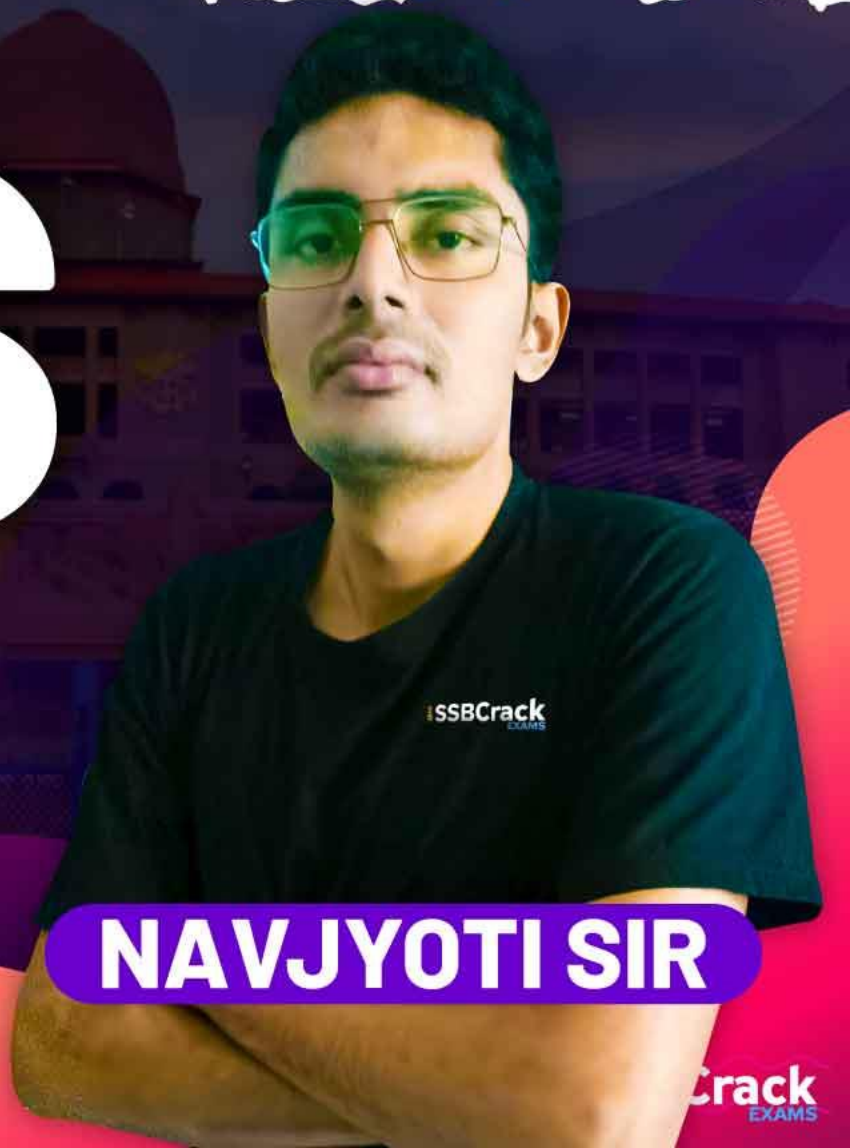
NDA 2 2024

LIVE

MATHS

LOGARITHMS



NAVJYOTI SIR

Crack
EXAMS

10 July 2024 Live Classes Schedule

8:00AM	10 JULY 2024 DAILY CURRENT AFFAIRS	RUBY MA'AM
9:00AM	10 JULY 2024 DAILY DEFENCE UPDATES	DIVYANSHU SIR

SSB INTERVIEW LIVE CLASSES

9:00AM	OVERVIEW OF GTO	ANURADHA MA'AM

NDA 2 2024 LIVE CLASSES

1:00PM	GS - PHYSICS - CLASS 9	NAVJYOTI SIR
4:00PM	MATHS - LOGARITHMS	NAVJYOTI SIR
5:30PM	ENGLISH - USAGE OF PAIRED WORDS - CLASS 2	ANURADHA MA'AM

CDS 2 2024 LIVE CLASSES

1:00PM	GS - PHYSICS - CLASS 9	NAVJYOTI SIR
5:30PM	ENGLISH - USAGE OF PAIRED WORDS - CLASS 2	ANURADHA MA'AM

SSBCrack EXAMS

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SSBCrack EXAMS

LOGARITHMS

$2^x = 8 \Rightarrow x = 3$

$2^x = 5 \Rightarrow$ (to find values of x, log is used)

$a^m = b$

$\log_a b = m$

(what power of a is b – ?)

