MATHS

BOOKS - TARGET MATHS (HINGLISH)

MATHEMATICAL LOGIC

Classical Thinking

1. Which of the following is a statement in logic?

A. What a wonderful day

B. Shut up

C. What are you doing

D. Bombay is the capital of India

Answer: D

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2. Which of the following is a statement?

A. Open the door

B. Do your homework

C. Switch on the fan

D. Two plus two is four

Answer: D

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3. Which of the following is a statement in logic?

A. Go away

B. How beautiful

C. $x > 5$

D. $2 = 3$

Answer: D

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4. The connective in the statement "Earth revolves around the Sun and Moon is a satellite of earth" is

A. or

B. Earth

C. Sun

D. and

Answer: D

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5. p: Sunday is a holiday, q: Ram does not study on holiday.

he symbolic form of the statement

"Sunday is a holiday and Ram studies on holiday' is

A. $p \wedge \sim q$

B. $p \wedge q$

C. $\sim p \wedge \sim q$

D. $p \vee \sim q$

Answer: A

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6. p: clouds in the sky and q:it is raining. There are clouds in the sky and it is not raining. The symbolic form is

A. $p \rightarrow q$

B. $p \rightarrow \sim q$

C. $p \wedge \sim q$

D. $\sim p \wedge q$

Answer: C

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7. If p: The sun has set, q: The moon has risen, then symbolically the statement 'The sun has not set or the moon has not risen' is written as

A. $p \wedge \sim q$

B. $\sim q \vee p$

C. $\sim p \wedge q$

D. $\sim p \vee \sim q$

Answer: D

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8. If p: Rohit is tall, q: Rohit is handsome, then the statement 'Rohit is tall or he is short and handsome can be written symbolically as

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

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

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

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

Answer: A

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9. Assuming the first part of the statement as p, second as q and the third as r, the statement 'Candidates are present, and voters are ready to vote but no ballot papers' in symbolic form is

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

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

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

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

Answer: D

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10. Write verbally $\sim p \vee q$ where p: She is beautiful, q: She is clever

A. She is beautiful but not clever

B. She is not beautiful or she is clever

C. She is not beautiful or she is not clever

D. She is beautiful and clever

Answer: B

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11. If p: Ram is lazy, q: Ram fails in the examination, then the verbal form of $\sim p \vee \sim q$ is

A. Ram is not lazy and he fails in the examination

B. Ram is not lazy or he does not fail in the examination

C. Ram is lazy or he does not fail in the examination

D. Ram is not lazy and he does not fail in the examination

Answer: B

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12. A compound statement p or q is false only when

A. p is false

B. q is false

C. both p and q are false.

D. depends on p and q

Answer: C

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13. A compound statement p and q is true only when

A. p is true

B. q is true

C. both p and q are true

D. none of p and q is true

Answer: C

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14. For the statements p and q $'p \to q'$ is read as 'if p then q'. Here, the statement q is called

A. antecedent.

B. consequent.

C. logical connective

D. prime component

Answer: D

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15. If p : Prakash passes the exam, q: Papa will give him a bicycle. Then the statement 'Prakash passing the exam, implies that his

papa will give him a bicycle' can be symbolically written as

A. $p \rightarrow q$

B. $q \rightarrow p$

C. $p \wedge q$

D. $p \vee q$

Answer: A

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16. If d: driver is drunk, a: driver meets with an accident, translate the statement 'If the Driver is not drunk, then he cannot meet with an accident' into symbols

A. $\sim a \rightarrow \sim d$

B. $\sim d \rightarrow \sim a$

C. $\sim d \wedge a$

D. $a \wedge \sim d$

Answer: C

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17. If a: Vijay becomes a doctor, b: Ajay is an engineer. Then the statement Vijay becomes a doctor if and only if Ajay is an engineer can be written in symbolic form as

A. $b \leftrightarrow \sim a$

B. $a \leftrightarrow b$

C. $a \rightarrow b$

D. $b \rightarrow a$

Answer: C

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18. A compound statement $p \rightarrow q$ is false only when

