লগারিদম

Md. Labu Miah

Instructor, P2A

বিগত বিসিএস এর প্রশ্ন বিশ্লেষণ

- $\log_{\sqrt{x}} 8 = 3\frac{1}{3}$ হলে x এর মান কত? [৪৬তম বিসিএস]
- যদি $\log\left(\frac{a}{b}\right) + \log\left(\frac{b}{a}\right) = \log(a+b)$ হয়, তবে- [৪৫তম বিসিএস]
- $2\log_{10} 5 + \log_{10} 36 - \log_{10} 9 = ?$ [৪৪তম বিসিএস]
- $2^{\log_2 3 + \log_2 5}$ [৪৩তম বিসিএস]
- $\log_x \frac{1}{9} = -2$ হলে, x এর মান কত? [৪২তম বিসিএস]
- $\log_2 \log_{\sqrt{e}} e^2 = ?$ [৪১তম বিসিএস]
- কোন শর্তে $\log \frac{1}{a} = 0$ [৪০তম বিসিএস]
- $\log_x \frac{1}{8} = -2$ হলে, x এর মান কত? [৩৮তম বিসিএস]
- $\log_x \frac{3}{2} = -\frac{1}{2}$ হলে, x এর মান কত? [৩৭তম বিসিএস]

$\log_a 1 = 0$

বিগত বিসিএস এর প্রশ্ন বিশ্লেষণ

- $\log_{\sqrt{3}} 81 =$ কত? [৩৬তম বিসিএস]
- $\log_a x = 1, \log_a y = 2$ এবং $\log_a z = 3$ হলে, $\log_a \frac{x^3 y^2}{z}$ এর মান কত? [৩৫তম বিসিএস]

$$2^3 = 8$$

$$2^{\square} = 8$$

(*) 2 কে পাওয়ার কত হলে 8 হবে? Ans: 3

$$\log_2 8 = 3$$

$\Rightarrow \log_2 16 = 4$ — ঘাত/ ঘাতাঙ্ক

$$a^x = N$$

$$\log_a N = x$$

$$a^x = N$$

$$a^x = N \rightarrow \log_a N = x$$

$$\log_a N = x \qquad a > 0,\ a \neq 1$$

{ লগারিদমে 1 ভিত্তি কখনো ব্যবহার
করা হয়। }

$\log_{-2} x = \frac{1}{2}$

$(-2)^{\frac{1}{2}} = x$

$\sqrt{-2} = x$

$\log_0 x = 5$

$0^5 = x$

0

$$\log_{1} 4 = \boxed{}$$

$$\log_{a} x$$

x — [illegible]

