# Assignment

## Properties of Logarithms

### Basic Level

**1.** $\log ab - \log|\,b| =$

(a) $\log a$ (b) $\log|\,a|$ (c) $-\log a$ (d) None of these

**2.** The value of $\sqrt{(\log_{0.5}^2 4)}$ is

(a) –2 (b) $\sqrt{(-4)}$ (c) 2 (d) None of these

**3.** The value of $\log_3 4 \log_4 5 \log_5 6 \log_6 7 \log_7 8 \log_8 9$ is **[IIIT Allahabad 2000]**

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

**4.** $\log_7 \log_7 \sqrt{7(\sqrt{7\sqrt{7}})} =$

(a) $3\log_2 7$ (b) $1-3\log_3 7$ (c) $1-3\log_7 2$ (d) None of these

**5.** The value of $81^{(1/\log_5 3)} + 27^{\log_9 36} + 3^{4/\log_7 9}$ is equal to

(a) 49 (b) 625 (c) 216 (d) 890

**6.** $7\log\left(\frac{16}{15}\right) + 5\log\left(\frac{25}{24}\right) + 3\log\left(\frac{81}{80}\right)$ is equal to **[EAMCET 1990]**

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

**7.** 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) $\frac{1}{2ab-1}$

**8.** If $\log_k x.\log_5 k = \log_x 5, k \neq 1, k > 0$, then $x$ is equal to

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

**9.** If $\log_5 a.\log_a x = 2$, then $x$ is equal to

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

**10.** If $a^2 + 4b^2 = 12ab$, then $\log(a+2b)$ is

(a) $\frac{1}{2}[\log a + \log b - \log 2]$ (b) $\log\frac{a}{2} + \log\frac{b}{2} + \log 2$ (c) $\frac{1}{2}[\log a + \log b + 4\log 2]$ (d) $\frac{1}{2}[\log a - \log b + 4\log 2]$

**11.** If $A = \log_2 \log_2 \log_4 256 + 2\log_{\sqrt{2}} 2$, then $A$ *is* equal to **[WB JEE 1992]**

(a) 2 (b) 3 (c) 5 (d) 7

**12.** If $\log_{10} x = y$, then $\log_{1000} x^2$ is equal to

(a) $y^2$ (b) $2y$ (c) $\frac{3y}{2}$ (d) $\frac{2y}{3}$

## 6 Logarithms

**13.** If $x = \log_a(bc), y = \log_b(ca), z = \log_c(ab)$, 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

**14.** If $a = \log_{24} 12, b = \log_{36} 24$ and $c = \log_{48} 36$, then 1+*abc* is equal to

(a) $2ab$ (b) $2ac$ (c) $2bc$ (d) 0

**15.** If $a^x = b, b^y = c, c^z = a$, then value of *xyz* is

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

**16.** 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

**17.** $\log_4 2 - \log_8 2 + \log_{16} 2 - ....\text{to}\ \infty$ is **[MNR 1994; Roorkee 1994; MP PET 2000]**

(a) $e^2$ (b) $\ln 2 + 1$ (c) $\ln 2 - 1$ (d) $1 - \ln 2$

**18.** If $\log_{10} 2 = 0.30103, \log_{10} 3 = 0.47712$, the number of digits in $3^{12} \times 2^8$ is

(a) 7 (b) 8 (c) 9 (d) 10

**19.** $\sum_{r=1}^{89} \log_3(\tan r^o)$

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

**20.** $\sum_{n=1}^{n} \frac{1}{\log_{2^n}(a)} =$

(a) $\frac{n(n+1)}{2}\log_a 2$ (b) $\frac{n(n+1)}{2}\log_2 a$ (c) $\frac{(n+1)^2 n^2}{4}\log_2 a$ (d) None of these

**21.** Which of the following is not true

(a) $\log(1+x) < x$ for $x > 0$ (b) $\frac{x}{1+x} < \log(1+x)$ for $x > 0$ (c) $e^x > 1 + x$ for $x > 0$ (d) $e^x < 1 - x$ for $x > 0$