A. p is true and q is false

B. p is false but q is true.

C. atleast one of p or q is false.

D. both p and q are false

Answer: A

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19. Assuming the first part of each statement as p, second as q and the third as r, the statement 'If A, B, C are three distinct points, then either they are collinear or they form a triangle' in symbolic form is

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

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

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

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

Answer: C

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20. If m: Rimi likes calculus. n: Rimi opts for engineering branch. Then the verbal form of $m \to n$ is

A. If Rimi opts for engineering branch then she likes calculus

B. If Rimi likes calculus then she does not opt for engineering branch

C. If Rimi likes calculus then she opts for engineering branch

D. If Rimi likes engineering branch then she opts for calculus

Answer: C

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21. The inverse of logical statement $p \rightarrow q$ is

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

B. $p \leftrightarrow q$

C. $q \rightarrow p$

D. $q \leftrightarrow p$

Answer: A

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22. Contrapositive of $p \rightarrow q$ is

A. $p \rightarrow q$

B. $\sim q \rightarrow p$

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

D. $q \rightarrow \sim p$

Answer: C

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23. The statement "If x^2 is not even, then x is not even" is coverse of the statement

A. If x^2 is odd, then x is even

B. If x is not even, then x^2 is not even

C. If x is even, then x^2 is even

D. If x is odd, then x^2 is even

Answer: B

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24. The converse of 'If x is zero then we cannot divide by x' is

A. If we cannot divide by x then x is zero

B. f we divide by x then x is non-zero

C. If x is non-zero then we can divide by x

D. If we cannot divide by x then x is non-zero.

Answer: A

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25. The converse of the statement "If $x > y$, then $x + a > y + a$" is

A. If x lt y, then x + a lt y+a

B. If x+a gt y+a, then x gt y

C. If x lt y, then x +a gty+a

D. If x gt y, then x + a lt y+a

Answer: B

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26. The inverse of the statement " If you access the internet, then you have to pay the charges " is

A. If you do not access the internet, then you do not have to pay the charges

B. If you pay the charges, then you accessed the internet

C. If you do not pay the charges, then you do not access the internet.

D. You have to pay the charges if and only if you access the internet.

Answer: A

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27. The contrapositive of the statement: "If a child concentrates then he learns" is

A. If a child does not concentrate he does not learn

B. If a child does not learn then he does not concentrate

C. If a child practises then he learns,

D. If a child concentrates, he does not forget

Answer: B

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28. If p: Sita gets promotion, q: Sita is transferred to Pune. The verbal form of $\sim p \leftrightarrow q$ is written as

A. Sita gets promotion and Sita gets transferred to Pune.

B. Sita does not get promotion then Sita will be transferred to Pune.

C. Sita gets promotion if Sita is transferred to Pune

D. Sita does not get promotion if and only if Sita is transferred to Pune.

Answer: D

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29. Negation of a statement in logic corresponds to_____in set theory

A. empty set

B. null set

C. complement of a set

D. universal set

Answer: C

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30. The logical statement '$p \wedge q$' can be related to the set theory's concept of

A. union of two sets

B. intersection of two set

C. subset of a set

D. equality of two sets

Answer: B

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31. If p and q are two logical statements and A and B are two sets, then $p \rightarrow q$ corresponds to

A. $A \subseteq B$

B. $A \cap B$

C. $A \cup B$

D. $A \not\subseteq B$

Answer: A

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32. Every conditional statement is equivalent to

A. its contrapositive

B. its inverse

C. its converse

D. only itself

Answer: A

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33. The statement, 'If it is raining then I will go to college' is equivalent to

A. If it is not raining then I will not go to college

B. If I do not go to college, then it is not raining

C. If I go to college then it is raining

D. Going to college depends on my mood

Answer: B

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34. The logically equivalent statement of

$(p \wedge q) \vee (p \wedge r)$ is

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

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

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

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

Answer: C

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35. When the compound statement is true for all its components then the statement is called

A. negation statement

B. tautology statement.

C. contradiction statement

D. contingency statement

Answer: B

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

A. a contradiction

B. a tautology

C. either (A) or (B)

D. a contingency

Answer: B

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

A. Contradiction

B. Tautology

C. Contingency

D. Tautology and Contradiction

Answer: A

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38. The proposition $p\sim(p \wedge \sim q)$ is a

A. contradiction

B. tautology.

C. contingency

D. none of these

Answer: C

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39. The proposition $(p \to q) \leftrightarrow (\sim p \to \sim q)$ is a

A. tautology

B. contradiction

C. contingency

D. none of these

Answer: C

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40. Using quantifiers $\forall, \exists$ convert the following open statement into true statement.