a → ভিত্তি

$$\boxed{a > 0,\ a \neq 1}$$

$\log_{\textcircled{0}} \textcircled{x}$

$x > 0$

$\log_{\textcircled{2}} \textcircled{8}$

$(2)^{\square} = \textcircled{8}$

$(2)^{-2} = \frac{1}{2^{\square}} = \textcircled{\frac{1}{4}}$

$$a^{x} = N \rightarrow \log_a N = x$$

$a > 0,\ a \neq 1$

$N > 0$

$\log_a N = x$

N এর a নিরপেক্ষ নয়

$\because a = 2^3$

$\because b = 2^4$

$ab = 2^3 \times 2^4 = 2^{3+4} = 2^{7}$ $\because$

$\because \log_2 ab = \log_2 2^7 = 7 = 3+4$

$= \log_2 a + \log_2 b$

$\log_2 a = \log_2 2^3 = 3$

$\log_2 b = \log_2 2^4 = 4$

$$\log_2 a \times b = \log_2 a + \log_2 b$$

$$2^3 \times 2^4 = 2^{3+4} = 2$$

$$\log_2 \frac{a}{b} = \log_2 a - \log_2 b$$

$\log_a 1 = 0$

$a^0 = 1$

$2^{\square} = 2$

$\log_2 2 = 1$

$$\log_a b^{3} = \log_a (b \times b \times b) = \log_a b + \log_a b + \log_a b$$

$$= 3 \log_a b$$

$$b^3 = b \times b \times b$$

$$\Rightarrow \log_a b^n = n \log_a b$$

$$\log_4 16 = 2$$

$$\log_{16} 4 = \frac{1}{2}$$

$$\sqrt{16} = 4$$

$$16^{\frac{1}{2}} = 4$$

$$1 \Big/ \log_4 16$$

$$\log_a b = \frac{1}{\log_b a}$$

$$\log_a b^{(n)} = n \log_a b$$

$$\log_{16} 4 = \frac{1}{2}$$

$$\log_{(4^2)} 4 = \frac{1}{\log_4 4^{(2)}} = \frac{1}{2 \log_4 4}$$

$$=$$

$$\log_{a^3} b = \frac{1}{\frac{1}{3}\log_b a} = \frac{1}{3\log_b a}$$

$$= \frac{1}{3} \times \frac{1}{\log_b a}$$

$$= \frac{1}{3} \times \log_a b$$

$$\log_a b^m = m \log_a b$$

$$\log_{a^m} b = \frac{1}{m} \log_a b$$

shaiwn

$$\log_{I} S = \log_{R} S \times \log_{I} R$$

$$\log_2 64 = 6$$

$$\log_{\textcircled{2}} 64 = \log_{\textcircled{4}} 64 \times \log_2 4$$

$$\textcircled{6} = \textcircled{3} \times 2$$

$$\log_{\text{Jahan}} \text{Abir} = \log_{\text{pori}} \text{Abir} \times \log_{\text{Jahan}} \text{pori}$$

