarrow q$
D. equivalent to $\sim p \leftrightarrow q$

## Answer: C

47. The negation of $\sim s \vee(\sim r \wedge s)$ is equivalent to :
A. $s \vee(r \vee \sim s)$
B. $s \wedge r$
C. $s \vee \sim r$
D. $s \wedge(r \wedge \sim s)$

Answer: B

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48. 

$(p \wedge \sim q) \vee q \vee(\sim p \wedge q \vee(\sim p \wedge q)$ is equivalent to
A. $\sim p \wedge q$
B. $p \wedge q$
C. $p \vee q$
D. $p \vee \sim q$

## Answer: C

## - Watch Video Solution

49. Consider the following statements.
p : if 7 is an odd number, then 7 is divisible by 2.

Q: If 87 is a prime number, then 7 is an odd number .
if $V_{1}$ is the truth value of contrapositive of p and $V_{2}$ is the truth value of conirapositive of Q , then the ordered pair
$\left(V_{1}, V_{2}\right)$ equals.
A. ( $\mathrm{F}, \mathrm{T}$ )
B. $(T, F)$
C. ( F,F)
D. $(\mathrm{T}, \mathrm{T})$

## Answer: B

## D Watch Video Solution

50. The negation of $A \rightarrow(A \vee \sim B)$ is
A. a fallacy
B. a tautology
C. equivalent to $(A \vee \sim B) \rightarrow A$
D. equivalent to $A \rightarrow(A \wedge \sim B)$

## Answer: A

## D Watch Video Solution

51. The following statement $(p \rightarrow q) \rightarrow[(\sim p \rightarrow q) \rightarrow q]$ is
A. equivalent to $p \rightarrow \sim q$
B. a fallocy
C. a tautology
D. equivalent to $\sim p \rightarrow q$

Answer: C
52. Which of the following is a tautology?
A. $p \rightarrow(p \rightarrow q)$
B. $(p \vee q) \rightarrow p$
C. $p \vee(p \vee q)$
D. $(p \vee q) \rightarrow q$

Answer:

## - Watch Video Solution

53. The proposition $\sim p \vee(p \wedge \sim q)$ is equivalent to
A. $p \vee \sim q$
B. $p \rightarrow \sim q$
C. $q \rightarrow p$
D. $p \wedge \sim q$

## Answer: B

## - Watch Video Solution

## Solved Mcqs

1. The following circuit when expressed in the symbolic form of logic, is
A. $(\sim p \wedge q) \vee(p \wedge \sim q)$
B. $(\sim p \vee q) \vee(p \vee \sim q)$
C. $(\sim p \wedge p) \wedge(\sim q \wedge q)$
D. $(\sim p \wedge \sim q) \wedge(q \wedge q)$

Answer: A

## - View Text Solution

2. The following circuit when expessed in symbolic form of logic is
A. $p \wedge(p \wedge q) \vee q$
B. $p \vee(p \vee q) \vee q$
C. $p \vee(p \vee q) \wedge q)$

## Answer: D

- View Text Solution

3. Consider the following circuit

The simplified of the above circuit is
A.
B.
C.
D.

Answer: A

## D View Text Solution

4. When does the current flow through the following circuit?
A. p,q,r should be closed
B. $p, q, r$ should be open
C. always
D. none of these

Answer: A

## 5. Given the circuit

which of the following is equivalent to the above circuit ?
A.

2
B.

R
C. any closed circuit
D. none of these

## Answer: A

- View Text Solution


## Section li Assertion Reason Type

1. Let p be the statement " x is an irrational number," q be the statement " y is a trascendental number", and r be the statement " $x$ is a rational number iff $y$ is a transcendental number ". Statement-1 $r$ is equivalent to either $q$ or $p$.

Statement-2: r is equivalent to $(p \leftrightarrow \sim q)$
A. Statement-1 is True, Statement -2 is Ture, Statement
-2 is a correct explanation for statement -1
B. Statement-1 is True, Statement -2 is True, Statement
-2 is not a correct explanation for statement -1
C. Statement -1 is True, Statement -2 is false.
D. Statement -1 is False, statement -2 is True.

## D Watch Video Solution

2. Statements $-1: \sim(p \leftrightarrow \sim q)$ is equivalent to $p \leftrightarrow q$

Statement-2: $(\sim p \leftrightarrow \sim q)$ is a tautology.
A. Statement- 1 is True, Statement -2 is Ture, Statement
-2 is a correct explanation for statement -2
B. Statement-1 is True, Statement -2 is True,, Statement
-2 is not a correct explanation for statement -2
C. Statement -1 is True, Statement -2 is false.
D. Statement -1 is False, statement -2 is True.

