MATHEMATICAL REASONING - EXERCISE

1. The inverse of the statement $(p \wedge \sim q) \rightarrow r$ is-

(1) $\sim(p \vee \sim q) \rightarrow \sim r$ (2) $(\sim p \wedge q) \rightarrow \sim r$
(3) $(\sim p \vee q) \rightarrow \sim r$ (4) None of these

2. $(\sim p \vee \sim q)$ is logically equivalent to-

(1) $p \wedge q$ (2) $\sim p \rightarrow q$
(3) $p \rightarrow \sim q$ (4) $\sim p \rightarrow \sim q$

3. The equivalent statement of $(p \leftrightarrow q)$ is-

(1) $(p \wedge q) \vee (p \vee q)$ (2) $(p \rightarrow q) \vee (q \rightarrow p)$
(3) $(\sim p \vee q) \vee (p \vee \sim q)$ (4) $(\sim p \vee q) \wedge (p \vee \sim q)$

4. If the compound statement $p \rightarrow (\sim p \vee q)$ is false then the truth value of p and q are respectively-

(1) T, T (2) T, F
(3) F, T (4) F, F

5. The statement $(p \rightarrow \sim p) \wedge (\sim p \rightarrow p)$ is-

(1) a tautology
(2) a contradiction
(3) neither a tautology nor a contradiction
(4) None of these

6. Negation of the statement $(p \wedge r) \rightarrow (r \vee q)$ is-

(1) $\sim(p \wedge r) \rightarrow \sim(r \vee q)$ (2) $(\sim p \vee \sim r) \vee (r \vee q)$
(3) $(p \wedge r) \wedge (r \wedge q)$ (4) $(p \wedge r) \wedge (\sim r \wedge \sim q)$

7. Which of the following is correct-

(1) $(\sim p \vee \sim q) \equiv (p \wedge q)$
(2) $(p \rightarrow q) \equiv (\sim q \rightarrow \sim p)$
(3) $\sim(p \rightarrow \sim q) \equiv (p \wedge \sim q)$
(4) $\sim(p \leftrightarrow q) \equiv (p \rightarrow q) \vee (q \rightarrow p)$

8. The contrapositive of $p \rightarrow (\sim q \rightarrow \sim r)$ is-

(1) $(\sim q \wedge r) \rightarrow \sim p$ (2) $(q \rightarrow r) \rightarrow \sim p$
(3) $(q \vee \sim r) \rightarrow \sim p$ (4) None of these

9. The converse of $p \rightarrow (q \rightarrow r)$ is-

(1) $(q \wedge \sim r) \vee p$ (2) $(\sim q \vee r) \vee p$
(3) $(q \wedge \sim r) \wedge \sim p$ (4) $(q \wedge \sim r) \wedge p$

10. If p and q are two statement then $(p \leftrightarrow \sim q)$ is true when-

(1) p and q both are true
(2) p and q both are false
(3) p is false and q is true
(4) None of these

11. Statement $(p \wedge q) \rightarrow p$ is-

(1) a tautology (2) a contradiction
(3) neither (1) nor (2) (4) None of these

12 If statements p, q, r have truth values T, F, T respectively then which of the following statement is true-

(1) $(p \rightarrow q) \wedge r$ (2) $(p \rightarrow q) \vee \sim r$
(3) $(p \wedge q) \vee (q \wedge r)$ (4) $(p \rightarrow q) \rightarrow r$

13. If statement $p \rightarrow (q \vee r)$ is true then the truth values of statements p, q, r respectively-

(1) T, F, T (2) F, T, F
(3) F, F, F (4) All of these

14. Which of the following statement is a contradiction-

(1) $(p \wedge q) \wedge (\sim(p \vee q))$ (2) $p \vee (\sim p \wedge q)$
(3) $(p \rightarrow q) \rightarrow p$ (4) $\sim p \vee \sim q$

15. The negative of the statement "If a number is divisible by 15 then it is divisible by 5 or 3"

(1) If a number is divisible by 15 then it is not divisible by 5 and 3
(2) A number is divisible by 15 and it is not divisible by 5 or 3
(3) A number is divisible by 15 or it is not divisible by 5 and 3
(4) A number is divisible by 15 and it is not divisible by 5 and 3

16. For any three simple statement p, q, r the statement $(p \wedge q) \vee (q \wedge r)$ is true when-

(1) p and r true and q is false
(2) p and r false and q is true
(3) p, q, r all are false
(4) q and r true and p is false

