PRACTICE TEST ON LOGARITHM

PART–A

[SINGLE CORRECT CHOICE TYPE]

Q.1 to Q.9 has four choices (A), (B), (C), (D) out of which **ONLY ONE** is correct. **[9 × 3 = 27]**
There is **NEGATIVE** marking. **One mark** will be deduct for each wrong answer.

Q.1 A circle has a radius of $\log_{10}(a^2)$ and a circumference of $\log_{10}(b^4)$. The value of $\log_a b$ is equal to

(A) $\frac{1}{4\pi}$ (B) $\frac{1}{\pi}$ (C*) π (D) 2π

Q.2 Greatest integer less than or equal to the number $\log_2 15 \cdot \log_{1/6} 2 \cdot \log_3 1/6$ is

(A) 1 (B*) 2 (C) 3 (D) 4

Q.3 If $5x^{\log_2 3} + 3^{\log_2 x} = 162$ then logarithm of x to the base 0.125 has the value equal to

(A*) – 1 (B) 1 (C) 2 (D) 3/2

Q.4 If $x = \log_9 14$ and $y = \log_{27} 196$ then $y = kx$ where k equals

(A) 1/3 (B) 3/4 (C) 3 (D*) 4/3

Q.5 The ratio $\frac{2^{\log_{2^{1/4}} a} - 3^{\log_{27}\left(a^2+1\right)^3} - 2a}{7^{4\log_{49} a} - a - 1}$ simplifies to

(A) $a^2 - a - 1$ (B) $a^2 + a - 1$ (C) $a^2 - a + 1$ (D*) $a^2 + a + 1$

Q.6 If $(21.4)^a = (0.00214)^b = 100$, then the value of $\frac{1}{a} - \frac{1}{b}$ is

(A) rational which is not integral (B*) prime
(C) irrational (D) composite

Q.7 The value of x satisfying the equation $2^{\log_3 x} + 8 = 3 \cdot x^{\log_9 4}$, is

(A) irrational number. (B) odd prime number.
(C*) relatively prime with 4. (D) rational number which is not an integer.

Q.8 The sum of all y such that $1 = 6\log_y 3 - \log_3 y$, is

(A*) $\frac{244}{27}$ (B) $\frac{244}{9}$ (C) – 1 (D) 1

Q.9 Find the sum of all values of $x > 0$ for which $(\log_{27} x^3)^2 = \log_{27} x^6$.

(A) 5 (B) 9 (C*) 10 (D) 1

[MULTIPLE CORRECT CHOICE TYPE]

Q.10 to Q.13 has four choices (A), (B), (C), (D) out of which **ONE OR MORE** may be correct. **[4 × 4 = 16]**
There is **NO NEGATIVE** marking.

Q.10 The equation $\log_{x^2} 16 + \log_{2x} 64 = 3$ has

(A*) one irrational solution
(B*) no prime solution
(C*) two real solutions
(D*) one integral solution

Q.11 Which of the following when simplified reduces to unity.

(A*) $\log_{10}\sqrt{5^{\log_5 8^2} + 7^{\log_7 6^2}}$
(B*) $\log_{1/2}(\log_3 \cos 30^\circ - \log_3 \sin 30^\circ)$
(C) $\dfrac{\left(5\sqrt{3}+\sqrt{50}\right)\left(5+\sqrt{24}\right)}{\sqrt{75}-5\sqrt{2}}$
(D*) $\left(\log_{697} 17 + \log_{697} 41\right)$

Q.12 Which of the following vanishes ?

(A*) $\log \tan 1^\circ \,.\, \log \tan 2^\circ \,.\, \log \tan 3^\circ \,.....\, \log \tan 87^\circ$
(B) $\log_2(\log 100)$
(C*) $\log \sin 1^\circ \,.\, \log \sin 2^\circ \,.\, \log \sin 3^\circ \,.....\, \log \sin 90^\circ$
(D*) $\log \tan 1^\circ + \log \tan 2^\circ + \log \tan 3^\circ + ... + \log \tan 89^\circ$.

