DPP-1 (LOGARITHM) **REF CODE MLJSIRLIVE**

JAI SHREE RAM

1 If $\log_7 2 = m$, then $\log_{49} 28$ is equal to

(a) $2(1+2m)$ (b) $\frac{1+2m}{2}$

(c) $\frac{2}{1+2m}$ (d) $1+m$

2. 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

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

3. $\log_7 \log_7 \sqrt{7(\sqrt{7\sqrt{7}})} =$

(a) $3\log_2 7$ (b) $1 - 3\log_3 7$

(c) $1 - 3\log_7 2$ (d) None of these

4. $7\log\left(\frac{16}{15}\right) + 5\log\left(\frac{25}{24}\right) + 3\log\left(\frac{81}{80}\right)$ is equal to

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

5. 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) $\frac{1}{2ab-1}$

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

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

7. 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) $\frac{1}{2}[\log a - \log b + 4\log 2]$

8. If $A = \log_2 \log_2 \log_4 256 + 2\log_{\sqrt{2}} 2$, then A is equal to

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

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

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

10. 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

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

(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

12. The solution of the equation $\log_7 \log_5 (\sqrt{x^2+5}+x) = 0$

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

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1. (b)

$$\log_{49} 28 = \frac{\log 28}{\log 49} = \frac{\log 7 + \log 4}{2\log 7} = \frac{\log 7}{2\log 7} + \frac{\log 4}{2\log 7} = \frac{1}{2} + \frac{1}{2}\log_7 4 = \frac{1}{2} + \frac{1}{2}.2\log_7 2$$

$$= \frac{1}{2} + \log_7 2 = \frac{1}{2} + m = \frac{1+2m}{2}$$

2. (a)

$$\log_e\left(\frac{a+b}{2}\right) = \frac{1}{2}(\log_e a + \log_e b) = \frac{1}{2}\log_e(ab) = \log_e \sqrt{ab}$$

$$\Rightarrow \frac{a+b}{2} = \sqrt{ab} \Rightarrow a+b = 2\sqrt{ab} \Rightarrow \left(\sqrt{a}-\sqrt{b}\right)^2 = 0 \Rightarrow \sqrt{a}-\sqrt{b} = 0 \Rightarrow a = b$$

3. (c)

$$\log_7 \log_7 \sqrt{7\sqrt{7\sqrt{7}}} = \log_7 \log_7 7^{7/8} = \log_7(7/8)$$

$$= \log_7 7 - \log_7 8 = 1 - \log_7 2^3 = 1 - 3\log_7 2.$$

4. (c)

Given expression $= \log\left(\frac{16^7}{15^7}.\frac{25^5}{24^5}.\frac{81^3}{80^3}\right) = \log 2$.

5. (d)

$$ab = \log_4 5.\log_5 6 = \log_4 6 = \frac{1}{2}\log_2 6$$

$$ab = \frac{1}{2}(1+\log_2 3) \Rightarrow 2ab - 1 = \log_2 3$$

$$\therefore \log_3 2 = \frac{1}{2ab-1}.$$

6. (c)

$$\log_5 a.\log_a x = 2 \Rightarrow \log_5 x = 2 \Rightarrow x = 5^2 = 25.$$

7. (c)

$$a^2 + 4b^2 = 12ab \Rightarrow a^2 + 4b^2 + 4ab = 16ab$$

$$\Rightarrow (a+2b)^2 = 16ab$$

$$\Rightarrow 2\log(a+2b) = \log 16 + \log a + \log b$$

$$\therefore \log(a+2b) = \frac{1}{2}[\log a + \log b + 4\log 2]$$

8. (c)

$$A = \log_2 \log_2 \log_4 256 + 2\log_{2^{1/2}} 2$$

$$= \log_2 \log_2 \log_4 4^4 + 2\times\frac{1}{(1/2)}\log_2 2$$

$$= \log_2 \log_2 4 + 4 = \log_2 \log_2 2^2 + 4$$

$$= \log_2 2 + 4 = 1 + 4 = 5.$$

9. (d)

$$\log_{1000} x^2 = \log_{10^3} x^2 = 2\log_{10^3} x = \frac{2}{3}\log_{10} x = \frac{2}{3}y.$$

10. (b) $x = \log_a bc \Rightarrow 1 + x = \log_a a + \log_a bc = \log_a abc$

$\therefore (1+x)^{-1} = \log_{abc} a$

$(1+x)^{-1} + (1+y)^{-1} + (1+z)^{-1} = \log_{abc} a + \log_{abc} b + \log_{abc} c$

$= \log_{abc} abc = 1$.

11. (a)

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

$= \log_a 2 . \frac{n(n+1)}{2} = \frac{n(n+1)}{2} \log_a 2$.

12. (c)

$\log_7 \log_5 (\sqrt{x^2+5+x}) = 0 = \log_7 1$

$\Rightarrow \log_5 (x^2+5+x)^{1/2} = 1 = \log_5 5$

$\Rightarrow (x^2+5+x)^{1/2} = 5$

$\Rightarrow (x^2+x+5) = 25 \Rightarrow x^2 + x - 20 = 0$

$\Rightarrow (x-4)(x+5) = 0 \Rightarrow x = 4, -5 \Rightarrow x = 4$.