RAVI MATHS TUITION CENTER, NEAR VILLIVAKKAM RLY STATION, CHENNAI – 82.
WHATSAPP - 8056206308

Discrete Mathematics

12th Standard

Maths

Exam Time : 00:40:00 Hrs | Total Marks : 40

40 x 1 = 40

1) A binary operation on a set S is a function from
   (a) S ⟶ S (b) (SxS) ⟶ S (c) S⟶ (SxS) (d) (SxS) ⟶ (SxS)
2) Subtraction is not a binary operation in
   (a) R (b) Z (c) N (d) Q
3) Which one of the following is a binary operation on N?
   (a) Subtraction (b) Multiplication (c) Division (d) All the above
4) In the set R of real numbers '*' is defined as follows. Which one of the following is not a binary operation on R?
   (a) a*b=min (a.b) (b) a*b= max (a,b) (c) a*b= a (d) $a*b=a^b$
5) The operation * defined by $a*b=\frac{ab}{7}$ is not a binary operation on
   (a) Q^+ (b) Z (c) R (d) C
6) In the set Q define a⊙b= a+b+ab. For what value of y, 3⊙(y⊙5)=7?
   (a) $y=\frac{2}{3}$ (b) $y=\frac{-2}{3}$ (c) $y=\frac{-3}{2}$ (d) y=4
7) If $a*b=\sqrt{a^2+b^2}$ on the real numbers then * is
   (a) commutative but not associative (b) associative but not commutative (c) both commutative and associative (d) neither commutative nor associative
8) Which one of the following statements has the truth value T?
   (a) sin x is an even function (b) Every square matrix is non-singular (c) The product of complex number and its conjugate is purely imaginary (d) $\sqrt{5}$ is an irrational number
9) Which one of the following statements has truth value F?
   (a) Chennai is in India or $\sqrt{2}$ is an integer (b) Chennai is in India or $\sqrt{2}$ is an irrational number (c) Chennai is in China or $\sqrt{2}$ is an integer (d) Chennai is in China or $\sqrt{2}$ is an irrational number
10) If a compound statement involves 3 simple statements, then the number of rows in the truth table is
   (a) 9 (b) 8 (c) 6 (d) 3
11) Which one is the inverse of the statement (PVq)→(p∧q)?
   (a) (p∧q)→(pVq) (b) ¬(pvq)→(p∧¬q) (c) (¬pv¬q)→(¬p∧¬q) (d) (¬p∧¬q)→(¬pV¬q)
12) Which one is the contrapositive of the statement (pVq)⟶r?
   (a) ¬r→(¬p∧¬q) (b) ¬r⟶(p∨q) (c) r⟶(p∧q) (d) p⟶(q∨r)
13) The truth table for (p ∧ q) ∨ ¬q is given below

p	q	(p ∧ q) ∨ (¬q)
T	T	(a)
T	F	(b)
F	T	(c)
F	F	(d)

Which one of the following is true?

(a)

(a)	(b)	(c)	(d)
T	T	T	T

(b)

(a)	(b)	(c)	(d)
T	F	T	T

(c)

(a)	(b)	(c)	(d)
T	T	F	F

(d)

(a)	(b)	(c)	(d)
T	F	F	F

14) In the last column of the truth table for ¬(p ∨ ¬q) the number of final outcomes of the truth value 'F' are

(a) 1 (b) 2 (c) 3 (d) 4

15) Which one of the following is incorrect? For any two propositions p and q, we have

(a) ¬ (p∨q) ≡ ¬ p ∧ ¬q (b) ¬ (p∧ q)≡¬p ∨ ¬q (c) ¬ (p ∨ q)≡¬p∨¬q (d) ¬(¬p)≡ p

16)

p	q	(p ∧ q) ⟶ ¬q
T	T	(a)
T	F	(b)
F	T	(c)
F	F	(d)

Which one of the following is correct for the truth value of (p ∧ q)⟶ ¬p p?

(a)

(a)	(b)	(c)	(d)
T	T	T	T

(b)

(a)	(b)	(c)	(d)
F	T	T	T

(c)

(a)	(b)	(c)	(d)
F	F	T	T

(d)

(a)	(b)	(c)	(d)
T	T	T	F

17) The dual of ¬(p V q) V [p V (p ∧ ¬r)] is

(a) ¬(p ∧ q) ∧ [p V (p ∧ ¬r)] (b) (p ∧ q) ∧ [p ∧ (p V ¬r)] (c) ¬(p ∧ q) ∧ [p ∧ (p ∧ r)] (d) ¬(p ∧ q) ∧ [p ∧ (pV ¬r)]

18) The proposition p ∧ (¬p ∨ q) is

(a) a tautology (b) a contradiction (c) logically equivalent to p ∧ q (d) logically equivalent to p ∨ q

19) Determine the truth value of each of the following statements:

(a) 4+2=5 and 6+3=9

(b) 3+2=5 and 6+1=7

(c) 4+5=9 and1+2= 4

(d) 3+2=5 and 4+7=11

(a)

(a)	(b)	(c)	(d)
F	T	T	T

(b)

(a)	(b)	(c)	(d)
T	F	T	F

(c)

(a)	(b)	(c)	(d)
T	T	F	F

(d)

(a)	(b)	(c)	(d)
F	F	T	T

20) Which one of the following is not true?

(a) Negation of a negation of a statement is the statement itself (b) If the last column of the truth table contains only T then it is a tautology. (c) If the last column of its truth table contains only F then it is a contradiction (d) If p and q are any two statements then p↔q is a tautology.

21) The binary operation * defined on a set s is said to be commutative if

(a) a*b ∈ S ∀ a, b ∈ S (b) a*b = b*a ∀ a, b ∈ S (c) (a*b) * c = a*(b*c) ∀ a, b ∈ S (d) a*b = e ∀ a, b ∈ S

22) If * is defined by a * b = $a^2 + b^2 + ab + 1$, then (2 * 3) * 2 is

(a) 20 (b) 40 (c) 400 (d) 445

23) The number of binary operations that can be defined on a set of 3 elements is

(a) 3^2 (b) 3^3 (c) 3^9 (d) 3^1

24) The Identity element of $\left\{ \begin{pmatrix} x & x \\ x & x \end{pmatrix} \right\}$ |x∈R, x≠0} under matrix multiplication is

(a) $\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$ (b) $\begin{pmatrix} \frac{1}{4x} & \frac{1}{4x} \\ \frac{1}{4x} & \frac{1}{4x} \end{pmatrix}$ (c) $\begin{pmatrix} \frac{1}{2} & \frac{1}{2} \\ \frac{1}{2} & \frac{1}{2} \end{pmatrix}$ (d) $\begin{pmatrix} \frac{1}{2x} & \frac{1}{2x} \\ \frac{1}{2x} & \frac{1}{2x} \end{pmatrix}$

25) Which one of the following is not a statement?
(a) 2 + 3 =5 (b) How beautiful is this flower? (c) Delhi is the capital of Tamil Nadu (d) A triangle has found angles.

