



## CHAPTER 4 LOGARITHMS

### NOTES

**Definition of logarithm:** For a positive real number  $a$  other than 1, if  $a^m = x$ , then we define that logarithm of  $x$  to the base  $a$  is  $m$ , and it is written as  $\log_a x = m$

Thus, the logarithm of a given number  $x$  to a given positive base  $a(a \neq 1)$  is the exponent of the power to which  $a$  is to be raised in order to equal  $x$ .

**Note:** 1) Here ' $a$ ' is called the base of the logarithm, ' $m$ ' the value of the logarithm and 'log' stands for logarithm.

2) The logarithms of the same number with respect to different bases are different.

### Laws of logarithms:

I.  $\log_a (m \times n) = \log_a m + \log_a n$

II.  $\log_a \frac{m}{n} = \log_a m - \log_a n$

III.  $\log_a m^n = n \log_a m$

IV.  $\log_a m = \log_b m \times \log_a^b = \frac{\log_b^m}{\log_b^a}$

**Note:**  $\log_a 1 = 0$ ,  $\log_a a = 1$ ,  $a^{\log_a n} = n$