$'x + 5 = 8, x \in N'$

A. $\forall x \in N, x + 5 = 8$

B. For every $x \in N, x + 5 > 8$

C. $\exists x \in N$ such that x+5 = 8

D. For every $x \in N, x + 5 < 8$

Answer: C

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41. Using quantifier the open sentence $x^2 - 4 = 32$ defined on W is converted into true statement as

A. $\forall x \in W, x^2 - 4 = 32$

B. $\exists x \in W$, such that $x^2 - 4 \leq 32$

C. $\forall x \in W, x^2 - 4 > 32$

D. $\exists x \in W$, such that $x^2 - 4 = 32$

Answer: D

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42. The dual of the statement $(p \wedge q) \vee \sim qf = p \vee \sim$ is

A. $(p \vee q) \vee \sim q \equiv p \vee \sim q$

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

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

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

Answer: C

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43. The dual of the statement "Manoj has the job but he is not happy" is

A. Manoj has the job or he is not happy.

B. Manoj has the job and he is not happy.

C. Manoj has the job and he is happy.

D. Manoj does not have the job and he is happy.

Answer: A

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44. Logical equivalent propostion to the proposition $\sim(p \wedge q)$ is

A. $p \wedge q$

B. $\sim p \vee \sim q$

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

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

Answer: B

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45. $\sim[p \vee (\sim q)]$ is equal to-

A. $\sim p \vee q$

B. $\sim p \wedge q$

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

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

Answer: B

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46. The negation of the statement "I like Mathematics and English" is

A. I do not like Mathematics and do not like English

B. I like Mathematics but do not like English

C. I do not like Mathematics but like English

D. Either I do not like Mathematics or do not like English

Answer: D

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47. $\sim(p \leftrightarrow q)$ is equivalent to

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

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

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

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

Answer: A

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48. The negation of 'If it is Sunday then it is a holiday' is

A. It is a holiday but not a Sunday.

B. No Sunday then no holiday.

C. It is Sunday, but it is not a holiday,

D. No holiday therefore no Sunday.

Answer: C

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49. The negation of 'For every natural number x, x +5 gt 4' is

A. $\forall x \in N, x + 5 < 4$

B. $\forall x \in N, x - 5 < 4$

C. For every integer x, x + 5 lt 4

D. There exists a natural number x, for which $x + 5 < = 4$

Answer: D

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50. The switching circuit for the statement $p \wedge q \wedge r$ is

A. 

B. 

C. 

D. 

Answer: A

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Critical Thinking

1. Which of the following is an incorrect statement in logic ?

A. Multiply the numbers 3 and 10

B. 3 times 10 is equal to 40.

C. What is the product of 3 and 10?

D. 10 times 3 is equal to 30.

Answer: B

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2. Assuming the first part of the sentence as p and the second as q, write the following statement symbolically: "Irrespective of one

being lucky or not, one should not stop working'

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

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

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

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

Answer: C

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3. If first part of the sentence is p and the second is q, then the symbolic form of the statement "It is not true that Physics is not interesting or difficult is

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

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

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

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

Answer: D

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4. The symbolic form of the statement 'It is not true that intelligent persons are neither polite nor helpful' is

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

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

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

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

Answer: B

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5. Given 'p' and 'q' as true and 'r' as false, the truth values of $\sim p \wedge (q \vee \sim r)$ and $(p \rightarrow q) \wedge r$ are respectively

A. T, F

B. F, F

C. T, T

D. F,T

Answer: B

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6. If p and q have truth value 'F', then the truth values of $(\sim p \vee q) \leftrightarrow \sim(p \wedge q)$ and $p \leftrightarrow (p \rightarrow \sim q)$ are respectively

A. T,T

B. F, F

C. T,F

D. F,T

Answer: c

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7. If p is true and q is false then the truth values of $(p \leftrightarrow q) \leftrightarrow (\sim q \rightarrow \sim p)$ and $(\sim p \vee q) \wedge (\sim q \vee p)$ are respectively

A. F, F

B. F, T

C. T,F

D. T, T

Answer: C

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8. If p is false, q is true then which of the following is false ?