$\log_a a^b = b$

$4^3 = 64$

$\log_4 64 = 3$

$\log_6 216 = 3$

$\log_{10} 100 = 2$

$\log_{10}\left(\frac{1}{100}\right) = \log_{10}(10^{-2})$

$= -2$

$\log_{10}(0.001) = -3$

SSBCrack EXAMS

PROPERTIES

log of zero and negative numbers is not defined.

$\log_a b$, $b > 0$ (non-negative)

Base of log is always positive but not equal to 1.

$a > 0$, $a \neq 1$

(1) $\log_m(a \cdot b) = \log_m a + \log_m b$

($\log_m a + \log_m b$; $\log_m a \cdot \log_m b$ no formulas)

$\log_1 4 =$ (no power of 1 is 4, all are 1)

(2) $\log_m\left(\frac{a}{b}\right) = \log_m(a) - \log_m(b)$

SSBCrack EXAMS

PROPERTIES

(3) $\log_m (a^b) = b \log_m a$

(4) $\log_b a = \dfrac{\log_m a}{\log_m b}$ (base change)

(5) $\log_b a = \dfrac{1}{\log_a b}$

SSBCrack EXAMS

If $f(x) = \log_{10}(1 + x)$, then what is $4f(4) + 5f(1) - \log_{10} 2$ equal to ?

A. 0

B. 1

C. 2

D. 4 ✓

$f(4) = \log_{10}(1+4) = \log_{10} 5$

$f(1) = \log_{10}(1+1) = \log_{10} 2$

$\log_m m = 1$

$4\log_{10} 5 + 5\log_{10} 2 - \log_{10} 2$

$4\log_{10} 5 + 4\log_{10} 2$

$4(\log_{10} 5 + \log_{10} 2) = 4\log_{10}(5 \times 2) = 4\log_{10}(10^1)$

$= 4 \times 1 = 4$

If $f(x) = \log_{10}(1 + x)$, then what is $4f(4) + 5f(1) - \log_{10} 2$ equal to ?

A. 0

B. 1

C. 2

D. 4

SSBCrack EXAMS

What is the value of $\log_7 \log_7 \sqrt{7\sqrt{7\sqrt{7}}}$?

A. $3\log_2 7$

B. $1 - 3\log_2 7$

C. $1 - 3\log_7 2$

D. $\frac{7}{8}$

$\sqrt{7\sqrt{7}} = \sqrt{7^1 \cdot 7^{\frac{1}{2}}} = \sqrt{7^{3/2}} = \left(7^{3/2}\right)^{\frac{1}{2}} = 7^{3/4}$

$\sqrt{7 \cdot 7^{\frac{3}{4}}} = \sqrt{7^{1+\frac{3}{4}}} = \left(7^{\frac{7}{4}}\right)^{\frac{1}{2}} = 7^{\frac{7}{8}}$

$\log_7 \log_7 \left(7^{\frac{7}{8}}\right)$ — $\log_m (a^b) = b \log_m a$

$\log_7 \left(\frac{7}{8} \log_7 (7)\right)$

$\log_m \left(\frac{a}{b}\right) = \log_m a - \log_m b$

$\log_7 \left(\frac{7}{8} \times 1\right) = \log_7 \left(\frac{7}{8}\right) = \log_7 (7) - \log_7 (8) = 1 - \log_7 (2^3)$

$1 - 3\log_7 2$

SSBCrack EXAMS

What is the value of $\log_7 \log_7 \sqrt{7\sqrt{7\sqrt{7}}}$?

A. $3\log_2 7$

B. $1 - 3\log_2 7$

C. $1 - 3\log_7 2$

D. $\frac{7}{8}$

SSBCrack EXAMS

What is the value of $\log_9 27 + \log_8 32$?

