Chapter 01

Basic Maths and Logarithm

TOPIC WISE QUESTIONS

Basic Maths

Q.1 For $x \neq 0, \left(\frac{x^l}{x^m}\right)^{(l^2+lm+m^2)} \left(\frac{x^m}{x^n}\right)^{(m^2+nm+n^2)} \left(\frac{x^n}{x^l}\right)^{(n^2+nl+l^2)}$ =

(1) 1 (2) x

(3) Does not exist (4) None of these

Q.2 $\frac{2.3^{n+1}+7.3^{n-1}}{3^{n+2}-2(1/3)^{l-n}} =$

(1) 1 (2) 3 (3) –1 (4) 0

Q.3 The greatest number among $\sqrt[3]{9}, \sqrt[4]{11}, \sqrt[6]{17}$ is

(1) $\sqrt[3]{9}$

(2) $\sqrt[4]{11}$

(3) $\sqrt[6]{17}$

(4) Can not be determined

Q.4 The value of $\frac{15}{\sqrt{10}+\sqrt{20}+\sqrt{40}-\sqrt{5}-\sqrt{80}}$ is

(1) $\sqrt{5}(5+\sqrt{2})$ (2) $\sqrt{5}(2+\sqrt{2})$

(3) $\sqrt{5}(1+\sqrt{2})$ (4) $\sqrt{5}(3+\sqrt{2})$

Q.5 The rationalizing factor of $a^{1/3}+a^{-1/3}$ is

(1) $a^{1/3}-a^{-1/3}$ (2) $a^{2/3}+a^{-2/3}$

(3) $a^{2/3}-a^{-2/3}$ (4) $a^{2/3}+a^{-2/3}-1$

Q.6 $\sqrt{(3+\sqrt{5})}$ is equal to

(1) $\sqrt{5}+1$ (2) $\sqrt{3}+\sqrt{2}$

(3) $(\sqrt{5}+1)/\sqrt{2}$ (4) $\frac{1}{2}(\sqrt{5}+1)$

Q.7 $\sqrt[4]{(17+12\sqrt{2})} =$

(1) $\sqrt{2}+1$ (2) $2^{1/4}(\sqrt{2}+1)$

(3) $2\sqrt{2}+1$ (4) None of these

Q.8 $(x^5)^{1/3}(16x^3)^{2/3}\left(\frac{1}{4}x^{4/9}\right)^{-3/2} =$

(1) $(x/4)^3$ (2) $(4x)^3$

(3) $8x^3$ (4) None of these

Q.9 If $a^{1/x}=b^{1/y}=c^{1/z}$ and $b^2=ac$ then $x+z=$

(1) y (2) $2y$

(3) $2xyz$ (4) None of these

Q.10 If $\frac{(2^{n+1})^m(2^{2n})2^n}{(2^{m+1})^n 2^{2m}}=1$, then m =

(1) 0 (2) 1 (3) n (4) $2n$

Q.11 If $a^x=b^y=(ab)^{xy}$, then $x+y=$

(1) 0 (2) 1

(3) xy (4) None of these

Q.12 $\frac{[4+\sqrt{(15)}]^{3/2}+[4-\sqrt{(15)}]^{3/2}}{[6+\sqrt{(35)}]^{3/2}-[6-\sqrt{(35)}]^{3/2}} =$

(1) 1 (2) 7/13

(3) 13/7 (4) None of these

Q.13 If $x=\frac{\sqrt{5}+\sqrt{2}}{\sqrt{5}-\sqrt{2}}, y=\frac{\sqrt{5}-\sqrt{2}}{\sqrt{5}+\sqrt{2}}$, then $3x^2+4xy-3y^2 =$

(1) $\frac{1}{3}[56\sqrt{10}-12]$ (2) $\frac{1}{3}[56\sqrt{10}+12]$

(3) $\frac{1}{3}[56+12\sqrt{10}]$ (4) None of these

Q.14 $\frac{\sqrt{(5/2)}+\sqrt{(7-3\sqrt{5})}}{\sqrt{(7/2)}+\sqrt{(16-5\sqrt{7})}} =$

