MATHS

BOOKS - ML KHANNA

MATHEMATICAL REASONING

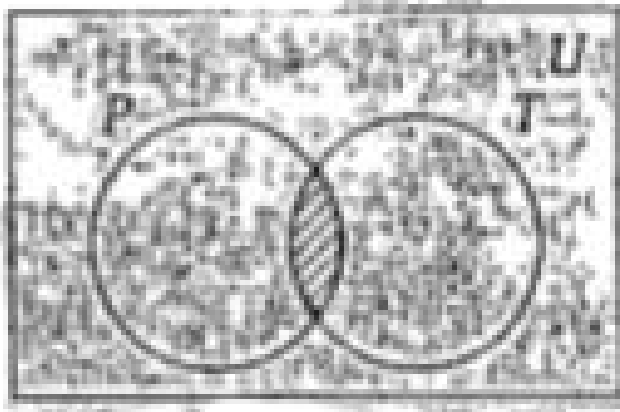**Solved Examples**

1. Give the venn diagram for the truth of the following statement "Equivalent triangles are isosceles triangles.

2. Let U, P and T denote respectively the set of human beings, the set of policemen and the set of all thieves. Write the truth value of the following statement from the Venn diagram given below:

No policeman is a thief.

3. Let U, P and T denote respectively the set of human beings, the set of policemen and the set of all thieves. Write the truth value of the following statement from the Venn diagram
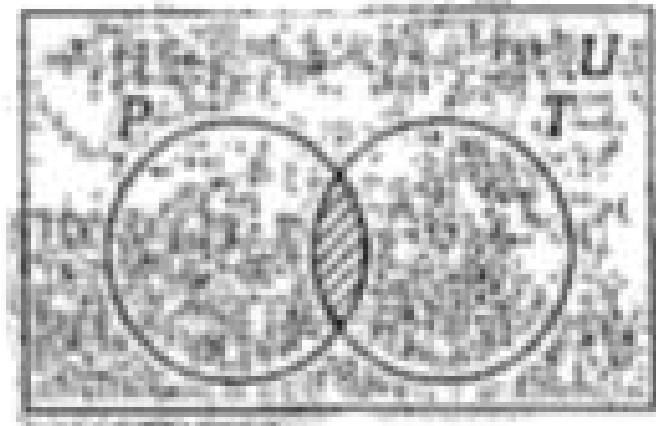
given below:

Thieves are not policeman.

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4. Let U, P and T denote respectively the set of human beings, the set of policemen and the set of all thieves. Write the truth value of the

following statement from the Venn diagram given below:

Men who are not policemen are thieves.

5. Let U, P and T denote respectively the set of human beings, the set of policemen and the

set of all thieves. Write the truth value of the following statement from the Venn diagram given below:
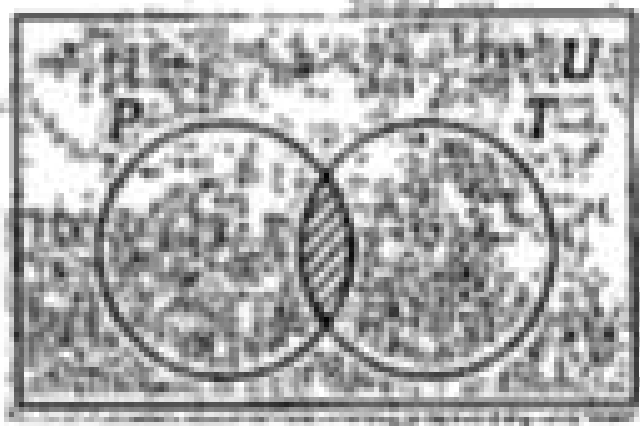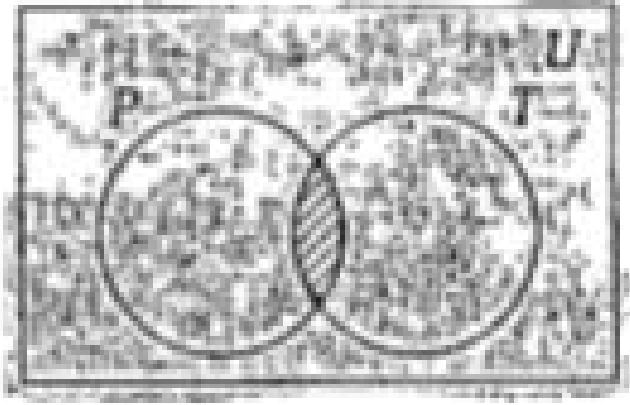

