Sri Raghavendra Tuition Center

unit - 12 - 2024 to 2025

12th Standard

	Date: 16-May-	24
Reg.No.:		

Maths

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Place: Kattuputhur - 621 207,

Trichy (Dt)

Time: 00:30:00 Hrs

Total Marks: 47

I. ANSWER ALL QUESTION

 $47 \times 1 = 47$

- A binary operation on a set S is a function from
 - (a) $S \rightarrow S$
- (b) $(SxS) \rightarrow S$ (c) $S \rightarrow (SxS)$

- Subtraction is not a binary operation in
 - (a) R
- (b) Z
- (c) N
- (d) O
- 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) $a*b = a^b$
- The operation * defined by $a*b=\frac{ab}{7}$ is not a binary operation on
- (b) Z
- (c) R
- In the set Q define $a \odot b = a+b+ab$. For what value of y, $3 \odot (y \odot 5) = 7$?
- (a) $y = \frac{2}{3}$ (b) $y = \frac{-2}{3}$ (c) $y = \frac{-3}{2}$ (d) y = 4
- 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
- Which one is the inverse of the statement $(pVq) \rightarrow (p\Lambda q)$?
 - (a) $(p \land q) \rightarrow (p \lor q)$ (b) $\neg (p \lor q) \rightarrow (p \land q)$ (c) $(\neg p \lor \neg q) \rightarrow (\neg p \land \neg q)$ (d) $(\neg p \land \neg q) \rightarrow (\neg p \lor \neg q)$
- Which one is the contrapositive of the statement (pVq) \rightarrow r?
 - (a) $\neg r \rightarrow (\neg p \land \neg q)$ (b) $\neg r \rightarrow (p \lor q)$ (c) $r \rightarrow (p \land q)$ (d) $p \rightarrow (q \lor r)$
- 13) The truth table for $(p \land q) \lor \neg q$ is given below

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

Which one of the following is true?

- In the last column of the truth table for \neg (p $\lor \neg$ q) the number of final outcomes of the truth value 'F' are
 - (a) 1 (b) 2 (c) 3 (d) 4
- Which one of the following is incorrect? For any two propositions p and q, we have
 - (a) $\neg (p \lor q) \equiv \neg p \land \neg q$ (b) $\neg (p \land q) \equiv \neg p \lor \neg q$ (c) $\neg (p \lor q) \equiv \neg p \lor \neg q$ (d) $\neg (\neg p) \equiv p$
- 16) $\begin{array}{c|c} p & q & (p \land q) \longrightarrow \neg q \\ \hline T & T & (a) \\ \hline T & F & (b) \\ \hline F & T & (c) \\ \hline F & F & (d) \\ \end{array}$

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

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

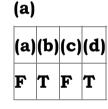
(b)			
(a)	(b)	(c)	(d)
F	T	T	T

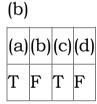
(c)			
(a)	(b)	(c)	(d)
F	F	T	T

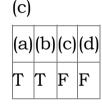
(d)			
(a)	(b)	(c)	(d)
Т	Т	Т	F

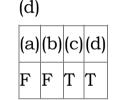
- 17) The dual of \neg (p V q) V [p V (p $\land \neg$ r)] is

 - (d) $\neg (p \land q) \land [p \land (pV \neg r)]$
- 18) The proposition $p \land (\neg p \lor q)$ is
 - (a) a tautology (b) a contradiction (c) logically equivalent to $p \wedge q$
 - (d) logically equivalent to p V 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 and 1 + 2 = 4
 - (d) 3 + 2 = 5 and 4 + 7 = 11









- 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.
- 21) The binary operation * defined on a set s is said to be commutative if _____
- (a) $a*b \in S \ \forall \ a, b \in S$ (b) $a*b = b*a \ \forall \ a, b \in S$ (c) $(a*b) *c = a*(b*c) \ \forall \ a, b \in S$
- (d) $a*b = e \forall a, b \in S$
- 22) If * is defined by a * b = $a^2 + b^2 + ab + 1$, then (2 * 3) * 2 is

(d) 445

- (a) 20 (b) 40 (c) 400
- 23) The number of binary operations that can be defined on a set of 3 elements is _____
 - (b) 3^3 (c) 3^9 (d) 3^1 (a) 3^2
- The identity element of $\left\{ \begin{pmatrix} x & x \\ x & x \end{pmatrix} \right\} \mid \mathbf{x} \in \mathbb{R}, \, \mathbf{x} \neq \mathbf{0} \}$ under matrix multiplication is ______ 24)
 - (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) $\begin{pmatrix} \frac{1}{2x} & \frac{1}{2x} \\ \frac{1}{2x} & \frac{1}{2x} \end{pmatrix}$

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), $x, y \in N$ then 7 * (-7)
 - **(a) 7** (b) -7 (c) 0 (d) -49
- 39) In (S, *), is defined by x * y = x where $x, y \in S$, then
 - (a) associative (b) Commutative (c) associative and commutative
 - (d) neither associative nor commutative
- 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
- On the set R of real numbers, the operation * is defined by a * b = a^2 b^2 Then (3 * 5) * 4 is ______
 - (a) -240 (b) 240 (c) -72 (d) 72
- 10 ln Z, we define a * b = a + b + 1. The identity element with respect to * is $\frac{1}{2}$
 - (a) 1 (b) 0 (c) -1 (d) 2
- Which of the following are logically equivalent?
 - (a) p o q, q o p **(b)** q o p,
 eg q ee p (c) $p o q,
 eg p \wedge q$ (d) $q o p, \ q ee \neg p$
- The number of rows and columns for (p V q) V r will be
 - (a) 3, 8 (b) 8, 4 (c) 8, 5 (d) 5, 8
- 45) If P V q is false (F), then _____
 - (a) p is false (b) q is false (c) p and q are false (d) p or q is false
- 46) The value of $[3] +_{8} [7]$ is
 - (a) a) [10] (b) a) [8] (c) a) [5] (d) a) [2]
- In the set Q define $a \times b = a + b + ab$. For what values of y, $3 \times (y \times 5) = 7$
 - (a) a)