(1) Rational (2) Surd

(3) Multiple of $\sqrt{7}$ (4) None of these

Q.15 $\frac{3\sqrt{2}}{\sqrt{6}+\sqrt{3}}-\frac{4\sqrt{3}}{\sqrt{6}+\sqrt{2}}+\frac{\sqrt{6}}{\sqrt{3}+\sqrt{2}} =$

(1) $5\sqrt{2}$ (2) $3\sqrt{2}$ (3) $2\sqrt{3}$ (4) 0

Q.16 The rationalizing factor of $2\sqrt{3}-\sqrt{7}$ is

(1) $\sqrt{3}+\sqrt{7}$ (2) $2\sqrt{3}+\sqrt{7}$
(3) $\sqrt{3}+2\sqrt{7}$ (4) None of these

Q.17 $\sqrt{(3+\sqrt{5})}-\sqrt{(2+\sqrt{3})}=$
(1) $\sqrt{(5/2)}+\sqrt{(3/2)}$ (2) $\sqrt{(5/2)}-\sqrt{(3/2)}$
(3) $\sqrt{(5/2)}-\sqrt{(1/2)}$ (4) $\sqrt{(3/2)}-\sqrt{(1/2)}$

Q.18 If $x+\sqrt{(x^2+1)}=a$, then x =
(1) $\frac{1}{2}(a+1/a)$ (2) $\frac{1}{2}(a-1/a)$
(3) $(a+a^{-1})$ (4) None of these

Q.19 If $x=\sqrt{7}+\sqrt{3}$ and $xy=4$, then x^4+y^4 =
(1) 400 (2) 368 (3) 352 (4) 200

Q.20 If $x=3-\sqrt{5}$, then $\frac{\sqrt{x}}{\sqrt{2}+\sqrt{(3x-2)}}=$
(1) 5 (2) $\sqrt{5}$ (3) $1/5$ (4) $1/\sqrt{5}$

Q.21 If $a=\sqrt{(21)}-\sqrt{(20)}$ and $b=\sqrt{(18)}-\sqrt{(17)}$, then
(1) $a=b$ (2) $a+b=0$
(3) $a>b$ (4) $a<b$

Q.22 Solution of the equation $\sqrt{(x+10)}+\sqrt{(x-2)}=6$ are
(1) 0 (2) 6
(3) 4 (4) None of these

Q.23 $\sqrt{[6+2\sqrt{3}+2\sqrt{2}+2\sqrt{6}]}-1/\sqrt{(5+2\sqrt{6})}=$
(1) 1 (2) –1
(3) 0 (4) None of these

PROPERTIES OF LOG AND LOGARITHMIC EQUATION

Q.24 For $y=\log_a x$ to be defined 'a' must be
(1) Any positive real number
(2) Any number
(3) $\geq e$
(4) Any positive real number $\neq 1$

Q.25 Logarithm of $32\sqrt[5]{4}$ to the base $2\sqrt{2}$ is
(1) 3.6 (2) 5
(3) 5.6 (4) None of these

Q.26 The number $\log_2 7$ is
(1) An integer
(2) A rational number
(3) An irrational number
(4) A prime number

Q.27 $\log ab-\log|b|=$
(1) $\log a$ (2) $\log|a|$
(3) $-\log a$ (4) None of these

Q.28 If $\log_e\left(\frac{a+b}{2}\right)=\frac{1}{2}(\log_e a+\log_e b)$, then relation between a and b will be
(1) $a=b$ (2) $a=\frac{b}{2}$
(3) $2a=b$ (4) $a=\frac{b}{3}$

Q.29 Which is the correct order for a given number α in increasing order
(1) $\log_2\alpha,\log_3\alpha,\log_e\alpha,\log_{10}\alpha$
(2) $\log_{10}\alpha,\log_3\alpha,\log_e\alpha,\log_2\alpha$
(3) $\log_{10}\alpha,\log_e\alpha,\log_2\alpha,\log_3\alpha$
(4) $\log_3\alpha,\log_e\alpha,\log_2\alpha,\log_{10}\alpha$

Q.30 The value of $\sqrt{(\log^2_{0.5}4)}$ is
(1) –2 (2) $\sqrt{(-4)}$
(3) 2 (4) None of these