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3. Statement-1 : $(p \wedge \sim q) \wedge(\sim p \wedge q)$ is a fallacy.

Statement -2: $(p \rightarrow q) \leftrightarrow(\sim q \rightarrow \sim p)$ is a tautology .
A. Statement-1 is True, Statement -2 is Ture, Statement
-2 is a correct explanation for statement -3
B. Statement-1 is True, Statement -2 is True,, Statement
-2 is not a correct explanation for statement -3
C. Statement -1 is True, Statement -2 is false.
D. Statement -1 is False, statement -2 is True.

## D Watch Video Solution

4. Let p and q be any two propositions.
statement $-1:(p \rightarrow q) \leftrightarrow q \vee \sim p 1$ is a tautology
A. Statement-1 is True, Statement -2 is Ture, Statement
-2 is a correct explanation for statement -4
B. Statement-1 is True, Statement -2 is True,, Statement
-2 is not a correct explanation for statement -4
C. Statement -1 is True, Statement -2 is false.
D. Statement -1 is False, statement -2 is True.

## D View Text Solution

## Exercise

1. Logical equivalent propostion to the proposition
$\sim(p \wedge q)$ is
A. $\sim p \wedge \sim q$
B. $\sim p \vee \sim q$
C. $\sim p \rightarrow \sim q$
D. $\sim p \leftrightarrow \sim q$

## - Watch Video Solution

2. Let $p$ and $q$ be two propositions. Then the inverse of the implication $p \rightarrow q$ is
A. $q \rightarrow p$
B. $\sim p \rightarrow-q$
C. $q \rightarrow p$
D. $\sim p \rightarrow p$

Answer: B

D Watch Video Solution
3. Let p and q be two propostions. Then , the contrapositive of the implication $p \rightarrow q$ is
A. $\sim q \rightarrow \sim p$
B. $\sim p \rightarrow q$
C. $q \rightarrow p$
D. $p \leftrightarrow q$

Answer: A

## - Watch Video Solution

4. If p and q are two simple propositions, then $p \rightarrow q$ is false when
A. $p$ is true and $q$ is true
B. $p$ is false and $q$ is true
C. $p$ is true and $q$ is false
D. $p$ and $q$ are false

## Answer: C

## - Watch Video Solution

5. If $p$ and $q$ are two statement then $(p<\rightarrow \sim q)$ is true when : (a) $p$ and $q$ both are true (b) $p$ and $q$ both are false
(c) $p$ is false and $q$ ia true (d) Non of these
A. $p$ and $q$ both are true
B. both $p$ and $q$ are false
C. $p$ is true and $q$ is false
D. none of these

## Answer: C

## - Watch Video Solution

6. for any three propositions $\mathrm{p}, \mathrm{q}$ and r , the proposition
$(p \wedge q) \wedge(q \wedge r)$ is true when
A. p,q,r are all false
B. p,q,r are all true
C. $p, q, r$ are true and $r$ is false
D. $p$ is true and $r$ is false

Answer: B

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7. If p and q are two propositions, then $\sim(p \leftrightarrow q)$ is
A. $\sim p \wedge \sim q$
B. $\sim p \vee \sim q$
C. $(p \wedge \sim q) \vee(\sim p \wedge q)$
D. none of these

Answer: C

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8. $p \wedge(q \wedge r)$ is logically equivalent to
A. $p \vee(q \wedge r)$
B. $(p \wedge q) \wedge r$
C. $(p \vee q) \vee r$
D. $p \rightarrow(q \wedge r)$

Answer: B

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9. $\sim(\sim p) \leftrightarrow p$ is
A. a tautology
B. a contradiction
C. neither a contradication a tautology
D. none of these

## Answer: A

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10. Which of the following is a proposition ?
A. I am a lion
B. A half open door is half closed
C. A triangle is a circle and 10 is a prime number
D. Logic is an intesting subject

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11. Which of the following propositions is a tautology ?
A. $(\sim p \vee \sim q) \vee(p \vee \sim q)$
B. $(\sim p \vee \sim q) \wedge(p \vee \sim q)$
C. $\sim p \wedge(\sim p \vee \sim q)$
D. $\sim q \wedge(\sim p \vee \sim q)$

