MATHS

BOOKS - MCGROW HILL EDUCATION MATHS (HINGLISH)

MATHEMATICAL REASONING

Solved Examples Concept Based Single Correct Answer Type Questions

1. Which of the following is not a proposition?

A. 7 is an odd number

B. $\sqrt{2}$ is an irrational number

C. Mumbai is the capital of India

D. Mathematics is a difficult subject

Answer: D

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2. Which of the following is . not a statement?

A. The sky is blue

B. The sky is dark in the night

C. The sky is not blue in the night

D. Is the sky blue?

Answer: D

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3. Which of the following is a false statement ?

A. 1

B. The earth is round

C. x + 7 = 5

D. $\sqrt{2}$ in an irrational number

Answer: C

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4. Suppose p and q are two statements and - p ^ q is true, then truth values of p and q are respectively

A. T, T

B. T, F

C. F, T

D. F, F

Answer: C

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5. If $p \rightarrow (\sim p \vee q)$ 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: A

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6. 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. $p \wedge q$

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

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

D. p $\wedge$ (~q)

Answer: D

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7. The contra-positive of $p \rightarrow \sim q$ is

A. $q \rightarrow \sim p$

B. $\sim q \rightarrow \sim P$

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

D. $p \rightarrow q$

Answer: A

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8. The inverse of contra-positive of $p \rightarrow q$ is

A. $\sim p \rightarrow q$

B. ~p $\rightarrow$ ~ q

C. $q \rightarrow p$

D. $\sim q \rightarrow p$

Answer: C

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9. The negation of p $\rightarrow (\sim p. \vee q)$ is

A. p $\wedge$ (~q)

B. p $\wedge$ (~ q)

C. p $\wedge$ q

D. (~ p) $\wedge$ q

Answer: A

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

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

B. ~p $\wedge$ q

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

D. ~p $\wedge$ q

Answer: A

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11. For any two statements p and q, the statement

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

is equivalent to

A. ~p

B. p

C. q

D. p $\wedge$ q

Answer: A

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12. Which of the following is not a negation of the statement p: $\sqrt{5}$ is rational ?

A. It is not the case that $\sqrt{5}$ is rational

B. $\sqrt{5}$ is not rational

C. $\sqrt{5}$ is an irrational number

D. $-\sqrt{5}$ is rational.

Answer: D

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13. Negation of ' $\sqrt{5}$ is irrational or 3 is rational' is

A. $\sqrt{5}$ is ratio.nal or 3 is irrational

B. $\sqrt{5}$ is rational and 3 is rational

C. $\sqrt{5}$ is rational and 3 is irrational

D. $\sqrt{5}$ is irrational and 3 is irrational

Answer: C

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14. Write the contra positive of the following statement: (i) If a number is divisible by 9, then it is

divisible by 3. (ii) If you are born in India, then you are a citizen of India. (iii) If a triangle is equilateral, it is isosceles.

A. If a number is not divisible by 3, it is not divisible by 9.

B. If a number is not divisible by 3, it is divisible by 9.

C. If a number is not divisible by 9, it is not divisible by 3.

D. none of these

Answer: A

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15. The negation of the following statement: P : Neh!l lives in Ludhiana or she lives in Gurudaspur.

A. Neha does not live in Ludhiana or she does not live in Gurudaspur.

B. Neha does not Jive in Ludhiana and sh.e does not live in Gurudaspur.

C. Neba does not live in Punjab.

D. None of these.

Answer: B

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16. The converse of the statement "If a < b then x + a < x + b ", is

A. If a $>$ b then x + a $<$ x + b

B. If a $\geq$ b then x + a $\geq$ x + b

C. If x + a $<$ x + b then a $<$ b

D. If x + a $\geq$ x + b then a $\geq$ b

Answer: C

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17. Which of the following is the conditional $p \to q$?

