Multiple Choice Questions

[MHT-CET 2022]
(online shift)

1. The statement pattern $(p \wedge q) \vee (\sim p \wedge q) \vee (r \wedge \sim q)$ is logically equivalent to
   a) $p \wedge r$ b) $q \wedge r$ c) $q \vee r$ d) $p \vee r$
2. Which of the following statement patterns is contradiction ?
   a) $S_3 \equiv (\sim p \wedge q) \wedge (\sim q)$
   b) $S_1 = (\sim p \vee \sim q) \vee (p \vee \sim q)$
   c) $S_2 = (p \to q) \vee (p \wedge \sim q)$
   d) $S_4 = (\sim p \wedge q) \vee (\sim q)$
3. Negation of the statement 'If $\forall x$, x is a complex number, then $x^2 < 0$' is
   a) $\exists x$, x is not a complex number and $x^2 \geq 0$
   b) $\forall x$, x is not a complex number and $x^2 < 0$
   c) $\exists x$, x is not a complex number and $x^2 < 0$
   d) $\forall x$, x is complex number and $x^2 \geq 0$
4. Which of the following is correct statement?
   $S_1 : (p \wedge q) = \sim(p \to \sim q)$
   $S_2 : (p \wedge q) \wedge (\sim p \vee \sim q)$ is tautology
   $S_3 : [p \wedge (p \to \sim q)] \to q$ is contradiction
   $S_4 : p \to (q \to p)$ is contingency
   a) Statement S_1 is correct
   b) Statement S_4 is correct
   c) Statement S_3 is correct
   d) Statements S_1 and S_2 are correct
5. If Statement I : If a quadrilateral ABCD is a square, then all of its sides are equal.
   Statement II : All the sides of a quadrilateral ABCD are equal, then ABCD is a square then
   a) statement II is a negation of statement I
   b) statement II is an inverse of statement I
   c) statement II is a converse of statement I
   d) statement II is a contrapositive of statement I
6. The statement pattern $p \to (q \to p)$ is equivalent to
   a) $p \to (p \vee q)$ b) $p \to (p \leftrightarrow q)$ c) $p \to (p \to q)$ d) $p \to (p \wedge q)$
7. The negation of $\sim s \vee (\sim r \wedge s)$ is equivalent to
   a) $s \wedge (r \vee \sim s)$ b) $\sim r \wedge s$ c) $s \wedge (r \wedge \sim s)$ d) $s \wedge r$
8. Consider the following three statements :
   P : 11 is a prime number
   Q : 7 is a factor of 176
   R : LCM of 3 and 7 is 21
   Then the truth value of which of the following statements is true ?
   a) $P \vee (\sim Q \wedge R)$ b) $(\sim P) \vee (Q \wedge R)$ c) $(\sim P) \wedge (\sim Q \wedge R)$ d) $(P \wedge Q) \vee (\sim R)$
9. The negation of the statement pattern, $p \vee (q \to \sim r)$ is
   a) $\sim p \wedge (q \wedge \sim r)$ b) $\sim p \wedge (q \wedge r)$ c) $\sim p \wedge (\sim q \wedge r)$ d) $\sim p \wedge (\sim q \wedge \sim r)$
10. If p : A man is happy, q : A man is rich, then the symbolic form of 'A man is neither happy nor rich' is
    a) $\sim p \wedge q$ b) $\sim (p \vee q)$ c) $p \vee q$ d) $\sim p \vee \sim q$

22. The statement pattern $[(p\vee q)\wedge\sim p]\wedge(\sim q)$ is

a) a contingency b) a contradiction c) a tautology d) equivalent to $p\wedge q$

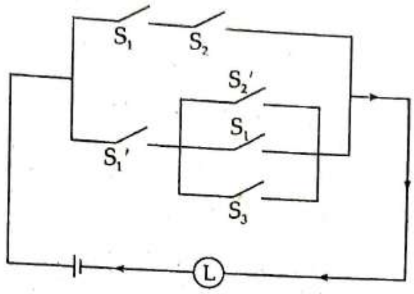
23. The negation of the statement 'If $5<7$ and $7>2$ then $5>2$' is

a) $5<7$ and $7>2$ or $5<2$
b) $5<7$ and $7>2$ and $5>2$
c) $5>7$ and $7>2$ or $5\le 2$
d) $5<7$ and $7>2$ or $5\le 2$

24. The statement pattern $p\wedge(q\vee\sim p)$ is equivalent to

a) $p\to q$ b) $p\vee q$ c) $p\wedge q$ d) $q\wedge\sim p$

25. The symbolic form of the following circuit is



a) $(p\wedge q)\vee\sim p\vee[\sim p\vee p\vee r]=1$
b) $[(p\vee q)\wedge\sim p]\vee[\sim p\vee q\vee r]=1$
c) $(p\wedge q)\vee[\sim p\wedge(\sim q\vee p\vee r)]=1$
d) $(p\vee q)\wedge[\sim p\vee(\sim q\wedge p\wedge r)]=1$