26) Which of the following is a tautology?
(a) p v q (b) p ∧ q (c) q v ~ q (d) q ∧ ~ q

27) Which of the following is a contradiction?
(a) p v q (b) p ∧ q (c) q v ~ q (d) q ∧ ~ q

28) The identity element in the group {R - {1},x} where a * b = a + b - ab is
(a) 0 (b) 1 (c) $\frac{1}{a-1}$ (d) $\frac{a}{a-1}$

29) Define * on Z by a*b = a+b+1 ∀ a,b ∈ Z. Then the identity element of z is
(a) 1 (b) 0 (c) 1 (d) -1

30) A binary operation * is defined on the set of positive rational numbers Q^+ by a*b = $\frac{ab}{4}$. Then 3 * $\left(\frac{1}{5} * \frac{1}{2}\right)$ is
(a) $\frac{3}{160}$ (b) $\frac{5}{160}$ (c) $\frac{3}{10}$ (d) $\frac{3}{40}$

31) If a * b = a^2b^2 - ab then 3 * (1 * 1)
(a) 0 (b) 1 (c) 2 (d) 4

32) The number whose multiplication universe does not exist in C.
(a) 0 (b) 1 (c) 0 (d) 1

33) Let p: Kamala is going to school
q: There are 20 students in the class. Then Kamala is not going to school or there are 20 students in the class is represented by
(a) p v q (b) p ∧ q (c) ~ p (d) ~ p v q

34) If p is true and q is unknown, then _____
(a) ~ p is true (b) p v (~p) is false (c) p ∧ (~p) is true (d) p v q is true

35) '+' is not a binary operation on
(a) ~ (b) z (c) c (d) Q- {0}

36) '-' is a binary operation on
(a) ~ (b) Q-{0} (c) R-{0} (d) Z

37) Which of the following is a statement?
(a) 7+2< 10 (b) Wish you all success (c) All the best (d) How old are you?

38) In (N, *), x * y = max(x, y), x, y ∈ N then 7 * (-7)
(a) 7 (b) -7 (c) 0 (d) -49

39) In (S, *), is defined by x * y = x where x, y ∈ S, then
(a) associative (b) Commutative (c) associative and commutative (d) neither associative nor commutative

40) The number of commutative binary operations which can be defined on a set containing n elements is
(a) $n^{\frac{n(n+1)}{2}}$ (b) n^{n^2} (c) $n^{\frac{n}{2}}$ (d) n^2

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RAVI MATHS TUITION CENTER, NEAR VILLIVAKKAM RLY STATION, CHENNAI – 82.
WHATSAPP - 8056206308

Discrete Mathematics

12th Standard

Maths

Exam Time : 01:15:00 Hrs | Total Marks : 50

25 x 2 = 50

1) Examine the binary operation (closure property) of the following operations on the respective sets (if it is not, make it binary)
   $a*b = a + 3ab - 5b^2; \forall a,b \in Z$
2) Verify the
   (i) closure property,
   (ii) commutative property,
   (iii) associative property
   (iv) existence of identity and
   (v) existence of inverse for the arithmetic operation + on
   Z_o = the set of all even integers
3) Let A = $\begin{bmatrix} 0 & 1 \\ 1 & 1 \end{bmatrix}$, $B = \begin{bmatrix} 1 & 1 \\ 0 & 1 \end{bmatrix}$ be any two boolean matrices of the same type. Find AvB and A^B.
4) Determine whether $*$ is a binary operation on the sets given below.
   a*b=min (a,b) on A={1,2,3,4,5)
5) On Z, define $\otimes$by ($m \otimes n$)=mn+nm: $\forall m, n \in Z$. Is $\otimes$binary on Z?
6) Let A={$a+\sqrt{5}b$:a,b∈Z}. Check whether the usual multiplication is a binary operation on A.
7) Write each of the following sentences in symbolic form using statement variables p and q.
   (i) 19 is not a prime number and all the angles of a triangle are equal.
   (ii) 19 is a prime number or all the angles of a triangle are not equal
   (iii) 19 is a prime number and all the angles of a triangle are equal
   (iv) 19 is not a prime number
8) Which one of the following sentences is a proposition?
   (i) 4 + 7 =12
   (ii) What are you doing?
   (iii) 3n ≤ 8,1 n ∈ N
   (iv) Peacock is our national bird
   (v) How tall this mountain is!
9) Consider the binary operation $*$ defined on the set A = {a,b,c, d} by the following table:

*	a	b	c	d
a	a	c	b	d
b	c	d	a	a
d	d	b	a	c

   Is it commutative and associative?
10) Construct the truth table for the following statements.
    $\neg p \wedge \neg q$

11) Construct the truth table for the following statements.
(p V q) ∧ ¬q
12) Show that p v (~p) is a tautology.
13) In the set of integers under the operation * defined by a * b = a + b - 1. Find the identity element.
14) Let G = {1, w, w^2) where w is a complex cube root of unity. Then find the universe of w^2. Under usual multiplication.
15) Check whether dot product is defined on the set of vectors. Explain?
16) In Z, the set of integers, an operation * is defined as a$\boxed{*}$b=2(a+b). Check whether * is associative.
17) If a≡b(mod n) and b≡c(mod n),check whether a≡c(mod n).
18) Give any four Boolean Matrices of order 2X2
19) A and B are Boolean matrices of order 2X2.If AVB=A, is it necessary that $B = \begin{pmatrix} 0 & 0 \\ 0 & 0 \end{pmatrix}$
20) An operation * is defined as mXn=m^n-n^m.Is it binary on N?
21) Form the truth table of (~P)→(~q).
22) Are ~pV(pVq) and pV(~pvq) tatology statements. Justify your answer.
23) p:N is divisible buy 4 and q:N is an even number. Whether p→q is true.
24) Give the truth table of ~p→~q
25) Give the truth value of (~pvq)v(~q)

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RAVI MATHS TUITION CENTER, CHENNAI – 82. PH - 8056206308

Discrete Mathematics 2M Date : 08-Nov-19

12th Standard

Maths

Reg.No. : | | | | | | |

Exam Time : 00:50:00 Hrs Total Marks : 50

25 x 2 = 50

1) Examine the binary operation (closure property) of the following operations on the respective sets (if it is not, make it binary)
$a*b = a + 3ab - 5b^2; \forall a,b \in Z$

2) Examine the binary operation (closure property) of the following operations on the respective sets (if it is not, make it binary)
$a * b = (\frac{a-1}{b-1}), \forall a, b \in Q$

3) Verify the
(i) closure property,
(ii) commutative property,
(iii) associative property
(iv) existence of identity and
(v) existence of inverse for the arithmetic operation + on Z.