Q.31 The value of $\log_3 4\log_4 5\log_5 6\log_6 7\log_7 8\log_8 9$ is
(1) 1 (2) 2 (3) 3 (4) 4

Q.32 $\log_7\sqrt{7(\sqrt{7\sqrt{7}})}=$
(1) $3\log_2 7$ (2) $1-3\log_3 7$
(3) $1-3\log_7 2$ (4) None of these

Q.33 The value of $81^{(1/\log_5 3)}+27^{\log_9 36}+3^{4/\log_7 9}$ is equal to
(1) 49 (2) 625 (3) 216 (4) 890

Q.34 If $\log_4 5=a$ and $\log_5 6=b$, then $\log_3 2$ is equal to
(1) $\frac{1}{2a+1}$ (2) $\frac{1}{2b+1}$
(3) $2ab+1$ (4) $\frac{1}{2ab-1}$

Q.35 If $\log_5 a.\log_a x=2$, then x is equal to
(1) 125 (2) a^2

(3) 25 (4) None of these

Q.36 If $\log_{10} x = y$, then $\log_{1000} x^2$ is equal to

(1) y^2 (2) $2y$ (3) $\frac{3y}{2}$ (4) $\frac{2y}{3}$

Q.37 If $x = \log_a(bc), y = \log_b(ca), z = \log_c(ab)$, then which of the following is equal to 1

(1) $x+y+z$

(2) $(1+x)^{-1}+(1+y)^{-1}+(1+z)^{-1}$

(3) xyz

(4) None of these

Q.38 If $a = \log_{24} 12, b = \log_{36} 24$ and $c = \log_{48} 36$, then $1+abc$ is equal to

(1) $2ab$ (2) $2ac$ (3) $2bc$ (4) 0

Q.39 $\log_4 18$ is

(1) A rational number

(2) An irrational number

(3) A prime number

(4) None of these

Q.40 The value of $(0.05)^{\log_{\sqrt{20}}(0.1+0.01+0.001+.....)}$ is

(1) 81 (2) $\frac{1}{81}$ (3) 20 (4) $\frac{1}{20}$

Q.41 If $\log_{12} 27 = a$, then $\log_6 16 =$

(1) $2.\frac{3-a}{3+a}$ (2) $3.\frac{3-a}{3+a}$

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

LINEAR, MODULUS, RATIONAL AND SQUARE ROOT INEQUALITIES

Q.42 If $\frac{3x-4}{2} \geq \frac{x+1}{4} - 1$, then

(1) [1, ∞) (2) (2, ∞)

(3) [1, 3] (4) none of these

Q.43 Solution of $0 < |3x + 1| < \frac{1}{3}$ is

(1) (–4/9, –2/9)

(2) [–4/9, – 2/9]

(3) (–4/9, – 2/9)–{–1/3}

(4) [–4/9, –2/9]–{–1/3}

Q.44 Solution of $|x-1| \geq |x-3|$ is

(1) $x \leq 2$ (2) $x \geq 2$

(3) [1, 3] (4) none of these

Q.45 The solution of $\left|\frac{1}{x} - 2\right| < 4$ is

(1) (–∞, –1/2)

(2) (1/6, ∞)

(3) (–1/2, 1/6)

(4) (–∞, –1/2) ∪ (1/6, ∞)

Q.46 For $\frac{|x-1|}{x+2} < 1$, x lies in the interval

(1) $(-\infty, -2) \cup \left(-\frac{1}{2}, \infty\right)$

(2) (–∞, 1)∪[2,3]

(3) (–∞, –4)

(4) $\left[-\frac{1}{2}, 1\right]$

Q.47 Solution of $|x-1|+|x-2|+|x-3| \geq 6$ is

(1) [0,4]

(2) (–∞, –2) ∪ [4, ∞)

(3) (– ∞, 0] ∪ [4, ∞)

