



PARISHRAM PUBLICATIONS PUNE

NAME of Students :- _____

Maths :- Mathematical Logic

Class : XII

Total Marks :-

1. Is the following sentence a statement in logic "The quadratic equation $x^2 - 6x + 8 = 0$ has 2 real roots."
- A) It is an interrogative hence it is not a statement
 B) It is a request hence it is not a statement.
 C) It is a statement which is true, hence its truth value is T.
 D) It is an open sentence hence it is not a statement.

2. Is the following sentence a statement in logic "The square of an even number is an odd number."
- A) It is a statement which is false, hence its truth value is F.
 B) It is a statement which is true, hence its truth value is T.
 C) It is a request hence it is not a statement.
 D) It is an open sentence hence it is not a statement.

3. If two statements are combined using the connective 'and' then it is called?
- A) Disjunction B) Implication
 C) Conjunction D) Negation

4. The negation of $p \wedge (q \rightarrow r)$ is _____.
- A) $\sim p \wedge (\sim q \rightarrow \sim r)$ B) $p \vee (\sim q \vee r)$
 C) $\sim p \wedge (\sim q \rightarrow \sim r)$ D) $\sim p \vee (\sim q \wedge \sim r)$

5. If $A = \{1, 2, 3, 4, 5\}$ then which of the following is not true?
- A) $\exists x \in A$ such that $x + 3 = 8$
 B) $\exists x \in A$ such that $x + 2 < 9$
 C) $\forall x \in A, x + 6 \geq 9$
 D) $\exists x \in A$ such that $x + 6 < 10$

6. A statement is a which type of sentence.
- A) Interrogative B) Declarative
 C) Exclamatory D) Suggestion

7. Combination of statement letters and connectives is called as.
- A) Logical Equivalence
 B) tautology
 C) statement pattern
 D) Contingency

8. A statement pattern whose truth value is true for all possible combinations of truth values of its prime components is called as
- A) tautology B) Contingency
 C) contradiction D) statement letters

9. What is the symbolically form of the compound statement, "Angle is neither acute nor obtuse."

If p : Angle is neither acute
 q : nor obtuse

A) $\sim p \leftrightarrow \sim q$ B) $\sim p \vee \sim q$
 C) $\sim p \vee q$ D) $\sim p \wedge \sim q$

10. A statement pattern whose truth value is false for all possible combinations of truth values of its prime components is called a
- A) Contingency B) Logical Equivalence
 C) tautology D) contradiction

11. What is the contrapositive of $a \rightarrow b$?
- A) $\sim a \rightarrow \sim b$ B) $b \rightarrow a$
 C) $\sim b \rightarrow \sim a$ D) $\sim b \rightarrow a$

12. What is the inverse of $q \rightarrow p$?
- A) $p \rightarrow \sim q$ B) $\sim p \rightarrow q$
 C) $\sim q \rightarrow p$ D) $\sim q \rightarrow \sim p$

13. Which type of law is $\sim (p \wedge q) \equiv \sim p \vee \sim q, \sim (p \vee q) \equiv \sim p \wedge \sim q$
- A) Distributive Law B) De Morgan's Law
 C) Associative Law D) Absorption Law

14. What is the converse of $a \rightarrow b$?
- A) $a \rightarrow \sim b$ B) $\sim a \rightarrow b$
 C) $b \rightarrow a$ D) $b \rightarrow \sim a$

15. Using truth tables, examine which type of the statement it is

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

p	q	r	$\frac{p}{\rightarrow}$ $\frac{q}{q}$	$\frac{q}{\rightarrow}$ $\frac{r}{r}$	$\frac{p}{\rightarrow}$ $\frac{r}{r}$	$\frac{(q \rightarrow r)}{\rightarrow}$ $\frac{(p \rightarrow r)}{(p \rightarrow r)}$	$\frac{(p \rightarrow q) \wedge (q \rightarrow r)}{(p \rightarrow r)}$
T	T	T	T	T	T	T	T
T	T	F	T	F	F	T	T
T	F	T	F	T	T	T	F
T	F	F	F	T	F	F	F
F	T	T	T	T	T	T	T
F	T	F	T	F	T	T	T
F	F	T	T	T	T	T	T
F	F	F	T	T	T	T	T

- A) Contingency B) tautology
 C) Contradiction D) statement pattern

16. A statement which asserts a condition for some or all objects in a collection. Words "there exists" and "for all" are called as.
- A) negation B) Duals
 C) Quantifiers D) Contrapositive

17. Using truth tables, examine which type of the statement it is

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

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

- A) Logical Equivalence
 B) tautology
 C) Contingency
 D) contradiction

18. $(p \wedge q) \rightarrow r$ is logically equivalent to _____.

- A) $p \rightarrow (q \rightarrow r)$ B) $(p \wedge q) \rightarrow \sim r$
 C) $(\sim p \vee \sim q) \rightarrow \sim r$ D) $(p \vee q) \rightarrow r$

19. Inverse of statement pattern $(p \vee q) \rightarrow (p \wedge q)$ is _____.

- A) $(p \wedge q) \rightarrow (p \vee q)$
 B) $\sim(p \vee q) \rightarrow (p \wedge q)$
 C) $(\sim p \wedge \sim q) \rightarrow (\sim p \vee \sim q)$
 D) $(\sim p \vee \sim q) \rightarrow (\sim p \wedge \sim q)$

20. If $p \wedge q$ is F, $p \rightarrow q$ is F then the truth values of p and q are _____.

- A) T, T B) T, F
 C) F, T D) F, F

21. The negation of inverse of $\sim p \rightarrow q$ is _____.

- A) $q \wedge p$ B) $\sim p \wedge \sim q$
 C) $p \wedge q$ D) $\sim q \rightarrow \sim p$