4) Let $A = \begin{bmatrix} 0 & 1 \\ 1 & 1 \end{bmatrix}, B = \begin{bmatrix} 1 & 1 \\ 0 & 1 \end{bmatrix}$ be any two boolean matrices of the same type. Find AvB and A^B.

5) Let p: Jupiter is a planet and q: India is an island be any two simple statements. Give verbal sentence describing each of the following statements.
(i) ¬p
(ii) p ∧ ¬q
(iii) ¬p ∨ q
(iv) p→ ¬q
(v) p↔q

6) Write each of the following sentences in symbolic form using statement variables p and q.
(i) 19 is not a prime number and all the angles of a triangle are equal.
(ii) 19 is a prime number or all the angles of a triangle are not equal
(iii) 19 is a prime number and all the angles of a triangle are equal
(iv) 19 is not a prime number

7) Determine the truth value of each of the following statements
(i) If 6 + 2 = 5 , then the milk is white.
(ii) China is in Europe or $\tilde{A}\overline{3}$ is an integer
(iii) It is not true that 5 + 5 = 9 or Earth is a planet
(iv) 11 is a prime number and all the sides of a rectangle are equal

8) Which one of the following sentences is a proposition?
(i) 4 + 7 =12
(ii) What are you doing?
(iii) $3n \leq 8, 1\ n \in N$
(iv) Peacock is our national bird
(v) How tall this mountain is!

9) Fill in the following table so that the binary operation ∗ on A = {a,b,c} is commutative.

*	a	b	c
a	b		

b	c	b	a
c	a		c

10) Write the converse, inverse, and contrapositive of each of the following implication.

(i) If x and y are numbers such that x = y, then $x^2 = y^2$

(ii) If a quadrilateral is a square then it is a rectangle.

11) Construct the truth table for the following statements.

$\neg p \wedge \neg q$

12) Construct the truth table for the following statements.

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

13) Construct the truth table for the following statements.

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

14) Construct the truth table for the following statements.

$(\neg p \longrightarrow r) \wedge (p \leftrightarrow q)$

15) Verify whether the following compound propositions are tautologies or contradictions or contingency

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

16) Verify whether the following compound propositions are tautologies or contradictions or contingency

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

17) Verify whether the following compound propositions are tautologies or contradictions or contingency

$(p \longrightarrow q) \leftrightarrow (\sim p \longrightarrow q)$

18) Show that

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

19) Show that $q \rightarrow p \equiv \neg p \rightarrow \neg q$

20) Show that $p \rightarrow q$ and $q \rightarrow p$ are not equivalent

21) Show that $\neg(p \leftrightarrow q) \equiv p \leftrightarrow \neg q$

22) Check whether the statement $p \rightarrow (q \rightarrow p)$ is a tautology or a contradiction without using the truth table.

23) Using truth table check whether the statements $\neg(p \vee q) \vee (\neg p \wedge q)$ and $\neg p$ are logically equivalent.

24) Prove $p \longrightarrow (q \longrightarrow r) \equiv (p \wedge q) \longrightarrow r$ without using truth table.

25) Prove that $p \rightarrow (\neg q \vee r) \equiv \neg p \vee (\neg q \vee r)$ using truth table.

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Discrete Mathematics 3M

Date : 08-Nov-19

12th Standard

Maths

Reg.No. : | | | | | | |

Exam Time : 01:00:00 Hrs

Total Marks : 45

15 x 3 = 45

1) Verify the
   (i) closure property,
   (ii) commutative property,
   (iii) associative property
   (iv) existence of identity and
   (v) existence of inverse for the arithmetic operation - on Z.

2) Verify the
   (i) closure property,
   (ii) commutative property,
   (iii) associative property
   (iv) existence of identity and
   (v) existence of inverse for the arithmetic operation + on
   Z_e = the set of all even integers

3) Verify the
   (i) closure property,
   (ii) commutative property,
   (iii) associative property
   (iv) existence of identity and
   (v) existence of inverse for the arithmetic operation + on
   Z_o = the set of all even integers

4) Verify
   (i) closure property
   (ii) commutative property, and
   (iii) associative property of the following operation on the given set.
   $(a*b) = a^b; \forall a,b \in N$ (exponentiation property)

5) Determine whether $*$ is a binary operation on the sets given below.
   $a*b=b=a.|b|$ on R

6) Determine whether $*$ is a binary operation on the sets given below.
   a*b=min (a,b) on A={1,2,3,4,5)

7) Determine whether $*$ is a binary operation on the sets given below.
   $(A*v)=a\sqrt{b}$ is binary on R

8) On Z, define $\otimes$by $(m \otimes n)=mn+nm: \forall m, n \in Z$. Is $\otimes$binary on Z?

9) Let *be defined on R by (a*b)=a+b+ab-7. is*binary on R? If so, find $3\rangle \frac{}{*\{}$.

10) Let A={a+ $\sqrt{}$ b:a,b∈Z}. Check whether the usual multiplication is a binary operation on A.

11) Consider the binary operation $*$ defined on the set A = {a,b,c, d} by the following table:

*	a	b	c	d
a	a	c	b	d

b	c	d	a	a
d	d	b	a	c

Is it commutative and associative?

12) Let $A \begin{pmatrix} * & \in * & \in \\ \in & * \in & * \\ * & \in \in & * \end{pmatrix}$ $3B \begin{pmatrix} \in & * \in & * \\ * & \in * & \in \\ * & \in \in & * \end{pmatrix}$ $3C \begin{pmatrix} * & * \in & * \\ \in & * * & \in \\ * & * * & * \end{pmatrix}$ be any three boolean matrices of the same type.

Find A∨B

13) Let $A \begin{pmatrix} * & \in * & \in \\ \in & * \in & * \\ * & \in \in & * \end{pmatrix}$ $3B \begin{pmatrix} \in & * \in & * \\ * & \in * & \in \\ * & \in \in & * \end{pmatrix}$ $3C \begin{pmatrix} * & * \in & * \\ \in & * * & \in \\ * & * * & * \end{pmatrix}$ be any three boolean matrices of the same type.