17. Which of the following statement is a tautology-

(1) $(\sim p \vee \sim q) \vee (p \vee \sim q)$
(2) $(\sim p \vee \sim q) \wedge (p \vee \sim q)$
(3) $\sim p \wedge (\sim p \vee \sim q)$
(4) $\sim q \wedge (\sim p \vee \sim q)$

18. Which of the following statement is a contradiction-

(1) $(\sim p \vee \sim q) \vee (p \vee \sim q)$ (2) $(p \rightarrow q) \vee (p \wedge \sim q)$
(3) $(\sim p \wedge q) \wedge (\sim q)$ (4) $(\sim p \wedge q) \vee (\sim q)$

19. The negation of the statement $q \vee (p \wedge \sim r)$ is equivalent to-

(1) $\sim q \wedge (p \to r)$ (2) $\sim q \wedge \sim(p \to r)$
(3) $\sim q \wedge (\sim p \wedge r)$ (4) None of these

20. The statement $\sim(p \to q) \leftrightarrow (\sim p \vee \sim q)$ is-

(1) a tautology
(2) a contradiction
(3) neither a tautology nor a contradiction
(4) None of these

21. Which of the following is equivalent to $(p \wedge q)$

(1) $p \to \sim q$ (2) $\sim(\sim p \wedge \sim q)$
(3) $\sim(p \to \sim q)$ (4) None of these

22. If p is any statement, t and c are a tautology and a contradiction respectively then which of the following is not correct-

(1) $p \wedge t \equiv p$ (2) $p \wedge c \equiv c$
(3) $p \vee t \equiv c$ (4) $p \vee c \equiv p$

23. If p is any statement, t is a tautology and c is a contradiction then which fo the following is not correct-

(1) $p \wedge (\sim c) \equiv p$
(2) $p \vee (\sim t) \equiv p$
(3) $t \vee c \equiv p \vee t$
(4) $(p \wedge t) \vee (p \vee c) \equiv (t \wedge c)$

24. If p, q, r are simple statement with truth values T, F, T respectively then the truth value of

$((\sim p \vee q) \wedge \sim r) \to p$ is-

(1) True (2) False
(3) True if r is false (4) True if q is true

25. Which of the following is wrong-

(1) $p \vee \sim p$ is a tautology
(2) $\sim(\sim p) \leftrightarrow p$ is a tautology
(3) $p \wedge \sim p$ is a contradiction
(4) $((p \wedge p) \to q) \to p$ is a tautology

26. The statement "If $2^2 = 5$ then I get first class" is logically equivalent to-

(1) $2^2 = 5$ and I donot get first class
(2) $2^2 = 5$ or I do not get first class
(3) $2^2 \neq 5$ or I get first class
(4) None of these

27. If statement $(p \vee \sim r) \to (q \wedge r)$ is false and statement q is true then statement p is-

(1) true
(2) false
(3) may be true or false
(4) None of these

28. Which of the following statement are not logically equivalent-

(1) $\sim(p \vee \sim q)$ and $(\sim p \wedge q)$
(2) $\sim(p \to q)$ and $(p \wedge \sim q)$
(3) $(p \to q)$ and $(\sim q \to \sim p)$
(4) $(p \to q)$ and $(\sim p \wedge q)$

29. Either p or q is equivalent to :-

(1) $p \vee q$ (2) $(p \wedge \sim q) \vee (q \wedge \sim p)$
(3) $(p \vee \sim q) \wedge (q \vee \sim p)$ (4) None

30. Neither p nor q is equivalent to :-

(1) $\sim p \wedge \sim q$ (2) $\sim(p \wedge q)$
(3) $(\sim p \vee q) \wedge (p \vee \sim q)$ (4) None

ANSWER KEY — Exercise-I

Que.	1	2	3	4	5	6	7	8	9	10
Ans.	**3**	**3**	**4**	**2**	**2**	**4**	**2**	**1**	**1**	**3**
Que.	11	12	13	14	15	16	17	18	19	20
Ans.	**1**	**4**	**4**	**1**	**4**	**4**	**1**	**3**	**1**	**3**
Que.	21	22	23	24	25	26	27	28	29	30
Ans.	**3**	**3**	**4**	**1**	**4**	**3**	**3**	**4**	**2**	**1**