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FINDING THE LOGARITHM VALUE OF ANY DIGIT NUMBER

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Abstract : ALGORITHM TO FIND THE LOGARITHM OF ANY NUMBER WITHOUT USING CALCULATORS, Conventional method of finding the logarithm is to have log table and search the numbers, it becomes very hard for the secondary, senior secondary students or college students to find the logarithm with log table some time the log tables are not available. In that case this method of finding the log is very handy which can be used to find the log of any number easily without using calculators.

Index Terms **- Calculators, logarithm**

I. INTRODUCTION

Finding algorithm of a number without any calculator or computer is very tedious when it is to finding in examination it becomes even hard to find with time pressure. The conventional log rules provides relation between multiplication, division and power of the number where if a number is a that can be represented by the product of two numbers m and n then

$$a = m \times n$$

$$\log(a) = \log(m \times n)$$

$$= \log m + \log n \qquad (1)$$

Similarly if number a is represented by division of two number m and n then

$$\log(a) = \log\left(\frac{m}{n}\right)$$

$$= \log m - \log n \qquad (2)$$

And

$$a = m^n$$

$$\log(a) = \log\left(m^n\right)$$

$$= n \log m \qquad (3)$$

II. ALGORITHM OF FINDING LOG

The method is based on the phenomenon that any number small or large can be written as the sum and product of numbers. Assuming a number is written in the form of $(x+y)z$ where x is whole number, y is decimal number and z is nth power of ten $\left(10^n\right)$ where n = 0, 1, 2, 3, …….

Let a number 99937 the number can be written in the form of whole number decimal and power of ten

$$99937 = (9 + 0.9937)10^4$$

Here 9 is whole number, 0.9937 is decimal number and 10^4 is 4 th power of ten.

From the conventional log rule it can be easily found the value of numbers from 1 to 10

$$\log 1 = 0$$
$$\log 2 = 0.3010$$
$$\log 3 = 0.4771$$
$$\log 5 = 0.6989$$
$$\log 7 = 0.8450$$
$$\log 10 = 1$$

Log of 4, 6, 8 and 9 can be found by rule number (1) , (2) and (3).

$$\log 4 = \log 2^2 = 2\log 2$$
$$\log 6 = \log(2 \times 3) = \log 2 + \log 3$$
$$\log 8 = \log 2^3 = 3\log 2$$
$$\log 9 = \log 3^2 = 2\log 3$$

Hence the values of log from 1 to 10 is

log1	0
log2	0.3010
log3	0.4771
log4	0.6020
log5	0.6389
log6	0.7781
log7	0.8450
log8	0.9030
log9	0.9542
log10	1

III. FORMATION OF FORMULA

A number a that can be written as $a = [(x + y)z]$ the log of number a can be written as

$$\log a = \log[(x + y)z]$$

$$\log[(x + y)z] = \log z + \log x + \frac{2y}{[(2x + y)2.303]}$$

Here 2.303 is constant.

For any number like 945

$$\log(945) = \log[(9 + 0.45) \times 10^2]$$

Here x = 9, y = 0.45 and z = 10^2

Hence

$$\log(945) = \log(10^2) + \log 9 + \frac{2 \times 9}{[(2 \times 9 + 0.45)2.303]}$$

$$= 2.9754$$

IV. CONCLUSION

The method of finding log of any number with the help of log table is very tedious work when the calculators or computers are not available. The method uses simple log rules and very simple representation of any number in the form of decimal, whole number and exponent form after simple mathematics the formula derived here can be very handy for the school and college students also professionals.