A. $q \wedge q$ is true

B. $p \vee \sim q$ is true

C. $q \rightarrow p$ is true

D. $p \rightarrow q$ is true

Answer: D

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9. Given that p is 'false' and q is 'true' then the statement which is 'false' is

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

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

C. $p \rightarrow \sim q$

D. $q \rightarrow \sim p$

Answer: A

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10. If p, q are true and r is false statement then which of the following is true statement?

A. $(p \wedge q) \vee$ r is F

B. $(p \wedge q) \wedge r$ is T

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

D. $(p \wedge q) \vee (p \wedge r)$is F

Answer: C

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11. If $\sim q \vee p$ is F, then which of the following is correct?

A. $p \leftrightarrow q$ is T

B. $p \rightarrow q$ is T

C. $q \rightarrow p$ is T

D. $p \rightarrow q$ is F

Answer: B

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12. Find out which of the following statements have the same meaning:

i. If Seema solves a problem then she is happy.

ii. If Seema does not solve a problem then she is not happy. iii If Seema is not happy then she hasn't solved the problem. iv. If Seema is happy then she has solved the problem

A. (i, ii) and (iii, iv)

B. i, ii, iii

C. (i, iii) and (ii, iv)

D. ii, iii, iv

Answer: C

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13. Find which of the following statements convey the same meanings?

i . If it is the bride's dress then it has to be red.

ii. If it is not bride's dress then it cannot be red. iii. If it is a red dress then it must be the bride's dress. iv. If it is not a red dress then it can't be the bride's dress

A. (i, iv) and (ii, iii)

B. (i, ii) and (iii, iv)

C. (i), (ii), (iii)

D. (i, iii) and (ii, iv)

Answer: A

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14. $p \wedge (p \rightarrow q)$ is logically equivalent to

A. $p \vee q$

B. $\sim p \vee q$

C. $p \wedge q$

D. $p \vee \sim q$

Answer: C

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15. Which of the following is logically equivalent to $\sim[p \rightarrow (p \vee \sim q)]$?

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

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

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

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

Answer: B

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16. Which of the following is true?

A. $p \wedge \sim p \equiv T$

B. $p \vee \sim p \equiv F$

C. $p \to q \equiv q \to p$

D. $p \to q \equiv (\sim p)$

Answer: D

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17. $\sim(\sim p) \leftrightarrow p$ is

A. a tautology

B. a contradiction

C. neither a contradiction nor a tautology

D. none of these

Answer: A

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18. $(\sim p \wedge \sim q) \wedge (q \wedge r)$ is a

A. tautology

B. contingency

C. contradiction

D. neither tautology nor contradiction

Answer: C

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19. Which of the following is a tautology?

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

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

C. $\sim(p \rightarrow q) \leftrightarrow p \wedge \sim q$

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

Answer: C

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20. Which of the following statement is contradiction?

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

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

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

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

Answer: B

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21. Which of the following statement is a contingency?

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

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

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

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

Answer: B

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22. If A $\equiv$ {4, 5, 7, 9), determine which of the following quantified statement is true.

A. $\exists x \in A,$ sun that x + 4 = 7

B. $\exists x \in A, x + 1 > \ = 10$

C. $\forall x \in A, 2x \leq 17$

D. $\exists x \in A$ such that $x + 1 > 10$

Answer: B

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23. Using quantifier the open sentence $x^2 > 0$ ' defined on N is converted into true statement as

A. $\forall x \in N, x^2 > 0$

B. $Aax \in N, x^2 = 0$

C. $\exists x \in N$, such that $x^2 < 0$

D. $\exists x \not\in N,$ such that $x^2 < 0$

Answer: A

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24. Which of the following quantified statement is false?