Some policemen are thieves.

6. 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.

7. Which of the following expressions are statements ,

(i) $1 + 2 + 3 = 1 \times 2 \times 3$ (ii)

$$\{2, 3\} \subset \{2, 4, 6\}$$

(iii) May you live long. (iv) 7 is a prime number

(v) $5 \in \{1, 4, 5)$ (vi) All roses are white

(vii) What is your Name?

(viii) The girls are beautiful.

(ix) Go to your home.

(x) Blood is red.

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8. Which of the following sentences are propositions ? What are the truth values of

those that are propositions (statement)?

(i) Do you speak Hindi ? (ii) Four is even.

(iii) Please submit your proposal as soon as possible.

(iv) Do you speak English ?

(v) 4 - x= 8.

(vi) Please try to solve the problem.

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9. If P = He is a carpenter and q = He is making a table.

Then write down the following statement into symbols :

He is a carpenter and making a table.

10. If P = He is a carpenter and q = He is making a table.

Then write down the following statement into symbols :

He is a carpenter but is not making a table.

11. If P = He is a carpenter and q = He is making a table.

Then write down the following statement into symbols :

It is false that he is a carpenter or making a table.

12. If P = He is a carpenter and q = He is making a table.

Then write down the following statement into symbols :

Neither he is a carpenter nor he is making a table.

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13. If P = He is a carpenter and q = He is making a table.

Then write down the following statement into symbols :

He is not a carpenter and he is making a table.

14. If P = He is a carpenter and q = He is making a table.

Then write down the following statement into symbols :

It is false that he is not a carpenter or is not making a table.

15. If P = He is a carpenter and q = He is making a table.

Then write down the following statement into symbols :

He is a carpenter or making a table.

16. Consider the following:

p: This computer is good.

q: This computer is cheap.

Write the statement in symbolic form:

This computer is good and cheap.

17. Consider the following:

p: This computer is good.

q: This computer is cheap.

Write the statement in symbolic form:

This computer is not good but cheap.

18. Consider the following:

p: This computer is good.

q: This computer is cheap.

Write the statement in symbolic form:

This computer is costly but good.

19. Consider the following:

p: This computer is good.

q: This computer is cheap.

Write the statement in symbolic form:

This computer is neither good nor cheap.

20. Consider the following:

p: This computer is good.

q: This computer is cheap.

Write the statement in symbolic form:

This computer is good or cheap.

21. Consider the following:

p : Question paper is hard.

p : I will fail in the examination.

Then translate the following sentence into symbols :

Question paper is hard then I will fail in the examination.

22. Consider the following:

p : Question paper is hard.

q : I will fail in the examination.

Then translate the following sentence into symbols :

If I will not fail in the examination, then question paper is not hard.

23. Consider the following:

p : Question paper is hard.

q : I will fail in the examination.

Then translate the following sentence into

symbols :

Question paper is not hard if and only if I will

fail in the examination.

24. Consider the following:

p : Question paper is hard.

q : I will fail in the examination.

Then translate the following sentence into

symbols :

If question paper is not hard then I will pass in the examination.

25. Write the following in symbols :

Sachin will go out of station or will remain in his house and he will repair his radio.

26. Write the following in symbols :

The necessary and sufficient condition for an infinite series $\sum u_n$ to be convergent'is that limit of u_n as n tending to infinity must be zero.