**22.** The solution of the equation $\log_7 \log_5(\sqrt{x^2+5} + x) = 0$ **[UPSEAT 2000 (S.E.)]**

(a) $x = 2$ (b) $x = 3$ (c) $x = 4$ (d) $x = -2$

### *Advance*

**23.** $\log_4 18$ is

(a) A rational number (b) An irrational number (c) A prime number (d) None of these

**24.** The value of $(0.05)^{\log_{\sqrt{20}}(0.1+0.01+0.001+.....)}$ is

(a) 81 (b) $\frac{1}{81}$ (c) 20 (d) $\frac{1}{20}$

**25.** If *a, b, c* are distinct positive numbers, each different from 1, such that

$[\log_b a \log_c a - \log_a a] + [\log_a b \log_c b - \log_b b] + [\log_a c \log_b c - \log_c c] = 0$, then *abc* =

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

**26.** If $\log_{12} 27 = a$, then $\log_6 16 =$ **[EAMCET 1990]**

(a) $2.\frac{3-a}{3+a}$ (b) $3.\frac{3-a}{3+a}$ (c) $4.\frac{3-a}{3+a}$ (d) None of these

**27.** If $n = 1983!$, then the value of expression $\frac{1}{\log_2 n}+\frac{1}{\log_3 n}+\frac{1}{\log_4 n}+.....+\frac{1}{\log_{1983} n}$ is equal to

(a) –1 (b) 0 (c) 1 (d) 2

**28.** If $\frac{\log x}{b-c}=\frac{\log y}{c-a}=\frac{\log z}{a-b}$, then which of the following is true

(a) $xyz = 1$ (b) $x^a y^b z^c = 1$ (c) $x^{b+c}y^{c+a}z^{a+b} = 1$ (d) $xyz = x^a y^b z^c$

**29.** If $x_n > x_{n-1} > ... > x_2 > x_1 > 1$ then the value of $\log_{x_1} \log_{x_2} \log_{x_3} ..... \log_{x_n} x_n^{x_{n-1}^{\cdot^{\cdot^{x_1}}}}$ is equal to

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

**30.** The number of solution of $\log_2(x+5) = 6 - x$ is

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

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

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

**32.** If $x^{\frac{3}{4}(\log_3 x)^2+\log_3 x-\frac{5}{4}} = \sqrt{3}$ then $x$ has

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

(c) Two positive rational values (d) None of these

## Logarithmic Inequalities

### Basic Level

**33.** If $x = \log_5(1000)$ and $y = \log_7(2058)$ then

(a) $x > y$ (b) $x < y$ (c) $x = y$ (d) None of these

**34.** The number $\log_{20} 3$ lies in

(a) $\left(\frac{1}{4},\frac{1}{3}\right)$ (b) $\left(\frac{1}{3},\frac{1}{2}\right)$ (c) $\left(\frac{1}{2},\frac{3}{4}\right)$ (d) $\left(\frac{3}{4},\frac{4}{5}\right)$

**35.** If $\frac{1}{\log_3 \pi}+\frac{1}{\log_4 \pi} > x$, then $x$ be

(a) 2 (b) 3 (c) 3.5 (d) $\pi$

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

(a) 4 (b) 12 (c) 3 (d) None of these

**37.** The set of real values of $x$ satisfying $\log_{1/2}(x^2 - 6x + 12) \geq -2$ is

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

**38.** 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

## *Advance*

**39.** Solution set of inequality $\log_{10}(x^2-2x-2)\le 0$ is

(a) $[-1,1-\sqrt{3}]$ (b) $[1+\sqrt{3},3]$ (c) $[-1,1-\sqrt{3})\cup(1+\sqrt{3},3]$ (d) None of these

**40.** If $\frac{1}{2}\le \log_{0.1} x \le 2$ then.....

(a) The 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 $\frac{1}{100}$

**41.** 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

**42.** 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

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