A. p is necessary for q

B. p is sufficient for q

C. p only if q

D. if q then p

Answer: B

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18. Converse of the stetement " if x^2 is odd then x is odd" is

A. if x^2 is even then x is even

B. if x is odd then x^2 is odd

C. if x is odd then x^2 is even

D. if x is even then x^2 is odd

Answer: B

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19. 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. $\sim(p \wedge \sim r) \leftrightarrow$ q

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

C. $\sim$ [q $\leftrightarrow$ (p ^ $\sim$ r)]

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

Answer: C

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20. For any two statements p and q , the negation of $p \vee (\sim p \wedge q)$ is

A. $p \wedge q$

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

C. $p \leftrightarrow q$

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

Answer: B

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Solved Examples Level 1 Single Correct Answer Type Questions

1. Let p, q and r be three logical statements. Which of the following-is true?

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

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

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

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

Answer: C

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2. If the Roofean expression

$(p \oplus q) \wedge (\sim p \odot q)$

is equivelent ot p $\wedge$ q where $\oplus$, $\odot$ $\in$ ($\wedge$, $\vee$), then the ordered pair ($\oplus$, $\odot$) is equal to

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

B. ($\vee$, $\vee$)

C. ($\wedge$, $\vee$)

D. ($\wedge$, $\wedge$)

Answer: C

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3. Given three statements P: 5 is a prime number, Q:7 is a factor of 192, R:The LCM of 5 & 7 is 35 Then which of the following statements are true (a) $Pv(\sim Q \wedge R)$ (b) $\sim P \wedge (\sim Q \wedge R)$ (c) $(PvQ) \wedge \sim R$ (d) $\sim P \wedge (\sim Q \wedge R)$

A. $(\sim P) \vee (Q \wedge R)$

B. $(P \wedge Q) \vee (\sim R)$

C. $(\sim P) \wedge (\sim Q \wedge R)$

D. $P \vee (\sim Q \wedge R)$

Answer: D

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4. If q is false and $(p \wedge q)$harr r $isalsotruethenwhichofthefollow \in garer\tau \to \log y(A)$ (pvvr)-gt(p^^r)(B)(pvvr)(C)(p^^r)-gt(pvvr)(D)p^^r`

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

B. $(p \vee r)$

C. $(p \wedge r)$

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

Answer: D

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5. Contrapostive of the statement "If two numbers are not equal, then their squares are not equal" is

A. If the squares of two pumbers are equal, then the numbers are equal.

B. If the squares of two numbers are equal, then the numbers are not equal

C. If the squares of two numbers are not equal, then the numbers are equal.

D. If the squares of two numbers aie not equal, then the numbers are not. equal.

Answer: A

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6. The Boolean expression

$((p \wedge q) \vee f(p \vee \sim q)) \wedge (\sim p \wedge \sim q)$ is equivalent

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

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

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

D. $P \wedge q$

Answer: C

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7. Suppose p and q are two statements, then $\sim [p \to (p \vee \sim q)]$ is equivalent to

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

B. F

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

D. T

Answer: B

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8. $p \rightarrow q$ is logically equivalent to

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

B. $p \wedge q$

C. $\sim p \wedge q$

D. $p \wedge \sim q$

Answer: A

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9. If $(p \wedge \sim q) \wedge (p \wedge r) \rightarrow \sim P \wedge r$ is false, then truth values of p, q, and rare respectively:

A. T, T, T

B. F, T , F

C. T , F , T

D. F, F, F

Answer: C

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10. For $\theta \in [0, 2\pi]$, consider the following statement

:

$p: \sqrt{1 - \cos(2\theta)} = \sqrt{2}|\sin\theta|$

$q: \sqrt{1-\cos(2\theta)} + \sqrt{2}\sin\theta = 0 \text{ if } \pi \leq \theta \leq 2\pi$

Then truth values of p and q are respectively:

A. T, T

B. F, T

C. F, F

D. T , F

Answer: A

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11. Let p and q be two statements, then $\sim p \rightarrow q \wedge (\sim q)$ is equivalent to

A. p

B. $p \wedge q$

C. q

D. p $\vee$ q

Answer: A

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12. Let p.q and r be three statements, then $(\sim p \rightarrow q) \rightarrow r$ is equivalent to

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

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

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

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

Answer: B

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13. Let p, q and r be three statements, then $(p \to q) \to r$ is equivalent to

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

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

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

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

Answer: B

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14. Which of the following is not equivalent to $p \rightarrow q$.

A. p is if and only if q

B. q if and only if p

C. pis necessary and sufficient for q

D. p implies q

Answer: D

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15. Write the negation of the following statement: q: For every real number x, either $x > 1 >$ or $x < 1$.

