

Total number of questions : 60

1001068_T1 MTC 112 DISCRETE MATHEMATICS

Time : 1hr

Max Marks : 50

N.B

- 1) All questions are Multiple Choice Questions having single correct option.
 - 2) Attempt any 50 questions out of 60.
 - 3) Use of calculator is allowed.
 - 4) Each question carries 1 Mark.
 - 5) Specially abled students are allowed 20 minutes extra for examination.
 - 6) Do not use pencils to darken answer.
 - 7) Use only black/blue ball point pen to darken the appropriate circle.
 - 8) No change will be allowed once the answer is marked on OMR Sheet.
 - 9) Rough work shall not be done on OMR sheet or on question paper.
 - 10) Darken ONLY ONE CIRCLE for each answer.
-

Q.no 1. The relation ' \leq ' is a partial order if it is _____.

- A : reflexive, antisymmetric and transitive
- B : reflexive, symmetric
- C : Asymmetric, transitive
- D : irreflexive and transitive

Q.no 2. What is the distributive property of a lattice?

- A : a meet b
- B : $a \vee b = b \vee a$
- C : $a \vee a = a$

D: $a \text{ NOT } b$

Q.no 3.

Let, $R = \{ (1,3) (3,4), (4,2) (2,2) (3,3) (1,1) \}$ be a relation on the set $A = \{1,2,3,4\}$
then relation R is-----

A: Transitive

B: Reflexive

C: Not symmetric

D: Function

Q.no 4. If a relation is reflexive, then all the diagonal entries in the relation matrix must

A: 0

B: 1

C: 2

D: -1

If $|A|=m$ and $|B|=n$ then number of functions from A to B are-----

Q.no 5.

A: m^n

B: n^m

C: $m * n$

D: $m + n$

Q.no 6.

If $n+1$ objects are put in n boxes then at least one box contains at least ----- objects.

A: one

B: Two

C: Zero

D: n

The number of r-permutations of n-objects, with repetition allowed is-----
Q.no 7.

A: n^r

B: r^n

C: nC_r

D: nPr

Q.no 8. Which of the following is a true statement?

A: $2+3=5$ and $1-7$ is a natural number

B: $3+2=8$ if $5-2=7$.

C: $1 > 3$ and 3 is a positive integer

D: $-2 > 3$ or 3 is a negative integer

If $|A|=m$ and $|B|=n$ then number of one-one functions from A to B are-----
Q.no 9.

A: m^n

B: n^m

C: $m * n$

D: nPr

A mapping which maps every element x to itself is _____ relation.
Q.no 10.

- A: reflexive
- B: symmetric
- C: transitive
- D: equivalence

Q.no 11. A relation R on a set X is symmetric if -----, for all x, y, z in X.

- A: $x R y, y R z \rightarrow x R z$
- B: $x R y$
- C: $x R y \rightarrow y R x$
- D: $x R x$

Q.no 12. A conditional statement in symbolic form is...

- A: $p \vee q$
- B: $p \rightarrow q$
- C: $p * q$
- D: $p \wedge q$

Q.no 13. In Boolean algebra, $a \wedge b$ is read as _____.

- A: a meet b
- B: a join b
- C: a OR b
- D: a NOT b

Q.no 14. If a relation is symmetric, then the relation matrix must be-----

- A: Symmetric

B: Skew symmetric

C: Identity matrix

D: triangular

Q.no 15. In propositional logic, which of the following is equivalent to $p \rightarrow q$?

A: $\sim p \rightarrow q$

B: $\sim p \vee q$

C: $\sim p \vee \sim q$

D: $q \rightarrow p$

Q.no 16.

If R is reflexive, Symmetric & Transitive, then the relation is said to be -----

A: Binary relation

B: Antisymmetric relation

C: Partial order relation

D: Equivalence relation

Q.no 17. The symbolic form of a conjunction is...

A: $p \rightarrow q$

B: $p \wedge q$

C: $p \vee q$

D: $\sim p$

Q.no 18.

Let, $R = \{ (3,3) (6,6) (9,9) (12,12) (3,6),(6,3),(3,9),(9,3),(9,12),(12,9) \}$ be a relation on the set $A = \{3,6,9,12\}$ then relation is-----

A: Reflexive and Transitive

B: Reflexive and symmetric

C: Symmetric and symmetric

D: Equivalence relation

Let $R = \{(2,2), (2,3), (3,1), (1,3)\}$ on the set $A = \{1,2,3\}$. Which of the following pair should be added to R so that it becomes symmetric?

Q.no 19.

A: $(1,1)$

B: $(3,3)$

C: $(3,2)$

D: $(1,2)$

The relation $R = \{(0,0), (1,2), (2,0), (1,3)\}$ on $A = \{0,1,2,3\}$ is _____.

Q.no 20.

A: reflexive, not symmetric, transitive

B: not reflexive, not symmetric, not transitive

C: reflexive, symmetric, not transitive

D: reflexive, not symmetric, not transitive

Warshall's Algorithm is used to find _____.

Q.no 21.

A: Equivalence relation

B: Transitive closure of a relation

C: Composition of relations

D: Matrix of a relation

Which of the following is a false statement?

Q.no 22.

A: If p is True and q is True then $p \rightarrow q$ is True.

B: If p is False and q is True then $p \rightarrow q$ is True.

C: If p is False and q is False then $p \rightarrow q$ is False.

D: If p is True and q is False then $p \rightarrow q$ is False.

Q.no 23.

Consider the Poset $(D_{30}, |)$. Then which of the following is least upper bound for 5 and 2?

A: 15

B: 10

C: 30

D: 1

Q.no 24. Which of the following are De-Morgan's laws?

A: $P \wedge (Q \vee R) \equiv (P \wedge Q) \vee (P \wedge R)$

B: $\sim (P \wedge R) \equiv \sim P \vee \sim R, \sim (P \vee R) \equiv \sim P \wedge \sim R$

C: $P \vee \sim P \equiv \text{True}, P \wedge \sim P \equiv \text{False}$

D: $P \vee (Q \wedge R) \equiv (P \vee Q) \wedge (P \vee R)$

Q.no 25.

Let P: I am in Bangalore. Q: I love cricket, then $Q \rightarrow P$ is written in English language as-----.

A: If I love cricket then I am in Bangalore

B: If I am in Bangalore then I love cricket

C: I am not in Bangalore

D: I love cricket

The propositional form $p \wedge (\sim p \vee q)$ is -----

Q.no 26.

A: A tautology

B: A contradiction

C: Logically equivalent to $p \wedge q$

D: Logically equivalent to $p \vee q$

Q.no 27.

The number of four letter words that begin with 'R' when repetition of letters is not allowed and if only capital letters are allowed is

A: 17576

B: 13800

C: 576

D: 676

Q.no 28. $\sim A \vee \sim B$ is logically equivalent to?

A: $\sim A \rightarrow \sim B$

B: $\sim A \wedge \sim B$

C: $A \rightarrow \sim B$

D: $B \vee A$

Q.no 29. An element \bar{a} in L is a complement of a then which of the following is true?

A: $a \vee \bar{a} = 1$

B: $a \vee \bar{a} = 0$

C: $a \vee \bar{a} = -1$

D: $a \vee \bar{a} = 2$

Q.no 30.

Which of the following statements is the negation of the statements "4 is odd or -9 is positive"?