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27. Write the following in symbols :

We shall go to Delhi, but we shall not see the Red Fort.

28. Write the following in symbols :

Not only the children, but also Mothers and Fathers were killed.

29. Write the following in symbols :

If teams do not arrive or the weather is bad, then there will be no match.

30. If p= Ramesh is a player, q = Mohan is an intelligent boy, then write the following symbols into sentence :

$p \wedge q$

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31. If p= Ramesh is a player, q = Mohan is an intelligent boy, then write the following

symbols into sentence :

$$\rceil(p \lor q)$$

32. If p= Ramesh is a player, q = Mohan is an intelligent boy, then write the following symbols into sentence :

$$p \land \rceil q$$

33. If p= Ramesh is a player, q = Mohan is an intelligent boy, then write the following symbols into sentence :

$$\neg(p \wedge q)$$

34. If p= Ramesh is a player, q = Mohan is an intelligent boy, then write the following symbols into sentence :

$$\neg p \Rightarrow q$$

35. If p= Ramesh is a player, q = Mohan is an intelligent boy, then write the following symbols into sentence :

$$p \Rightarrow \rceil q$$

36. If p $\equiv$ Money is evil, q $\equiv$ Wise men are poor, r $\equiv$ beggars are failures. Then translate

the following statement into symbols :

Wise men are poor only if money is evil.

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37. If p $\equiv$ Money is evil, q $\equiv$ Wise men are poor, r $\equiv$ beggars are failures. Then translate the following statement into symbols :

Money is evil unless wise men are poor.

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38. If $p \equiv$ Money is evil, $q \equiv$ Wise men are poor, $r \equiv$ beggars are failures. Then translate the following statement into symbols :

That beggars are failures is a sufficient condition that money is evil.

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39. If $p \equiv$ Money is evil, $q \equiv$ Wise men are poor, $r \equiv$ beggars are failures. Then translate the following statement into symbols :

A necessary condition for money to be evil is that beggars are failures.

40. If p $\equiv$ Money is evil, q $\equiv$ Wise men are poor, r $\equiv$ beggars are failures. Then translate the following statement into symbols :

Money is evil and beggars are failures if wise men are poor

41. If p $\equiv$ Money is evil, q $\equiv$ Wise men are poor, r $\equiv$ beggars are failures. Then translate the following statement into symbols :

Unless beggars are failures, wise men are not poor and money is not evil.

42. Write the negation of the following statement in terms of symbols :

It will rain unless the barometer rises.

43. Write the negation of the following statement in terms of symbols :

I grow fat only if I eat too much.

44. Write the negation of the following statement in terms of symbols :

A necessary condition that two triangles are equivalent is that they have the same area.

45. Write the negation of the following statement in terms of symbols :

In order to live well, it is sufficient to be wealthy.

46. Write the negation of the following:

If she studies, she will pass in exam.

47. Write the negation of the following:

If it rains, then they will not go for picnic.

48. Write the negation of the following:

Every even integer greater than 4 is the sum of two primes.

49. Write the negation of the following:

Some people have no scooter.

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50. Write the negation of the following:

No one wants to buy my house.

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51. Write the negation of the following:

Anil is not rich and Kanchan is poor.

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52. Write the negation of the following:

A cow is an animal.

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53. Write the negation of the following:

If the determinant of a system of linear equations is zero, then either the system has no solution or it has an infinite number of solution.

54. Write in words the converse, inverse, contrapositive and negation of the implication "If 2 is less than 3, then $1/3$ is less than $1/2$".

55. Let p be a statement "Eight is an even number", and let q be a statement "Candy is sweet". Write in words the implication $p \implies q$.

56. Let p be a statement "Eight is an even number", and let q be a statement "Candy is sweet". Write in words its converse.

57. Let p be a statement "Eight is an even number", and let q be a statement "Candy is sweet". Write in words its inverse.

58. Let p be a statement "Eight is an even number", and let q be a statement "Candy is sweet". Write in words its contrapositive.

