# Extended Programmings of Spreadsheet

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## INTRODUCTION

Scientists and engineers have just started to use electronic spread sheet for saving time, and to solve tedious calculations (1). Author have developed many engineering programs useful in implementations of first degree engineering models (2). However more complicated engineering programs require novel features, invented by author to solve such problems as linear and non linear programming, query, B-trees and programming.

Each cell in the electronic spread sheet must be fully utlize to enable the desired reiterations for an immedaite evaluations of results, manipulations by comparison, modelling by query and a quick presentations of results on the screen. Many early engineering and scientific calucations, with tedious programming in Basics, are solved with great similarity but with a fantastic ease in computer aided engineering, computer aided manufacture and design (CAE, CAD, CAM) operations. The limitations implicit in the technical models specially in operation research, and engineering practices is fit in the expanded spread sheet reported in this article.

## PROGRAMMING LANGUAGE AND SEMANTICS:

In principles if function facilitates engineering functions by the statement of form:

$$@if(a1=b1, @if( IF (a_2 = b_1, p_2, @IF(a_2= b_1, p_3 \cdots )(1)$$

Where $a_1$ inputs users data $b_1$; p1 perform the programmed operation from the file.

The template of the results are quired through the following statements:

$$@if(e10 = b\$17, @VLOOKUP(a8,a8..e13,4),a8) \quad (2)$$
$$@if(e11=b\$17, @HLOOKUP(a8,a8..a13,4), a8) \quad (3)$$

The utility of the above functions are demonstrated in the programms covering recursive relations in simplex algorithm, in linear programming and recursive relations in dynamic programming of various models in operation research (3,4).

Equation 1 takes up to 29 instructions; these instructions may be linked or continued through the same instructions in a more complicated programmings. This equation does not limit the user from querying the data or manipulating them. However, it happens to be most useful in engineering or scientific calculations where there are limited set of variables. For example, PH scale in chemical research, or relative volatility in distillation modelling in chemical engineering or certain set of queuing in operation research involving multiple servers. The same equation may be applied in other areas with pertinent variables. The application of instructions accompaning the spread sheet in such programming, expands and increases the scope of the job. Another aspect of these equations, is matching of codes with data or descriptions, qoutations may be used to replace numbers or codes with descriptions.

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