A. 7/2

B. 19/6

C. 4

D. 7

$$\frac{\log_3 27}{\log_3 9} + \frac{\log_2 32}{\log_2 8}$$

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

$$= \frac{9 + 10}{6} = \frac{19}{6}$$

$$(\log_a b) = \left(\frac{\log_m b}{\log_m a}\right)$$

SSBCrack EXAMS

What is the value of $\log_9 27 + \log_8 32$?

A. 7/2

B. 19/6

C. 4

D. 7

SSBCrack EXAMS

If $(0.2)^x = 2$ and $\log_{10} 2 = 0.3010$, then what is the value of x to the nearest tenth ?

A. – 10.0

B. – 0.5

C. – 0.4

D. – 0.2

$(0.2)^x = 2$

Apply $\log_{10}$ both sides,

$\log_{10}(0.2)^x = \log_{10} 2$

$x \log_{10}(0.2) = \log_{10} 2$

$x \log_{10}\left(\frac{2}{10}\right) = \log_{10} 2$

$x(\log_{10} 2 - \log_{10} 10) = \log_{10} 2$

$x(\log_{10} 2 - 1) = \log_{10} 2$

$x = \frac{\log_{10} 2}{\log_{10} 2 - 1} = \frac{0.3010}{0.3010 - 1}$

$\simeq \frac{0.3}{-0.7} \simeq -\frac{3}{7}$

-0.42

$\simeq -0.4$

SSBCrack EXAMS

If $(0.2)^x = 2$ and $\log_{10} 2 = 0.3010$, then what is the value of x to the nearest tenth ?

A. – 10.0

B. – 0.5

C. – 0.4

D. – 0.2

SSBCrack EXAMS

If n = (2017)!, then what is $\frac{1}{\log_2 n}+\frac{1}{\log_3 n}+\frac{1}{\log_4 n}+\ldots+\frac{1}{\log_{2017} n}$ equal to ?

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

A. 0

B. 1

C. n / 2

D. n

$\log_n 2 + \log_n 3 + \log_n 4 + \ldots \log_n 2017$

$\log_n (2 \cdot 3 \cdot 4 \cdot \ldots 2017)$

$\log_n (1 \cdot 2 \cdot 3 \cdot 4 \ldots 2017) = \log_{2017!} (2017!) = 1$

SSBCrack EXAMS

If n = (2017)!, then what is $\frac{1}{\log_2 n} + \frac{1}{\log_3 n} + \frac{1}{\log_4 n} + \ldots + \frac{1}{\log_{2017} n}$ equal to ?

A. 0

B. 1

C. n / 2

D. n

SSBCrack EXAMS

If $x + \log_{15}(1 + 3^x) = x\log_{15} 5 + \log_{15} 12$, where x is an integer, then what is x equal to ?

A. – 3

B. 2

C. 1

D. 3

$\log_{15} 15^x + \log_{15}(1+3^x) = \log_{15} 5^x + \log_{15}(12)$

$\log_{15}(15^x(1+3^x)) = \log_{15}(12 \cdot 5^x)$

removable

$= 15^x(1+3^x) = 12 \cdot 5^x$

$\Rightarrow \frac{15^x}{5^x}(1+3^x) = 12$

$3^x(1+3^x) = 12$

$3^x + 3^{2x} = 12$

$x = 1$ satisfying

SSBCrack EXAMS

If $x + \log_{15}(1 + 3^x) = x\log_{15} 5 + \log_{15} 12$, where x is an integer, then what is x equal to ?

A. -3

B. 2

C. 1

D. 3

SSBCrack EXAMS

For what value(s) of x is $\log_{10}\{999 + \sqrt{x^2 - 3x + 3}\} = 3$?

A. 0 , 1

B. 1

C. 2

D. 1 , 2 ✓

$\log_{10}\left(999 + \sqrt{x^2 - 3x + 3}\right) = \log_{10} 10^3$

$999 + \sqrt{x^2 - 3x + 3} = 10^3$

$\sqrt{x^2 - 3x + 3} = 1000 - 999 = 1$

Squaring, —

$x^2 - 3x + 2 = 0$

$(x-1)(x-2) = 0$

$x = 1, 2$

SSBCrack EXAMS

For what value(s) of x is $\log_{10}\{999 + \sqrt{x^2 - 3x + 3}\} = 3$?

