MATHS

BOOKS - OBJECTIVE RD SHARMA ENGLISH

MATHEMATICAL REASONING

Illustration

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

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

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3. construct truth table for $\sim(p \wedge q)$

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4. Write down the truth table for the compound statements :

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

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5. Construst truth tables for the following statements :

$\sim(p \wedge -q) \quad (ii) \sim[(\sim p) \vee (\sim q)] \quad (iii)(p \wedge q) \wedge (\sim p)$

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6. construct truth table for $(p \wedge q) v (\sim p \wedge q)$

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

$(p \wedge q) \Rightarrow \sim p \qquad (ii)(p \wedge q) \Rightarrow (p \vee q)$

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8. For any statement 'p' prove that $\sim(\sim p) \equiv p$.

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9. If p and q are two statements , prove that

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

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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 .

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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 : (i) $[\sim(p \vee q)] \wedge [p \vee \{\sim q \wedge \sim s)\}]$ (ii) $\sim p \vee [(\sim q) \vee (p \vee \sim q) \vee \sim r]$

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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.

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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 : x is an integer

S: x is a natural number.

(ii) S_1: Natural numbers are integers.

S_2 : x is an interger.

S : x is not a natural number.

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21. Construst a circuit for the statements $(p \wedge q \wedge r) \vee [(\sim p) \wedge (\sim q)]$

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Illusration 1

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

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Illusration 3

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.

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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

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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

Answer: B

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3. Let p and q be two propositions given by

p : I play cricket during the holidays.

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

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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

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5. Let there be two propositions :

p : I take only bread and butter in breakfast.

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 ^ q

B. p v q

C. $p \rightarrow q$

D. $p \leftrightarrow q$

Answer: B

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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

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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 v q

B. $p \rightarrow q$

C. p ^ q

D. $p \leftrightarrow q$

Answer: C

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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 v q

B. p ^ q

C. $p \rightarrow q$

D. $p \leftrightarrow q$

Answer: D

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9. Consider the following statements

P : I have the raincoat q : I can walk in the rain.

The propositions " If i have the raincoat , then I can walk in the rain " is represented by

A. $p \rightarrow q$

B. p v q

C. p ^ q

D. $p \leftrightarrow q$

Answer: A

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10. Which of the following is true for the propositions p and q ?

A. p ^ q is true when at least one of p and q is true

B. $p \to q$ 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. ~$(p \vee q)$ is true only when both p and q are false

Answer: D

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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

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12. The logically equvalent proposition of $p \leftrightarrow q$ is

A. $(p \rightarrow q) \wedge (q \rightarrow p)$

B. $(p \to q) \vee)(q \to p)$

C. $(p \wedge q) \to (p \vee q$

D. $(p \wedge q) \vee (p \vee q)$

Answer: A

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13. Using truth table show that $-(p \vee q) \vee (\sim p \wedge q)$ is logically equivalent to ~ p.

A. ~p

B. p

C. q

D. ~ q

Answer: A

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14. 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

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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

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16. Which of the following is logically equivalent to (p^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: C

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17. Write the contrapositive of the contrapositive of p implies q.

A. $q \rightarrow p$

B. $p \leftrightarrow q$

C. $\sim q \rightarrow \sim p$

D. $\sim p \rightarrow \sim q$

Answer: C

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18. The expression $\sim(\sim p \rightarrow q)$ is logically equivalent to

A. $\sim p \rightarrow \sim q$

B. p ^ q

C. $p \rightarrow \sim q$

D. $p \leftrightarrow q$

Answer: C

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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

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20. If $p \to (q \vee r)$ is false, then the truth values of p,q, and r are, respectively.

A. T,F,F

B. F,F,F

C. F,T,T

D. T,T,F

Answer: A

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21. The compound statement $p \to (\sim p \wedge q)$ 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

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22. The false statement in the following is

A. $p \wedge (\sim p)$ is a contradiction

B. $(p \to q) \leftrightarrow (\sim q \to \sim p)$ is a contradiction

C. $\sim(\sim p) \leftrightarrow$ is a tautology

D. $P \vee (\sim p)$ is a tautology

Answer: B

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23. Which of the following is a proposition ?

A. 5.6 is a decimal number

B. $\sqrt{4}$ is 2

C. Mathematics is not interesting

D. 5 is an even integer

Answer: C

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24. $(p \wedge \sim q) \wedge (\sim p \wedge q)$ is

A. a tautology

B. a contradiction

C. both a tauology and a contradiction

D. neither a tauology nor a contradiction

Answer: B

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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

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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

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27. Negation of the statement $p \to (q \wedge r)$ is

A. $\sim p \to \sim(q \vee r)$

B. $\sim p \to \sim(q \wedge r)$

C. $(q \wedge r) \to p$

D. $p \wedge (\sim q \vee \sim r)$

Answer: D

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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

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29. The negation of the propostion $q \vee \sim(p \wedge r)$ 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

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30. Which of the following is always true ?