A: 4 is even or -9 is not negative.

B: 4 is odd or -9 is not negative.

C: 4 is even and -9 is negative.

D: 4 is odd and -9 is not negative.

Q.no 31. A function from B^n to B is called as _____.

A: one-one function

B: onto function

C: Boolean function of degree n.

D: Bijective function

Q.no 32.

How many friends you must have to guarantee that at least 8 of them will have birthday in the same month?

A: 56

B: 90

C: 96

D: 8

Q.no 33.

The number of four letter words that begin with 'R' when repetition of letters is allowed is

A: 17576

1228

B:

C: 576

D: 676

Q.no 34.

If a Boolean function is represented by join of minterms then it is said to be _____.

A: Disjunctive Normal Form

B: Conjunctive Normal Form

C: Normal Form

D: Standard Form

Q.no 35. Which of the following is a declarative statement?

A: It's right

B: He says

C: Two is not an even integer

D: I love you

Q.no 36. Which of the following lattice is bounded ?

A: (\mathbb{R}, \leq) , where \mathbb{R} denotes the set of reals.

B: (\mathbb{N}, \leq) , where \mathbb{N} denotes the set of natural numbers.

C: $(\mathbb{Z}, |)$, where \mathbb{Z} denotes the set of integers.

D: D_{30} -set of all divisors of 30 with divides relation

Let, $S = \{(1, 2) (3, 4) (2, 6)\}$ and $R = \{(4, 3) (2, 5) (6, 6)\}$ be a relation then R

Q.no 37. composite S is given by $(R \circ S) = \text{-----}$

A: $\{ (1,5) (3,3) (2,6) \}$

B: $\{ (1,5) (3,6) (2,5) \}$

C: $\{ (4,4) (2,5) (3,3) \}$

D: $\{ (1,1) (3,3) (2,2) \}$

Q.no 38. $\sim (P \rightarrow Q)$ is equivalent to

A: $P \wedge \sim Q$

B: $P \wedge Q$

C: $\sim P \vee Q$

D: $\sim P \wedge Q$

Q.no 39.

Let, $S = \{ (1,b) (3,d) (2,b) \}$ and $R = \{ (b,4) (2,5) (d,a) \}$ be a relation then R composite S
 $(R \circ S) = \underline{\hspace{2cm}}$.

A: $\{ (1,b) (3,d) (2,b) \}$

B: $\{ (1,4) (3,a) (2,4) \}$

C: $\{ (4,b) (2,5) (3,a) \}$

D: $\{ (1,d) (3,b) (2,c) \}$

Q.no 40. What is the following statement is true for any two sets A and B?

$$|A \cup B| = |A| + |B| - |A \cap B|$$

A:

B: $|A \cup B| = |A| - |A \cap B|$

C: $|A \cup B| = |B| - |A \cap B|$

D: $|A \cup B| = |A| + |B|$

Q.no 41.

If a Boolean function is represented by meet of maxterms then it is said to be _____

A: Disjunctive Normal Form

B: Conjunctive Normal Form

C: Normal Form

D: Standard Form

Q.no 42.

Which of the following relation defined on any set of numbers is a partial order as well as an equivalence relation?

A: equal to ($=$)

B: less than ($<$)

C: greater than ($>$)

D: not equal to (\neq)

Q.no 43. Which of the following statement is a proposition?

A: Get me a glass of milkshake

B: God bless you!

C: What is the time now?

D: The only odd prime number is 2.

Q.no 44. Which of the following is not a maxterm of the Boolean variable x_1, x_2, x_3 ?

A: $x_1 \vee x_2 \vee x_3$

B: $\overline{x_1} \vee x_2 \vee x_3$

C: $\overline{x_1} \wedge x_2 \wedge \overline{x_3}$

D: $x_1 \vee \overline{x_2} \vee \overline{x_3}$

Q.no 45. What is the distributive property of a lattice?

A: $a \vee (a \wedge b) = a$

B: $a \vee b = b \vee a$

C: $a \vee a = a$

D: $a \wedge (b \vee c) = (a \wedge b) \vee (a \wedge c)$

Q.no 46. If R is a reflexive, symmetric and transitive relation, then it is said to be -----

A: Binary relation

B: An antisymmetric relation

C: Partial order relation

D: An equivalence relation

Q.no 47. Let $S = \{ (a, b) (c, d) (b, b) \}$ $R = \{ (d, b) (c, b) (a, d) \}$ then $R \circ S =$ -----

A: $\{ (a, e) (c, b) (b, e) \}$

B: $\{ (d, b) (c, b) (a, d) \}$

C: $\{ (a, a) (b, b) \}$

D: $\{ (c, b) \}$

Q.no 48.

Which is the matrix of relation R defined on the set $A = \{ a, b, c \}$, $R = \{ (a, c), (b, c), (c, a) \}$

A:
$$\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

B:
$$\begin{bmatrix} 0 & 0 & 1 \\ 0 & 0 & 1 \\ 1 & 0 & 0 \end{bmatrix}$$

C:
$$\begin{bmatrix} 1 & 0 & 1 \\ 0 & 0 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

D:
$$\begin{bmatrix} 1 & 0 & 0 \\ 1 & 1 & 1 \\ 1 & 0 & 0 \end{bmatrix}$$

Q.no 49. A lattice is called Boolean Algebra if _____.

A: it is bounded

B: it is bounded, complemented

C: it is bounded, complemented and distributive.

D: it is distributed

Q.no 50. The four logical connectives are...

A: Conjunctions, conditionals, compounds, and disjunctions

B: If p is False and q is True then $p \rightarrow q$ is True.

C: Conditionals, disjunction, negations, and conjunctions

D: Compound, disjunction, conditionals, and negations

Q.no 51.

The number of ways of 5-card hands can be formed from the standard deck of 52-card deck is -----.

A: 2598960

1228

B:

260

C:

2598690

D:

Which of the following is transitive closure of relation

$R = \{(1,1), (1,2), (2,3), (3,1), (3,2)\}$ on the set $A = \{1,2,3\}$

Q.no 52.

$R^* = \{(1,1), (1,2), (1,3), (2,1), (2,2), (2,3), (3,1), (3,2), (3,3)\}$

A:

$R^* = \{(1,1), (1,2), (1,3), (2,1), (2,2), (2,3), (3,1)\}$

B:

$R^* = \{(1,1), (1,2), (1,3), (2,1), (2,2)\}$

C:

$R^* = \{(1,3), (2,1), (2,2), (2,3), (3,1), (3,2), (3,3)\}$

D:

In the Lattice D_{20} with the divides relation, what is the value of $4 \wedge 10$?

Q.no 53.

A: 2

B: 1

C: 4

D: 10

Q.no 54.

In a bounded lattice (L, \vee, \wedge) an element b belongs to L is the complement of an element a belongs to L then which of the following is false?

A: $a \vee b = 1$

B: $a \vee b = 0$

C: $a \wedge b = 0$

D: $a \wedge b = b \wedge a$

Which of the following is a tautology?

Q.no 55.

A: $a \vee b \rightarrow b$

B: $a \wedge b \rightarrow b$

C: $a \vee b \rightarrow a$

D: $(a \vee b) \rightarrow (\sim b)$

Q.no 56. The proposition $P \rightarrow (Q \rightarrow R)$ is equivalent to ----

A: $(P \wedge Q) \rightarrow R$

B: $(P \vee \sim Q) \rightarrow R$

C: $(P \vee Q) \rightarrow R$

D: $(P \vee R) \rightarrow Q$

Q.no 57. Which of the following is not a Boolean algebra?