$$\log_a b = \log_m b \times \log_a m$$

$$= \log_m b \times \frac{1}{\log_m a}$$

$$\log_a b = \frac{\log_m b}{\log_m a} = \frac{\log b}{\log a}$$

$$\log_a b = \frac{\log b}{\log a}$$

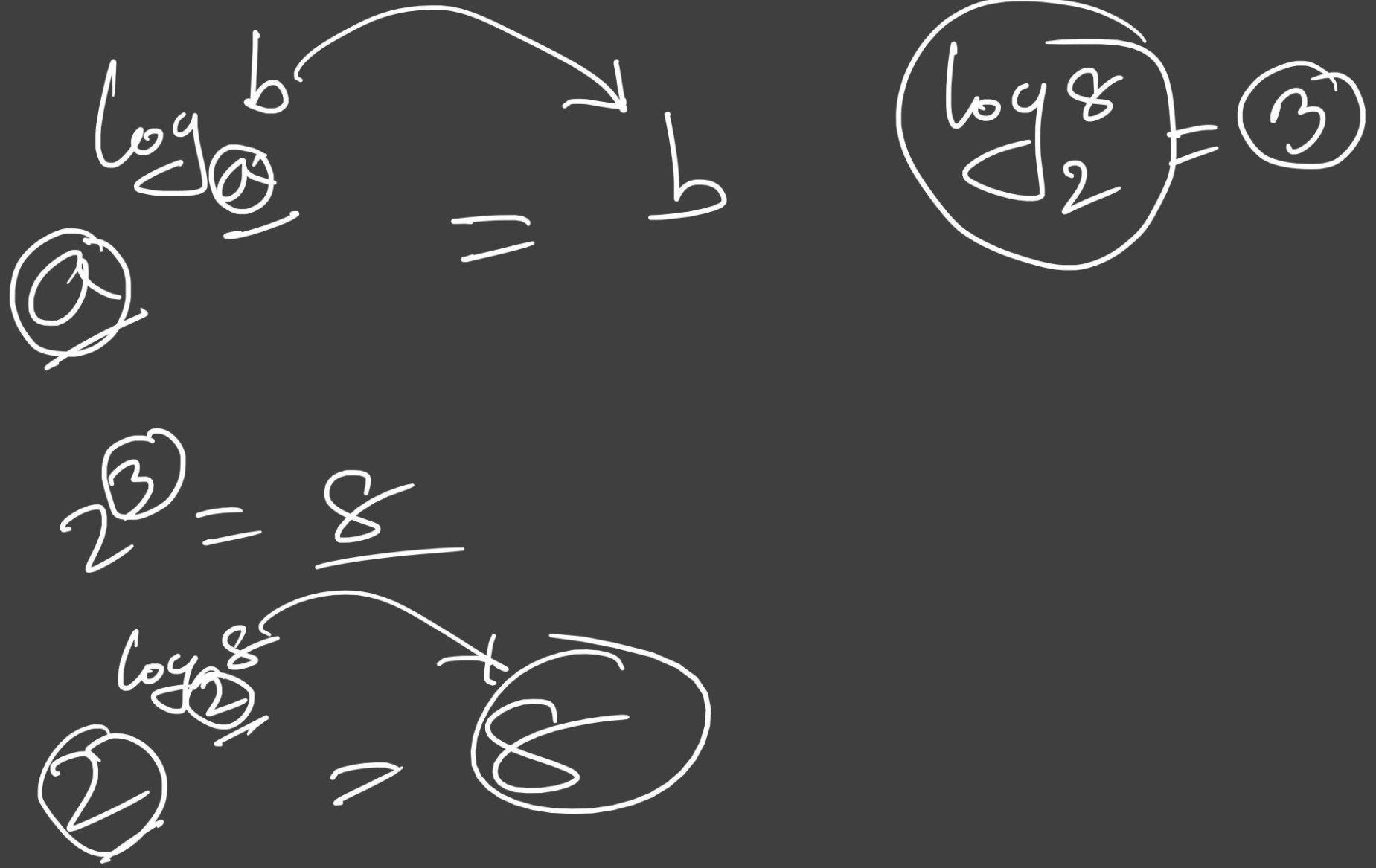
$2^3 = 8$

$\log_2 8 = 3$

$2^3 = 8$

$\log_2 8$

2


$\log_a b$
$= b$
$\log_2 8 = 3$
$2^3 = 8$
$\log_2 8$
$= 8$

$$\log_4 64 = 3 \qquad \log_4 2 = \frac{1}{2}$$

$$2^{\log_4 64} = 2^3 = 8$$

$$64^{\log_4 2} = (64)^{\frac{1}{2}} = \sqrt{64} = 8$$

$$x^{\log_a y} = y^{\log_a x}$$

③ $9^{\log_9 2} = 2^{\log_9 3}$

$= 2^{\frac{1}{2}}$

লগারিদমের সূত্রাবলি

- যদি $a^x = N\ (a > 0, a \neq 1)$ হলে, $x = \log_a N$ [যেখানে $N \geq 0$]
- $\log_a(m \times n) = \log_a m + \log_a n$
- $\log_a\left(\frac{m}{n}\right) = \log_a m - \log_a n$
- $\log_a m^n = n \log_a m$
- $\log_a m = \log_b m \times \log_a b$
- $\log_a m = \frac{\log m}{\log a}$

লগারিদমের সূত্রাবলি

- $a^{\log_a b} = b$
- $\log_a a = 1$
- $\log_a 1 = 0$
- $\log_a b = x$ হলে, $a^x = b$
- $x^{\log_a y} = y^{\log_a x}$
- $\log_{a^n} b^m = \frac{m}{n} \log_a b$

$\log_a b = x$

$a^x = b$

Type-1

মান নির্ণয়

$\log_3 81 =$ কত? 4

$\log_3 81 = \log_3 3^4 = 4 \log_3 3$

$= 4 \times 1 = 4$

$\log_{\sqrt{3}} 81 =$ কত? 8

$3^4 = 81$

$\{(\sqrt{3})^2\}^4 = 81$

$(\sqrt{3})^8 = 81$

$\log_{\sqrt{3}} 81 =$ কত?

$$\log_2 \frac{1}{32} = ?$$

$$\frac{1}{32} = \frac{1}{2^5}$$

$$\log_2 2^{-5} = -5$$

$$= 2^{-5}$$

$3\sqrt{3}$ এর 3 ভিত্তিক লগ কত?

$$\log_3 3\sqrt{3} = \log_3 3^{3/2} = 3/2$$

$$3\sqrt{3} = 3 \cdot 3^{\frac{1}{2}} = 3^{1+\frac{1}{2}} = 3^{3/2}$$

$\log_8 2 = ?$

$$\log_{2^3} 2 = \frac{1}{3} \log_2 2$$

$$= \frac{1}{3}$$

$\log_{2\sqrt{5}} 20 = ?$ (2)

$(2\sqrt{5})^1 = 2\sqrt{5}$

$(2\sqrt{5})^2 = 4 \times 5$

$= 20$

$$\log_5 \sqrt{5} = ?$$

(H.W)

$$\log_{3\sqrt{2}} \frac{1}{324} = ?$$

-4

$$(3\sqrt{2})^2 = 9 \times 2 = 18$$

$$(3\sqrt{2})^4 = 81 \times 4 = 324$$

$$\log_{3\sqrt{2}} 324 = 4$$

$\log_3 243 =$ কত?