26. Which of the following statement patterns is a contradiction ?

$S_1=(p\to q)\wedge(p\wedge\sim q)$
$S_2=[p\wedge(p\to q)]\to q$
$S_3=(p\vee q)\to\sim p$
$S_4=[p\wedge(p\to q)]\leftrightarrow q$

a) S_3 b) S_4 c) S_2 d) S_1

27. The dual of the statement pattern $\sim p\wedge(q\vee t)$ is (where t is tautology and c is contradiction)

a) $\sim p\vee(q\wedge t)$ b) $\sim p\vee(q\wedge c)$ c) $p\vee(q\wedge c)$ d) $p\vee(q\wedge t)$

28. If $(\sim p\wedge q)\to r$ is false, then the truth values of p, q, r are respectively

a) F, T, F b) T, T, F c) F, F, T d) F, T, T

29. Write the statement in symbolic form 'Sandeep neither likes tea nor coffee but enjoys a soft drink'

where p : Sandeep likes tea,
q : Sandeep likes coffee,
r : Sandeep enjoys a soft drink

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

30. Which of the following is logically equivalent to $\sim(\sim p\Rightarrow q)$?

a) $p\wedge q$ b) $p\wedge\sim q$ c) $\sim p\wedge q$ d) $\sim p\wedge\sim q$

[MHT-CET 2019]

31. The equivalent form of the statement $\sim(p\to\sim q)$ is

a) $\sim p\vee q$ b) $p\wedge q$ c) $p\wedge\sim q$ d) $p\vee\sim q$

32. Which of the following is NOT equivalent to $p\to q$?

a) p is sufficient for q b) p only if q c) q only if p d) q is necessary for p

43. The statement pattern $p \wedge (\sim p \wedge q)$ is

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

[MHT-CET 2017]

44. The statement pattern $(\sim p \wedge q)$ is logically equivalent to

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

45. Which of the following statement patterns is a tautology ?

a) $p \vee (q \to p)$
b) $\sim q \to \sim p$
c) $(q \to p) \vee (\sim p \leftrightarrow q)$
d) $p \wedge \sim p$

46. If c denotes the contradiction then dual of the compound statement $\sim p \wedge (q \vee c)$ is

a) $\sim p \vee (q \wedge t)$ b) $\sim p \wedge (q \vee t)$ c) $p \vee (\sim q \vee t)$ d) $\sim p \vee (q \wedge c)$

[MHT-CET 2016]

47. If p : Every square is a rectangle
q : Every rhombus is a kite

then truth values of $p \to q$ and $p \leftrightarrow q$ are '..... and .....'.

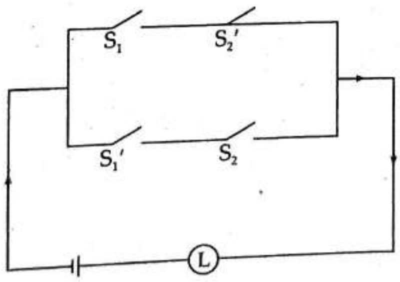
a) F, F b) T, F c) F, T d) T, T

48. Which of the following quantified statements is True ?

a) The square of every real number is positive.
b) There exists a real number whose square is negative.
c) There exists a real number whose square is not positive.
d) Every real number is rational.

49. Symbolic form of the switching circuit is equivalent to ..... (Assume $S_1 = p$ and $S_2 = q$)

a) $p \vee \sim q$ b) $p \wedge \sim q$ c) $p \leftrightarrow q$ d) $\sim (p \leftrightarrow q)$



[MHT-CET 2013]

50. Let p : A triangle is equilateral
q : A triangle is equiangular

Then inverse of $q \to p$ is

a) If a triangle is not equilateral, then it is not equiangular.
b) If a triangle is not equiangular, then it is not equilateral.
c) If triangle is equiangular, then it is not equilateral.
d) If a triangle is equiangular, then it is equilateral.

[MHT-CET 2008]

60. $(p \to \sim p) \vee (\sim p \to p)$ is equivalent to

a) $T \to F$ b) $p \wedge \sim p$ c) $T \vee p$ d) $T \leftrightarrow F$

61. $p \to$ Ram is rich.
$q \to$ Ram is successful.
$r \to$ Ram is talented

Write the symbolic form of the following statement :
Ram is neither rich nor successful and he is not talented.

a) $\sim p \wedge \sim q \vee \sim r$ b) $\sim p \vee \sim q \wedge \sim r$ c) $\sim p \vee \sim q \vee \sim r$ d) $\sim p \wedge \sim q \wedge \sim r$

[MHT-CET 2007]

62. If p and q are true statements in logic, which of the following statement patterns is true ?

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

63. The converse of 'If x is zero, then we cannot divide by x' is

a) If we cannot divide by x, then x is zero
b) If we divide by x, then x is non-zero
c) If x is non-zero, then we can divide by x
d) none of these