Find A∧B

14) Let $A \begin{pmatrix} * & \in * & \in \\ \in & * \in & * \\ * & \in \in & * \end{pmatrix}$ $3B \begin{pmatrix} \in & * \in & * \\ * & \in * & \in \\ * & \in \in & * \end{pmatrix}$ $3C \begin{pmatrix} * & * \in & * \\ \in & * * & \in \\ * & * * & * \end{pmatrix}$ be any three boolean matrices of the same type.

Find (A∨B)∧C

15) Let $A \begin{pmatrix} * & \in * & \in \\ \in & * \in & * \\ * & \in \in & * \end{pmatrix}$ $3B \begin{pmatrix} \in & * \in & * \\ * & \in * & \in \\ * & \in \in & * \end{pmatrix}$ $3C \begin{pmatrix} * & * \in & * \\ \in & * * & \in \\ * & * * & * \end{pmatrix}$ be any three boolean matrices of the same type.

Find (A∧B)∨C

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RAVI MATHS TUITION CENTER, NEAR VILLIVAKKAM RLY STATION, CHENNAI – 82.
WHATSAPP - 8056206308

Discrete Mathematics

12th Standard

Maths

Exam Time : 01:30:00 Hrs | Total Marks : 60

20 x 3 = 60

1) Verify the
   (i) closure property,
   (ii) commutative property,
   (iii) associative property
   (iv) existence of identity and
   (v) existence of inverse for the arithmetic operation + on Z.
2) Verify the
   (i) closure property,
   (ii) commutative property,
   (iii) associative property
   (iv) existence of identity and
   (v) existence of inverse for the arithmetic operation + on
   Z_e = the set of all even integers
3) How many rows are needed for following statement formulae?
   p ∨ ¬ t (p ∨ ¬s)
4) Consider p→q : If today is Monday, then 4 + 4 = 8.
5) Construct the truth table for $(p \overline{\vee} q) \wedge (p \overline{\vee} \neg q)$
6) Establish the equivalence property p → q ≡ ¬p v q
7) Let $A = \begin{pmatrix} 1 & 0 & 1 & 0 \\ 0 & 1 & 0 & 1 \\ 1 & 0 & 0 & 1 \end{pmatrix}, B = \begin{pmatrix} 0 & 1 & 0 & 1 \\ 1 & 0 & 1 & 0 \\ 1 & 0 & 0 & 1 \end{pmatrix}, C = \begin{pmatrix} 1 & 1 & 0 & 1 \\ 0 & 1 & 1 & 0 \\ 1 & 1 & 1 & 1 \end{pmatrix}$ be any three boolean matrices of the same type.
   Find AVB
8) Let $A = \begin{pmatrix} 1 & 0 & 1 & 0 \\ 0 & 1 & 0 & 1 \\ 1 & 0 & 0 & 1 \end{pmatrix}, B = \begin{pmatrix} 0 & 1 & 0 & 1 \\ 1 & 0 & 1 & 0 \\ 1 & 0 & 0 & 1 \end{pmatrix}, C = \begin{pmatrix} 1 & 1 & 0 & 1 \\ 0 & 1 & 1 & 0 \\ 1 & 1 & 1 & 1 \end{pmatrix}$ be any three boolean matrices of the same type.
   Find (A∨B)∧C
9) Let $A = \begin{pmatrix} 1 & 0 & 1 & 0 \\ 0 & 1 & 0 & 1 \\ 1 & 0 & 0 & 1 \end{pmatrix}, B = \begin{pmatrix} 0 & 1 & 0 & 1 \\ 1 & 0 & 1 & 0 \\ 1 & 0 & 0 & 1 \end{pmatrix}, C = \begin{pmatrix} 1 & 1 & 0 & 1 \\ 0 & 1 & 1 & 0 \\ 1 & 1 & 1 & 1 \end{pmatrix}$ be any three boolean matrices of the same type.
   Find (A∧B)∨C
10) Verify whether the following compound propositions are tautologies or contradictions or contingency
   ((p V q)∧ ~p) → q
11) Show that
   ¬(p ∧ q) ≡ ¬p V ¬q

12) Show that p → q and q → p are not equivalent
13) Show that ¬(p↔q) ≡ p↔¬q
14) Write the truth value for each of the following statements.
    (1) 3 + 5 = 8 and $\sqrt{2}$ is an irrational number.
    (2) 5 is a positive integer or a square is a rectangle.
    (3) Chennai is not in Tamilnadu.
15) Let G = {1, i,-1, -i} under the binary operation multiplication. Find the inverse of all the elements.
16) Construct the truth table for (-p) v (q ∧ r)
17) The pair (S,*) identify and inverse aximos, prove that * is commutative if and only if $(a*b)^2 = a^a * b^2$.
18) Show that (Z_4+$_4$) satisfies closure closure, associative and commutative properties.
19) In in (S,*) satisfying closure, associative, identity and inverse axioms and $(a*b)^{-1} = a^{-1} * b^{-1}$ ∀a,b∈S, then prove that * is commutative.
20) If $A = \begin{pmatrix} 1 & 1 \\ 1 & 0 \end{pmatrix}$, $B = \begin{pmatrix} 0 & 0 \\ 1 & 0 \end{pmatrix}$ and $C = \begin{pmatrix} 1 & 0 \\ 0 & 0 \end{pmatrix}$,find (AVB)VC

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Ravi home tutions PH-8056206308

Discrete Mathematics 5M

Date : 08-Nov-19

12th Standard

Maths

Reg.No. : | | | | | | |

Exam Time : 01:30:00 Hrs

Total Marks : 75

15 x 5 = 75

1) Write the statements in words corresponding to $\neg p$, $p \wedge q$, $p \vee q$ and $q \vee \neg p$, where p is 'It is cold' and q is 'It is raining.'

2) Verify

(i) closure property,

(ii) commutative property,

(iii) associative property,

(iv) existence of identity, and

(v) existence of inverse for following operation on the given set

$m*n=m+n-mn$; $m,n \in Z$

3) How many rows are needed for following statement formulae?

$p \vee \neg t (p \vee \neg s)$

4) How many rows are needed for following statement formulae?

$((p \wedge q) \vee (\neg r \vee \neg s)) \wedge (\neg t \wedge v))$

5) Consider $p \rightarrow q$: If today is Monday, then 4 + 4 = 8.