A. There exists a real number x such that neither $x >$ 1 nor $x < 1$

B. There exists a real number x such that 0 $< x < 1$

C. There ex_ists a real number x such that neither

$x \geq 1$ nor x ≤ 1

D. There exists a real number x such that 0

$\leq x \leq 1$

Answer: A

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16. Contra - positive of

p: "If x and y are integers such that xy is odd then both x and y are odd" is

A. If both x and y are odd, then xy is odd

B. If both x and y are even, then xy is even

C. If x or y is odd, then xy is odd

D. If either x or y is not odd then product xy is not odd

Answer: D

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Solved Examples Level 2 Single Correct Answer Type Questions

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

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

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

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

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

Answer: B

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2. The statement p $\rightarrow (q \vee r)$ is not equivalent to

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

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

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

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

Answer: D

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3. The negation of contrapositive of $p \rightarrow \sim q$ is

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

B. $\sim p \vee q)$

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

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

Answer: A

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4. Contra-positive of p $\rightarrow (q \rightarrow r)$ is logically equivalent to

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

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

C. $p \vee q \rightarrow r$

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

Answer: A

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5. The only statement among the following that is a tautology is

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

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

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

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

Answer: C

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6. If truth value of p is T, q is F, then truth values of $(p \to q)$ and $(q \to p) \vee (\sim p)$ are respectively

A. F, F

B. F, T

C. T, F

D. T, T

Answer: B

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7. If p, q and rare three statements and truth value of $p \wedge q \to$ r is F, then truth values of p,q and r are

respectively

A. T, F, T

B. T, T ,F

C. F, T, T

D. F, F, T

Answer: B

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8. If p is any statement, then which of the following is a contradiction?

A. $p \wedge p$

B. $p \wedge \sim p$

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

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

Answer: B

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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, F

B. T,F

C. F,T

D. T, T

Answer: B

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10. For integers m and n, both greater than 1, consider the following three statements

P : m divides n, Q : m divides n^2 and R : m is prime, then

A. $q \wedge r \rightarrow p$

B. $p \wedge q \rightarrow r$

C. $q \rightarrow r$

D. $q \rightarrow p$

Answer: A

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

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

B. a tautology

C. a fallacy

D. equivalent to $p \leftrightarrow q$

Answer: D

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12. Let p, q and r be the statements:

p: Mathura is in U.P.

q: Mathura is in lndia.

r : $p \rightarrow q$

Contra-positive of r is

A. If Mathura is not in India then Mathura is not in U.P.

B. Mathura is neither in U.P. nor in India

C. Mathura is in India but not in U.P.

D. none of these

Answer: A

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13. Let p and q be the following statements: p : X is a rectangle

q : X is a square

then which one of the following represents converse of $p \rightarrow q$.

A. If Xis a rectangle then X is a square.

B. If Xis a rectangle then Xis not a square

C. Xis a rectangle but Xis not a square

D. Xis a square then Xis a rectangle

Answer: D

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14. Let p, q and r be three statements, then

$[p \to (q \to r)] \leftrightarrow [(p \wedge q) \to r]$, is a

A. tautology

B. contradiction

C. fallacy

D. none of these

Answer: A

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Exercise Concept Based Single Correct Answer Type Questions

1. Which of the following is not a proposition ?

A. What a beautiful Bower!

B. $\sqrt{5}$ is a rational number.

C. 5 is an even an integer.

D. Paris_is in India.

Answer: A

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2. Which of the following is a statement?

A. Shut the door.

B. What are you doing here?

C. Good evenirig, Sir.

D. Chennai is the capital of Tamil Nadu

Answer: D

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3. Which of the following is not statement?

A. 3 + 5= 11

B. x + 5= 9

C. 25 is a perfect number

D. 27 is a perfect number

Answer: B

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4. Suppose p and q are two statements and $p \vee (\sim q)$ is false, then truth values of p and q are respectively:

A. T, T

B. T,F

C. F,T

D. F,F

Answer: C

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5. Let p and q be the statements:

p: It is cold.

q: She needs a hot cup of tea.

Then p $\rightarrow$ q stands for

A. If it is cold then she needs a hot cup of tea

B. If it is not cold then she needs a hot cup of tea

C. It is cold and she needs a hot cup of tea

D. If she needs a hot cup of tea then it is cold.

Answer: A

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6. Let p and q stand for the statements:

p: Monica is old .

q: She needs medicine.