22. Which type of law is $p \vee (p \wedge q) \equiv p$, $p \wedge (p \vee q) \equiv p$

- A) Absorption Law B) Associative Law
 C) Conditional Law D) De Morgan's Law

23. Which type of law is $p \leftrightarrow q \equiv (p \rightarrow q) \wedge (q \rightarrow p) \equiv (\sim p \vee q) \wedge (\sim q \vee p)$

- A) Conditional Law B) Identity Law
 C) Idempotent Law D) Biconditional Law

24. What is the dual of $(p \vee q) \wedge r$

- A) $(p \wedge \sim q) \vee r$ B) $(p \wedge q) \vee r$
 C) $(p \vee q) \wedge \sim r$ D) $(\sim p \vee \sim q) \wedge \sim r$

25. If two statements contain logical connectives like \vee , \wedge and letters t and c then they are said to be

- A) Dual B) negation
 C) Contrapositive D) Compound statements

26. Is the following sentence a statement in logic "How are you doing?"

- A) It is an open sentence hence it is not a statement.
 B) It is a statement which is true.
 C) It is a request hence it is not a statement.
 D) It is an interrogative hence it is not a statement

27. What type of sentence is this, "Physics is an interesting subject."

- A) Interrogative B) Exclamatory
 C) Open sentence D) Suggestion

28. If two statements are combined using the logical connective 'if and only if' then it is called?

- A) Implication B) Disjunction
 C) Conjunction D) Double Implication

29. What is the symbolically form of the compound statement, "4 is an even number and 16 is a perfect square."

If p : 4 is an even number

q : 16 is a perfect square.

- A) $p \vee q$ B) $p \vee \sim q$
 C) $p \wedge q$ D) $p \rightarrow q$

30. What is the symbolically form of the compound statement, "x is not a prime number but is a root of an integer"

If p : x is not a prime number

q : root of an integer

- A) $\sim p \wedge \sim q$ B) $\sim p \vee \sim q$
 C) $p \vee \sim q$ D) $\sim p \vee q$

31. What is the symbolically form of the compound statement, "Babita wins gold medal if and only if she comes first."

If p : Babita wins gold

q : she comes first

- A) $\sim p \rightarrow q$ B) $p \rightarrow \sim q$
 C) $p \leftrightarrow q$ D) $p \leftrightarrow \sim q$

32. A statement pattern which is neither a tautology nor a contradiction is called a

- A) statement letter B) Logical Equivalence
 C) Contingency D) statement pattern

33. What is the symbolically form of the compound statement, "Aurangabad is in Maharashtra and Bengaluru is in Karnataka."

If p : Aurangabad is in Maharashtra

q : Bengaluru is in Karnataka

- A) $p \rightarrow q$ B) $p \vee q$
 C) $p \wedge q$ D) $p \leftrightarrow q$

34. What is the symbolically form of the compound statement, "Curd is white if and only if the Sun rises in the East."

If p : Curd is white

q : Sun rises in the East

- A) $p \leftrightarrow q$ B) $p \rightarrow \sim q$
 C) $p \rightarrow q$ D) $\sim p \leftrightarrow \sim q$

35. What is the symbolically form of the compound statement, "All apples are red or all buffaloes are black."

If p : All apples are red

q : all buffaloes are black

- A) $p \wedge q$ B) $p \vee q$

- C) $\sim p \vee q$ D) $p \leftrightarrow q$

36. Is the following sentence a statement, "What a beautiful garden it is!"

- A) True B) False
C) Can't Say D) None of the above

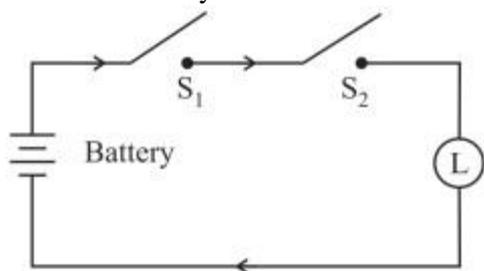
37. What is the Symbol for existential quantifier.

- A) \equiv B) \exists
C) \forall D) \in

38. Is the following sentence a statement, "every equilateral triangle is an equiangular triangle."

- A) True B) False
C) Can't Say D) May be

39. What is the symbolic form for below circuit.



- A) $p \leftrightarrow q$ B) $p \vee q$
C) $p \wedge q$ D) $\sim p \wedge q$

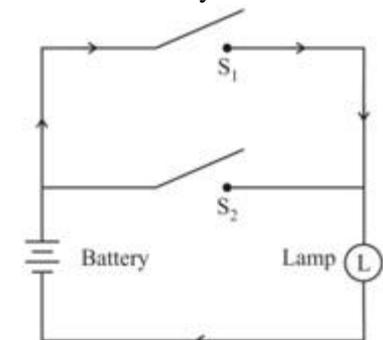
40. What is the Symbol for universal quantifier.

- A) \forall B) C
C) \exists D) \nexists

41. If $p \wedge q$ is false and $p \vee q$ is true, the _____ is not true.

- A) $p \vee q$ B) $p \leftrightarrow q$
C) $\sim p \vee \sim q$ D) $q \vee \sim p$

42. What is the symbolic form for below circuit?



- A) $\sim p \vee \sim q$ B) $p \vee q$
C) $p \vee \sim q$ D) $\sim p \wedge \sim q$

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

44. 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

45. 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

46. If p and q are true statements is 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) $(\sim p \wedge q) \wedge q$

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

- (A) F, T (B) F, F
(C) T, T (D) T, F

48. 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

49. If p : Every square is a rectangle

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

- (A) F, F (B) T, F
(C) F, T (D) T, T

50. 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