Answer: A

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12. Which of the following proposition is a tautology ?
A. $\sim(p \rightarrow q) \vee(p \wedge \sim q)$
B. $(p \rightarrow q) \rightarrow(p \wedge \sim q)$
C. $(p \rightarrow q) \vee(p \wedge \sim q)$
D. $(p \vee q) \wedge(p \wedge \sim q)$

## Answer: C

## D Watch Video Solution

13. Which of the following propositions is a contradiction ?
A. $(\sim p \vee \sim q) \vee(p \vee \sim q)$
B. $(p \rightarrow q) \vee(p \wedge \sim q)$
C. $(\sim p \wedge p) \wedge(\sim q)$
D. $(\sim p \wedge q) \vee(\sim q)$

## Answer: C

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14. $p \wedge q \rightarrow p$ is
A. a tautology
B. a contradiction
C. neither a tauology nor a contradiction
D. none of these

Answer: A
15. Which of the following is false ?
A. $p \vee \sim p$ is a tautology
B. $\sim(\sim p) \leftrightarrow p$ is a tautology
C. $(p \wedge(p \rightarrow q)) \rightarrow p$ is a contradiction
D. $p \wedge \sim p$ is a contradiction

## Answer: C

## - Watch Video Solution

16. Given that water freezes below zero degree celsius.

Consider the following statements:
$p$ : water froze this morning , $q$ : this morning temperature
was below $0^{\circ} C$
which of the following is correct ?
A. $p$ and $q$ are logically equivalent
B. $p$ is the inverse of $q$
C. $p$ is the converse of $q$
D. $p$ si the contrapositive of $q$

## Answer: A

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17. If $p, q, r$ have truth values $T, F, T$ respectively, which of the following is true?
A. $(p \rightarrow q) \wedge r$
B. $(p \rightarrow q) \wedge \sim r$
C. $(p \wedge q) \wedge(p \vee r)$
D. $q \rightarrow(p \wedge r)$

## Answer: D

## D Watch Video Solution

18. If $p \rightarrow(q \vee r)$ is false, then the truth values of $\mathrm{p}, \mathrm{q}, \mathrm{r}$ are respectively
A. T,T,T
B. F,T,T

## C. F,F,F

D. T,F,F

## Answer: D

## - Watch Video Solution

19. The negation of the propostion $q \vee \sim(p \wedge r)$ is
A. $\sim q \vee(p \wedge r)$
B. $(\sim q \wedge(p \wedge r)$
C. $\sim p \vee \sim q \vee \sim r$
D. $q \rightarrow(p \wedge r)$

## (D) Watch Video Solution

20. Which of the following is logically equivalent to ( $\mathrm{p}^{\wedge} \mathrm{q}$ ) ?
A. $p \rightarrow \sim q$
B. $p \wedge \sim q$
C. $\sim p \wedge q$
D. $\sim(\sim P \wedge \sim q$

Answer: C

- Watch Video Solution

21. Which of the following is logically equivalent to $\sim(\sim p \rightarrow q) ?$
A. $p \wedge q$
B. $p \wedge \sim q$
C. $\sim(p \rightarrow \sim q)$
D. $\sim(\sim p \wedge \sim q$

## Answer: D

## - Watch Video Solution

22. which of the following is a contradiction ?
A. $(p \wedge q) \wedge(\sim p \wedge \sim q)$
B. $p \vee \sim q$
C. $\sim p \wedge q$
D. $\sim p \wedge \sim q$

## Answer:

## - Watch Video Solution

23. The negative of the statement If a number isdivisible by

15 then it is divisible by 5 or 3
A. if a number is divisible by 15 ,then it is not divisible by

5 and 3
B. A number is divisible by 15 and it is not divisble by 5
and 3
C. A number is divisible by 15 and it is not divisible by 5
or 3
D. A number is not divisible by 15 or its is not divisible by 5 and 3

Answer: B

## - Watch Video Solution

24. Consider the proposition : " if the pressure increases, the volume decreases". The negation of this propositions is
A. If the pressure does not increase the volume does not decrease
B. of the volume increases, the pressure decreases,
C. if the volume does not decrease, the pressure, does
not increase
D. If the volume decreases, then the pressure increases.