Then negation of $p \wedge q$ is

A. Monica is neither old nor she needs medicine

B. Momca is not old or she doesn't need medicine

C. Monica is not old but she needs medicine

D. Monica is old but she needs medicine.

Answer: B

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7. If $p \to (\sim p \vee q)$ is false, 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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8. $\sim p \wedge q$ 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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9. The negation of $p \wedge (q \rightarrow \sim r)$ is

A. $p \rightarrow q \vee r$

B. $p \rightarrow q \wedge r$

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

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

Answer: B

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10. Identify the false statement

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

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

C. $(p \wedge q \wedge (\sim P)$ is a contradiction

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

Answer: D

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11. If $S(p, q, r) = (\sim p) \vee (\sim(q \wedge r))$ is a compound statement, then $S(\sim p, \sim q, \sim r)$ is

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

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

C. $A(p, q, r)$

D. $\sim A(p, q, r)$

Answer: B

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12. Which of the following statements is false

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

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

C. ~(~p) $\equiv$ p

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

Answer: D

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13. Which of the following statement is dual of

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

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

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

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

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

Answer: B

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14. The statement

$(p \to q) \to p$

is equivalent to

A. p

B. q

C. $\sim p \vee q$

D. $p \vee \sim q$

Answer: A

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15. 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. F, F

B. F, T

C. T,F

D. T, T

Answer: D

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16. Which of the following is a tautology ?

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

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

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

A. contradiction

B. tautology

C. neither tautology nor a contradiction

D. cannot be determined

Answer: A

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18. Which of the following is not always true ?

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

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

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

D. $\sim[p \wedge (\sim p)]$ is a tautology

Answer: C

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19. The converse of the contrapositive of the conditional $p \to \sim q$ is

A. $q \to p$

B. $\sim q \to \sim p$

C. $p \to q$

D. $\sim p \rightarrow q$

Answer: A

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20. Suppose t denotes the tautology and c denotes the contradiction. Let p and q denote two propositions, then dual of $(p \wedge t) \vee (\sim q \wedge c) \equiv$ p is

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

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

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

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

Answer: A

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Exercise Level 1 Single Correct Answer Type Questions

1. The truth values of p,q and r for which $(p \wedge q) \vee (\sim r)$ has truth value F are respectively

A. F, F , T

B. F, T, F

C. T, T ,F

D. F, F , F

Answer: A

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2. If p denotes "It is cold" and q denote "It rains" , write the statements in symbotic form.

A sufficient condition for it to be cold is that it rains.

A. $\sim p \wedge q$

B. $p \vee \sim q$

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

D. $\sim p \vee q$

Answer: C

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

A. F, F

B. T, F

C. F, T

D. T, T

Answer: D

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4. The converse of the statement:

If $(x \neq y)$ then (x + a $\neq$ y +a) is

A. If (x = y) then (x + a = y + a)

B. If (x $\neq$ y) then (x + a = y + a)

C. If $(x + a \neq y + a)$ then $(x \neq y)$

D. If $(x + a \neq y + a)$ then (x = y)

Answer: C

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5. The dual of the statement

$(p \vee t) \wedge (q \wedge c) \equiv p \wedge q$ is

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

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

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

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

Answer: A

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6. Let p and q be two -logical statements, then dual of

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

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

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

C. $p \wedge \sim q$

D. $p \wedge$ q`

Answer: B

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7. $[(p \rightarrow q) \wedge \sim r] \vee r \vee (p \wedge \sim q \wedge -r)$ is equivalent to

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

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

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

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

Answer: C

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8. What is the contra-positive of the following statement? For a, b, > 0, If $\sqrt{ab} = \frac{1}{2}$ (a + b) then a = b.

A. For a, b $>$ 0 , if $a \neq b$ then $\sqrt{ab} \neq \frac{1}{2}$ (a + b)

B. For a, b < 0, if $a \neq b$ then $\sqrt{ab} = \frac{1}{2}$ (a + b)

C. for a, b > 0, if a = b then $\sqrt{ab} = \frac{1}{2}$ (a + b)

D. For a, b > 0 , if a $\neq$ b then $\sqrt{ab} = \frac{1}{2}$ (a + b

)

Answer: A

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9. Let , p q, r and s be four statements, then

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

is equivalent to

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

B. $p \wedge q \wedge r \wedge s$

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

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

Answer: A

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10. Let p and q be two statements and let r and s be the following statements:

r : $p \leftrightarrow q$

s: $\sim q \leftrightarrow \sim p$

Then which of the following is not true

A. r $\equiv$ s

B. $r \wedge s \equiv$ s

C. $r \vee s \equiv s$

D. $r \neq s$

Answer: D

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11. Which one of the following statements is not equiva- lent to p $\rightarrow (q \vee r)$?