A. 0 , 1

B. 1

C. 2

D. 1 , 2

SSBCrack EXAMS

$$\frac{1}{(\log_a bc)+1}+\frac{1}{(\log_b ac)+1}+\frac{1}{(\log_c ab)+1}$$ is equal to

A. 1

B. 2

C. 0

D. abc

$$\frac{1}{\log_a bc+\log_a a}+\frac{1}{\log_b ac+\log_b b}+\frac{1}{(\log_c ab)+\log_c c}$$

$$\frac{1}{\log_a (abc)}+\frac{1}{\log_b (abc)}+\frac{1}{\log_c (abc)}$$

$$= \log_{abc} a + \log_{abc} b + \log_{abc} c = \log_{abc} (a\cdot b\cdot c)$$

$$= \log_{abc} (abc) = 1$$

$\log_m a + \log_m b = \log_m (a\cdot b)$

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

SSBCrack EXAMS

$$\frac{1}{(\log_a bc)+1}+\frac{1}{(\log_b ac)+1}+\frac{1}{(\log_c ab)+1}$$ **is equal to**

A. 1

B. 2

C. 0

D. abc

SSBCrack EXAMS

What is the value of $\dfrac{\log_{\sqrt{\alpha\beta}}(H)}{\log_{\sqrt{\alpha\beta\gamma}}(H)}$?

(a) $\log_{\alpha\beta}(\alpha)$
(b) $\log_{\alpha\beta\gamma}(\alpha\beta)$
(c) $\log_{\alpha\beta}(\alpha\beta\gamma)$
(d) $\log_{\alpha\beta}(\beta)$

$$\frac{\frac{1}{\log_H \sqrt{\alpha\beta}}}{\frac{1}{\log_H \sqrt{\alpha\beta\gamma}}} = \frac{\log_H \sqrt{\alpha\beta\gamma}}{\log_H \sqrt{\alpha\beta}} = \frac{\log_H (\alpha\beta\gamma)^{1/2}}{\log_H (\alpha\beta)^{1/2}} = \frac{\log_H (\alpha\beta\gamma)}{\log_H (\alpha\beta)}$$

$$= \frac{\frac{1}{2}\log_H (\alpha\beta\gamma)}{\frac{1}{2}\log_H (\alpha\beta)} = \log_{\alpha\beta}(\alpha\beta\gamma)$$

$$\left[\frac{\log_m a}{\log_m b} = \log_b a\right]$$

What is the value of $\frac{\log_{\sqrt{\alpha\beta}}(H)}{\log_{\sqrt{\alpha\beta\gamma}}(H)}$?

(a) $\log_{\alpha\beta}(\alpha)$
(b) $\log_{\alpha\beta\gamma}(\alpha\beta)$
(c) $\log_{\alpha\beta}(\alpha\beta\gamma)$
(d) $\log_{\alpha\beta}(\beta)$

ANSWER : C

SSBCrack EXAMS

If $\log_y x = 8$ and $\log_{10y} 16x = 4$, then find the value of y.

(a) 1 (b) 2 (c) 3 (d) 5

$\log_y x = 8$

$x = y^8$ — (1)

$\log_{10y} 16x = 4$

$16x = (10y)^4$ —

$16y^8 = 10^4 y^4$ (From (1))

$\frac{y^8}{y^4} = \frac{10^4}{2^4} = \left(\frac{10}{2}\right)^4$

$y^4 = (5)^4$

$\Rightarrow y = 5$

SSBCrack EXAMS

If $\log_y x = 8$ and $\log_{10y} 16x = 4$, then find the value of y.