A: D_{15} , with divides relation

B: D_{30} , with divides relation

C: D_{12} , with divides relation

D: D_{10} , with divides relation

Q.no 58.

What rules of inference are used in this argument?

“It is either colder than Himalaya today or the pollution is harmful. It is hotter than Himalaya today. Therefore, the pollution is harmful.”

A: Conjunction

B: Modus ponens

C: Disjunctive syllogism

D: Hypothetical syllogism

Q.no 59. Dual of the Boolean expression $x \vee (y \wedge z)$ is _____.

A: $x \wedge (y \vee z)$

B: $(x \wedge y) \vee (x \wedge z)$

C: $(x \vee y) \wedge (x \vee z)$

D: $x \vee (y \vee z)$

Q.no 60. In a Poset $P (\{2, 3, 6, 12\}, |)$ which of the following is the least element?

A: 2

B: 3

C: 1

D: does not exist

Q.no 1. The value of 8C_8 = _____

A: 1

B: $8!$

C: 8

D: 0

IF set A contains m elements and set B contains n elements then their Cartesian product $A \times B$ contains _____ elements.

A: m

B: n

C: $m \cdot n$

D: $m + n$

Q.no 3. Transitive closure of the given relation R is denoted by_____.

A: R^1

B: R^*

C: R^c

D: R^{-1}

Q.no 4.

Let P: I am in Pune; Q: Pune is clean; then $Q \wedge P$ can be written in English language as----

A: Pune is not clean or I am in Pune

B: Pune is clean and I am in Pune

C: I am in Pune and Pune is not clean

D: Pune is clean but I am in Mumbai

Q.no 5. The symbolic form of a conjunction is...

A: $p \rightarrow q$

B: $p \wedge q$

C: $p \vee q$

D: $\sim p$

Q.no 6. If a relation is symmetric, then the relation matrix must be-----

A: Symmetric

B: Skew symmetric

C: Identity matrix

D: triangular

Q.no 7. Warshall's Algorithm is used to find_____.

A: Equivalence relation

B: Transitive closure of a relation

C: Composition of relations

D: Matrix of a relation

Q.no 8.

Let P: I am in Bangalore. Q: I love cricket, then $Q \rightarrow P$ is written in English language as-----.

A: If I love cricket then I am in Bangalore

B: If I am in Bangalore then I love cricket

C: I am not in Bangalore

D: I love cricket

Q.no 9. If R is reflexive, Symmetric & Transitive, then the relation is said to be -----

A: Binary relation

B: Antisymmetric relation

C: Partial order relation

D: Equivalence relation

If $|A|=m$ and $|B|=n$ then number of one-one functions from A to B are-----

Q.no 10.

A: m^n

B: n^m

C: $m^* n$

D: n_{p_m}

Q.no 11. A mapping which maps every element x to itself is _____ relation.

A: reflexive

B: symmetric

C: transitive

D: equivalence

Q.no 12. Which of the following are De-Morgan's laws?

A: $P \wedge (Q \vee R) \equiv (P \wedge Q) \vee (P \wedge R)$

B: $\sim (P \wedge R) \equiv \sim P \vee \sim R, \sim (P \vee R) \equiv \sim P \wedge \sim R$

C: $P \vee \sim P \equiv \text{True}, P \wedge \sim P \equiv \text{False}$

D: $P \vee (Q \wedge R) \equiv (P \vee Q) \wedge (P \vee R)$

Q.no 13.

If $n+1$ objects are put in n boxes then at least one box contains at least ----- objects.

A: one

B: Two

C: Zero

D: n

Q.no 14. Which of the following is a true statement?

A: $2+3=5$ and $1-7$ is a natural number

B: $3 + 2 = 8$ if $5 - 2 = 7$.

C: $1 > 3$ and 3 is a positive integer

D: $-2 > 3$ or 3 is a negative integer

Q.no 15. Which of the following is a false statement?

A: If p is True and q is True then $p \rightarrow q$ is True.

B: If p is False and q is True then $p \rightarrow q$ is True.

C: If p is False and q is False then $p \rightarrow q$ is False.

D: If p is True and q is False then $p \rightarrow q$ is False.

Q.no 16. In propositional logic, which of the following is equivalent to $p \rightarrow q$?

A: $\sim p \rightarrow q$

B: $\sim p \vee q$

C: $\sim p \vee \sim q$

D: $q \rightarrow p$

Q.no 17. A conditional statement in symbolic form is...

A: $p \vee q$

B: $p \rightarrow q$

C: $p * q$

D: $p \wedge q$

Q.no 18. What is the distributive property of a lattice?

A: a meet b

B: $a \vee b = b \vee a$

C: $a \vee a = a$

D: $a \text{ NOT } b$

Q.no 19. If a relation is reflexive, then all the diagonal entries in the relation matrix must

A: 0

B: 1

C: 2

D: -1

Q.no 20.

Consider the Poset $(D_{30}, |)$. Then which of the following is least upper bound for 5 and 2?

A: 15

B: 10

C: 30

D: 1

Q.no 21. The relation ' \leq ' is a partial order if it is _____.

A: reflexive, antisymmetric and transitive

B: reflexive, symmetric

C: Asymmetric, transitive

D: irreflexive and transitive

If $|A|=m$ and $|B|=n$ then number of functions from A to B are-----

Q.no 22.

A: m^n

B: n^m

C: $m * n$

D: $m + n$

Q.no 23.

Let, $R = \{ (1,3) (3,4), (4,2) (2,2) (3,3) (1,1) \}$ be a relation on the set $A = \{1,2,3,4\}$
then relation R is-----

A: Transitive

B: Reflexive

C: Not symmetric

D: Function

Let $R = \{(2,2), (2,3), (3,1), (1,3)\}$ on the set $A = \{1,2,3\}$. Which of the following

Q.no 24. pair should be added to R so that it becomes symmetric?

A: $(1,1)$

B: $(3, 3)$

C: $(3, 2)$

D: $(1, 2)$

Q.no 25. A relation R on a set X is symmetric if -----, for all x, y, z in X.

A: $x R y, y R z \rightarrow x R z$

B: $x R y$

C: $x R y \rightarrow y R x$

D: $x R x$

In a Boolean algebra, a nonzero element 'a' is called _____ if for every x in B,

Q.no 26. $x \wedge a = a$ or $x \wedge a = 0$.

A: a variable

B: an atom

C: a lattice

D: a boolean variable

What rule of inference is used here?

Q.no 27. "It is cloudy and drizzling now. Therefore, it is cloudy now."

A: Addition

B: Simplification

C: Resolution

D: Conjunction

Q.no 28.

Consider the Poset $(D_{42}, |)$. Then which of the following is not a lower bound of 6 and 42?

A: 2

B: 3

C: 7

D: 1

Which of the following statement is TRUE?

Q.no 29.

A: ${}^nC_r = {}^nC_{n-r}$

B: ${}^nC_0 = n$

C: ${}^nC_0 = 0$

D: ${}^nC_0 = n!$

Q.no 30.