Here the component statements p and q are given by,

p: Today is Monday; q: 4 + 4 = 8.

The truth value of $p \rightarrow q$ is T because the conclusion q is T.

An important point is that $p \rightarrow q$ should not be treated by actually considering the meanings of p and q in English. Also it is not necessary that p should be related to q at all.

Chapter

6) Write down the

(i) conditional statement

(ii) converse statement

(iii) inverse statement, and

(iv) contrapositive statement for the two statements p and q given below.

p: The number of primes is infinite.

q: Ooty is in Kerala.

7) Verify

(i) closure property,

(ii) commutative property,

(iii) associative property,

(iv) existence of identity, and

(v) existence of inverse for the operation $+_5$ on Z_5 using table corresponding to addition modulo 5.

8) Verify

(i) closure property,

(ii) commutative property,

(iii) associative property,

(iv) existence of identity, and

(v) existence of inverse for the operation ×11 on a subset A = {1,3,4,5,9}
of the set of remainders {0,1,2,3,4,5,6,7,8,9,10}

9) Using the equivalence property, show that $p \leftrightarrow q \equiv (p \wedge q) \vee (\neg p \wedge \neg q)$

10) Define an operation*on Q as follows: $a*b=(\frac{a+b}{2})$; a,b ∈Q. Examine the closure, commutative, and associative properties satisfied by*on Q.

11) Define an operation∗ on Q as follows: $a*b=(\frac{a+b}{2})$; a,b ∈Q. Examine the existence of identity and the existence of inverse for the operation * on Q.

12) Let $M=\{\begin{pmatrix} x & x \\ x & x \end{pmatrix} : x \in R - \{0\}\}$ and let * be the matrix multiplication. Determine whether M is closed under ∗. If so, examine the commutative and associative properties satisfied by ∗ on M.

13) Let $M=\{\begin{pmatrix} x & x \\ x & x \end{pmatrix} : x \in R - \{0\}\}$ and let ∗ be the matrix multiplication. Determine whetherM is closed under ∗ . If so, examine the existence of identity, existence of inverse properties for the operation ∗ on M.

14) Let A be Q\{1}. Define ∗ on A by x*y = x + y − xy . Is ∗ binary on A? If so, examine the commutative and associative properties satisfied by ∗ on A.

15) Let A be Q\{1}. Define ∗ on A by x*y = x + y − xy . Is ∗ binary on A? If so, examine the existence of identity, existence of inverse properties for the operation ∗ on A.

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RAVI MATHS TUITION CENTER, NEAR VILLIVAKKAM RLY STATION, CHENNAI – 82.
WHATSAPP - 8056206308

Discrete Mathematics

12th Standard

Maths

Exam Time : 02:00:00 Hrs | Total Marks : 75

15 x 5 = 75

1) Verify
   (i) closure property,
   (ii) commutative property,
   (iii) associative property,
   (iv) existence of identity, and
   (v) existence of inverse for following operation on the given set
   m*n=m+n-mn; m,n ∈Z
2) Verify
   (i) closure property,
   (ii) commutative property,
   (iii) associative property,
   (iv) existence of identity, and
   (v) existence of inverse for the operation ×11 on a subset A = {1,3,4,5,9}
   of the set of remainders {0,1,2,3,4,5,6,7,8,9,10}
3) Define an operation*on Q as follows: a*b=$\left(\frac{a+b}{2}\right)$; a,b ∈Q. Examine the closure, commutative, and associative properties satisfied by*on Q.
4) Define an operation$*$ on Q as follows: a*b=$\left(\frac{a+b}{2}\right)$; a,b ∈Q. Examine the existence of identity and the existence of inverse for the operation * on Q.
5) Verify whether the following compound propositions are tautologies or contradictions or contingency
   ((p⟶ q) ∧ (q ⟶ r)) ⟶ (p ⟶ r)
6) Let M=$\left\{\begin{pmatrix} x & x \\ x & x \end{pmatrix} : x \in R - \{0\}\right\}$ and let * be the matrix multiplication. Determine whether M is closed under $*$. If so, examine the commutative and associative properties satisfied by $*$ on M.
7) Let A be Q\{1}. Define $*$ on A by x*y = x + y − xy . Is $*$ binary on A? If so, examine the commutative and associative properties satisfied by $*$ on A.
8) Using truth table check whether the statements ¬(p V q) V (¬p ∧ q) and ¬p are logically equivalent.
9) Let A be Q\{1}. Define $*$ on A by x*y = x + y − xy . Is $*$ binary on A? If so, examine the existence of identity, existence of inverse properties for the operation $*$ on A.
10) Prove that p→(¬q V r) ≡ ¬pV(¬qVr) using truth table.
11) Construct the truth table for (p ∧ q) v r.
12) $M = \left\{\begin{pmatrix} a & 0 \\ 0 & a \end{pmatrix} / \alpha \neq 0 \; and \; \alpha \epsilon R\right\}$ Show that M satisfies the closure, associative, inverse, identity and commutative axioms under multiplication.
13) Show that (Z_7-[0],X7) satisfies closure, identity, inverse and commutative properties.
14) Prove by using truth table $\sim (pV(qVr) \equiv (\sim p) \wedge (\sim q \wedge \sim r)$

15) Prove without using the truth table $\sim (pV\,(qVr)) \equiv (\sim pV \sim q)\,V\,(-r)$

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Ravi home tutions PH- 8056206308

Discrete Mathematics FULL TEST

Date : 08-Nov-19

12th Standard

Maths

Reg.No. : | | | | | | |

Exam Time : 02:30:00 Hrs

Total Marks : 90

20 x 1 = 20

1) A binary operation on a set S is a function from

(a) $S \longrightarrow S$ (b) $(SxS) \longrightarrow S$ (c) $S \longrightarrow (SxS)$ (d) $(SxS) \longrightarrow (SxS)$

2) Subtraction is not a binary operation in

(a) R (b) Z (c) N (d) Q

3) Which one of the following is a binary operation on N?

(a) Subtraction (b) Multiplication (c) Division (d) All the above

4) In the set R of real numbers '*' is defined as follows. Which one of the following is not a binary operation on R?

(a) a*b=min (a.b) (b) a*b= max (a,b) (c) a*b= a (d) $a*b=a^b$

5) The operation * defined by a*b = — is not a binary operation on

(a) Q^+ (b) Z (c) R (d) C

6) In the set Q define a⊙b= a+b+ab. For what value of y, 3⊙(y⊙5)=7?