(H.W)

$\log_7 343 =$ কত?

$log_5 \sqrt[3]{5} =$ কত?

$$\log_{10} 0.001 = ?$$

$\log_5(\sqrt[3]{5} \cdot \sqrt{5}) = ?$

$\sqrt[3]{5} \cdot \sqrt{5}$

$= 5^{\frac{1}{3}} \cdot 5^{\frac{1}{2}}$

$= 5^{\frac{1}{3}+\frac{1}{2}}$

$= 5^{\frac{5}{6}}$

$\log_5 5^{5/6} = 5/6$

$$\log_2 \log_{\sqrt{e}} e^2 = ?$$

$\log_2 \boxed{\log_{\sqrt{e}} e^2}$

$\log_{\sqrt{e}} e^2 = 4$

$\Rightarrow \log_2 4 = 2$

$2^{\log_2 3+\log_2 5}$ এর মান কত?

$$2^{(\log_2 3 + \log_2 5)}$$

$$2^{\log_2 (3\times 5)}$$

$$= 3\times 5 = 15$$

Type-2

log এর সমাধান

$\log_{10} x^x = 3$ হলে, x এর মান কত?

$10^3 = x$

$x = 1000$

$\log_{10} x = 3$

$10^3 = x$

$\log_{12} x = 4$ হলে, x এর মান কত?

$12^4 = x$

$\log_x 4 = 2$ হলে, x এর মান কত?

$x^2 = 4$

$x^2 = (\pm 2)^2$

$x = 2$

$x = 2$

$x^2 = 4$

$x = \pm 2$

২১ / ৭

$\log_x 144 = 4$ হলে, x এর মান কত?

$x^4 = 144$

$x^4 = (\sqrt{12})^4$

$x = \sqrt{12}$

$\log_{2\sqrt{5}} 400 = x$ হলে x এর মান কত?

$4 = n$

$(2\sqrt{5})^2 =$ 

$(2\sqrt{5})^4 = 400$

$(2\sqrt{5})^6$

$\log_x\left(\frac{1}{27}\right) = 3$ হলে, x এর মান কত?

$\log_2 \frac{1}{8} = -3$

$x^3 = \frac{1}{27}$

$x^3 = \frac{1}{3^3} = \left(\frac{1}{3}\right)^3$

$x^3 = \left(\frac{1}{3}\right)^3 \Rightarrow x = \frac{1}{3}$

$\log_x \frac{1}{81} = -4$ হলে, x এর মান কত?

$\log_x \frac{3}{2} = -\frac{1}{2}$ হলে x এর মান কতো?

$\log_{\sqrt{8}} x = 3\frac{1}{3}$ হলে x এর মান কত?

$\log_{\sqrt{8}} x = \frac{10}{3}$

$(\sqrt{8})^{\frac{10}{3}} = x$

$\left(\sqrt{2^3}\right)^{\frac{10}{3}} = x$

$2^{\frac{3}{2} \times \frac{10}{3}} = x$

$2^5 = 32 = x$

$\log_a x = 1$, $\log_a y = 2$ এবং $\log_a z = 3$ হলে, $\log_a \frac{x^3 y^2}{z} = ?$

$a^1 = x$ $\quad a^2 = y$ $\quad a^3 = z$

$$\log_a \frac{x^3 y^2}{z} = \log_a \frac{a^3 \cdot (a^2)^2}{a^3}$$

$$\log_a a^4 = 4$$

$\log_x \frac{1}{9} = -2$ হলে, x এর মান কতো?

