CTQ - 2023

CTQ : Concept Through Questions **Year : 2023**

Topic : Logarithmic & Inequality

1. The number of real roots of the equation $(\sin 2^x)(\cos 2^x) = \frac{2^x+2^{-x}}{2}$, is
   (a) 1 (b) 2
   (c) 3 (d) None of these
2. The number of real solutions of the equation $\sin(e^x) = 5^x + 5^{-x}$ is
   (a) 0 (b) 1
   (c) 2 (d) infinity
3. The value of $\log_{\sqrt{2}} \sqrt{2\sqrt{2\sqrt{2\sqrt{2}}}}$, is
   (a) $\frac{15}{16}$ (b) $\frac{7}{16}$
   (c) $\frac{15}{8}$ (d) $\frac{31}{32}$
4. The number of real solutions of the equation $e^{-x} = x$, is
   (a) 0 (b) 1
   (c) 2 (d) None of these
5. If $\log_8\{\log_2(\log_3(x^2 - 4x + 85))\} = \frac{1}{3}$, then $x =$
   (a) 5 (b) 4
   (c) 3 (d) 2
6. The value of $3^{3-\log_3 5}$ is
   (a) $\frac{5}{27}$ (b) $\frac{27}{5}$
   (c) $\frac{9}{5}$ (d) $\frac{5}{9}$

[NIMCET 2022]

7. If $\log(1 - x + x^2) = a_1x + a_2x^2 + a^3x^3 + \cdots$. Then $a_3 + a_6 + a_9 + \cdots$ is equal to
   (a) $\log 2$ (b) $\frac{2}{3}\log 2$
   (c) $\frac{1}{3}\log 2$ (d) $2\log 2$

[NIMCET 2021]

8. $6 + \log_{\frac{1}{4}}\frac{1}{\sqrt{2}}\left[\sqrt{1 - \frac{1}{\sqrt{2}}\sqrt{1 - \frac{1}{\sqrt{2}}\sqrt{1 - \frac{1}{\sqrt{2}}\ldots}}}\right] =$
   (a) 6 (b) 13/2
   (c) 4 (d) $\frac{25}{4}$

[NIMCET 2018]

9. Solution set of inequality $\log_3(x+2)(x+4) + \log_{\frac{1}{3}}(x+2) < \frac{1}{2}\log_{\sqrt{3}} 7$ is

(a) $(-2, -1)$ (b) $(-2,3)$
(c) $(-1,3)$ (d) $(3,8)$

[NIMCET 2019]

10. The solution set of equation $\log_x 2 \log_{2x} 2 = \log_{4x} 2$ is

(a) $\left\{2^{-\sqrt{2}}, 2^{\sqrt{2}}\right\}$ (b) $\left\{\frac{1}{2}, 2\right\}$
(c) $\left\{\frac{1}{4}, 2^2\right\}$ (d) $\left\{\frac{1}{4}, 2\right\}$

[NIMCET 2016]

11. If $3^x = 4^{x-1}$, then x=

(a) $\frac{2\log_3 2}{2\log_3 2-1}$ (b) $\frac{2}{2\log_3 2-1}$
(c) $\frac{2\log_3 2}{2\log_3 2+1}$ (d) $\frac{2\log_3 2}{2\log_2 3-1}$

[NIMCET 2016]

12. If x, y and z are three consecutive positive integers, then log (1+ x z) is

(a) log y (b) log $\frac{y}{2}$
(c) log (2y) (d) 2 log (y)

[NIMCET 2014]

13. If (x_0, y_0) is the solution of the following equations: $(2x)^{\ln 2} = (3y)^{\ln 3}$ & $3^{\ln x} = 2^{lny}$. Then, x_0 is

(a) 1/6 (b) 1/3
(c) 1/2 (d) 6

[NIMCET 2014]

14. If a, b and c are in geometric progression, then $\log_{ax} x$, $\log_{bx} x$ and $\log_{cx} x$ are in

(a) A P (b) G P
(c) H P (d) AGP

[NIMCET 2014]

15. If $a = \log_{12} 18$, $b = \log_{24} 54$, then ab+5(a-b) is

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

[NIMCET 2014]

16. If $\log_x y = 100$ and $\log_2 x = 10$, then the value of y is

(a) 2^{10} (b) 2^{100}
(c) 2^{1000} (d) 2^{10000}

[NIMCET 2013]

17. Find the value of 'x', if $\left(\frac{1}{2^{\log_x 4}}\right)\left(\frac{1}{2^{\log_x 16}}\right)\left(\frac{1}{2^{\log_x 256}}\right) \ldots\ldots \infty = 2$

(a) 2 (b) $\frac{1}{2}$
(c) 4 (d) $\frac{1}{4}$

[NIMCET 2009]

18. The value of $y = 0.36^{\log_{0.25}\left(\frac{1}{3}+\frac{1}{3^2}+\cdots\right)}$ is:
(a) 0.9 (b) 0.8
(c) 0.6 (d) 0.25