A. $\exists x \in N,$ such that $x + 5 \leq 6$

B. $\forall x \in N, x^2 \not\leq 0$

C. $\exists x \in N,$ such that $x - 1 < 0$

D. $\exists x \in N,$ such that $x^2 - 3x + 2 = 0$

Answer: C

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25. Given below are four statements along with their respective duals. Which dual statement is not correct?

A. $(p \vee q) \wedge (r \vee s), (p \wedge q) \vee (r \wedge s)$

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

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

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

Answer: D

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26. The dual of $(p \wedge t) \vee (c \wedge \sim q)$ where t is a tautology and c is a contradiction, is

A. $(p \vee c) \wedge (t \vee \sim q)$

B. $(\sim p \wedge c) \wedge (t \vee q)$

C. $(\sim p \vee c) \wedge (t \vee q)$

D. $(\sim p \vee t) \wedge (c \vee \sim q)$

Answer: A

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27. Negation of the proposition $(p \vee q) \wedge (\sim q \wedge r)$ is

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

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

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

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

Answer: C

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28. The negation of $p \vee \sim q$ is

A. $\sim p \wedge q$

B. $p \vee \sim q$

C. $\sim p \wedge \sim q$

D. $\sim p \vee \sim q$

Answer: A

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

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

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

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

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

Answer: B

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30. The negation of the statement, $\exists x \in R$ such that $x^2 + 3 > 0$, is

A. $\exists x \in R, \quad \text{such that} \quad x^2 + 3 < 0$

B. $\forall x \in R, x^2 + 3 > 0$

C. $\forall x \in R, x^2 + 3 < \ = 0$

D. $\exists x \in R, \quad \text{such that} \quad x^2 + 3 = 0$

Answer: C

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31. The negation of the statement "If Saral Mart does not reduce the prices, I will not shop there any more" is

A. Saral Mart reduces the prices and still I will shop there.

B. Saral Mart reduces the prices and I will not shop there

C. Saral Mart does not reduce the prices and still I will shop there.

D. Saral Mart does not reduce the prices or

I will shop there.

Answer: C

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32. The switching circuit for the statement $[p \wedge (q \vee r)] \vee (\sim p \vee s)$ is

A. 

B. 

C. 

D. 

Answer: C

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33. If the symbolic form is $(p \wedge r) \vee (\sim q \wedge \sim r) \vee (\sim q \wedge \sim r)$, then switching circuit is

A. 

B. 

C. 

D. 

Answer: B

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34. The switching circuit for the symbolic form

$(p \vee q) \wedge [\sim p \vee (r \wedge \sim q)]$ is

A. 

B. 

C. 

D. 

Answer: A

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Competitive Thinking

1. Which of the following statement is not a statement in logic?

A. Earth is a planet

B. Plants are living object.

C. $\sqrt{-9}$ is a rational number.

D. I am lying

Answer: D

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2. p: A man is happy q: The man is rich. The symbolic representation of "If a man is not rich then he is not happy" is

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

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

C. $p \rightarrow q$

D. $p \rightarrow \sim q$

Answer: B

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3. $p \rightarrow$ Ram is rich

$q \rightarrow$ Ram is successful

$r \rightarrow$ Ram is talented

Write the symbolic form of the given statement, Ram is neither rich nor successful and he is not talented

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

B. $\sim \vee \sim q \wedge \sim r$

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

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

Answer: D

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4. Which of the following is not a correct statement?

A. Mathematics is interesting

B. $\sqrt{3}$ is a prime

C. $\sqrt{2}$ is irrational

D. The sun is a star

Answer: B

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5. 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 interesting or Mathematics is difficult

Answer: C

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6. Let p: roses are red and q: the sun is a star. Then the verbal translation of $(\sim p) \vee q$ is

A. Roses are not red and the sun is not a star.

B. It is not true that roses are red or the sun is not a star

C. It is not true that roses are red and the sun is not a star.

D. Roses are not red or the sun is a star.

Answer: D

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7. Let p : Boys are playing, q: Boys are happy, the equivalent form of compound statement $\sim p \vee q$ is

A. Boys are not playing or they are happy

B. Boys are not happy or they are playing

C. Boys are playing or they are not happy.

D. Boys are not playing or they are not happy.

Answer: A

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8. If p and q are true statements in logic, which of the following statement pattern is true?