A. $(p \to q) \cong (\sim q \to \sim p)$

B. $\sim (p \vee q) \cong (\sim p \vee \sim q)$

C. $\sim (p \to q) \cong (p \vee \sim q)$

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

Answer: A

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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

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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

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

A. $p \rightarrow (q \vee r)$

B. $r \rightarrow (p \vee q)$

C. $\sim r \rightarrow \sim(p \vee q)$

D. $\sim r \rightarrow (\sim p \wedge \sim q)$

Answer: C

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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::C

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35. The contrapositive of the statement $\text{if } 2^2 = 5$ 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

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36. If x = 5 and y = -2 , then x -2y =9, the contrapositive of this proposition is

A. If x -2y is not equal to 9 , then $x \neq 5$ or $y \neq -2$

B. if $x - 2y = 9, x \neq 5$ and $y \neq -2$

C.

$x - 2y = 9$ if and only if $x = 5$ and $y = -2$

D. none of these

Answer: A

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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

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38. Which of the following is wrong?

A. $p \to q$ is logically equivation to $\sim p \vee q$

B. if The truth values of p,q,r are T,F,T respectively, then the truth value of $(p \vee q) \wedge (q \vee r)$ 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

Answer: D

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39. The symbolic form of logic of the circuit given below is :

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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

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40. Which of the following statements is a tautology ?

A. $(\sim q \wedge q) \wedge p$

B. $(\sim q \wedge p) \wedge (p \wedge \sim p)$

C. $(-p \vee p) \vee (-q \wedge p)$

D. $(p \wedge q)$

Answer: C

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41. The statement $p \rightarrow (q \rightarrow p)$ is equivalent to

A. $p \rightarrow (p \wedge q)$

B. $p \rightarrow q$

C. $p \rightarrow (p \rightarrow q)$

D. $p \rightarrow (p \vee q)$

Answer: D

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

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

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. $x \in S \ \text{and} \ x \leq 0 \Rightarrow x$ is not rational

C. There is a rational number $x \in S \ \text{such that} \ x \leq 0$

D. There is no rational number $x \in Ssucht\widehat{x} \leq 0$

Answer: A

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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 and 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. $(A \wedge B)$

B. $[A \wedge (A \rightarrow B)] \rightarrow B$

C. $B \rightarrow [A \wedge (A \rightarrow B)]$

D. $(A \vee B)$

Answer: B

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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. $p \vee \sim q$

Answer: :C

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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

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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. The Bolean Expression `(p ^^ ~ q) vv q vv (~ p ^^ q vv (~ p ^^ q) is equivalent to

A. $\sim p \wedge q$

B. $p \wedge q$

C. $p \vee q$

D. $p \vee \sim q$

Answer: C

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49. Consider the following two statements:

P : If 7 is an odd number, then 7 is divisible by 2.

Q : If 7 is a prime number, then 7 is an odd number.

If V_1 is the truth value of the contrapositive of P and V_2 is the truth value of contrapositive of Q then the ordered pair (V_1, V_2) equals:

A. (F,T)

B. (T,F)

C. (F,F)

D. (T,T)

Answer: B

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50. The negation of $A \to (A \vee \sim B)$ is

A. a fallacy

B. a tautology

C. equivalent to $(A \vee \sim B) \to A$

D. equivalent to $A \to (A \wedge \sim B)$

Answer: A

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51. The following statement $(p \to q) \to [(\sim p \to q) \to q]$ is

A. equivalent to $p \to \sim q$

B. a fallocy

C. a tautology

D. equivalent to $\sim p \rightarrow q$

Answer: C

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52. Which of the following is a tautology ?

A. $p \vee (p \rightarrow q)$

B. $(p \vee q) \rightarrow p$

C. $p \vee (p \vee q)$

D. $(p \vee q) \rightarrow q$

Answer:

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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

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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

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

D. $p \wedge (p \vee q) \wedge q$

Answer: D

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3. Consider the following circuit

The simplified of the above circuit is

A. 

B. 

C. 

D. 

Answer: A

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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

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5. Given the circuit

which of the following is equivalent to the above circuit ?

A. 

B. 

C. any closed circuit

D. none of these

Answer: A

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Section Ii 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.

Answer: C

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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.

Answer: C

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

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.