The number of four letter words that begin with 'S' and end with 'V' when repetition of letters is not allowed and if only capital letters are used is -----

A: 7576

B: 552

C: 576

D: 676

Q.no 31.

If any number students can be assigned to any faculty advisor then the number of ways to assign 25 students to 4 faculty advisors is ---

A: 25^4

B: 4^{25}

C: $4!$

D: ${}^{25}C_4$

Q.no 32. A lattice is called Boolean Algebra if _____.

A: it is bounded

B: it is bounded, complemented

C: it is bounded, complemented and distributive.

D: it is distributed

Q.no 33.

If a Boolean function is represented by meet of maxterms then it is said to be _____

A: Disjunctive Normal Form

B: Conjunctive Normal Form

C: Normal Form

D: Standard Form

Q.no 34. Which of the following statement is a proposition?

A: Get me a glass of milkshake

B: God bless you!

C: What is the time now?

D: The only odd prime number is 2.

Q.no 35.

How many friends you must have to guarantee that at least 8 of them will have birthday in the same month?

A: 56

B: 90

C: 96

D: 8

Let, $S = \{(1, 2) (3, 4) (2, 6)\}$ and $R = \{(4, 3) (2, 5) (6, 6)\}$ be a relation then R

Q.no 36. composite S is given by $(R \circ S) = \text{-----}$

A: $\{(1, 5) (3, 3) (2, 6)\}$

B: $\{(1, 5) (3, 6) (2, 5)\}$

C: $\{(4, 4) (2, 5) (3, 3)\}$

D: $\{ (1,1) (3,3) (2,2) \}$

The propositional form $p \wedge (\sim p \vee q)$ is -----
Q.no 37.

A: A tautology

B: A contradiction

C: Logically equivalent to $p \wedge q$

D: Logically equivalent to $p \vee q$

Which of the following is a declarative statement?
Q.no 38.

A: It's right

B: He says

C: Two is not an even integer

D: I love you

What is the distributive property of a lattice?
Q.no 39.

A: $a \vee (a \wedge b) = a$

B: $a \vee b = b \vee a$

C: $a \vee a = a$

D: $a \wedge (b \vee c) = (a \wedge b) \vee (a \wedge c)$

What is the following statement is true for any two sets A and B?
Q.no 40.

$$|A \cup B| = |A| + |B| - |A \cap B|$$

A:

B: $|A \cup B| = |A| - |A \cap B|$

C: $|A \cup B| = |B| - |A \cap B|$

D: $|A \cup B| = |A| + |B|$

Q.no 41. A function from B^n to B is called as _____.

A: one-one function

B: onto function

C: Boolean function of degree n.

D: Bijective function

Q.no 42.

The number of four letter words that begin with 'R' when repetition of letters is allowed is

A: 17576

B: 1228

C: 576

D: 676

Q.no 43.

Let, $S = \{ (1,b) (3,d) (2,b) \}$ and $R = \{ (b,4) (2,5) (d,a) \}$ be a relation then R composite S
 $(R \circ S) = \underline{\hspace{2cm}}$.

A: $\{ (1,b) (3,d) (2,b) \}$

B: $\{ (1,4) (3,a) (2,4) \}$

C: $\{ (4,b) (2,5) (3,a) \}$

D: $\{ (1,d) (3,b) (2,c) \}$

Q.no 44. The four logical connectives are...

A: Conjunctions, conditionals, compounds, and disjunctions

B: If p is False and q is True then $p \rightarrow q$ is True.

C: Conditionals, disjunction, negations, and conjunctions

D: Compound, disjunction, conditionals, and negations

Q.no 45.

Which of the following relation defined on any set of numbers is a partial order as well as an equivalence relation?

A: equal to ($=$)

B: less than ($<$)

C: greater than ($>$)

D: not equal to (\neq)

Q.no 46.

Which of the following statements is the negation of the statements “4 is odd or -9 is positive”?

A: 4 is even or -9 is not negative.

B: 4 is odd or -9 is not negative.

C: 4 is even and -9 is negative.

D: 4 is odd and -9 is not negative.

Q.no 47. If R is a reflexive, symmetric and transitive relation, then it is said to be -----

A: Binary relation

B: An antisymmetric relation

C: Partial order relation

D: An equivalence relation

Q.no 48.

If a Boolean function is represented by join of minterms then it is said to be _____.

A: Disjunctive Normal Form

B: Conjunctive Normal Form

C: Normal Form

D: Standard Form

Q.no 49. $\sim A \vee \sim B$ is logically equivalent to?

A: $\sim A \rightarrow \sim B$

B: $\sim A \wedge \sim B$

C: $A \rightarrow \sim B$

D: $B \vee A$

Q.no 50. Which of the following lattice is bounded ?

A: (\mathbb{R}, \leq) , where \mathbb{R} denotes the set of reals.

B: (\mathbb{N}, \leq) , where \mathbb{N} denotes the set of natural numbers.

C: $(\mathbb{Z}, |)$, where \mathbb{Z} denotes the set of integers.

D: D_{30} -set of all divisors of 30 with divides relation

Q.no 51.

If each license plate contains a sequence of three capital letters followed by three digits, then the possible number of license plates available is -----

A: 26^3

B: $26^3 * 10^3$

C: 780

D: 260

The number of permutations of the word AAAAAABBBBBCCDDD are
Q.no 52.

A: $\frac{15!}{(6!)(4!)(2!)(3!)}$

B: $15!$

C: ${}^{15}C_5$

D: ${}^{15}P_5$

Q.no 53. Hasse Diagram is drawn for _

A: Equivalence relation

B: Finite Poset

C: Transitive closure

D: Any set

Q.no 54. Which of the following relation on $\{1,2,3,4\}$ is an equivalence relation?

A: $R = \{(1,1), (1,2), (2,1), (2,2), (3,3), (3,4), (4,3), (4,4)\}$

B: $R = \{(1,1), (1,2), (2,1), (2,2), (3,3), (3,4), (4,3)\}$

C: $R = \{(1,1), (1,2), (2,1), (2,2), (3,3), (3,4)\}$

D: $R = \{(1,2), (2,1), (2,2), (3,3), (3,4), (4,3), (4,4)\}$

The name of the following argument form is.....

$$p \rightarrow q, \sim q \vdash \sim p$$

Q.no 55.

A: Denying the consequent

B: Disjunctive syllogism

C: Modus tollens

D: Denying the antecedent

Q.no 56.

The number of ways of 5-card hands can be formed from the standard deck of 52-card deck is -----.

A: 2598960

B: 1228

C: 260

D: 2598690

Q.no 57. Dual of the Boolean expression $x \vee (y \wedge z)$ is _____.

A: $x \wedge (y \vee z)$

B: $(x \wedge y) \vee (x \wedge z)$

C: $(x \vee y) \wedge (x \vee z)$

D: $x \vee (y \vee z)$

Q.no 58. In the Lattice D_{20} with the divides relation, what is the value of $4 \wedge 10$?

A: 2

B: 1

C: 4

D : 10

Q.no 59.

What rules of inference are used in this argument?

“It is either colder than Himalaya today or the pollution is harmful. It is hotter than Himalaya today. Therefore, the pollution is harmful.”

A : Conjunction

B : Modus ponens

C : Disjunctive syllogism

D : Hypothetical syllogism

Which of the following is transitive closure of relation

$R = \{(1,1), (1,2), (2,3), (3,1), (3,2)\}$ on the set $A = \{1,2,3\}$

Q.no 60.

