Module 3: Linear Programming

Learning Objectives

It was discussed in module 2 that optimization methods using calculus have several limitations and thus not suitable for many practical applications. Most widely used optimization method is *linear programming* which is the main objective of this module. The characteristics of *linear programming problem (LPP)* and also different techniques to solve LPP are introduced.

The module starts with the definition of *LPP*, underlying assumptions and elementary operations. Illustration of graphical method will help to conceive the idea behind the solution of *LPP*. This will also help the reader to visualize the overall concept though explained for only two decisions variables. Once the concept becomes clear, theoretical as well as logical approach of most popularly used *simplex method* will be explained. Discussion on r*evised simplex method*, *duality* in *LPP*, *Primal-Dual* relation, *Dual simplex method* and *sensitivity* or *postoptimality* analysis will help the reader to understand the practical application of *LPP*. Among the other algorithms for solving LP problems, *Karmakar's projective scaling method* will be outlined.

At the end of the module the reader will be able to

1. Formulate the LPP.
2. Conceptualize the *feasible region*.
3. Solve the LPP with two variables using graphical method.
4. Solve the LPP using simplex method.
5. Formulate the dual problem from primal.
6. Analyse the sensitivity of a decision variable.
7. Run and analyse the results of user friendly software for *LPP*.