Logarithms

Choose the most appropriate option (a, b, c or d).

Q 1. If $\log_4 5 = a$ and $\log_5 6 = b$ then $\log_3 2$ is equal to

(a) $\frac{1}{2a+1}$ (b) $\frac{1}{2b+1}$ (c) $2ab + 1$ (d) $\frac{1}{2ab-1}$

Q 2. If $\log_{ax} x, \log_{bx} x, \log_{cx} x$ are in HP, where a,b,c, x belong to $(1, +\infty)$, then a, b, c are in

(a) AP (b) GP (c) HP (d) none of these

Q 3. If $\log_5 a . \log_a x = 2$ then x is equal to

(a) 125 (b) a^2 (c) 25 (d) none of these

Q 4. The value of $3\log\frac{81}{80} + 5\log\frac{25}{24} + 7\log\frac{16}{15}$ is

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

Q 5. Let $f(x) = \sqrt{\log_{10} x^2}$. The set of all values of x for which f(x) is real, is

(a) $[-1, 1]$ (b) $[1, +\infty)$ (c) $(-\infty, -1]$ (d) $(-\infty, -1] \cup [1, +\infty)$

Q 6. The set of real values of x for which $2^{\log_{\sqrt{2}}(x-1)} > x + 5$ is

(a) $(-\infty, -1) \cup (4, +\infty)$ (b) $(4, +\infty)$ (c) $(-1, 4)$ (d) none of these

Q 7. If $a_1, a_2 a_3 \ldots$ are positive numbers in GP then $\log a_n, \log a_{n+1}, \log a_{n+2}$ are in

(a) AP (b) GP (c) HP (d) none of these

Q 8. IF $x = \log_a (bc)$, $y = \log_b (ca)$ and $z = \log_c (ab)$ then which of the following is equal to 1 ?

(a) $x + y + z$ (b) $(1 + x)^{-1} + (1 + y)^{-1} + (1 + z)^{-1}$

(c) xyz (d) none of these

Q 9. If $x_n > x_{n-1} > \ldots > x_2 > x_1 > 1$ then the value of is equal to

$$\log_{x_1} \log_{x_2} \log_{x_3} \ldots \log_{x_n} x_n^{\cdot^{\cdot^{x_1}}_{x_{n-1}}}$$

(a) 0 (b) 1 (c) 2 (d) none of these

Q 10. If $\log x : \log y : \log z = (y - z) : (z - x) : (x - y)$ then

(a) $x^y . y^z . z^x = 1$ (b) $x^x y^y z^z = 1$ (c) $\sqrt[x]{x}.\sqrt[y]{y}.\sqrt[z]{z} = 1$ (d) none of these

Q 11. $x^{\log_x a \times \log_a y \times \log_y z}$ is equal to

(a) x (b) y (c) z (d) none of these

Q 12. The number of zeros coming immediately after the decimal point in the value of $(0.2)^{25}$ is (given $\log_{10} 2 = 0.30103$)

(a) 16 (b) 17 (c) 18 (d) none of these

Q 13. If [x] = the greatest integer less than or equal to x then $[\log_{10} 6730.4]$ has the value

(a) 6 (b) 4 (c) 5 (d) none of these

Q 14. The number of solutions of $\log_2 (x + 5) = -6 - x$ is

(a) 2 (b) 0 (c) 3 (d) none of these

Q 15. The number of real values of the parameter k for which $(\log_{16} x)^2 - \log_{16} k = 0$ with real coefficients will have exactly one solution is

(a) 2 (b) 1 (c) 4 (d) none of these

Q 16. If $\log_{0.5} \sin x = 1 - \log_{0.5} \cos x$ then the number of solutions of $x \in [-2\pi, 2\pi]$ is

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

Q 17. If $\log_{\cos x} \tan x + \log_{\sin x} \cot x = 0$ then the most general solutions of x are

(a) $n\pi + \frac{\pi}{4}, n \in \not{Z}$ (b) $2n\pi + \frac{\pi}{4}, n \in \not{Z}$ (c) $2n\pi - \frac{3\pi}{4}, n \in \not{Z}$ (d) none of these