(a) y=$\frac{\wedge}{\vee}$ (b) y=$\frac{\wedge}{\vee}$ (c) y=$\frac{\vee}{\wedge}$ (d) y=4

7) If a*b= $\wedge 2 \wedge$ on the real numbers then * is

(a) commutative but not associative (b) associative but not commutative (c) both commutative and associative (d) neither commutative nor associative

8) Which one of the following statements has the truth value T?

(a) sin x is an even function (b) Every square matrix is non-singular (c) The product of complex number and its conjugate is purely imaginary (d) $\overline{\{}$ is an irrational number

9) Which one of the following statements has truth value F?

(a) Chennai is in India or $\overline{\wedge}$ is an integer (b) Chennai is in India or $\overline{\wedge}$ is an irrational number (c) Chennai is in China or $\overline{\wedge}$ is an integer (d) Chennai is in China or $\overline{\wedge}$ is an irrational number

10) If a compound statement involves 3 simple statements, then the number of rows in the truth table is

(a) 9 (b) 8 (c) 6 (d) 3

11) Which one is the inverse of the statement $(PVq) \rightarrow (p\Lambda q)$?

(a) $(p\Lambda q) \rightarrow (pVq)$ (b) $\neg(pvq) \rightarrow (p\Lambda q)$ (c) $(\neg pv \neg q) \rightarrow (\neg p\Lambda \neg q)$ (d) $(\neg p\Lambda \neg q) \rightarrow (\neg pV \neg q)$

12) Which one is the contrapositive of the statement $(pVq) \longrightarrow r$?

(a) $\neg r \rightarrow (\neg p\Lambda \neg q)$ (b) $\neg r \longrightarrow (pVq)$ (c) $r \longrightarrow (p\Lambda q)$ (d) $p \longrightarrow (q\vee r)$

13) The truth table for $(p \wedge q) \vee \neg q$ is given below

p	q	$(p \wedge q) \vee (\neg q)$
T	T	(a)
T	F	(b)
F	T	(c)
F	F	(d)

Which one of the following is true?

(a)

(a)	(b)	(c)	(d)
T	T	T	T

(b)

(a)	(b)	(c)	(d)
T	F	T	T

(c)

(a)	(b)	(c)	(d)
T	T	F	F

(d)

(a)	(b)	(c)	(d)
T	F	F	F

14) In the last column of the truth table for $\neg(p \vee \neg q)$ the number of final outcomes of the truth value 'F' are

(a) 1 (b) 2 (c) 3 (d) 4

15) Which one of the following is incorrect? For any two propositions p and q, we have

(a) $\neg (pVq) \equiv \neg p \wedge \neg q$ (b) $\neg (p\Lambda q) \equiv \neg p \vee \neg q$ (c) $\neg (p \vee q) \equiv \neg pV\neg q$ (d) $\neg(\neg p) \equiv p$

16)

p	q	$(p \wedge q) \longrightarrow \neg q$
T	T	(a)
T	F	(b)

F	T	(c)
F	F	(d)

Which one of the following is correct for the truth value of $(p \wedge q) \longrightarrow \neg p\ p$?

(a)

(a)	(b)	(c)	(d)
T	T	T	T

(b)

(a)	(b)	(c)	(d)
F	T	T	T

(c)

(a)	(b)	(c)	(d)
F	F	T	T

(d)

(a)	(b)	(c)	(d)
T	T	T	F

17) The dual of $\neg(p \vee q) \vee [p \vee (p \wedge \neg r)]$ is

(a) $\neg(p \wedge q) \wedge [p \vee (p \wedge \neg r)]$ (b) $(p \wedge q) \wedge [p \wedge (p \vee \neg r)]$ (c) $\neg(p \wedge q) \wedge [p \wedge (p \wedge r)]$ (d) $\neg(p \wedge q) \wedge [p \wedge (p \vee \neg r)]$

18) The proposition $p \wedge (\neg p \vee q)$ is

(a) a tautology (b) a contradiction (c) logically equivalent to $p \wedge q$ (d) logically equivalent to $p \vee q$

19) Determine the truth value of each of the following statements:

(a) 4+2=5 and 6+3=9

(b) 3+2=5 and 6+1=7

(c) 4+5=9 and1+2= 4

(d) 3+2=5 and 4+7=11

(a)

(a)	(b)	(c)	(d)
F	T	T	T

(b)

(a)	(b)	(c)	(d)
T	F	T	F

(c)

(a)	(b)	(c)	(d)
T	T	F	F

(d)

(a)	(b)	(c)	(d)
F	F	T	T

20) Which one of the following is not true?

(a) Negation of a negation of a statement is the statement itself

(b) If the last column of the truth table contains only T then it is a tautology.

(c) If the last column of its truth table contains only F then it is a contradiction

(d) If p and q are any two statements then $p \leftrightarrow q$ is a tautology.

7 x 2 = 14

21) Examine the binary operation (closure property) of the following operations on the respective sets (if it is not, make it binary)

$(\frac{*}{*})\ 3 \quad 3$

22) Let $A = \begin{bmatrix} \in & * \\ * & * \end{bmatrix}\ 3Q \quad \begin{bmatrix} * & * \\ \in & * \end{bmatrix}$ be any two boolean matrices of the same type. Find AvB and A^B.

23) Write the converse, inverse, and contrapositive of each of the following implication.

(i) If x and y are numbers such that x = y, then $x^2 = y^2$

(ii) If a quadrilateral is a square then it is a rectangle.

24) Verify whether the following compound propositions are tautologies or contradictions or contingency

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

25) Verify whether the following compound propositions are tautologies or contradictions or contingency

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

26) Check whether the statement $p \rightarrow (q \rightarrow p)$ is a tautology or a contradiction without using the truth table.

27) Prove that $p \rightarrow (\neg q \vee r) \equiv \neg p \vee (\neg q \vee r)$ using truth table.

7 x 3 = 21

28) Determine whether $*$ is a binary operation on the sets given below.

$a*b=b=a.|b|$ on R

29) Determine whether $*$ is a binary operation on the sets given below.

$(A*v)=a\sqrt{b}$ is binary on R

30) Let *be defined on R by (a*b)=a+b+ab-7. is*binary on R? If so, find $3(\frac{}{*\{})$.

31) Let $A=\{a+ \overline{\{}\ b:a,b \in Z\}$. Check whether the usual multiplication is a binary operation on A.

32)

Consider the binary operation $*$ defined on the set A = {a,b,c, d} by the following table:

*	a	b	c	d
a	a	c	b	d
b	c	d	a	a
d	d	b	a	c

Is it commutative and associative?