[NIMCET 2008]

19. For a > 0, a ≠ 1, the number of values of x satisfying the equation $2\log_x(a) + \log_{ax}(a) + 3\log_{a^2x}(a) = 0$ is:
(a) 2 (b) 3
(c) 4 (d) 5

[NIMCET 2008]

20. If $\frac{3(x-2)}{5} \geq \frac{5(2-x)}{3}$, then x belongs to
(a) $(2, \infty)$ (b) $[2, \infty)$
(c) $(-\infty, 2]$ (d) None of these

21. If $|3x + 2| < 1$, then x belongs to the interval
(a) $\left(-1, -\frac{1}{3}\right)$ (b) $\left[-1, -\frac{1}{3}\right]$
(c) $(-\infty, -1)$ (d) $\left(-\frac{1}{3}, \infty\right)$

22. The solution set of the inequation $0 < |3x + 1| < \frac{1}{3}$
(a) $\left(-\frac{4}{9}, -\frac{2}{9}\right)$ (b) $\left[-\frac{4}{9}, -\frac{2}{9}\right]$
(c) $\left(-\frac{4}{9}, -\frac{2}{9}\right) - \left\{-\frac{1}{3}\right\}$ (d) $\left[-\frac{4}{9}, -\frac{2}{9}\right] - \left\{-\frac{1}{3}\right\}$

23. The solution set of the inequation $|x - 1| + |x - 2| + |x - 3| \geq 6$
(a) [0,4] (b) $(-\infty, -2) \cup [4, \infty)$
(c) $(-\infty, 0] \cup [4, \infty)$ (d) None of these

24. The greatest negative integer satisfying $x^2 - 4x - 77 < 0$ and $x^2 > 4$
(a) – 4 (b) – 6
(c) – 7 (d) None of these

25. If $\frac{8x^2+16x-51}{(2x-3)(x+4)} < 3$, then
(a) $\left(\frac{3}{2}, \frac{5}{2}\right)$ (b) $(-4, -3)$
(c) $(-4, -3) \cup \left(\frac{3}{2}, \frac{5}{2}\right)$ (d) None of these

26. The solution set $x^2 + 2 \leq 3x \leq 2x^2 - 5$, is
(a) ϕ (b) [1,2]
(c) $(-\infty, -1] \cup \left[\frac{5}{2}, \infty\right)$ (d) None of these

27. The number of real solutions of the equation $e^{|x|} - |x| = 0$, is
(a) 0 (b) 1
(c) 2 (d) None of these

28. The number of real solutions of the equation $2\cos(e^x) = 3^x + 3^{-x}$, is
(a) 0 (b) 1
(c) 2 (d) None of these

29. The number of solutions of
$3^{|x|} = \left|2 - |x|\right|$ is
(a) 0 (b) 2
(c) 4 (d) infinite

30. Equation $\sqrt{4x+9} - \sqrt{11x+1} = \sqrt{7x+4}$ has
(a) no solution (b) one solution
(c) two solutions (d) more than two solution

31. The total number of roots of the equation $|x - x^2 - 1| = |2x - 3 - x^2|$ is
(a) 1 (b) 2
(c) 0 (d) infinitely many

32. Let $f(x) = ax^3 + 5x^2 - bx + 1$. If $f(x)$ when divided by $2x + 1$ leaves 5 as remainder, and $f'(x)$ is divisible by $3x - 1$ then
(a) $a = 26,\ b = 10$ (b) $a = 24,\ b = 12$
(c) $a = 26,\ b = 12$ (d) None of these

33. If $\log_{30} 3 = x, \log_{30} 5 = y$, then $\log_{30} 8 =$
(a) $3(1 - x - y)$ (b) $x - y + 1$
(c) $1 - x - y$ (d) $2(x - y + 1)$

34. The value of $\log_5\left(1 + \frac{1}{5}\right) + \log_5\left(1 + \frac{1}{6}\right) + \log_5\left(1 + \frac{1}{7}\right) + \cdots \log_4\left(1 + \frac{1}{624}\right)$ is
(a) 5 (b) 4
(c) 3 (d) 2

35. If $\log_3\left\{\log_6\left(\frac{x^2+x}{x-1}\right)\right\} = 0$, then $x =$
(a) – 1 (b) 1
(c) 3 (d) 4

Answer Key

Ques.	1	2	3	4	5	6	7	8	9	10
Ans.	D	A	C	B	D	B	B	B	B	A
Ques.	11	12	13	14	15	16	17	18	19	20
Ans.	A	D	C	C	A	C	B	C	A	B
Ques.	21	22	23	24	25	26	27	28	29	30
Ans.	A	C	C	D	C	A	A	A	B	B
Ques.	31	32	33	34	35					
Ans.	A	C	A	C	C					