Sri Raghavendra Tuition Center

Slip test 14 - Unit 2.1 to 2.4 , 12.2

12th Standard

Maths

Date : 18-May-24

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

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Exam Time : 01:30:00 Hrs

Total Marks : 50

I. Answer all questions 10 x 1 = 10

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

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

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

(a) $S \to S$ (b) $(S \times S) \to S$ (c) $S \to (S \times S)$ (d) $(S \times S) \to (S \times S)$

3) 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

4) The operation * defined by $a * b = \frac{ab}{7}$ is not a binary operation on

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

5) Which one is the contrapositive of the statement $(p \vee q) \to r$?

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

6) 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

7)

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

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

(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

8) 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

9) 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.

10) The proposition p ∧ (¬p ∨ q) is

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

II. Answer any 5 question 5 x 2 = 10

11) If $z_i = 2- i$ and $z_2 = -4+3i$, find the inverse of z_1z_2 and $\frac{z_1}{z_2}$

12) Show that the equation $z^2 = \bar{z}$ has four solutions.

13) Find the square roots of 4+3i

14) 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.

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

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

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

((p ∧ q) ∨ (¬r ∨¬s)) ∧ (¬ t ∧ v))

17) Construct the truth table for the following statements.

¬p ∧ ¬q

18) Construct the truth table for the following statements.

¬(p ∧ ¬q)

19) Construct the truth table for the following statements.

(p V q) V ¬q

III. Answer any 5 questions 5 x 3 = 15

20) Show that the following equations represent a circle, and find its centre and radius $|z - 2 - i| = 3$

21) If $2cos\alpha = x + \frac{1}{x}$ and $2cos\ \beta = y + \frac{1}{y}$, show that $x^m y^n + \frac{1}{x^m y^n} = 2cos(m\alpha + n\beta)$

22) Construct the truth table for $(p \overline{\vee} q) \wedge (p \overline{\vee} \neg q)$

23) Prove that q → p ≡ ¬p → ¬q

24) Establish the equivalence property connecting the bi-conditional with conditional: p ↔ q ≡ (p → q) ∧ (q⟶ p)

25) Show that ¬(p↔q) ≡ p↔¬q

Any 3 Question 3 x 5 = 15

26) If the area of the triangle formed by the vertices z, iz and z + iz is 50 square units, find the value of $|z|$

27) Prove p⟶(q⟶r) ≡ (p ∧ q)⟶r without using truth table.

28) Show that $p \leftrightarrow q \equiv (p \rightarrow q) \wedge (q \rightarrow p)$

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

30) Show that $\neg(p \rightarrow q) \equiv p \wedge \neg q$

All the best

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