A : $R^* = \{(1,1), (1,2), (1,3), (2,1), (2,2), (2,3), (3,1), (3,2), (3,3)\}$

B : $R^* = \{(1,1), (1,2), (1,3), (2,1), (2,2), (2,3), (3,1)\}$

C : $R^* = \{(1,1), (1,2), (1,3), (2,1), (2,2)\}$

D : $R^* = \{(1,3), (2,1), (2,2), (2,3), (3,1), (3,2), (3,3)\}$

IF set A contains m elements and set B contains n elements then their Cartesian

Q.no 1. product $A \times B$ contains _____ elements.

A : m

B : n

C : m n

D : m +n

In Boolean algebra, $a \wedge b$ is read as _____.

Q.no 2.

A: a meet b

B: a join b

C: a OR b

D: a NOT b

Q.no 3. The number of r-permutations of n-objects, with repetition allowed is-----

A: n^r

B: r^n

C: nC_r

D: ${}_np_r$

Q.no 4. Transitive closure of the given relation R is denoted by_____.

A: R^1

B: R^*

C: R^c

D: R^{-1}

Q.no 5. The value of 8C_8 =-----

A: 1

B: $8!$

C: 8

D: 0

Q.no 6.

Let, $R = \{ (3,3) (6,6) (9,9) (12,12) (3,6),(6,3),(3,9),(9,3),(9,12),(12,9) \}$ be a relation on the set $A = \{3,6,9,12\}$ then relation is-----

A: Reflexive and Transitive

B: Reflexive and symmetric

C: Symmetric and symmetric

D: Equivalence relation

Q.no 7. The relation $R = \{ (0, 0), (1, 2), (2,0), (1,3) \}$ on $A = \{0, 1, 2, 3, \}$ is _____.

A: reflexive, not symmetric, transitive

B: not reflexive, not symmetric, not transitive

C: reflexive, symmetric, not transitive

D: reflexive, not symmetric, not transitive

Q.no 8. If a relation is symmetric, then the relation matrix must be-----

A: Symmetric

B: Skew symmetric

C: Identity matrix

D: triangular

Q.no 9.

Let P : I am in Pune; Q : Pune is clean; then $Q \wedge P$ can be written in English language as----

A: Pune is not clean or I am in Pune

B: Pune is clean and I am in Pune

C: I am in Pune and Pune is not clean

D: Pune is clean but I am in Mumbai

Q.no 10.

Let P: I am in Bangalore. Q: I love cricket, then $Q \rightarrow P$ is written in English language as-----.

A: If I love cricket then I am in Bangalore

B: If I am in Bangalore then I love cricket

C: I am not in Bangalore

D: I love cricket

A conditional statement in symbolic form is...

Q.no 11.

A: $p \vee q$

B: $p \rightarrow q$

C: $p \neq q$

D: $p \wedge q$

Q.no 12.

Consider the Poset $(D_{30}, |)$. Then which of the following is least upper bound for 5 and 2?

A: 15

B: 10

C: 30

D: 1

If $|A|=m$ and $|B|=n$ then number of functions from A to B are-----

Q.no 13.

A: m^n

B: n^m

C: $m * n$

D: $m + n$

Q.no 14. The relation ' \leq ' is a partial order if it is _____.

A: reflexive, antisymmetric and transitive

B: reflexive, symmetric

C: Asymmetric, transitive

D: irreflexive and transitive

Q.no 15. In propositional logic, which of the following is equivalent to $p \rightarrow q$?

A: $\sim p \rightarrow q$

B: $\sim p \vee q$

C: $\sim p \vee \sim q$

D: $q \rightarrow p$

Q.no 16. A mapping which maps every element x to itself is _____ relation.

A: reflexive

B: symmetric

C: transitive

D: equivalence

Q.no 17. The symbolic form of a conjunction is...

A: $p \rightarrow q$

B: $p \wedge q$

C: $p \vee q$

D: $\sim p$

If $|A|=m$ and $|B|=n$ then number of one-one functions from A to B are-----

Q.no 18.

A: m^n

B: n^m

C: $m * n$

D: $n p_m$

Let $R = \{(2,2), (2,3), (3,1), (1,3)\}$ on the set $A = \{1,2,3\}$. Which of the following pair should be added to R so that it becomes symmetric?

Q.no 19.

A: $(1,1)$

B: $(3,3)$

C: $(3,2)$

D: $(1,2)$

Q.no 20.

Let, $R = \{ (1,3) (3,4), (4,2) (2,2) (3,3) (1,1) \}$ be a relation on the set $A = \{1,2,3,4\}$ then relation R is-----

A: Transitive

B: Reflexive

C: Not symmetric

D: Function

What is the distributive property of a lattice?

Q.no 21.

- A: $a \text{ meet } b$
- B: $a \vee b = b \vee a$
- C: $a \vee a = a$
- D: $a \text{ NOT } b$

Q.no 22. Which of the following is a false statement?

- A: If p is True and q is True then $p \rightarrow q$ is True.
- B: If p is False and q is True then $p \rightarrow q$ is True.
- C: If p is False and q is False then $p \rightarrow q$ is False.
- D: If p is True and q is False then $p \rightarrow q$ is False.

Q.no 23.

If R is reflexive, Symmetric & Transitive, then the relation is said to be -----

- A: Binary relation
- B: Antisymmetric relation
- C: Partial order relation
- D: Equivalence relation

Q.no 24. Which of the following is a true statement?

- A: $2+3=5$ and $1-7$ is a natural number
- B: $3+2=8$ if $5-2=7$.
- C: $1 > 3$ and 3 is a positive integer
- D: $-2 > 3$ or 3 is a negative integer

Q.no 25. A relation R on a set X is symmetric if -----, for all x, y, z in X .

A: $x R y, y R z \rightarrow x R z$

B: $x R y$

C: $x R y \rightarrow y R x$

D: $x R x$

Q.no 26.

The number of four letter words that begin with 'R' when repetition of letters is not allowed and if only capital letters are allowed is

A: 17576

B: 13800

C: 576

D: 676

Q.no 27. $\sim (P \rightarrow Q)$ is equivalent to

A: $P \wedge \sim Q$

B: $P \wedge Q$

C: $\sim P \vee Q$

D: $\sim P \wedge Q$

Q.no 28.

Which is the matrix of relation R defined on the set $A = \{a, b, c\}$, $R = \{(a, c), (b, c), (c, a)\}$

A: $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$

B: $\begin{bmatrix} 0 & 0 & 1 \\ 0 & 0 & 1 \\ 1 & 0 & 0 \end{bmatrix}$

$$C: \begin{bmatrix} 1 & 0 & 1 \\ 0 & 0 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

$$D: \begin{bmatrix} 1 & 0 & 0 \\ 1 & 1 & 1 \\ 1 & 0 & 0 \end{bmatrix}$$

Q.no 29. Let $S = \{ (a, b) (c, d) (b, b) \}$ $R = \{ (d, b) (c, b) (a, d) \}$ then $R \circ S = \text{-----}$

$$A: \{ (a, e) (c, b) (b, e) \}$$

$$B: \{ (d, b) (c, b) (a, d) \}$$

$$C: \{ (a, a) (b, b) \}$$

$$D: \{ (c, b) \}$$

Q.no 30. An element \bar{a} in L is a complement of a then which of the following is true?

$$A: a \vee \bar{a} = 1$$

$$B: a \vee \bar{a} = 0$$

$$C: a \vee \bar{a} = -1$$

$$D: a \vee \bar{a} = 2$$

Q.no 31. Which of the following statement is TRUE?

$$A: {}^nC_r = {}^nC_{n-r}$$

$$B: {}^nC_0 = n$$

$$C: {}^nC_0 = 0$$

$$D: {}^nC_0 = n!$$

Q.no 32. Which of the following is not a maxterm of the Boolean variable x_1, x_2, x_3 ?