59. Let p be a statement "Eight is an even number", and let q be a statement "Candy is sweet". Write in words its negation

60. If p = Missiles are costly and q = Grandma chews gum. Write in words, the following statement given in symbol :

$p \vee \rceil q$

61. If p = Missiles are costly and q = Grandma chews gum. Write in words, the following statement given in symbol :

$\rceil p \wedge \rceil q$

62. If p = Missiles are costly and q = Grandma chews gum. Write in words, the following

statement given in symbol :

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

63. If p=Mathematics is easy and q =Two is less than three. Write in words the following statement given in symbols.

$$\rceil(p \wedge q)$$

64. If p=Mathematics is easy and q =Two is less than three. Write in words the following statement given in symbols.

$\rceil(p \vee q)$

65. If p=Mathematics is easy and q =Two is less than three. Write in words the following statement given in symbols.

$\rceil p \vee q$

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

67. If p $\equiv$ It is 10 o'clock, q $\equiv$ the train is late, then state in words the following resultant :

$q \vee \rceil p$

68. If p $\equiv$ It is 10 o'clock, q $\equiv$ the train is late, then state in words the following resultant :

$$\rceil p \wedge q$$

69. If p $\equiv$ It is 10 o'clock, q $\equiv$ the train is late, then state in words the following resultant :

$$p \wedge \rceil q$$

70. If p $\equiv$ It is 10 o'clock, q $\equiv$ the train is late, then state in words the following resultant :

$$\rceil(p \wedge q) = \rceil p \vee \rceil q$$

71. If p $\equiv$ It is 10 o'clock, q $\equiv$ the train is late, then state in words the following

resultant :

$$\rceil p \wedge \rceil q$$

72. Consider the following:

p: You take a course in Discrete Mathematics.

q: You understand logic.

r : You get an A grade on the final exam.

Write in simple sentences the meaning of the following:

$$q \Rightarrow r$$

73. Consider the following:

p: You take a course in Discrete Mathematics.

q: You understand logic.

r : You get an A grade on the final exam.

Write in simple sentences the meaning of the

following:

$$\rceil p \Rightarrow \rceil q$$

74. Consider the following:

p: You take a course in Discrete Mathematics.

q: You understand logic.

r : You get an A grade on the final exam.

Write in simple sentences the meaning of the following:

$(p \wedge q) \Rightarrow r$

75. Consider the following:

p: You take a course in Discrete Mathematics.

q: You understand logic.

r : You get an A grade on the final exam.

Write in simple sentences the meaning of the following:

$(p \wedge q) \Rightarrow r$

76. Construct a truth table for the following function :

$(p \wedge q) \wedge (q \wedge r) \wedge (r \wedge s)$

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77. Construct a truth table for the following function :

$\rceil(\rceil p \wedge \rceil q)$

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78. Write the negation for the statement

$$\forall \in R, x > 3 \Rightarrow x^2 > 9$$

Problem Set 1 Multiple Choice Questions

1. The order of the connective " $\Rightarrow$ " is :

A. 1

B. 2

C. 4

D. 3

Answer: C

2. Which of these connectives is conjunction :

A. ∨

B. ⟹

C. ⌐

D. ∧

Answer: D

3. Which of the following is true :

A. $p \wedge q = p \vee q$

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

C. $](p \wedge q) < \Rightarrow]p \vee]q$

D. $]p =]q$

Answer: C

4. The contrapositive of $p \Rightarrow q$ is:

A. $\rceil q \Rightarrow \rceil p$

B. $\rceil p \Rightarrow \rceil q$

C. $q \Rightarrow p$

D. $p \Rightarrow q$

Answer: A

5. If p is true, q is false and r is false, then which of the following is true :

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

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

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

    D. $p \Rightarrow \rceil(q \Rightarrow r)$

Answer: B

6. $p \wedge (q \vee r) \equiv (p \wedge q) \vee (p \wedge r)$ is :

