Topic :- LINEAR INEQUALITIES

1. The number of real solutions of the equation $27^{1/x} + 12^{1/x} = 2.8^{1/x}$, is
   a) 1   b) 2   c) 0   d) Infinite

2. If roots of the equation $x^4 - 8x^3 + bx^2 + cx + 16 = 0$ are positive then
   a) $b = 8 = c$ b) $b = -24, c = -32$ c) $b = 24, c = -32$ d) $b = 24, c = 32$

3. If $3 < |x| < 6$, then x belongs to
   a) $(-6, -3) \cup (3,6)$ b) $(-6, 6)$ c) $(-3, -3) \cup (3,6)$ d) None of these

4. If a,b are distinct positive real numbers, then which one of the following is true?
   a) $a^4 + b^4 > a^3b + ab^3$ b) $a^4 + b^4 < a^3b + ab^3$ c) $a^3 + b^3 < a^2b + ab^2$ d) None of these

5. The solution of the inequation $4^{-x+0.5} - 7 \cdot 2^{-x} < 4, x \in R$ is
   a) $(-2, \infty)$ b) $(2, \infty)$ c) $\left(2, \frac{7}{2}\right)$ d) None of tnese

6. Suppose a,b and c are real numbers such that $\frac{a}{b} > 1$ and $\frac{a}{c} < 0$. Which one of the following is true?
   a) $a + b - c > 0$ b) $a > b$ c) $(a-c)(b-c) > 0$ d) $a + b + c > 0$

7. If a,b,c are positive real numbers such that $a + b + c = p$ then, which of the following is true?
   a) $(p - a)(p - b)(p - c) \geq \frac{1}{27}p^3$
   b) $(p - a)(p - b)(p - c) \geq 8abc$
   c) $\frac{bc}{a} + \frac{ca}{b} + \frac{ab}{c} \geq p$
   d) None of these

8. The number of solutions of the equation $\frac{(1 + e^{x^2})\sqrt{1 + x^2}}{\sqrt{1 + x^4 - x^2}} = 1 + \cos x$, is
   a) 1   b) 2   c) 3   d) 4

9. Let n be an odd integer such that the polynomial $P_n(x) = 1 + 2x + 3x^2 + \ldots + (n + 1)x^n$ has exactly one real root. This real root α satisfies
   a) $-1 < \alpha < 0$ b) $0 < \alpha < 1$ c) $0 \leq \alpha \leq 1$ d) $-1 \leq \alpha \leq 0$

10. Let a,b be integers and $f(x)$ be a polynomial with integer coefficients such that $f(b) - f(a) = 1$. Then, the value of $b - a$, is

    a) 1   b) -1 c) $1, -1$ d) None of these

11. Let $y = \sqrt{\dfrac{(x+1)(x-3)}{(x-2)}}$,then all real values of x for which y takes real values, are

    a) $-1 \le x < 2$ or $x \ge 3$ b) $-1 \le x < 3$ or $x > 2$ c) $1 \le x < 2$ or $x \ge 3$ d) None of these

12. If $a,b,c > 0$ and if $abc = 1$, then the value of $a + b + c + ab + bc + ca$ lies in the interval

    a) $(\infty, -6)$ b) $(-6, 0)$ c) $(0, 6)$ d) $(6, \infty)$

13. The number of real roots of the equation $(\sin 2^x)(\cos 2^x) = \dfrac{2^x + 2^{-x}}{2}$, is

    a) 1   b) 2   c) 3   d) None of these

14. The largest interval for which $x^{12} - x^9 + x^4 - x + 1 > 0$ is

    a) $-4 < x \le 0$ b) $0 < x < 1$ c) $-100 < x < 100$ d) $0 < x < \infty$

15. The number of negative real roots of $x^4 - 4x - 1 = 0$, is

    a) 3   b) 2   c) 1   d) 0

16. If $0 < x < \dfrac{\pi}{2}$, then minimum value of $\dfrac{\cos^3 x}{\sin x} + \dfrac{\sin^3 x}{\cos x}$ is

    a) $\sqrt{3}$ b) $\dfrac{1}{2}$ c) $\dfrac{1}{3}$ d) 1

17. The number of solutions of $\sqrt{3x^2 + 6x + 7} + \sqrt{5x^2 + 10x + 14} = 4 - 2x - x^2$, is

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

18. The solution set of $||x| - 1| < |1 - x|, x \in R$ is

    a) $(-1,1)$ b) $(0,\infty)$ c) $(-1,\infty)$ d) None of these

19. The minimum value of $f(x) = |3 - x| + 7$ is

    a) 0   b) 6   c) 7   d) 8

20. The solution set of the inequation $\dfrac{x+11}{x-3} > 0$ is

    a) $(-\infty, 11) \cup (3, \infty)$ b) $(-\infty, -10) \cup (2, \infty)$ c) $(-100, -11) \cup (1, \infty)$
    d) $(-5, 0) \cup (3, 7)$