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

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

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

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

Answer: C

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9. If $p \rightarrow (\sim p \vee q)$ is false, the truth values of p and q are , respectively

A. F,T

B. F,F

C. T,T

D. T,F

Answer: D

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10. If $(p \wedge \sim q) \rightarrow (\sim p \vee r)$ is a false statement, then respective truth values of p, q and r are

A. T,F,F

B. F, T,T

C. T, T, T

D. F,F, F

Answer: A

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11. If p : Every square is a rectangle.

q : Every rhombus is a kite, then truth values of $p \to q$ and $p \leftrightarrow q$ are _____ and _____ respectively.

A. F, F

B. T, F

C. F, T

D. T, T

Answer: D

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

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

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

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

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

Answer: A

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13. Contrapositive of $p \rightarrow q$ is

A. $\sim p \rightarrow q$

B. $p \rightarrow \sim q$

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

D. $q \rightarrow p$

Answer: C

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14. If Ram secures 100 marks in maths, then he will get a mobile. The converse is

A. If Ram gets a mobile, then he will not secure 100 marks in maths.

B. If Ram does not get a mobile, then he will secure 100 marks in maths.

C. If Ram will get a mobile, then he secures 100 marks in maths.

D. None of these

Answer: C

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15. Let p: A triangle is equilateral, q: A triangle is equiangular, then inverse of $q \rightarrow p$ is

A. If a triangle is not equilateral then it is not equiangular.

B. If a triangle is not equiangular then it is not equilateral.

C. If a triangle is equiangular then it is not equilateral

D. If a triangle is equiangular then it is equilateral.

Answer: B

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16. If it is raining, then I will not come. The contrapositive of this statement will be

A. If I will come, then it is not raining

B. If I will not come, then it is raining

C. If I will not come, then it is not raining

D. If I will come, then it is raining

Answer: A

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17. The contrapositive statement of the statement "If x is prime number, then x is odd" is

A. If x is not a prime number, then x is not odd.

B. If x is a prime number, then x is not odd.

C. If x is not a prime number, then x is odd.

D. If x is not odd, then x is not a prime number.

Answer: D

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18. The contrapositive of the statement: "If the weather is fine then my friends will come and we go for a picnic".

A. The weather is fine but my friends will not come or we do not go for a picnic.

B. If my friends do not come or we do not go for a picnic then weather will not be fine.

C. If the weather is not fine then my friends will not come or we do not go for a

picnic.

D. The weather is not fine but my friends will come and we go for a picnic.

Answer: B

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19. Write the converse and contrapositive of the statement " If x is a prime number then x is odd "

A. If .x is not an odd number then r is not a prime number

B. If x is not a prime number then r is not an odd

C. If x is not a prime number then x is odd

D. If x is a prime number then it is not odd

Answer: B

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20. The logically equivalent statement of $p \to q$ is

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

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

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

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

Answer: C

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21. $\sim p \wedge q$ is logically equivalent to

A. $p \rightarrow q$

B. $q \rightarrow p$

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

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

Answer: D

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22. The statement pattern $(\sim p \wedge q)$ is logically equivalent to

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

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

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

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

Answer: B

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

A. $q \vee p$

B. P

C. $\sim q$

D. $p \wedge q$

Answer: B

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24. The Boolean expression $\sim(p \vee q) \vee (\sim p \wedge q)$ is equivalent to (1) $\sim p$ (2) p (3) q (4) $\sim q$

A. p

B. q

C. ~q

D. ~p

Answer: D

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25. The Boolean Expression $(p \wedge \sim q) \vee q \vee (\sim p \wedge q)$ is equivalent to:

A. $p \wedge q$

B. $p \vee q$

C. $p \vee \sim q$

D. $\sim p \wedge q$

Answer: B

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

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

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

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

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

Answer: D

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

A. $q \rightarrow p$

B. $\sim q \vee \sim p$

C. $p \wedge \sim q$

D. $\sim q \rightarrow p$

Answer: B

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28. Which of the following is not true for any two statements p and q?