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

B. $P \wedge (\sim q) \rightarrow r$

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

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

Answer: D

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12. $\sim p \wedge q$ 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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13. The negation of $q \vee \sim(p \vee r)$ is

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

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

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

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

Answer: B

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14. Negation of the statement if a number is prime then it is odd' is.

A. A number is not prime but odd

B. number is prime but it is not odd

C. A number is neither prime nor odd

D. none of these

Answer: B

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15. If p and q are two propositions, Then $\sim(p \vee q) \equiv \sim p \wedge \sim q$, is

A. a tautology

B. a contradiction

C. a simple statement

D. none of these

Answer: A

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Exercise Level 2 Single Correct Answer Type Questions

1. Which of the following is a tautology ?

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

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

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

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

Answer: A

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2. Which of the following is not equivalent to $p \to q$.

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

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

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

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

Answer: B

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3. Which of the following is equivalent to $p \Rightarrow q$?

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

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

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

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

Answer: B

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4. Let p and q be two statements, then $q \leftrightarrow (\sim p \vee \sim q)$ is logically equivalent to

A. p

B. q

C. $p \rightarrow q$

D. $\sim p \wedge q$

Answer: D

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5. Dual of $(p \to q) \to$ r is

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

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

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

D. none of these

Answer: A

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Questions From Previous Years Aieee Jee Main Papers

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

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

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

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

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

Answer: C

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2. Let S be a non-empty subset of R. Consider the following statement: P: There is a rational number $x \in S$ such that $x > 0$. Which of the following statements is the negation of the statement P ? There is no rational number $x \in S$ such that $x \leq 0$ (9) Every rational number $x \in S$ satisfies $x \leq 0$ (18) $x \in S$ and $x \leq 0 \Rightarrow x$ (27) is not rational There is a rational number $x \in S$ such that $x \leq 0$ (36)

A. Every rational number x $\in$ S satisfies x ≤ 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 such that $x \leq 0$.

Answer: A

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

B. $\sim P \wedge (Q \wedge \sim R)$

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

D. $Q \leftrightarrow \sim P \wedge R$

Answer: C

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4. The only statement among the following that is 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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5. The negation of the statement

"If I becomes a teacher, then I will open a school", is

A. Either I will not become a teacher or I will not open a school.

B. Neither I will become a teacher nor I will. open a school.

C. I will not become a teacher or I will open a school.

D. I will become a teacher and I will not open a school.

Answer: D

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

A. p $\rightarrow$ q

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

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

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

Answer: B

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7. let $p \rightarrow (\sim p \vee r)$ is false, then truth values of p,q,r are respectively.

A. F, F

B. T,T

C. T,F

D. F,T

Answer: C

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8. For integers m and n, both greater than 1, consider the following three statements

P : m divides n, Q : m divides n^2 and R : m is prime, then

A. $Q \wedge R \rightarrow p$

B. $P \wedge Q \rightarrow R$

C. $Q \rightarrow R$

D. $Q \rightarrow P$

Answer: A

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

A. equivaJent to $\sim p \leftrightarrow q$

B. a tautology

C. a fallacy

D. equivalent to $p \leftrightarrow q$

Answer: D

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10. The contra-positive of the statement "if I am not feel- ing well, then I will go to the doctor" is ·

A. If I am feeling well, then I will not go to the doctor

B. If I will go to the doctor, then I am feeling well

C. If I will not go to the doctor, then I am feeling well

D. If I will go to the doctor, then I am not feeling well

Answer: C

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

A. p

B. q

C. $\sim p$

D. $\sim q$

Answer: C

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12. Let p, q and r denote three arbitrary statements. The logically equivalent of the statement p $\rightarrow (q \vee r)$ is

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

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

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

D. $p \vee q \rightarrow p$

Answer: B

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13. The contrapositive of the statement I go toschool if it does not rain' is If it rains, I do not go to school.