Q 18. The number of values of $x \in [0, n\pi]$, $n \in \not{Z}$, that satisfy $\log_{|\sin|} (1 + \cos x) = 2$, is

(a) 0 (b) n (c) 2n (d) none of these

Q 19. The value of $\sum_{r=1}^{89} \log_{10} \tan \frac{\pi r}{180}$ is equal to

(a) 10 (b) 1 (c) 0 (d) none of these

Q 20. The solution set of $\log_2 |4 - 5x| > 2$ is

(a) $\left(\frac{8}{5}, +\infty\right)$ (b) $\left(\frac{4}{5}, \frac{8}{5}\right)$ (c) $(-\infty, 0) \cup \left(\frac{8}{5}, +\infty\right)$ (d) none of these

Q 21. The set of real values of x for which $\log_{0.2} \frac{x+2}{x} \le 1$ is

(a) $\left(-\infty, -\frac{5}{2}\right] \cup (0, +\infty)$ (b) $\left[\frac{5}{2}, +\infty\right)$ (c) $(-\infty, -2) \cup (0, +\infty)$ (d) none of these

Q 22. The set of real values of x satisfying $\log_{1/2} (x^2 - 6x + 15) \ge -2$ is

(a) $(-\infty, 2]$ (b) [2, 4] (c) $[2, +\infty)$ (d) none of these

Q 23. If $\log_{0.04} (x - 1) \ge \log_{0.2} (x - 1)$ then x belongs to the interval

(a) (1, 2] (b) $(-\infty, 2]$ (c) $[2, +\infty)$ (d) none of these

Q 24. If $\log_{1/\sqrt{2}} \sin x > 0$, $x \in [0, 4\pi]$, then number of values of x which are integral multiple of $\frac{\pi}{4}$, is

(a) 6 (b) 12 (c) 3 (d) none of these

Q 25. If $\log_{\cos x} \sin x \ge 2$ and $0 \le x \le 3\pi$ then sin x lies in the interval

(a) $\left[\frac{\sqrt{5}-1}{2}, 1\right]$ (b) $\left(0, \frac{\sqrt{5}-1}{2}\right]$ (c) $\left[0, \frac{1}{2}\right]$ (d) none of these

Q 26. If $\log_{\sqrt{3}} (\sin x + 2\sqrt{2} \cos x) \ge 2$, $-2\pi \le x \le 2\pi$, then the number of solutions of x is

(a) 0 (b) infinite (c) 3 (d) none of these

Type 2

Choose the correct options. One or more options may be correct.

Q 27. If $\log_k x . \log_5 k = \log_x 5$, $k \ne 1$, $k > 0$, then x is equal to

(a) k (b) $\frac{1}{5}$ (c) 5 (d) none of these

Q 28. If $x^2 + 4y^2 = 12xy$, $x \in [1, 4]$, $y \in [1, 4]$, then

(a) the greatest value of $\log_2 (x + 2y)$ is 4

(b) the least value of $\log_2 (x + 2y)$ is 3

(c) the range of values of $\log_2 (x + 2y)$ is [2, 4]

(d) the number of integral values of (x, y) is 2 such that $\log_2 (x + 2y)$ is equal to 3

Q 29. If $\leq \log_{0.1} x \leq 2$ then

(a) then maximum value of x is $\frac{1}{\sqrt{10}}$ (b) x lies between $\frac{1}{100}$ and $\frac{1}{\sqrt{10}}$

(c) x does not lie between $\frac{1}{100}$ and $\frac{1}{\sqrt{10}}$ (d) the minimum value of x is $\frac{1}{100}$

Q 30. If $x^{3/4(\log_3 x)^2 + \log_3 x - 5/4} = \sqrt{3}$ then x has

(a) one positive integral value (b) one irrational value

(c) two positive rational value (d) none of these

Answers

1d	2b	3c	4a	5d	6a	7a	8b	9b	10b
11c	12b	13d	14d	15b	16b	17b	18a	19c	20c
21a	22b	23c	24a	25b	26d	27b,c	28a,c,d	29a,b,d,	30a,b,c