A. $\sim[p \vee (\sim q)] \equiv \sim p \wedge q$

B. $(p \vee q) \vee (\sim q)$ is a tautology

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

D. $\sim(p \vee q) \equiv \sim p \vee \sim q$

Answer: D

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29. The statement pattern $p \wedge (\sim p \wedge q)$is

A. a tautology

B. a contradiction

C. equivalent to $p \wedge q$

D. equivalent to $p \vee q$

Answer: B

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

A. Neither tautology nor contradiction

B. Tautology

C. Tautology and contradiction

D. Contradiction

Answer: D

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31. $(p \wedge \sim q) \wedge (\sim p \wedge q)$ is a

A. Tautology

B. Contradiction

C. Tautology and contradiction

D. Contingency

Answer: B

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32. Which of the following statements is a tautology?

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

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

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

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

Answer: C

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33. The only statement among the following i.e. a tautology is

A. $A \wedge (A \vee B)$

B. $A \vee (A \wedge B)$

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

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

Answer: C

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34. Which of the following statement pattern is a tautology?

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

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

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

D. $p \wedge \sim p$

Answer: C

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35. The false statement in the following is

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

B. $p \vee (\sim p)$ is a tautology

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

D. $(p \rightarrow q) \leftrightarrow (\sim q \rightarrow \sim p)$ is a contradiction

Answer: D

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36. The statement $\sim(p \leftrightarrow \sim q)$ is

A. a tautology

B. a fallacy

C. equivalent to $p \leftrightarrow q$

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

Answer: C

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

A. A fallacy

B. A tautology

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

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

Answer: B

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38. Which of the following quantified statement is ture ?

A. The square of every real number is positive

B. There exists a real number whose square is negative

C. There exists a real number whose square is not positive

D. Every real number is rational

Answer: C

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39. If c denotes the contradication, then dual of the compound statement $\sim p \wedge (q \vee c)$ is

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

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

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

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

Answer: A

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40. The negation of $q \vee \sim(p \vee r)$ is

A. $\sim q \tilde{} (p \vee r)$

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

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

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

Answer: B

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41. The negation of $(p \vee \sim q) \wedge q$ is

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

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

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

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

Answer: C

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42. Negation of the statement 'A is rich but silly' is

A. Either A is not rich or not silly.

B. A is poor or clever

C. A is rich or not silly.

D. A is either rich or silly.

Answer: B

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43. The negation of the statement "He is rich and happy" is given by

A. He is not rich and not happy

B. He is rich but not happy

C. He is not rich but happy

D. Either he is not rich or he is not happy

Answer: D

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44. The negation of the statement "72 is divisble by 2 and 3" is

A. 72 is not divisible by 2 or 72 is not divisible by 3

B. 72 is divisible by 2 or 72 is divisible by 3.

C. 72 is divisible by 2 and 72 is divisible by 3.

D. 72 is not divisible by 2 and 3.

Answer: A

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45. Let p : 7 is not greater than 4 and q : Paris is in France

be two statements. Then, $\sim(p \vee q)$ is the statement

A. 7 is greater than 4 or Paris is not in France.

B. 7 is not greater than 4 and Paris is not in France.

C. 7 is not greater than 4 and Paris is in France.

D. 7 is greater than 4 and Paris is not in France.

Answer: D

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46. The negation of $\sim s \vee (\sim r \wedge s)$

A. $s \wedge \sim r$

B. $s \wedge (r \wedge \sim s)$

C. $s \vee (r \vee \sim s)$

D. $s \wedge r$

Answer: D

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47. Which of the following is always true?