A. if it rains, I do not go to school

B. if I do not go to school, it rains

C. if it rains, I go to school

D. if I go to school, it rains

Answer: B

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14. The negation of $\sim s \vee (\sim r \wedge s)$ is equivalent to : (1) $s \wedge \sim r$ (2) $s \wedge (r \wedge \sim s)$ (3) $s \vee (r \vee \sim s)$ (4) $s \wedge r$

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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15. Contra-positive of the statement "If it is raining then I will not come", is

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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16. 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. $\sim Q \leftrightarrow P \wedge R$

B. $\sim Q \leftrightarrow \sim p \vee R$

C. $\sim Q \leftrightarrow P \vee \sim R$

D. $\sim Q \leftrightarrow P \wedge \sim R$

Answer: B

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

A. $\sim p \wedge q$

B. $p \wedge q$

C. $p \vee q$

D. $p \vee \sim q$

Answer: C

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18. 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 (V_1, V_2) equals.

A. (F, F)

B. (F, T)

C. (T, F)

D. (T, T)

Answer: B

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19. The contra-positive of the following statement, "If the side of a square doubles, then its area increases four times", is

A. if the area of a square increases four times, then its side is not doubled

B. if the area of a square.increases four times, then its side is doubled

C. if the area of a square does not increase fourtimes, then its side is not doubled

D. if the side of a square is not doubled, then its area does not increase four times

Answer: C

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20. The following statement:

$(p \to q) \to [(\sim p \to q) \to q]$ is :

A. a tautology

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

C. equivalent to $\to \sim q$

D. a fallace

Answer: A

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21. The proposition $\sim p \vee (p \wedge \sim q)$ is equivalent to

A. $P \vee \sim q$

B. $p \rightarrow \sim q$

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

D. $q \rightarrow p$

Answer: B

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22. Contrapositive of the statement "If two numbers are not equal, then their squares are not equal." is

A. If the squares of two numbers are equal, then the numbers are equal.

B. If the squares of two numbers are equal then the numbers are not equal

C. If the squares of two numbers are not equal, then the numbers are not equal.

D. If the squares of two numbers are-not equal, then the numbers are equal.

Answer: A

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

A. p

B. q

C. ~q

D. ~p

Answer: D

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24. If $(p \wedge \sim q) \wedge (p \wedge r) \rightarrow \sim p \vee r$ is false, then the truth values of p. q and r are respectively:

A. T, T, T

B. F, T, F

C. T, F, T

D. F, F, F

Answer: C

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25. Consider the following two statements :

Statement p : The value of can be derived by taking $\theta = 240^\circ$ in the equation $2\sin.\frac{\theta}{2} = \sqrt{1+\sin\theta} - \sqrt{1-\sin\theta}$

Statement q : The angles A, B, C and D of any quadrilateral ABCD satisfy the equation $\cos\left(\frac{1}{2}(A+C)\right) + \cos\left(\frac{1}{2}(B+D)\right) = 0$

Then the truth value of p and q are respectively :

A. T, T

B. F, F

C. F, T

D. T, F

Answer: C

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

A. F,F

B. T, F

C. F, T

D. T, T

Answer: D

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27. If the Boolean expression

$(p \oplus q) \wedge (\sim p \square q)$ is equivalent to $p \wedge q$ where $\oplus, \square \varepsilon \{\wedge, \vee\}$ then the ordered pair $(\oplus, \square)$ is

A. $(\vee, \wedge)$

B. $(\vee, \wedge)$

C. $(\wedge, \vee)$

D. $(\wedge , \wedge)$

Answer: C

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28. Given three statements P: 5 is a prime number, Q:7 is a factor of 192, R:The LCM of 5 & 7 is 35 Then which of the following statements are true (a) $Pv(\sim Q \wedge R)$ (b) $\sim P \wedge (\sim Q \wedge R)$ (c) $(PvQ) \wedge \sim R$ (d) $\sim P \wedge (\sim Q \wedge R)$

A. $(\sim P) \vee (Q \wedge R)$

B. $(P \wedge Q) \vee (\sim R)$

C. $(\sim P) \wedge (\sim Q \wedge R)$

D. $P \vee (\sim Q \wedge R)$

Answer: D

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29. If q is false and $(p \wedge q)$harr r $isalsotruethenwhichofthefollow \in gare\tau \to \log y(A)$ (pvvr)-gt(p^^r)(B)(pvvr)(C)(p^^r)-gt(pvvr)(D)p^^r`