Q.13 Which of the following real numbers is(are) non-positive ?

(A*) $\log_{\frac{1}{2}}\left(\dfrac{2+\sqrt{3}}{2-\sqrt{3}}\right)$
(B*) $\log_2\left(\log_5 3 \cdot \log_7 5 \cdot \log_3 7\right)$
(C*) $\log_7\left(\dfrac{3}{2}\right)^{\frac{-2}{3}}$
(D) $\log_{12}\left(\sqrt{65}-7\right)$

PART–B

[MATRIX TYPE]

Q.1 and **Q.2** has **three/four** statements (A, B, C **or** A, B, C, D) given in **Column-I** and **four/five** statements (P, Q, R, S **or** P, Q, R, S, T) given in **Column-II**. Any given statement in **Column-I** can have correct matching with one or more statement(s) given in **Column-II**.

[3 + 3 + 3 = 9]

Q.1

COLUMN-I	**COLUMN-II**
(A) If $x = \dfrac{\sqrt{10}+\sqrt{2}}{2}$ and $y = \dfrac{\sqrt{10}-\sqrt{2}}{2}$, then the value of $\log_2(x^2+xy+y^2)$, is equal to	(P) 4
(B) $\sqrt[3]{5^{\frac{1}{\log_7 5}} + \dfrac{1}{\sqrt{-\log_{10}(0.1)}}}$ simplifies to	(Q) 3
(C) The expression $\dfrac{\left(\log_{\frac{a}{b}} p\right)^2 + \left(\log_{\frac{b}{c}} p\right)^2 + \left(\log_{\frac{c}{a}} p\right)^2}{\left(\log_{\frac{a}{b}} p + \log_{\frac{b}{c}} p + \log_{\frac{c}{a}} p\right)^2}$, wherever defined, simplifies to	(R) 2
	(S) 1

[Ans. (A) Q ; (B) R ; (C) S]

[3+3+3+3 = 12 + 1 Bonus mark]

Q.2

	Column-I		**Column-II**
(A)	$(0.01)^{\log_{10}\left(\frac{1}{5}\right)-\frac{1}{2}}$ is	(P)	positive
(B)	$\log_3\left(\sqrt{73}-8\right)$ is	(Q)	negative
(C)	$\log(\log 10)$ is	(R)	irrational
(D)	$\left(\frac{1}{3}\right)^{\log_9 2-3}$ is	(S)	integer

[Ans. (A) P, S; (B) Q, R ; (C) S ; (D) P, R]

PART–C

[INTEGER TYPE]

Q.1 to Q.5 are "Integer Type" questions. (The answer to each of the questions **are upto 4 digits**)**[5 × 5 = 25]**

Q.1 If $\log_x y+\log_y x=\frac{29}{10}$ and $xy=128$, find $(x+y)$.

[Ans. 36]

Q.2 If p is the smallest value of x satisfying the equation $2^x+\frac{15}{2^x}=8$ then find the value of 4^p.

[Ans. 0009]

Q.3 Let L denotes the value of a satisfying the equation $\log_{\sqrt{8}}(a)=\frac{10}{3}$

and M denotes the value of b satisfying the equation $4^{\log_9 3}+9^{\log_2 4}=10^{\log_b 83}$. Find $(L+M)$

[Ans. 42]

Q.4 If α, β are the roots of the equation $x^2-\left(3+2^{\sqrt{\log_2 3}}-3^{\sqrt{\log_3 2}}\right)x-2\left(3^{\log_3 2}-2^{\log_2 3}\right)=0$

then find $2(\alpha+\beta)-\alpha\beta$.

[Ans. 0004]

Q.5 Given $\log_2(\log_8 x)=\log_8(\log_2 x)$ then find the value of $(\log_2 x)^2$.

[Ans. 27]