

## ABSTRACT

This thesis deals with the optimality and duality for inequality constrained and cone constrained mathematical programming problems. We first introduce the notion of a non-smooth and non-convex function called semi-invex and study its subdifferential and its properties to derive the optimality conditions for inequality constrained programs. Another class of non-smooth and non-convex functions is introduced and we discuss the equivalence of saddle points and optima for inequality constrained programs. We then consider inequality constrained programs, where the functions involved are defined on a set of measurable subsets of a finite atomless measure space. We study in detail the necessary and sufficient conditions for both unconstrained and constrained programs involving set functions. Finally we discuss the optimality conditions for mathematical programming problems involving generalized convex multifunctions and multifunctions possessing tangent derivatives.

**KEY WORDS** : Locally Lipschitz, Non-smooth Optimization, Subdifferential, Non-convex, mathematical programming, set functions, multifunctions, multiobjective programming.