LINEAR PROGRAMMING

SIMPLEX METHOD :-

This method is an iterative (step by step) procedure in which we proceed in systematic steps from an initial B.F. solution to other B.F. solutions and finally, in a finite number of steps, to an optimal B.F. solution, in such a way that the value of the objective B.F. solution. in such a way that the value of the objective function at each step is better than at the preceding step In other words the simplex algorithm Consists of the following main steps.

(i) Finding a trial B.F.S. of the L.P.P.

(ii) Testing whether it is an optimal solution or not.

(iii) Improving the first B.F.S. (if it is not optimal) by a set of rules.

(iv) Repeating the steps (ii) and (iii) till we get an optimal solution.

SLACK AND SURPLUS VARIABLES

1. **Slack Variables :-**

If a constraint has a sign $\leq$, then in order to make it an equality we have to add something positive to the left hand side.

The positive variables which are added to L.H. sides to the constraints to convert them into equalities are called the **slack variables.**

For example. Consider the linear programming problem

$$\text{Max } Z = 2x_1 + 3x_2 + 4x_3$$

$$\left.\begin{aligned} x_1 + x_2 + x_3 &\leq b_1 \\ 2x_1 + 4x_2 - x_3 &\leq b_2 \end{aligned}\right\} \quad -(1)$$

$$x_1, x_2, x_3 \geq 0$$

In order to convert Constraints (1) into equalities equations we add x_4 and x_5 on L.H.S. of (1). then we have

$$x_1 + x_2 + x_3 + x_4 = b_1$$

and $2x_1 + 4x_2 - x_3 + x_5 = b_2$.

Hence x_4 and x_5 are called the slack variables.