

Class – 9

Topic – Logarithm

Section A (1 marks)

Evaluate the following without using log tables:

1. $\frac{\log 81}{\log 27}$ [$\frac{4}{3}$]

2. $\frac{\log 128}{\log 32}$ [$\frac{7}{5}$]

Section B (2 marks)

Evaluate the following without using the tables :

3. $2 \log 5 + \log 8 - \frac{1}{2} \log 4$ [$\log 10^2 = 2 \log 10 = 2$]

4. $\log 8 + \log 25 + 2 \log 3 - \log 18$ [$\log 10^2 = 2 \log 10 = 2$]

5. $\log \frac{75}{16} - 2 \log \frac{5}{9} + \log \frac{32}{243}$ [$\log 2$]

1. $5 \log 2 + \frac{3}{2} \log 25 + \frac{1}{2} \log 49 - \log 28$ [$3 \log 10 = 3$]

If $\log_{10} 2 = a$ and $\log_{10} 3 = b$; express each of the following in terms of 'a' and 'b':

2. $\log 12$ [$2a + b$]

3. $\log 2.25$ [$2(b - a)$]

4. $\log 5.4$ [$a + 3b - 1$]

5. $\log 60$ [$a + b + 1$]

Section C (3 marks)

6. If $\log_{10} x = p$ and $\log_{10} y = q$, show that $xy = (10)^{p+q}$. [$xy = (10)^{p+q}$]

7. Given $\log_{10} x = a$, $\log_{10} y = b$,

(i) Write down 10^{a+1} in terms of x. [$10x$]

(ii) Write down 10^{2b} in terms of y. [y^2]

- (iii) If $\log_{10} P = 2a - b$, express P in terms of x and y . $\left[P = \frac{x^2}{y} \right]$
8. If $\log 2 = 0.3010$, find the value of $\log \frac{75}{16} - 2\log \frac{5}{9} + \log \frac{32}{243}$ $[\log 2 = 0.3010]$
9. Express $\log_{10} \sqrt[5]{108}$ in terms of $\log_{10} 2$ and $\log_{10} 3$ $\left[\frac{1}{5} [2 \log_{10} 2 + 3 \log_{10} 3] \right]$
10. If $\log 2 = 0.3010$ and $\log 3 = 0.4771$, find the value of: $\log \sqrt{24}$ $[0.9005]$
11. Evaluate the following without using tables: $\log_{10} 8 + \log_{10} 25 + 2 \log_{10} 3 - \log_{10} 18$ $[2]$
12. Express $\log_{10} 2 + 1$ in the form of $\log_{10} x$ $[\log_{10} 20]$
13. If $x = (100)^a$, $y = (10000)^b$ and $z = (10)^c$, find $\log \frac{10\sqrt{y}}{x^2z^3}$ in terms of a, b and c $[1 + 2b - 4a - 3c]$
14. Evaluate: $\log_{16} 32 - \log_{25} 125 + \log_9 27$ $\left[1 \frac{1}{4} \right]$
15. Show that: $\log_a m \div \log_{ab} m = \frac{\log_a m}{\log_{ab} m}$
16. If $\log(x^2 - 21) = 2$, show that $x = \pm 11$

Section D (4 marks)

17. If, $\log \left(\frac{a+b}{2} \right) = \frac{1}{2} (\log a + \log b)$; show that $\frac{1}{2} (a + b) = \sqrt{ab}$
18. If $\log(a + b) = \log a + \log b$, find a in terms of b . $\left[a = \frac{b}{b-1} \right]$
19. Prove that: $(\log a)^2 - (\log b)^2 = \log \left(\frac{a}{b} \right) \cdot \log(ab)$
20. If $\log \frac{a-b}{2} = \frac{1}{2} (\log a + \log b)$ show that $a^2 + b^2 = 6ab$.
21. Find x , if: $\log_{10}(x + 1) + \log_{10}(x - 1) = \log_{10} 11 + 2 \log_{10} 3$ $[x = 10]$