A. Associative law

B. Distributive

C. Identity law

D. Absorption

Answer: B

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7. If p $\equiv$ "She goes to market" and

q $\equiv$ "She buys some fruits".

then choose the correct symbol for the given

statement :

Either she goes to market or she buys some

fruits :

    A. $p \lor q$

    B. $p \land q$

    C. $]p \lor q$

    D. $p \lor]q$

Answer: A

8. If p $\equiv$ "She goes to market" and

q $\equiv$ "She buys some fruits".

then choose the correct symbol for the given

statement :

If she goes to market, then she buys some

fruits :

   A. $]p \wedge q$

B. $p \Rightarrow q$

C. $p \wedge q$

D. $\rceil p \wedge q$

Answer: B

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9. If p $\equiv$ "She goes to market" and

q $\equiv$ "She buys some fruits".

then choose the correct symbol for the given

statement :

Neither she goes to market nor she buy some fruits :

A. $\rceil p \vee \rceil q$

B. $p \Rightarrow q$

C. $p \vee q$

D. $\rceil p \wedge \rceil q$

Answer: D

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10. If $p \equiv$ "She goes to market" and

$q \equiv$ "She buys some fruits".

then choose the correct symbol for the given

statement :

She does not go to market and she buys some

fruits :

   A. $\rceil p \wedge q$

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

   C. $p \wedge \rceil q$

   D. $p \Rightarrow q$

Answer: A

11. If p $\equiv$ "She goes to market" and

q $\equiv$ "She buys some fruits".

then choose the correct symbol for the given

statement :

She does not go to market unless she buys

some fruits :

A. $p \Rightarrow q$

B. $q \Rightarrow p$

C. $\rceil q \Rightarrow \rceil p$

D. $p \vee q$

Answer: C

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12. $p \wedge \rceil p$ is :

A. False

B. True

C. p

D. q

Answer: A

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13. True stands for :

A. 0

B. 1

C. -1

D. 2

Answer: B

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14. The negation of $p \Rightarrow q$ is:

A. $p \wedge \rceil q$

B. $p \Rightarrow q$

C. $q \Rightarrow p$

D. $p \vee \rceil q$

Answer: A

15. $(p \Rightarrow q) \vee p$ is:

A. $p \Rightarrow q$

B. q

C. $p \vee q$

D. $p \wedge q$

Answer: C

16. $(p \Rightarrow q) \wedge (q \Rightarrow p)$ is :

A. $p \Rightarrow q$

B. $p < \Rightarrow q$

C. $p \vee q$

D. q

Answer: B

17. $p \Rightarrow q$ is false if :

A. p is false, q is true

B. p is false, q is false

C. p is true, q is false

D. p is true, q is true

Answer: C

18. The dual of $(p \vee q) \wedge r$ is :

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

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

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

D. $p \wedge r$

Answer: B

19. Which of these is a tautology:

A. $p \vee \rceil p$

B. $p \wedge \rceil p$

C. $p \vee q$

D. $p \wedge q$

Answer: A

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20. Which of these is a tautology:

A. $p \Rightarrow q$

B. $\rceil p \wedge q$

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

D. $p \wedge q$

Answer: C

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21. The inverse of $p \Rightarrow \rceil q$ is :

A. $\rceil q \Rightarrow p$

B. $\rceil p \Rightarrow q$

C. $p \Rightarrow q$

D. $q \Rightarrow p$

Answer: B

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22. Which of these is false :

A. $\rceil p \wedge p$

B. $p \vee q$

C. $p \wedge q$

D. $p \Rightarrow q$

Answer: A

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23. If p is true and q is false, then $p \Rightarrow q$ is:

A. True

B. False

C. p

D. $\rceil p$

Answer: B

24. Conditional is represented by :

A. $\wedge$

B. $\Rightarrow$

C. $< \; \Rightarrow$

D. $\vee$

Answer: B

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25. $p \Leftrightarrow q$ is :

