Logarithms

OLYMPIAD EXCELLENCE BOOK

NOTES

FUNDAMENTALS

- Logarithm:- Let a be a positive real number other than 1 and $a^x = m(where\, m > 0)$ then x is called the logarithm, of m to the base a and written, as log_a m.

Example:- $(I) 10^4 = 10000$

$$\Rightarrow log_{10} = 10000 = 4$$

(II) $If 3^{-3} = \frac{1}{27} \Rightarrow \log_3 \frac{1}{27} = -3$

LAWS OF LOGARITHMS

- (I) $\log_a(mn) = \log_4 m + \log_a n$
- (II) $\log_a \frac{m}{n} = \log_4 m - \log_a n$
- (III) $\log_a a = 1$
- (IV) $\log_a 1 = 0$
- (V) $\log_a(m^p) = P(\log_a m)$
- (VI) $\log_a m = \frac{1}{\log_m a}$
- (VII) $\log_a m = \frac{\log_b m}{\log_b a} = \frac{\log m}{\log a}$
- (VIII) $\log_{a^k} b = \frac{1}{k}\log_a b$