## Answer: C

## - Watch Video Solution

25. Consider the proposition : " if we control polulation growth, we prosper". Negative of this proposition is
A. If we do not contral population growth, we prosper
B. If we control propulation, we do not prosper
C. we contral population but we do not prosper
D. we do not contral propulation but we prosper

## Answer: C

## - Watch Video Solution

26. The negative of $p \wedge \sim(p \wedge r)$ is
A. $\sim p \vee \sim(p \wedge r)$
B. $\sim p \vee(p \wedge r)$
C. $\sim q \wedge(q \wedge r)$
D. $\sim q \wedge \sim(p \wedge r)$

## Answer: B

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27. The nagative of $p \wedge \sim(\sim q \wedge r)$ is
A. $\sim p \vee(-q \wedge r)$
B. $\sim p \vee(\sim q \vee \sim r)$
C. $p \vee(\sim \wedge r)$
D. $\sim p \wedge(q \vee r)$

Answer: A
28. The contra positive of $(\sim p \wedge q) \rightarrow \sim r$ is
A. $(p \wedge q) \rightarrow r$
B. $(p \vee q) \rightarrow r$
C. $r \rightarrow(p \vee \sim q)$
D. none of these

Answer: C

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29. $p \rightarrow q$ is logically equivalent to
A. $p \wedge \sim q$
B. $\sim p \rightarrow \sim q$
C. $(p \vee \sim q)$
D. none of these

## Answer: C

## - Watch Video Solution

30. Which of the following is logcially equivalent to
$\sim(p \leftrightarrow q) ?$
A. $(p \wedge \sim q) \wedge(q \wedge \sim p)$
B. $p \vee q$
C. $(p \wedge \sim q) \vee(q \wedge \sim p)$
D. none of these

## Answer: C

## - Watch Video Solution

31. Which of the following is logically equivalent to $\sim(p \rightarrow q) ?$
A. $p \wedge q$
B. $p \wedge \sim q$
C. $\sim p \wedge q$
D. $\sim p \wedge \sim q$

Answer: B
32. which of the following is logically equivalent to $(p \wedge q)$ ?
A. $p \rightarrow q$
B. $\sim p \wedge \sim q$
C. $p \wedge \sim q$
D. $\sim(p \rightarrow \sim q)$

Answer: D

- Watch Video Solution

33. The contrapositive of $2 x+3=9 \Rightarrow x \neq 4$ is

$$
\begin{aligned}
& \text { A. } x=4 \Rightarrow 2 x+3 \neq 9 \\
& \text { В. } x=4 \Rightarrow 2 x+3=9 \\
& \text { C. } x \neq 4 \Rightarrow 2 x+3 \neq 9 \\
& \text { D. } x \neq 4 \Rightarrow 2 x+3=9
\end{aligned}
$$

Answer: A

## D Watch Video Solution

34. The proposition $(p \rightarrow \sim p) \wedge(\sim p \rightarrow p)$ is a

A. tautology

# B. contradiction 

C. neither a tautology nor a contradiction
D. tautology and contradiction

## Answer: B

## - Watch Video Solution

35. Consider the following statements:
p : I shall pass, q : I study
The symbolic represention of the proposition " I shall pass
iff I study" is
A. $p \rightarrow q$
B. $q \rightarrow p$
C. $p \rightarrow \sim q$
D. $p \leftrightarrow q$

## Answer: D

## D Watch Video Solution

36. The proposition $p \rightarrow \sim(p \wedge \sim q)$ is
A. a contradiction
B. a tautology
C. etiher a tauology or a contradiction
D. neither a tautology nor a equirvalent to

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37. $\sim(p \vee q) \vee(\sim p \wedge q)$ is logically equivalent to
A. $\sim p$
B. $p$
C. q
D. $\sim q$

Answer: A

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38. The negation of the compound proposition $p \vee(\sim p \vee q)$ is
A. $(p \wedge \sim q) \wedge \sim p$
B. $(p \wedge \sim q) \vee \sim p$
C. $(p \vee q) \vee \sim p$
D. none of these

Answer: A

## D Watch Video Solution

39. Let p be the proposition that Mathematics is interesting and $q$ be the proposition that Mathematics is
difficult, then the symbol $p \wedge q$ means
A. Mathematics is interesting implies that mathematics is difficult
B. Mathematics is interesting implies and is implied by

Mathematics is difficult
C. Mathematics is interesting and Mathematics is difficult
D. Mathematics is intersting or Mathematics is difficult

Answer: C

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40. The inverse of the proposition $(p \wedge \sim q) \rightarrow s$
A. $\sim s \rightarrow \sim p \vee q$
B. $\sim p \vee q \rightarrow \sim s$
C. $s \rightarrow p \wedge \sim q$
D. none of these