33) Let C $\begin{pmatrix} * & \in * & \in \\ \in & * \in & * \\ * & \in \in & * \end{pmatrix} 3Q$ $\begin{pmatrix} \in & * \in & * \\ * & \in * & \in \\ * & \in \in & * \end{pmatrix} 3a$ $\begin{pmatrix} * & * \in & * \\ \in & * * & \in \\ * & * * & * \end{pmatrix}$ be any three boolean matrices of the same type.

Find A∧B

34) Let C $\begin{pmatrix} * & \in * & \in \\ \in & * \in & * \\ * & \in \in & * \end{pmatrix} 3Q$ $\begin{pmatrix} \in & * \in & * \\ * & \in * & \in \\ * & \in \in & * \end{pmatrix} 3a$ $\begin{pmatrix} * & * \in & * \\ \in & * * & \in \\ * & * * & * \end{pmatrix}$ be any three boolean matrices of the same type.

Find (A∧B)∨C

7 x 5 = 35

35) How many rows are needed for following statement formulae?

((p ∧ q) ∨ (¬r ∨¬s)) ∧ (¬ t ∧ v))

36) Consider p→q : If today is Monday, then 4 + 4 = 8.

Here the component statements p and q are given by,

p: Today is Monday; q: 4 + 4 = 8.

The truth value of p→q is T because the conclusion q is T.

An important point is that p→q should not be treated by actually considering the meanings of p and q in English. Also it is not necessary that p should be related to q at all.

Chapter

37) Write down the

(i) conditional statement

(ii) converse statement

(iii) inverse statement, and

(iv) contrapositive statement for the two statements p and q given below.

p: The number of primes is infinite.

q: Ooty is in Kerala.

38) Construct the truth table for ( ) ( )

39) Define an operation*on Q as follows: a*b=($\frac{2}{\wedge}$) ; a,b ∈Q. Examine the closure, commutative, and associative properties satisfied by*on Q.

40) Define an operation$*$ on Q as follows: a*b=($\frac{2}{\wedge}$) ; a,b ∈Q. Examine the existence of identity and the existence of inverse for the operation * on Q.

41) Let A be Q\{1}. Define $*$ on A by x*y = x + y − xy . Is $*$ binary on A? If so, examine the commutative and associative properties satisfied by $*$ on A.

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RAVI MATHS TUITION CENTER ,GKM COLONY, CHENNAI- 82. PH: 8056206308

Discrete Mathematics FULL TEST

12th Standard

Maths

Reg.No. : | | | | | | |

Exam Time : 03:00:00 Hrs Total Marks : 90

ANSWER ALL THE QUESTIONS. 20 x 1 = 20

1) A binary operation on a set S is a function from
(a) $S \longrightarrow S$ (b) $(SxS) \longrightarrow S$ (c) $S \longrightarrow (SxS)$ (d) $(SxS) \longrightarrow (SxS)$

2) Subtraction is not a binary operation in
(a) R (b) Z (c) N (d) Q

3) Which one of the following is a binary operation on N?
(a) Subtraction (b) Multiplication (c) Division (d) All the above

4) In the set R of real numbers '*' is defined as follows. Which one of the following is not a binary operation on R?
(a) a*b=min (a.b) (b) a*b= max (a,b) (c) a*b= a (d) $a*b=a^b$

5) The operation * defined by a*b = — is not a binary operation on
(a) Q^+ (b) Z (c) R (d) C

6) In the set Q define a⊙b= a+b+ab. For what value of y, 3⊙(y⊙5)=7?
(a) y= (b) y= (c) y= (d) y=4

7) If a*b= ^ 2 ^ on the real numbers then * is
(a) commutative but not associative (b) associative but not commutative (c) both commutative and associative (d) neither commutative nor associative

8) Which one of the following statements has the truth value T?
(a) sin x is an even function (b) Every square matrix is non-singular (c) The product of complex number and its conjugate is purely imaginary (d) ξ is an irrational number

9) Which one of the following statements has truth value F?
(a) Chennai is in India or ∧ is an integer (b) Chennai is in India or ∧ is an irrational number (c) Chennai is in China or ∧ is an integer (d) Chennai is in China or ∧ is an irrational number

10) If a compound statement involves 3 simple statements, then the number of rows in the truth table is
(a) 9 (b) 8 (c) 6 (d) 3

11) Which one is the inverse of the statement $(PVq) \rightarrow (p\Lambda q)$?
(a) $(p\wedge q) \rightarrow (pVq)$ (b) $\neg(pvq) \rightarrow (p\wedge q)$ (c) $(\neg pv \neg q) \rightarrow (\neg p\wedge \neg q)$ (d) $(\neg p\wedge \neg q) \rightarrow (\neg pV \neg q)$

12) Which one is the contrapositive of the statement $(pVq) \longrightarrow r$?
(a) $\neg r \rightarrow (\neg p\wedge \neg q)$ (b) $\neg r \longrightarrow (p\vee q)$ (c) $r \longrightarrow (p\wedge q)$ (d) $p \longrightarrow (q\vee r)$

13) The truth table for $(p \wedge q) \vee \neg q$ is given below

p	q	$(p \wedge q) \vee (\neg q)$
T	T	(a)
T	F	(b)
F	T	(c)
F	F	(d)

Which one of the following is true?

(a) (a)(b)(c)(d) (b) (a)(b)(c)(d) (c) (a)(b)(c)(d) (d) (a)(b)(c)(d)

T	T	T	T

T	F	T	T

T	T	F	F

T	F	F	F

14) In the last column of the truth table for ¬(p ∨ ¬q) the number of final outcomes of the truth value 'F' are

(a) 1 (b) 2 (c) 3 (d) 4

15) Which one of the following is incorrect? For any two propositions p and q, we have

(a) ¬ (p∨q) ≡ ¬ p ∧ ¬q (b) ¬ (p∧ q)≡¬p ∨ ¬q (c) ¬ (p ∨ q)≡¬p∨¬q (d) ¬(¬p)≡ p

16)

p	q	(p ∧ q) ⟶ ¬q
T	T	(a)
T	F	(b)
F	T	(c)
F	F	(d)

Which one of the following is correct for the truth value of (p ∧ q)⟶ ¬p p?