A. Tautology

B. Logic Equivalence

C. Contradiction

D. None of these

Answer: C

26. If p is true,q is also true, then $(p \Rightarrow q) \Rightarrow \rceil q$ is:

A. True

B. p

C. False

D. q

Answer: C

27. $p \Rightarrow q$ is logically equivalent to :

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

B. $p \vee q$

C. q

D. $p \Rightarrow q$

Answer: A

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28. The dual of $p \Rightarrow q$ is:

A. $\rceil p \vee q$

B. $p \vee q$

C. $p \wedge q$

D. $\rceil p \wedge q$

Answer: D

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29. $(p \vee p) \Leftrightarrow p, (p \wedge p) \Leftrightarrow p$ are under:

A. Idempotent laws

B. Absorption laws

C. Chain rule

D. Commutative laws.

Answer: A

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Problem Set 1 Fill In The Blanks

1. A declarative sentence which is either true

or false is called ....

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2. "Grass is Yellow". This statement ....

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3. The expression 3x + y = 7 is a ....

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4. To form new statement with the help of two or more than two statements using ....

5. The combination of two or more than two statements using connectives gives a ....

6. The negative of $p \vee q$ is ....

7. The disjunction of p and q is ......

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8. The truth values are ....

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9. A statement is a ..... sentence.

10. The truth values 'T' and 'F' can also be denoted by ....

11. If a statement is always true, then it is a ....

12. If a statement is not always true, then it is a ....

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13. The dual of $(p \wedge q) \vee r$ is ....

▶ Watch Video Solution

14. $(p \vee q) \wedge q =$ is ....

▶ Watch Video Solution

15. $(p \wedge q) \vee r = (p \vee r) \wedge$ ....

▶ Watch Video Solution

16. $(p \Rightarrow q) \wedge p \Leftrightarrow$ ....

▶ Watch Video Solution

17. $(p \Rightarrow q) \Leftrightarrow$ ....

▶ Watch Video Solution

18. $(p \Leftrightarrow q) \Leftrightarrow (p \Rightarrow q) \wedge$ ....

> ▶ **Watch Video Solution**

19. If p is true, and q is false, then $\rceil(p \vee \rceil q)$ is

> ▶ **Watch Video Solution**

20. The converse of $p \Rightarrow q$ is ....

> ▶ **Watch Video Solution**

21. the contrapositive of $p \Rightarrow q$ is ......

> ▶ **Watch Video Solution**

22. $\rceil(p \vee q)$ = ...

> ▶ **Watch Video Solution**

Problem Set 1 True Or False

1. Write 'T' for True and 'F' for False.

The negation of $p \Rightarrow q$ is $p \wedge \neg q$.

2. Write 'T' for True and 'F' for False.

A statement is not a declarative sentence.

3. Write 'T' for True and 'F' for False.

The equation of 4x +2=6 is an open statement.

4. Write 'T' for True and 'F' for False.

p unless q means $\rceil q \Rightarrow p$.

5. Write 'T' for True and 'F' for False.

"If you read" then you will pass" is a compound statement.

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6. Write 'T' for True and 'F' for False.

$\rceil(p \Rightarrow q) = p \wedge \rceil q.$

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7. Write 'T' for True and 'F' for False.

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

8. Write 'T' for True and 'F' for False.

$(p \vee q) \wedge p = p$ is an absorption law.

9. Write 'T' for True and 'F' for False.

$$(p \Leftrightarrow q) \Leftrightarrow (p \Rightarrow q) \wedge (q \Rightarrow p).$$

10. Write 'T' for True and 'F' for False.

If p is false and q is true, then: $\rceil(p \wedge q)$ is true.

11. Write 'T' for True and 'F' for False.

Always true statement is called contradiction.

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12. Write 'T' for True and 'F' for False.

1 stands for true and 0 stands for false.

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13. Write 'T' for True and 'F' for False.

If $(p \wedge q) \Rightarrow r$ in this statement ' $\Rightarrow$ ' is a principal connective.