## Answer: B

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## Chapter Test

1. Which of the following sentences is a statement?
A. Arushi is a pretty girl
B. what are you doing ?
C. Oh! It is amazing
D. 2 is the smallest prime number

## Answer: D

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2. The property $\sim(p \wedge q) \equiv \sim p \vee \sim q$ is called
A. associative law
B. De morgan's law
C. commutative law
D. idempoten law

## Answer: B

## - Watch Video Solution

3. When does the inverse of the statement $\sim p \Rightarrow q$ results in $T$ ?
A. $p$ and $q$ both are true
B. $p$ is true and $q$ is false
C. $p$ is false and $q$ is false
D. both $b$ and $c$

## ( Watch Video Solution

4. which of the following is a contradiction ?
A. $p \vee q$
B. $P \wedge q$
C. $p \vee \sim p$
D. $p \wedge \sim p$

Answer: D

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5. In which of the following is equivalent cases, $p \Rightarrow q$ is false?
A. $p$ is true, $q$ is true
B. $p$ is false, $q$ is true
C. $p$ is true, $q$ is false
D. none of these

## Answer: C

## - Watch Video Solution

6. Which of the following is equivalent to $p \Rightarrow q$ ?
A. $p \Rightarrow q$
B. $q \Rightarrow p$
C. $(p \Rightarrow q) \wedge(q \Rightarrow p)$
D. none of these

## Answer: A C

## - Watch Video Solution

7. Which of the following pairs are logically equivalent ?
A. Conditional, Contrapositive
B. Conditional , Inverse
C. Contrapositive, conserse
D. Inverse, contrapositive

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8. Which of the following is contingency ?
A. $p \vee \sim p$
B. $p \wedge q \Rightarrow p \vee q$
C. $p \wedge \sim q$
D. none of these

Answer: C
9. The statement $p \vee q$ is
A. a tautology
B. a contradiction
C. contingency
D. none of these

Answer: C

## - Watch Video Solution

10. Which of the following is a tautology?
A. $p \wedge q$
B. $p \vee q$
C. $p \vee \sim p$
D. $p \wedge \sim p$

## Answer: C

## - Watch Video Solution

11. The statement $p \Rightarrow p \vee q$
A. a tautology
B. a contradiction
C. both a tautology and contradiction
D. None of these

## - Watch Video Solution

12. what are the truth values of $(\sim p \Rightarrow \sim q)$ and $\sim(\sim p \Rightarrow q)$ respectively, when p and q always speak true in any argument ?
A. T,T
B. F,F
C. T,F
D. F,T

## Answer: C

13. If truth values of $p \vee q$ is true ,then truth value of $\sim p \wedge q$ is
A. false if $p$ is true
B. true if $p$ is true
C. false if $q$ is true
D. true if $q$ is true

Answer: A

## D Watch Video Solution

14. If p and q are two statements, then $p \vee \sim(p \Rightarrow \sim q)$ is equivalent to
A. $p \wedge \sim q$
B. $p$
C. q
D. $\sim p \wedge q$

## Answer: B

## D Watch Video Solution

15. The contrapositive of statement $\sim p \Rightarrow(p \wedge \sim q)$ is
A. $p \Rightarrow(\sim p \vee q)$
B. $p \Rightarrow(p \wedge q)$
C. $p \Rightarrow(\sim p \wedge q)$
D. $\sim p \vee q \Rightarrow p$

## Answer: C

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16. $\sim[\sim p \wedge(p \leftrightarrow q)] \equiv$
A. $p \vee q$
B. $q \wedge q$
C. T
D. F

Answer: A
17. If a compound statement $r$ is contradiction, then the truth value of $(p \Rightarrow q) \wedge r \wedge p[p \Rightarrow \sim r]$ is
A. T
B. F
C. Tor F
D. none of these

Answer: B

D Watch Video Solution
18. When does the value of the statement $(p \wedge r) \leftrightarrow(r \wedge q)$ become false ?
A. $p$ is $T, q$ is $F$
B. $p$ is $T, q$ is $T$ and $r$ is $F$
C. $p$ is $F, q$ is $F$ and $r$ is $F$
D. none of these

## Answer: D

## - Watch Video Solution

19. If p always speaks against q , then $p \Rightarrow p \vee \sim q$ is
A. a tautology

# B. contradiction 

C. contingency
D. none of these

## Answer: A

## - Watch Video Solution

20. Which of the following connectives satisfy
commutatiive law?
A. $\wedge$
B. $V$
C. $\leftrightarrow$
D. 'all the above

## Answer: D

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