(a)

(a)	(b)	(c)	(d)
T	T	T	T

(b)

(a)	(b)	(c)	(d)
F	T	T	T

(c)

(a)	(b)	(c)	(d)
F	F	T	T

(d)

(a)	(b)	(c)	(d)
T	T	T	F

17) The dual of ¬(p V q) V [p V (p ∧ ¬r)] is

(a) ¬(p ∧ q) ∧ [p V (p ∧ ¬r)] (b) (p ∧ q) ∧ [p ∧ (p V r)] (c) ¬(p ∧ q) ∧ [p ∧ (p ∧ r)] (d) ¬(p ∧ q) ∧ [p ∧ (pV ¬r)]

18) The proposition p ∧ (¬p ∨ q) is

(a) a tautology (b) a contradiction (c) logically equivalent to p ∧ q (d) logically equivalent to p ∨ q

19) Determine the truth value of each of the following statements:

(a) 4+2=5 and 6+3=9

(b) 3+2=5 and 6+1=7

(c) 4+5=9 and1+2= 4

(d) 3+2=5 and 4+7=11

(a)

(a)	(b)	(c)	(d)
F	T	T	T

(b)

(a)	(b)	(c)	(d)
T	F	T	F

(c)

(a)	(b)	(c)	(d)
T	T	F	F

(d)

(a)	(b)	(c)	(d)
F	F	T	T

20) Which one of the following is not true?

(a) Negation of a negation of a statement is the statement itself

(b) If the last column of the truth table contains only T then it is a tautology.

(c) If the last column of its truth table contains only F then it is a contradiction

(d) If p and q are any two statements then p↔q is a tautology.

Answer any 7 questions in which question no. 30 is compulsory 7 x 2 = 14

21) Examine the binary operation (closure property) of the following operations on the respective sets (if it is not, make it binary)

$\left)\frac{*}{*}\right.$ 3 3

22) Let A = $\begin{Bmatrix} \in & * \\ * & * \end{Bmatrix}$ $3Q$ $\begin{Bmatrix} * & * \\ \in & * \end{Bmatrix}$ be any two boolean matrices of the same type. Find AvB and A^B.

23) Write the converse, inverse, and contrapositive of each of the following implication.

(i) If x and y are numbers such that x = y, then $x^2 = y^2$

(ii) If a quadrilateral is a square then it is a rectangle.

24) Verify whether the following compound propositions are tautologies or contradictions or contingency

((p V q)∧ ~p) → q

25) Verify whether the following compound propositions are tautologies or contradictions or contingency
((p⟶ q) ∧ (q ⟶ r)) ⟶ (p ⟶ r)

26) Check whether the statement p→(q→p) is a tautology or a contradiction without using the truth table.

27) Prove that p→(¬q V r) ≡ ¬pV(¬qVr) using truth table.

28) Show that p v (q ∧ r) is a contingency.

29) In the set of integers under the operation * defined by a * b = a + b - 1. Find the identity element.

30) Let S be the set of positive rational numbers and is defined by a * b = $\frac{}{\wedge}$. Then find the identity element and the inverse of 2.

Answer any 7 questions in which question no. 40 is compulsory 7 x 3 = 21

31) Determine whether ∗ is a binary operation on the sets given below.
a*b=b=a.|b| on R

32) Determine whether ∗ is a binary operation on the sets given below.
(A*v)=a√b is binary on R

33) Let *be defined on R by (a*b)=a+b+ab-7. is*binary on R? If so, find $3\Big)\frac{}{*\{}$.

34) Let A={a+ $\overline{\{}$ b:a,b∈Z}. Check whether the usual multiplication is a binary operation on A.

35) Consider the binary operation ∗ defined on the set A = {a,b,c, d} by the following table:

*	a	b	c	d
a	a	c	b	d
b	c	d	a	a
d	d	b	a	c

Is it commutative and associative?

36) Let C $\begin{matrix} * & \in * & \in \\ \in & * \in & * \\ * & \in \in & * \end{matrix}$ $3Q$ $\begin{matrix} * & \in * & \in \\ * & \in \in & * \end{matrix}$ $3a$ $\begin{matrix} * & * \in & * \\ \in & * * & \in \\ * & * * & * \end{matrix}$ be any three boolean matrices of the same type.
Find AΛB

37) Let C $\begin{matrix} * & \in * & \in \\ \in & * \in & * \\ * & \in \in & * \end{matrix}$ $3Q$ $\begin{matrix} * & \in * & \in \\ * & \in \in & * \end{matrix}$ $3a$ $\begin{matrix} * & * \in & * \\ \in & * * & \in \\ * & * * & * \end{matrix}$ be any three boolean matrices of the same type.
Find (A∧B)∨C

38) In (z, *) where * is defined by a * b = ab, prove that * is not a binary operation on z.

39) Let G = {1, i,-1, -i} under the binary operation multiplication. Find the inverse of all the elements.

40) In (z, *) where * is defined as a * b = a + b + 2. Verify the commutative and associative axiom.

ANSWER 7 QUESTIONS. 7 x 5 = 35

41) How many rows are needed for following statement formulae?
((p ∧ q) ∨ (¬r ∨¬s)) ∧ (¬ t ∧ v))

42) Consider p⟶q : If today is Monday, then 4 + 4 = 8.
Here the component statements p and q are given by,
p: Today is Monday; q: 4 + 4 = 8.

The truth value of p→q is T because the conclusion q is T.

An important point is that p→q should not be treated by actually considering the meanings of p and q in English. Also it is not necessary that p should be related to q at all.

Chapter

43) Construct the truth table for ( ) ( )

44) Define an operation*on Q as follows: a*b=$\frac{2}{\wedge}$; a,b ∈Q. Examine the closure, commutative, and associative properties satisfied by*on Q.

45) Define an operation∗ on Q as follows: a*b=$\frac{2}{\wedge}$; a,b ∈Q. Examine the existence of identity and the existence of inverse for the operation * on Q.

46) Let A be Q\{1}. Define ∗ on A by x*y = x + y − xy . Is ∗ binary on A? If so, examine the commutative and associative properties satisfied by ∗ on A.

47) Verify

(i) closure property,

(ii) commutative property,

(iii) associative property,

(iv) existence of identity, and

(v) existence of inverse for following operation on the given set

m*n=m+n-mn; m,n ∈Z

48) Verify

(i) closure property,

(ii) commutative property,

(iii) associative property,

(iv) existence of identity, and

(v) existence of inverse for the operation $+_5$ on Z_5 using table corresponding to addition modulo 5.

49) Let M=) [∈ and let ∗ be the matrix multiplication. Determine whetherM is closed under ∗ . If so, examine the existence of identity, existence of inverse properties for the operation ∗ on M.

50) Let A be Q\{1}. Define ∗ on A by x*y = x + y − xy . Is ∗ binary on A? If so, examine the existence of identity, existence of inverse properties for the operation ∗ on A.