(4) None of these

Q.48 The set of admissible value of x such that $\frac{2x+3}{2x-9} < 0$ is

(1) $\left(-\infty, -\frac{3}{2}\right) \cup \left(\frac{9}{2}, \infty\right)$

(2) $(-\infty, 0) \cup \left(\frac{9}{2}, \infty\right)$

(3) $\left(-\frac{3}{2}, 0\right)$

(4) $\left(-\frac{3}{2}, \frac{9}{2}\right)$

Q.49 Number of integral solution of $\frac{x+2}{x^2+1} > \frac{1}{2}$ is

(1) 0 (2) 1 (3) 2 (4) 3

Q.50 If x is real, the expression $\frac{x^2+2x-11}{x-3}$ takes all real values except those which lie between a and b, then a and b are :

(1) –12, –4 (2) –12, 12

(3) 4, 12 (4) –4, 4

Q.51 If $x^3 - 6x^2 + 11x - 6 > 0$ then x lies in the interval

(1) [1,4]

(2) (1, 2) ∪ [3, ∞)

(3) (– ∞, –1] ∪ [4, ∞)

(4) None of these

Q.52 Solve the inequality if f(x) =

$$\frac{(x-2)^{10}(x+1)^3\left(x-\frac{1}{2}\right)^5(x+8)^2}{x^{24}(x-3)^3(x+2)^5} < 0.$$

(1) $x \in (-1, 0) \cup \left(0, \frac{1}{2}\right) \cup (3, \infty)$

(2) $x \in (-3, 0) \cup \left(0, \frac{1}{2}\right) \cup (3, 8)$

(3) $x \in (-2, -1) \cup \left(\frac{1}{2}, 2\right) \cup (2, 3)$

(4) None of these

Q.53 If $\sqrt{9x^2+6x+1} < (2-x)$, then

(1) $x \in \left(-\frac{3}{2}, \frac{1}{4}\right)$ (2) $x \in \left[-\frac{3}{2}, \frac{1}{4}\right)$

(3) $x \in \left(-\frac{3}{2}, \frac{1}{4}\right]$ (4) $x < \frac{1}{4}$

Q.54 If $\sqrt{x-4} \geq \sqrt{x-8}$, then

(1) $x \in [4, \infty)$ (2) $x \in (4, \infty)$

(3) $x \in (8, \infty)$ (4) $x \in [8, \infty)$

LOG INEQUALITIES, CHARACTERSTIC AND MENTISSA

Q.55 The set of real values of *x* satisfying $\log_{1/2}(x^2 - 6x + 12) \geq -2$ is

(1) $(-\infty, 2]$ (2) [2,4]

(3) $[4, +\infty)$ (4) None of these

Q.56 The set of real values of *x* for which $2^{\log_{\sqrt{2}}(x-1)} > x + 5$ is

(1) $(-\infty, -1) \cup (4, +\infty)$ (2) $(4, +\infty)$

(3) $(-1, 4)$ (4) None of these

Q.57 If $\log_{0.04}(x-1) \geq \log_{0.2}(x-1)$ then *x* belongs to the interval

(1) $(1, 2]$ (2) $(-\infty, 2]$

(3) $[2, +\infty)$ (4) None of these

Q.58 The set of real values of *x* for which $\log_{0.2}\frac{x+2}{x} \leq 1$ is

(1) $\left(-\infty, -\frac{5}{2}\right] \cup (0, +\infty)$

(2) $\left[\frac{5}{2}, +\infty\right)$

(3) $(-\infty, -2) \cup (0, +\infty)$

(4) None of these

Q.59 The least positive integer x, which satisfies the inequality $\log_{\log_2\left(\frac{x}{2}\right)}(x^2 - 10x + 22) > 0$ is equal to

(1) 3 (2) 4 (3) 7 (4) 8

Q.60 Complete set of solution of equation $\frac{\log_{0.3}(x-2)}{|x|} \geq 0$

(1) [1, 2) ∪ (2, 3] (2) [1, 3]

(3) (2, 3] (4) {1}

ANSWER KEY

TOPIC WISE QUESTIONS

Qus.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans.	1	1	1	3	4	3	1	4	2	4	2	2	2	1	4
Qus.	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Ans.	2	2	2	2	4	4	2	1	4	1	3	2	1	2	3
Qus.	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
Ans.	2	3	4	4	3	4	2	3	2	1	3	1	3	2	4
Qus.	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Ans.	1	3	4	4	3	4	3	1	4	2	2	3	1	4	3