Answer: 3

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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. $\sim p \leftrightarrow \sim q$

Answer: A

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2. Write the inverse of the converse of p implies q.

A. $q \rightarrow p$

B. $\sim p \rightarrow \ -q$

C. $q \rightarrow p$

D. $\sim p \rightarrow p$

Answer: B

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3. The contrapositive of the statement If p then q is

A. $\sim q \rightarrow \sim p$

B. $\sim p \rightarrow q$

C. $q \rightarrow p$

D. $p \leftrightarrow q$

Answer: A

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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

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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

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6. If p,q and r are simple propositions such that $(p \wedge q) \wedge (q \wedge r)$ is true, then

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

Answer: C

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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. The conditional statement $(p \wedge q) \rightarrow p$ is

A. a tautology

B. a contradiction

C. neither a tauology nor a contradiction

D. none of these

Answer: A

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13. 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

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14. 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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15. If p,q,r have truth values T,F,T respectively, which of the following is true ?

A. $(p \to q) \wedge r$

B. $(p \to q) \wedge \sim r$

C. $(p \wedge q) \wedge (p \vee r)$

D. $q \to (p \wedge r)$

Answer: D

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16. If $p \to (q \vee r)$ is false, then the truth values of p,q, and r are, respectively.

A. T,T,T

B. F,T,T

C. F,F,F

D. T,F,F

Answer: D

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17. The negation of the propostion $q \vee \sim(p \wedge r)$ is

A. $\sim q \vee (p \wedge \sim r)$

B. $(\sim q \wedge (p \wedge r)$

C. $\sim p \vee \sim q \vee \sim r$

D. $q \rightarrow (p \wedge r)$

Answer: A

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18. Which of the following is logically equivalent to (p^q) ?

A. $\sim(p \rightarrow \sim q)$

B. $p \wedge \sim q$

C. $\sim p \wedge q$

D. $\sim(\sim P \wedge \sim q)$

Answer: C

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19. 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

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20. 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:

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21. Write the negative of the proposition : "If a number is divisible 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

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22. 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

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23. 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

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24. 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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25. The negative 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

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26. 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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27. $p \rightarrow q$ 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

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28. Which of the following is logically equivalent to $\sim(\sim p \rightarrow q)$?

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

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29. Which of the following is logically equivalent to $\sim(p \to q)$?

A. $p \wedge q$

B. $p \wedge \sim q$

C. $\sim p \wedge q$

D. $\sim p \wedge \sim q$

Answer: B

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30. Which of the following is logically equivalent to (p^q) ?

A. $p \rightarrow q$

B. $\sim p \wedge \sim q$

C. $p \wedge \sim q$

D. $\sim(p \rightarrow \sim q)$

Answer: D

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

A. $x = 4 \Rightarrow 2x + 3 \neq 9$

B. $x = 4 \Rightarrow 2x + 3 = 9$

C. $x \neq 4 \Rightarrow 2x + 3 \neq 9$

D. $x \neq 4 \Rightarrow 2x + 3 = 9$

Answer: A

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

A. tautology

B. contradiction

C. neither a tautology nor a contradiction

D. tautology and contradiction

Answer: B

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33. 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. $p \to q$

B. $q \to p$

C. $p \to \sim q$

D. $p \leftrightarrow q$

Answer: D

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34. 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

Answer: D

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35. $(\sim(p \vee q)) \vee (\sim p \wedge q)$ is logically equivalent to

A. $\sim p$

B. p

C. q

D. $\sim q$

Answer: A

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36. Write the negative of the compound proposition $p \vee (\sim p \vee q)$

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

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37. 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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38. 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 petty 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. idempotent law

Answer: b

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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

Answer: D

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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

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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

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7. Which of the following pairs are logically equivalent ?

A. Conditional, Contrapositive

B. Conditional , Inverse

C. Contrapositive, converse

D. Inverse, contrapositive

Answer: C

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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&B

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9. The statement $p \vee q$ is

A. a tautology

B. a contradiction

C. contingency

D. none of these

Answer: C

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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

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11. The statement $p \Rightarrow p \vee q$

A. a tautology

B. a contradiction

C. both a tautology and contradiction

D. None of these

Answer: A

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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

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13. If truth values of $p \vee q$ is ture,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

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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

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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. $\sim[\sim p \wedge (p \leftrightarrow q)] \equiv$ is equivalent to

A. $p \vee q$

B. $q \wedge q$

C. T

D. F

Answer: A

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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. T or F

D. none of these

Answer: B

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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

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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

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20. Which of the following connectives satisfy commutatiive law ?

A. $\wedge$

B. $\vee$

C. $\leftrightarrow$

D. `all the above

Answer: D

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