(a) 1 (b) 2 (c) 3 (d) 5

ANSWER : D

SSBCrack EXAMS

If $\log_{10} x - \log_{10} \sqrt{x} = 2 \log_x 10$, then a possible value of x is given by

(a) 10 (b) 1/100

(c) 1/1000 (d) None of these

$\log_{10}\left(\frac{x}{\sqrt{x}}\right) = 2 \times \frac{1}{\log_{10} x}$

$\log_{10} \sqrt{x} \times \log_{10} x = 2$

(a) $x = 10 \longrightarrow LHS = \frac{1}{2} \times 1 = \frac{1}{2}$ ✗

(b) $x = \frac{1}{100} \longrightarrow LHS = -1 \times -2 = 2$ ✓

(c) $-\frac{3}{2} x - 3 = \frac{9}{2}$ ✗

SSBCrack EXAMS

If $\log_{10} x - \log_{10} \sqrt{x} = 2 \log_x 10$, then a possible value of x is given by

(a) 10
(b) 1/100
(c) 1/1000
(d) None of these

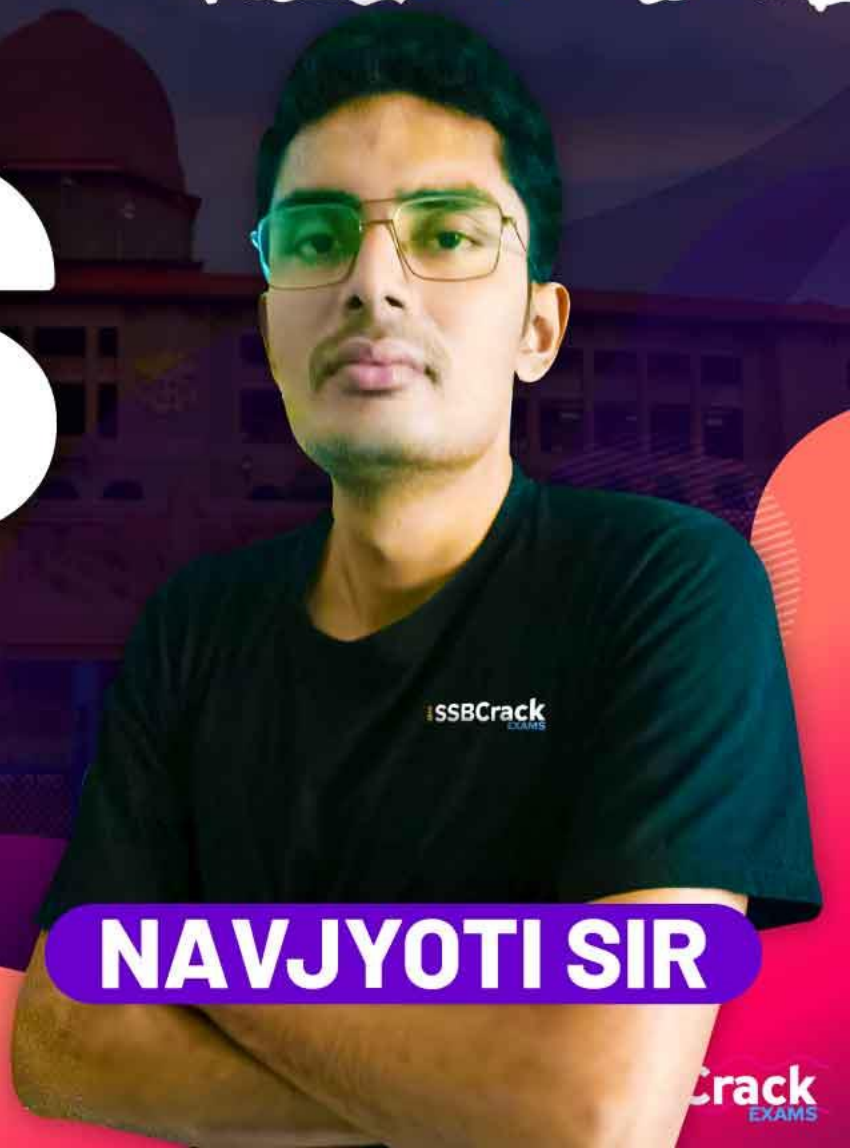
ANSWER : B

NDA 2 2024

LIVE

MATHS

BINARY NUMBERS



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