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

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

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

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

Answer: C

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48. Negation of $(\sim p \vee q)$ is

A. $\sim p \vee \sim q$

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

C. $p \wedge \sim q$

D. $\sim p \vee q$

Answer: c

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49. The negation of $p \to (\sim p \vee q)$ is

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

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

C. $p \to q$

D. $p \wedge \sim q$

Answer: D

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50. Negation of $(\sim p \wedge \sim q) \vee (\sim p \vee r)$ is

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

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

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

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

Answer: A

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51. Negation of $p \leftrightarrow q$ is

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

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

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

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

Answer: B

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52. The negation of the proposition "If 2 prime, then 3 is odd" is

A. If 2 is not prime, then 3 is not odd

B. 2 is prime and 3 is not odd.

C. 2 is not prime and 3 is odd.

D. If 2 is not prime then 3 is odd.

Answer: B

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53. The negation of the statement: "Getting above $95\,\%$ marks is necessary condition for Hema to get the admission in good college".

A. Hema gets above 95% marks but she does not get admission in good college.

B. Hema does not get above 95% marks and she gets admission in good college

C. If Hema does not get above 95% marks then she will not get admission in good college.

D. Hema does not get above 95% marks or she gets admission in good college.

Answer: B

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54. 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. There is a rational number $x \in S$ such that $x < = 0$

B. There is no rational number $x \in S$ such that $x \leq 0$

C. Every rational number $x \in S$ satisfies $x \leq 0$

D. $x \in S$ and $x \leq 0 \rightarrow x$ is not rational

Answer: C

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Evaluation Test

1. Which of the following is not a statement in logic?

A. Every set is a finite set.

B. 2 + 3 lt 6

C. x + 3 = 10

D. Zero is a complex number.

Answer: C

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2. 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, F

D. T, T, F

Answer: A

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3. The contrapositive 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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4. If p: Rohit is tall, q: Rohit is handsome, then the statement 'Rohit is tall or he is short and handsome can be written symbolically as

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

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

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

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

Answer: A

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5. The converse of the statement, "If $\sqrt{x}$ is a complex number, then x is a negative number" is

A. If $\sqrt{x}$ is not a complex number, then x is not a negative number.

B. If x is a negative number, then $\sqrt{x}$ is a complex number.

C. If x is not a negative number, then $\sqrt{x}$ is not a complex number.

D. If $\sqrt{x}$ is a real number, then x is a positive number.

Answer: B

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6. Which of the following statements is a contingency?

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

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

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

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

Answer: C

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7. Which of the following is a contradiction?

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

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

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

D. none of these

Answer: A

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8. 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 true.

B. Statement-1 is true, `statement-2 is false.

C. Statement-1 is false, statement-2 is true.

D. Statement-1 is true, statement-2 is true, statement-2 is a correct explanation for statement-1.

Answer: B

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9. If p, q are true and r is a false statement, then which of the following is a true statement?

A. $(p \wedge q) \vee r$ is F

B. $(p \wedge q) \rightarrow r$ is T

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

D. $(p \rightarrow q) \leftrightarrow (p \rightarrow r)$ is T

Answer: C

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10. The dual of the statement

$\sim(p \vee q) \wedge [p \vee (q \wedge \sim r)]$ is

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

B. $(\sim p \wedge \sim q) \vee [\sim p \wedge (\sim q \vee r)]$

C. $(p \vee q) \wedge [\sim p \vee (q \wedge \sim r)]$

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

Answer: D

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11. 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. $\sim P \wedge (Q \leftrightarrow R)$

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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12. Which of the following is true?

A. $p \wedge \sim p \equiv T$

B. $p \vee \sim p \equiv F$

C. $p \rightarrow q \equiv q \rightarrow p$

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

Answer: D

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13. The inverse of the proposition $(p \wedge \sim q) \rightarrow s$

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

B. $\sim p \vee q \rightarrow \sim r$

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

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

Answer: B

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14. The negation of the statemen

$\forall x \in N, x + 1 > 2$ is

A. $\forall x \not\in N, x + 1 < 2$

B. $\exists x \in N,$ such that x + 1 gt 2

C. $\forall x \in N, x + 1 \leq 2$

D. $\exists x \in N,$ such that $x + 1 \leq 2$

Answer: D

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