64. $\sim(\sim p \wedge \sim q)$ is equivalent to

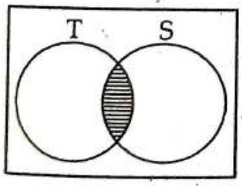
a) $p \wedge q$ b) $p \to q$ c) $p \vee q$ d) $p \leftrightarrow q$

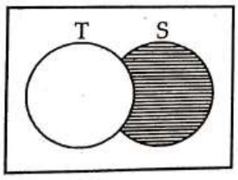
[MHT-CET 2006]

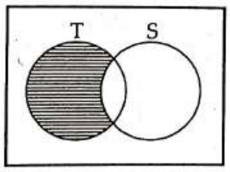
65. Negation of the statement "A is rich but silly" is

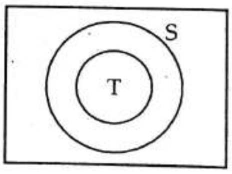
a) Either A is not rich or not silly
b) A is poor or clever
c) A is rich not silly
d) A is either rich or silly

66. All teachers are not sincere is represented by

a) 

b) 

c) 

d) 

67. If $p : x > y$
$q : y > z$
$r : x > z$

then which of the options represents :
'If $x > y$ and $y > z$ then $x > z$'.

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

[MHT-CET 2005]

68. Which of the following statements is not a statement in logic ?

a) Earth is a planet
b) Planets are living objects
c) $\sqrt{-9}$ is rational number
d) I am lying

69. Negation of $p \leftrightarrow q$ is

a) $(p \wedge q) \vee (p \wedge q)$
b) $(p \wedge \sim q) \vee (q \wedge \sim p)$
c) $(\sim p \wedge q) \vee (q \wedge p)$
d) $(p \wedge q) \vee (\sim q \wedge p)$

c) If the triangle is an equilateral or an isosceles triangle, then it is an isosceles or it is not right-angled

d) If the triangle is an equilateral or an isosceles triangle, then it is not an isosceles and it is not right-angled

157. The negation of $(p \wedge \sim q) \rightarrow (p \vee \sim q)$ is

a) a tautology b) a contradiction c) a contingency d) equivalent to $p \wedge q$

158. Which of the following statements has the truth value T ?

S_1 : Cube roots of unity are in GP and their sum is 1

$S_2 : 4 + 7 > 10$ iff $2 + 8 < 10$

$S_3 : \exists\, x \in N$ such that $x^2 - 3x + 2 = 0$ and $\exists\, x \in N$ such that x is an odd number

$S_4 : 3 + i$ is a complex number or $\sqrt{2} + \sqrt{3} = \sqrt{5}$

a) Only S_1 b) S_2, S_3 and S_4 c) Both S_1 and S_3 d) Both S_3 and S_4

159. Consider the three statements :

$p : \forall\, n \in N$, $10n - 3$ is a prime number, when n is not divisible by 3.

$q : \frac{2}{\sqrt{3}}, -\frac{2}{\sqrt{3}}, -\frac{1}{\sqrt{3}}$ are the direction cosines of a directed line.

$r : \sin x$ is an increasing function in the interval $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$.

Then which of the following statement patteren has truth value true ?

a) $(p \wedge q) \leftrightarrow r$ b) $(p \rightarrow q) \rightarrow \sim r$ c) $(\sim p \vee q) \wedge r$ d) $(\sim p \wedge \sim q) \leftrightarrow \sim r$

160. Negation of the statement 'For all M > 0, there exist $x \in S$ such that $x \geq M$' is

a) $\exists\, M > 0$ such that $x > M$ for all $x \in S$ b) $\exists\, M > 0, \exists\, x \in S$ such that $x > M$

c) $\exists\, M > 0$ such that $x < M$ for all $x \in S$ d) $\exists\, M > 0$, there exist $x \in S$ such that $x < M$

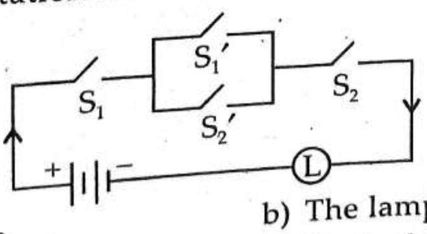
161. If the statements p, q and r are true, false and true statements respectively, then the truth value of the statement pattern $(\sim q \wedge (p \vee \sim q) \wedge \sim r) \vee p$ and the truth value of its dual statement respectively are

a) T, T b) F, T c) T, F d) F, F

162. Let p : Switch S_1 is closed

q : Switch S_2 is closed

Then the correct interpretation from the following circuit is



a) The lamp is always on b) The lamp is always off

c) Symbolic form is $p \vee (\sim p \wedge \sim q) \vee q$ d) Equivalent to $p \vee q$

163. Number of switches in alternative simple circuit for the following circuit is (are)