Abstract

In this thesis different types of single objective and multi-objective fuzzy chance constrained programming models, where fuzziness is present in the chance constrained programming problem either in objective function or in the constraints or in both in the form of fuzzy random variables and fuzzy numbers are considered. The methodologies to solve different types of fuzzy chance constrained programming models are discussed by converting the mathematical models into their equivalent deterministic models. Throughout the thesis we have considered the chance constrained programming problem under fuzzy environment. All the methodologies have been developed by using the concept of Buckley’s fuzzy probability theory.

Single objective fuzzy chance constrained programming models are solved by converting the mathematical models into their crisp equivalent deterministic models using $\alpha$-cut technique and chance constraint method. Crisp deterministic models are solved by existing methodology or software. Throughout the thesis, the mathematical model is solved using the LINGO Schrage (2008b) software.

In this thesis, a new solution procedure is proposed to solve multi-objective fuzzy chance constrained programming problem after finding out the deterministic equivalent model of multi-objective fuzzy chance constrained programming problem. The fuzzy random variables are generated using the fuzzy known parameters of the different continuous distributions. These parameters are taken as triangular fuzzy numbers, exponential fuzzy numbers and trapezoidal fuzzy numbers. In order to solve multi-objective fuzzy chance constrained programming problem, first fuzziness is removed using $\alpha$-cut technique. Then randomness is removed using
chance constraint method. After removing fuzziness and randomness the problem is known as crisp multi-objective deterministic models. We have considered, fuzzy programming approach, $\epsilon$-constraint method, and weighting method to handle the multi-objective mathematical programming problem to obtain the compromise solution.

This thesis not only contains single objective and multi-objective fuzzy chance constrained programming problem in different fuzzy distributions but also different mathematical programming problems, namely fuzzy stochastic transportation problem, fuzzy stochastic quadratic programming problem, fuzzy stochastic two stage programming problem and fuzzy stochastic bi-level programming problem in single objective and multi-objective functions.

**Keywords:** Fuzzy Programming, Multi-Objective Programming, Stochastic Programming, Chance Constrained Programming, Fuzzy Probability, Transportation Problem, Two Stage Programming, Quadratic Programming, Bi-Level Programming.