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14. Write 'T' for True and 'F' for False.

If $p \equiv q$, then $p \Leftrightarrow q$ will be a tautology.

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15. Write 'T' for True and 'F' for False.

$$p \vee (q \wedge r) \equiv (p \vee q) \wedge (p \vee r) \qquad \text{is} \qquad \text{an}$$

associative law.

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16. Write 'T' for True and 'F' for False.

$$\rceil(p \Leftrightarrow q) \equiv p \Leftrightarrow \rceil q \equiv \rceil p \Leftrightarrow q \quad \text{is} \quad \text{under} \quad \text{De-}$$

Morgan's law.

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17. Write 'T' for True and 'F' for False.

$(p \Rightarrow q) \vee (r \Rightarrow p)$ is a tautology.

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18. Write 'T' for True and 'F' for False.

$(p \vee q) \wedge r$ is a dual of $(p \vee q) \vee r$.

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19. Write 'T' for True and 'F' for False.

$(p \wedge q) \Rightarrow q$ is not tautology.

20. Write 'T' for True and 'F' for False.

$\rceil(p \Rightarrow q) \vee r$ is a dual of $\rceil(p \Rightarrow q) \wedge r$.

21. Write 'T' for True and 'F' for False.

$p \wedge (p \Rightarrow q) = q$ is under the law of detachment.

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Problem Set 2

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

A. $\sim p$

B. p

C. q

D. ~q

Answer: A

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2. 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

3. Let S be a non-empty subset of R. Consider

the following statement p: there is a rational

number $x \in S$ such that $x > 0$

The negation of p is

A. There is a rational number $x \in S$ such

that $x \leq 0$

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

that $x \leq 0$

C. Every rational number $x \in S$ such that

$x \leq 0$

Answer: C

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

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

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

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

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

Answer: A

5. Which of the following statement is a tautology

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

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

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

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

Answer: C

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6. Consider the following statement.

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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7. 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 secures 100 marks

  B. If Ram does not get a mobile, then he will secures 100 marks

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

  D. None of these

Answer: C

8. The negation of $(p \lor \sim q) \land q$ is

A. $(\sim p \lor q) \land \sim q$

B. $(p \land \sim q) \lor q$

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

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

Answer: C

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

A. $p \rightarrow q$

B. $q \rightarrow p$

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

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

Answer: D

10. $\sim(p \Leftrightarrow q)$ 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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11. Which of the following is logically equivalent to $\sim(p \vee q)$?

A. $p \wedge q$

B. $p \wedge \sim q$

C. $\sim p \wedge q$

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

Answer: D

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12. If $(p \wedge \sim r) \Rightarrow (q \vee r)$ is false and q and r are both false, then p is

    A. true

    B. false

    C. may be true or false

    D. data insufficient

Answer: A

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13. 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. S(p, q, r)

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

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

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

Answer: D

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

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

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

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

D. none of these

Answer: B

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15. If it is raining, then I will not come, give its contrapositive.

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

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

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

D. If I will came, then it is raining

Answer: A

1. Statement-1 : $\sim(p \Leftrightarrow \sim q)$ is equivalent to $p \Leftrightarrow q$.

Statement-2: $\sim(p \Leftrightarrow q)$ is a tautology

   A. Statement-1 is true, statement-2 is true, statement-2 is 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. Let p be the statement "x is an irrational number", q be the statement "y is a transcendental number" and r be the statement "x is a rational number if y is a

transcendental number.

Statement-1 : r is equivalent to either p or q.

Statement-2: r is equivalent to $\sim\{p \Leftrightarrow \sim q)$.

A. Statement-1 is true, statement-2 is true,

   statement-2 is correct explanation for

   statement-0

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

   statement-2 is not a correct explanation

   for statement-0

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: $(p \to q) \leftrightarrow (\sim q \to \sim p)$ is a tautology .

A. Statement-1 is true, statement-2 is true, statement-2 is 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: B

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