(মা.বো)

Type-3

Log এর সরলীকরণ

$3\log 2 + \log 5 = ?$

$\log 2^3 + \log 5$

$= \log 8 + \log 5$

$= \log 8 \times 5 \quad = \log 40$

$$\log_2 64 + \log_2 8 = ?$$

$$6 + 3 = 9$$

$$\log_{\sqrt{2}} 4 \times \log_{\sqrt{3}} 3 = ?$$

$4 \times 2 = 8$

$(\sqrt{2})^1 = \sqrt{2}$

$(\sqrt{2})^2 = 2$

$(\sqrt{2})^4 = 4$

$(\sqrt{3})^2 = 3$

$$2\log_{10} 5 + \log_{10} 36 - \log_{10} 9 = ?$$

$$\log_{10} 25 + \log_{10} 36 - \log_{10} 9$$

$$\log_{10} \frac{25 \times 36^{4}}{9} = \log_{10} 100 = 2$$

$$\log_2 \sqrt{6} + \log_2 \sqrt{\frac{2}{3}} = ?$$

$$\log_2 \sqrt{6} \times \sqrt{\frac{2}{3}}$$

$$= \log_2 \sqrt{6 \times \frac{2}{3}} = \log_2 \sqrt{4} = \log_2 2 = 1$$

$$\frac{\log 36}{\log 6} = \text{কত?}$$

$$\sqrt{6} \times \sqrt{2} = \sqrt{6 \times 2}$$

$$= \sqrt{12}$$

$$\frac{\log 6^2}{\log 6} = \frac{2 \log 6}{\log 6} = 2$$

$\log_2 \log_2 \log_2 16 =$ কতো?

$\log_2 \log_2 \log_2 16 = 4$

$= \log_2 \log_2 4 = 2$

$= \log_2 2$

$= 1$

$$\log\frac{a^3b^3}{c^3}+\log\frac{b^3c^3}{d^3}+\log\frac{c^3d^3}{a^3}-3\log b^2c=?$$

$$\log\frac{a^3b^3}{c^3}\times\frac{b^3c^3}{d^3}\times\frac{c^3d^3}{a^3}-\log(b^2c)^3$$

$$\log b^6c^3-\log b^6c^3=\log\frac{b^6c^3}{b^6c^3}$$

$$=\log 1=0$$

Type-4

বিবিধ

$log_7(\sqrt[5]{7}.\sqrt{7}) - log_3 \sqrt[3]{3} + log_4 2 =$ কতো?

(উ-৩)

$\log(a^a . b^b . c^c) = 0$ হলে $a^a . b^b . c^c = ?$

Ⓟ

$- P^0 = = a^a . b^b . c^c = 1$

$\log_a b \times \log_b c \times \log_c d$ = কতো?

$$\frac{\log b}{\log a} \times \frac{\log c}{\log b} \times \frac{\log d}{\log c}$$

$$\Rightarrow \frac{\log d}{\log a} = \log_a d$$

$\log_{\sqrt{a}} b \log_{\sqrt{b}} c \log_{\sqrt{c}} a$ এর মান কতো?

$\frac{\frac{1}{1}}{\frac{1}{2}} = 1 \times \frac{2}{1}$

$= 2$

$\frac{\log b}{\frac{1}{2}\log a} \times \frac{\frac{1}{2}\log c}{\frac{1}{2}\log b} \times \frac{\frac{1}{2}\log a}{\frac{1}{2}\log c}$

$\Rightarrow \frac{2}{\frac{1}{2}} \times \frac{1}{\frac{1}{2}} \times \frac{1}{\frac{1}{2}} = 2 \times 2 \times 2$

$= 8$

$\log_a \log_a \log_a (a^{a^{a^b}})$ = কতো?

$\log_a a^{a^{a^b}}$

$\log_a a^b = b$

$\log_a (a^{a^{a^b}}) = a^{a^b}$

$\log_a (a^b) = b$

$$\log_k \frac{a^n}{b^n} + \log_k \frac{b^n}{c^n} + \log_k \frac{c^n}{a^n} = \text{কতো?}$$

$$\log_k \frac{a^n}{b^n} \times \frac{b^n}{c^n} \times \frac{c^n}{a^n} = \log_k 1 = 0$$

$p = \log_a(bc)$ হলে, $p + 1 =$?

$\log_a a = 1$

$p + 0$

$\Rightarrow \log_a bc + \log_a a$

$\Rightarrow \log_a abc$

Thank You