A: $x_1 \vee x_2 \vee x_3$

$\overline{x_1} \vee x_2 \vee x_3$

B:

C: $q \quad \overline{x_1} \wedge x_2 \wedge \overline{x_3}$

$x_1 \vee \overline{x_2} \vee \overline{x_3}$

D:

Q.no 33.

Consider the Poset $(D_{42}, |)$. Then which of the following is not a lower bound of 6 and 42?

A: 2

B: 3

C: 7

D: 1

What rule of inference is used here?

Q.no 34. "It is cloudy and drizzling now. Therefore, it is cloudy now."

A: Addition

B: Simplification

C: Resolution

D: Conjunction

In a Boolean algebra, a nonzero element 'a' is called _____ if for every x in B,

Q.no 35. $x \wedge a = a$ or $x \wedge a = 0$.

A: a variable

B: an atom

C: a lattice

D: a boolean variable

Q.no 36. Which of the following is a declarative statement?

A: It's right

B: He says

C: Two is not an even integer

D: I love you

Q.no 37.

The number of four letter words that begin with 'R' when repetition of letters is allowed is -----

A: 17576

B: 1228

C: 576

D: 676

Q.no 38.

If a Boolean function is represented by join of minterms then it is said to be _____.

A: Disjunctive Normal Form

B: Conjunctive Normal Form

C: Normal Form

D: Standard Form

Q.no 39.

The number of four letter words that begin with 'S' and end with 'V' when repetition of letters is not allowed and if only capital letters are used is -----

A: 7576

B: 552

C: 576

D: 676

Q.no 40. What is the distributive property of a lattice?

A: $a \vee (a \wedge b) = a$

B: $a \vee b = b \vee a$

C: $a \vee a = a$

D: $a \wedge (b \vee c) = (a \wedge b) \vee (a \wedge c)$

Let, $S = \{(1, 2) (3, 4) (2, 6)\}$ and $R = \{(4, 3) (2, 5) (6, 6)\}$ be a relation then R
Q.no 41. composite S is given by $(R \circ S) = \text{-----}$

A: $\{(1, 5) (3, 3) (2, 6)\}$

B: $\{(1, 5) (3, 6) (2, 5)\}$

C: $\{(4, 4) (2, 5) (3, 3)\}$

D: $\{(1, 1) (3, 3) (2, 2)\}$

Q.no 42. Which of the following lattice is bounded ?

A: (\mathbb{R}, \leq) , where \mathbb{R} denotes the set of reals.

B: (\mathbb{N}, \leq) , where \mathbb{N} denotes the set of natural numbers.

C: $(\mathbb{Z}, |)$, where \mathbb{Z} denotes the set of integers.

D: D_{30} -set of all divisors of 30 with divides relation

Q.no 43. The four logical connectives are...

A: Conjunctions, conditionals, compounds, and disjunctions

B: If p is False and q is True then $p \rightarrow q$ is True.

C: Conditionals, disjunction, negations, and conjunctions

D: Compound, disjunction, conditionals, and negations

Q.no 44. Which of the following statement is a proposition?

A: Get me a glass of milkshake

B: God bless you!

C: What is the time now?

D: The only odd prime number is 2.

Q.no 45.

If any number students can be assigned to any faculty advisor then the number of ways to assign 25 students to 4 faculty advisors is ---

A: 25^4

B: 4^{25}

C: $4!$

D: ${}^{25}C_4$

Q.no 46.

Which of the following relation defined on any set of numbers is a partial order as well as an equivalence relation?

A: equal to ($=$)

B: less than ($<$)

C: greater than ($>$)

D: not equal to (\neq)

Q.no 47. A lattice is called Boolean Algebra if _____.

A: it is bounded

B: it is bounded, complemented

C: it is bounded, complemented and distributive.

D: it is distributed

Q.no 48.

Which of the following statements is the negation of the statements “4 is odd or -9 is positive”?

A: 4 is even or -9 is not negative.

B: 4 is odd or -9 is not negative.

C: 4 is even and -9 is negative.

D: 4 is odd and -9 is not negative.

Q.no 49.

Let, $S = \{ (1,b) (3,d) (2,b) \}$ and $R = \{ (b,4) (2,5) (d,a) \}$ be a relation then R composite S $(R \circ S) =$ _____.

A: $\{ (1,b) (3,d) (2,b) \}$

B: $\{ (1,4) (3,a) (2,4) \}$

C: $\{ (4,b) (2,5) (3,a) \}$

D: $\{ (1,d) (3,b) (2,c) \}$

Q.no 50.

How many friends you must have to guarantee that at least 8 of them will have birthday in the same month?

A: 56

B: 90

C: 96

D: 8

Q.no 51.

In a bounded lattice (L, \vee, \wedge) an element b belongs to L is the complement of an element a belongs to L then which of the following is false?

A: $a \vee b = 1$

B: $a \vee b = 0$

C: $a \wedge b = 0$

D: $a \wedge b = b \wedge a$

Q.no 52. Which of the following is a tautology?

A: $a \vee b \rightarrow b$

B: $a \wedge b \rightarrow b$

C: $a \vee b \rightarrow a$

D: $(a \vee b) \rightarrow (\sim b)$

Q.no 53. In a Poset $P (\{2, 3, 6, 12\}, |)$ which of the following is the least element?

A: 2

B: 3

C: 1

D: does not exist

Q.no 54. Which of the following is not a Boolean algebra?

A: D_{15} , with divides relation

B: D_{30} , with divides relation

C: D_{12} , with divides relation

D: D_{10} , with divides relation

Q.no 55. The proposition $P \rightarrow (Q \rightarrow R)$ is equivalent to ----

A: $(P \wedge Q) \rightarrow R$

B: $(P \vee \sim Q) \rightarrow R$

C: $(P \vee Q) \rightarrow R$

D: $(P \vee R) \rightarrow Q$

Q.no 56. Which of the following relation on $\{1,2,3,4\}$ is an equivalence relation?

A: $R = \{(1,1), (1,2), (2,1), (2,2), (3,3), (3,4), (4,3), (4,4)\}$

B: $R = \{(1,1), (1,2), (2,1), (2,2), (3,3), (3,4), (4,3)\}$

C: $R = \{(1,1), (1,2), (2,1), (2,2), (3,3), (3,4)\}$

D: $R = \{(1,2), (2,1), (2,2), (3,3), (3,4), (4,3), (4,4)\}$

Q.no 57.

The number of ways of 5-card hands can be formed from the standard deck of 52-card deck is -----.

A: 2598960

B: 1228

C: 260

D: 2598690

Q.no 58. In the Lattice D_{20} with the divides relation, what is the value of $4 \wedge 10$?