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

B. $p \vee r$

C. $p \wedge r$

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

Answer: D

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30. Contrapositive of the statement "If two numbers are not equal, then their squares are not equal." is

A. If the squares of two numbers are equal, then the numbers are equal.

B. If the squares of two numbers are equal, then the numbers are not equal.

C. If the squares of two numbers are not equal, then the numbers are equal.

D. If the squares of two numbers are not equal, then the numbers are not equal.

Answer: A

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31. The Boolean expression

$((p \wedge q) \vee f(p \vee \sim q)) \wedge (\sim p \wedge \sim q)$ is equivalent

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

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

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

D. $p \wedge q$

Answer: C

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32. The logical statement

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

is equivalent to

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

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

C. $\sim p \vee r$

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

Answer: A

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

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

B. $p \wedge q$

C. $\sim p \wedge q$

D. $p \wedge \sim q$

Answer: A

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34. \'If you are born in India then you are citizen of India\'\' contrapositive of this statement is (A) If you are born in India then you are not citizen of India (B) If you are not citizen of India then you are not born in India (C) If you are citizen of India then you are not born in India (D) If you are citizen of India then you are born in India

A. If you are not born in India, then you are not a citizen of India.

B. If you are born in lndia, then you are not a citizen of India.

C. lf you are not a citizen of India, then you are not born in India.

D. lf you are a citizen of India, then you are born in India.

Answer: C

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35. Which one of the following statements is not a tautology ?

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

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

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

D. $p \rightarrow$ q

Answer: C

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36. For any two statements p and q, the negation of the expression $p \vee (\sim p \wedge q)$ is

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

B. $p \Rightarrow q$

C. $p \wedge q$

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

Answer: D

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

A. F, F, F

B. T, F, F

C. F, T, T

D. T, T, F

Answer: B

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38. Which one of the following Boolean expressions is a tautology?

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

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

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

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

Answer: B

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39. The negation of the Boolean expression $\sim s \vee (\sim r \wedge s)$ is equivalent to:

A. $\sim s \wedge \sim r$

B. r

C. $s \wedge r$

D. $s \vee r$

Answer: C

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40. If the truth value of the statement $p \rightarrow (\sim q \vee r)$ is false (F), then the truth values of the statements p,q and r are respectively

A. T,F, T

B. F, T, T

C. T, T, F

D. T, F, F

Answer: C

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41. The boolean expression $\sim(p \Rightarrow (\sim q))$ is equivalent to

A. $p \wedge q$

B. $\sim p \rightarrow q$

C. $q \rightarrow \sim p$

D. $p \vee q$

Answer: A

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Questions From Previous Years B Architecture Entrance Examination Papers

1. The statement $\sim(p \wedge q) \vee q)$:

A. is a tautology

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

C. is equivalent to $p \vee q$

D. is a contradiction

Answer: A

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2. The contra-positive of the statement, "If x is a prime number and x divides ab then x divides a or x divides b", can be symbolically represented using logical connec- tives, on appropriately defined statements p, q, r, s, as

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

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

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

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

Answer: C

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3. If p is any· logical statement, then

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

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

C. $p \wedge p = p$

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

Answer: C

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4. The statement

$[p \wedge (p \rightarrow q)] \rightarrow$ q

is

A. a fallacy

B. a tautology

C. neither a fallacy nor a tautology

D. not a compound statement

Answer: B

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5. The negation of $A \rightarrow (A \vee \sim B)$is

A. a tautology

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

C. equivalent to $\rightarrow (A \wedge \sim B)$

D. a fallacy

Answer: D

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6. Which of the following statements is a tautology?

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

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

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

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

Answer: C

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7. The Boolean expression $(p \wedge q) \vee ((-q) \vee p)$ is equivalent to

A. $\sim p \lambda q$

B. $-q \vee p$

C. $p \vee q$

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

Answer: B

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8. The compound statement

$(\sim C \wedge A \wedge B) \vee \sim C \wedge \sim A \wedge B) \vee (C \wedge B)$ is

equivalent to

A. A

B. ~A

C. C

D. B

Answer: D

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

A. $p \wedge q$

B. $\sim p \wedge q$

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

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

Answer: D

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

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

B. $p \vee q$

C. $p \wedge \sim q$

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

Answer: D

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11. Which one of the following statements is a tautology ?

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

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

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

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

Answer: D

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