A: 2

B: 1

C: 4

D: 10

Q.no 59. Dual of the Boolean expression $x \vee (y \wedge z)$ is _____.

A: $x \wedge (y \vee z)$

B: $(x \wedge y) \vee (x \wedge z)$

C: $(x \vee y) \wedge (x \vee z)$

D: $x \vee (y \vee z)$

Q.no 60. Hasse Diagram is drawn for _

A: Equivalence relation

B: Finite Poset

C: Transitive closure

D: Any set

Q.no 1. In Boolean algebra, $a \wedge b$ is read as _____.

A: a meet b

B: a join b

C: a OR b

D: a NOT b

Q.no 2. Which of the following are De-Morgan's laws?

A: $P \wedge (Q \vee R) \equiv (P \wedge Q) \vee (P \wedge R)$

B: $\sim (P \wedge R) \equiv \sim P \vee \sim R, \sim (P \vee R) \equiv \sim P \wedge \sim R$

C: $P \vee \sim P \equiv \text{True}, P \wedge \sim P \equiv \text{False}$

D: $P \vee (Q \wedge R) \equiv (P \vee Q) \wedge (P \vee R)$

Q.no 3.

If $n+1$ objects are put in n boxes then at least one box contains at least ----- objects.

A: one

B: Two

C: Zero

D: n

Q.no 4. Warshall's Algorithm is used to find_____.

A: Equivalence relation

B: Transitive closure of a relation

C: Composition of relations

D: Matrix of a relation

Q.no 5. If a relation is reflexive, then all the diagonal entries in the relation matrix must

A: 0

B: 1

C: 2

D: -1

Q.no 6. IF set A contains m elements and set B contains n elements then their Cartesian product $A \times B$ contains _____ elements.

A: m

B: n

C: m n

D: m + n

Q.no 7. The number of r-permutations of n-objects, with repetition allowed is-----

A: n^r

B: r^n

C: nC_r

D: np_r

Q.no 8.

Let, $R = \{ (3,3) (6,6) (9,9) (12,12) (3,6),(6,3),(3,9),(9,3),(9,12),(12,9) \}$ be a relation on the set $A = \{3,6,9,12\}$ then relation is-----

A: Reflexive and Transitive

B: Reflexive and symmetric

C: Symmetric and symmetric

D: Equivalence relation

Q.no 9. What is the distributive property of a lattice?

A: a meet b

B: $a \vee b = b \vee a$

C: $a \vee a = a$

D: a NOT b

Q.no 10. The symbolic form of a conjunction is...

A: $p \rightarrow q$

B: $p \wedge q$

C: $p \vee q$

D: $\sim p$

Q.no 11. The relation ' \leq ' is a partial order if it is _____.

A: reflexive, antisymmetric and transitive

B: reflexive, symmetric

C: Asymmetric, transitive

D: irreflexive and transitive

Let $R = \{(2,2), (2,3), (3,1), (1,3)\}$ on the set $A = \{1,2,3\}$. Which of the following pair should be added to R so that it becomes symmetric?

A: (1,1)

B: (3, 3)

C: (3, 2)

D: (1, 2)

If $|A|=m$ and $|B|=n$ then number of functions from A to B are-----

Q.no 13.

A: m^n

B: n^m

C: $m * n$

D: $m + n$

Q.no 14. The relation $R = \{(0, 0), (1, 2), (2, 0), (1, 3)\}$ on $A = \{0, 1, 2, 3, \}$ is _____.

A: reflexive, not symmetric, transitive

B: not reflexive, not symmetric, not transitive

C: reflexive, symmetric, not transitive

D: reflexive, not symmetric, not transitive

Q.no 15.

Let P: I am in Bangalore. Q: I love cricket, then $Q \rightarrow P$ is written in English language as-----.

A: If I love cricket then I am in Bangalore

B: If I am in Bangalore then I love cricket

C: I am not in Bangalore

D: I love cricket

Q.no 16. A relation R on a set X is symmetric if -----, for all x, y, z in X.

A: $x R y, y R z \rightarrow x R z$

B: $x R y$

C: $x R y \rightarrow y R x$

D: $x R x$

Q.no 17. If a relation is symmetric, then the relation matrix must be-----

A: Symmetric

B: Skew symmetric

C: Identity matrix

D: triangular

Q.no 18. The value of 8C_8 =-----

A: 1

B: 8!

C: 8

D: 0

Q.no 19.

Let, $R = \{ (1,3) (3,4), (4,2) (2,2) (3,3) (1,1) \}$ be a relation on the set $A = \{1,2,3,4\}$
then relation R is-----

A: Transitive

B: Reflexive

C: Not symmetric

D: Function

Q.no 20. A conditional statement in symbolic form is...

A: $p \vee q$

B: $p \rightarrow q$

C: $p \neq q$

D: $p \wedge q$

If $|A|=m$ and $|B|=n$ then number of one-one functions from A to B are-----

Q.no 21.

A: m^n

B: n^m

C: $m * n$

D: ${}^n P_m$

Q.no 22.

If R is reflexive, Symmetric & Transitive, then the relation is said to be -----

A: Binary relation

B: Antisymmetric relation

C: Partial order relation

D: Equivalence relation

In propositional logic, which of the following is equivalent to $p \rightarrow q$?

Q.no 23.

A: $\sim p \rightarrow q$

B: $\sim p \vee q$

C: $\sim p \vee \sim q$

D: $q \rightarrow p$

Which of the following is a false statement?

Q.no 24.

A: If p is True and q is True then $p \rightarrow q$ is True.

If p is False and q is True then $p \rightarrow q$ is True.

B:

If p is False and q is False then $p \rightarrow q$ is False.

C:

If p is True and q is False then $p \rightarrow q$ is False.

D:

Q.no 25. Transitive closure of the given relation R is denoted by_____.

A: R^1

B: R^*

C: R^c

D: R^{-1}

Q.no 26.

Which is the matrix of relation R defined on the set $A = \{a, b, c\}$, $R = \{(a, c), (b, c), (c, a)\}$

A: $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$

B: $\begin{bmatrix} 0 & 0 & 1 \\ 0 & 0 & 1 \\ 1 & 0 & 0 \end{bmatrix}$

C: $\begin{bmatrix} 1 & 0 & 1 \\ 0 & 0 & 0 \\ 0 & 0 & 1 \end{bmatrix}$

D: $\begin{bmatrix} 1 & 0 & 0 \\ 1 & 1 & 1 \\ 1 & 0 & 0 \end{bmatrix}$

Q.no 27. What is the following statement is true for any two sets A and B?

$$|A \cup B| = |A| + |B| - |A \cap B|$$

A:

B: $|A \cup B| = |A| - |A \cap B|$

C: $|A \cup B| = |B| - |A \cap B|$

D: $|A \cup B| = |A| + |B|$

Q.no 28. $\sim A \vee \sim B$ is logically equivalent to?

A: $\sim A \rightarrow \sim B$

B: $\sim A \wedge \sim B$

C: $A \rightarrow \sim B$

D: $B \vee A$

Q.no 29. If R is a reflexive, symmetric and transitive relation, then it is said to be -----

A: Binary relation

B: An antisymmetric relation

C: Partial order relation

D: An equivalence relation

Q.no 30. The propositional form $p \wedge (\sim p \vee q)$ is -----

A: A tautology

B: A contradiction

C: Logically equivalent to $p \wedge q$

D: Logically equivalent to $p \vee q$

Q.no 31. An element \bar{a} in L is a complement of a then which of the following is true?

A: $a \vee \bar{a} = 1$

B: $a \vee \bar{a} = 0$

C: $a \vee \bar{a} = -1$

D: $a \vee \bar{a} = 2$

Q.no 32. $\sim (P \rightarrow Q)$ is equivalent to

A: $P \wedge \sim Q$

B: $P \wedge Q$

C: $\sim P \vee Q$

D: $\sim P \wedge Q$

Q.no 33. A function from B^n to B is called as _____.

A: one-one function

B: onto function

C: Boolean function of degree n.

D: Bijective function

Q.no 34.

Consider the Poset $(D_{42}, |)$. Then which of the following is not a lower bound of 6 and 42?

A: 2

B: 3

C: 7

D: 1

Q.no 35.

The number of four letter words that begin with 'R' when repetition of letters is not allowed and if only capital letters are allowed is

A: 17576

B: 13800

C: 576

D: 676

Q.no 36. Which of the following is not a maxterm of the Boolean variable x_1, x_2, x_3 ?

A: $x_1 \vee x_2 \vee x_3$

B: $\overline{x_1} \vee x_2 \vee x_3$

C: $\overline{x_1} \wedge x_2 \wedge \overline{x_3}$

D: $x_1 \vee \overline{x_2} \vee \overline{x_3}$

Q.no 37. Which of the following statement is TRUE?

A: ${}^nC_r = {}^nC_{n-r}$

B: ${}^nC_0 = n$

C: ${}^nC_0 = 0$

D: ${}^nC_0 = n!$

Q.no 38. Let $S = \{ (a, b) (c, d) (b, b) \}$ $R = \{ (d, b) (c, b) (a, d) \}$ then $R \circ S =$ -----

A: $\{ (a, e) (c, b) (b, e) \}$

B: $\{ (d, b) (c, b) (a, d) \}$

C: $\{ (a, a) (b, b) \}$

D: $\{ (c, b) \}$

Q.no 39.

If a Boolean function is represented by meet of maxterms then it is said to be _____

A: Disjunctive Normal Form

B: Conjunctive Normal Form

C: Normal Form

D: Standard Form

Q.no 40. Which of the following is a declarative statement?

A: It's right

B: He says

C: Two is not an even integer

D: I love you

Q.no 41.

The number of four letter words that begin with 'S' and end with 'V' when repetition of letters is not allowed and if only capital letters are used is -----

A: 7576

B: 552

C: 576

D: 676

Q.no 42. Which of the following lattice is bounded ?

A: (\mathbb{R}, \leq) , where \mathbb{R} denotes the set of reals.

B: (\mathbb{N}, \leq) , where \mathbb{N} denotes the set of natural numbers.

C: $(\mathbb{Z}, |)$, where \mathbb{Z} denotes the set of integers.

D: D_{30} -set of all divisors of 30 with divides relation

Q.no 43.

Which of the following statements is the negation of the statements “4 is odd or -9 is positive”?

A: 4 is even or -9 is not negative.

B: 4 is odd or -9 is not negative.

C: 4 is even and -9 is negative.

D: 4 is odd and -9 is not negative.

Q.no 44. Which of the following statement is a proposition?

A: Get me a glass of milkshake

B: God bless you!

C: What is the time now?

D: The only odd prime number is 2.

What rule of inference is used here?

Q.no 45. “It is cloudy and drizzling now. Therefore, it is cloudy now.”

A: Addition

B: Simplification

C: Resolution

D: Conjunction

Q.no 46.

How many friends you must have to guarantee that at least 8 of them will have birthday in the same month?

A: 56

B: 90

C: 96

D: 8

Q.no 47.

The number of four letter words that begin with 'R' when repetition of letters is allowed is -----

A: 17576

B: 1228

C: 576

D: 676

Q.no 48.

If any number students can be assigned to any faculty advisor then the number of ways to assign 25 students to 4 faculty advisors is ---

A: 25^4

B: 4^{25}

C: $4!$

D: ${}^{25}C_4$

Q.no 49. What is the distributive property of a lattice?

A: $a \vee (a \wedge b) = a$

B: $a \vee b = b \vee a$

C: $a \vee a = a$

D: $a \wedge (b \vee c) = (a \wedge b) \vee (a \wedge c)$

Q.no 50.

If a Boolean function is represented by join of minterms then it is said to be_____.

A: Disjunctive Normal Form

B: Conjunctive Normal Form

C: Normal Form

D: Standard Form

Q.no 51.

If each license plate contains a sequence of three capital letters followed by three digits, then the possible number of license plates available is -----

A: 26^3

B: $26^3 * 10^3$

C: 780

D: 260

The number of permutations of the word AAAAAABBBBBCCDDD are

Q.no 52.

A: $\frac{15!}{(6!)(4!)(2!)(3!)}$

B: $15!$

C: ${}^{15}C_5$

$^{15}P_5$

D :

Q.no 53.

In a bounded lattice (L, \vee, \wedge) an element b belongs to L is the complement of an element a belongs to L then which of the following is false?

A : $a \vee b = 1$

B : $a \vee b = 0$

C : $a \wedge b = 0$

D : $a \wedge b = b \wedge a$

Which of the following is a tautology?

Q.no 54.

A : $a \vee b \rightarrow b$

B : $a \wedge b \rightarrow b$

C : $a \vee b \rightarrow a$

D : $(a \vee b) \rightarrow (\sim b)$

Q.no 55.

What rules of inference are used in this argument?

“It is either colder than Himalaya today or the pollution is harmful. It is hotter than Himalaya today. Therefore, the pollution is harmful.”

A : Conjunction

B : Modus ponens

C : Disjunctive syllogism

D : Hypothetical syllogism

The name of the following argument form is.....

$p \rightarrow q, \sim q \vdash \sim p$

Q.no 56.

A: Denying the consequent

B: Disjunctive syllogism

C: Modus tollens

D: Denying the antecedent

Which of the following is transitive closure of relation

$R = \{(1,1), (1,2), (2,3), (3,1), (3,2)\}$ on the set $A = \{1,2,3\}$

Q.no 57.

A: $R^* = \{(1,1), (1,2), (1,3), (2,1), (2,2), (2,3), (3,1), (3,2), (3,3)\}$

B: $R^* = \{(1,1), (1,2), (1,3), (2,1), (2,2), (2,3), (3,1)\}$

C: $R^* = \{(1,1), (1,2), (1,3), (2,1), (2,2)\}$

D: $R^* = \{(1,3), (2,1), (2,2), (2,3), (3,1), (3,2), (3,3)\}$

Q.no 58. In a Poset $P (\{2, 3, 6, 12\}, |)$ which of the following is the least element?

A: 2

B: 3

C: 1

D: does not exist

Q.no 59.

The number of ways of 5-card hands can be formed from the standard deck of 52-card deck is -----.

A: 2598960

B: 1228

C: 260

D: 2598690

Q.no 60. Dual of the Boolean expression $x \vee (y \wedge z)$ is _____.

A: $x \wedge (y \vee z)$

B: $(x \wedge y) \vee (x \wedge z)$

C: $(x \vee y) \wedge (x \vee z)$

D: $x \vee (y \vee z)$