Chapter I is a brief introduction and chapter wise summary of the results contained in the thesis.

Chapter II deals with the Symmetric duality in nonlinear programming. The weak duality, forward duality and converse duality theorems have been given for a pair of nonlinear programming problems for semilocally Pseudo Convex/semilocally Pseudo Concave functions under feasibility condition. Also the weak, forward and converse duality theorems for semilocally Invex are discussed.

Chapter III deals with the Generalized Convexity and a pair of nonlinear mixed integer programming problems. Here the weak, forward and converse duality theorems for a pair of nonlinear mixed integer programming problems are done by considering the function to be semilocally Pseudo Convex and semilocally Invex which generalize the class of semilocally strongly Pseudo Convex functions.

In Chapter IV of this thesis generalization of Convex and related functions have been done. The concepts like semilocally logarithmic and semilocally Harmonic Convexities have been introduced which fill up a gap in the existing literature. Some other concepts like Harmonic Quasi Convex and Harmonic Pseudo Convex have also been introduced there. The relationships with various known and new concepts are discussed.
Chapter V deals with the Generalized Convexity and related functions, where a number of new non-Convex functions which are more general than the known ones are defined. The co-relation between the known and newly defined non-Convex functions are established.

In Chapter VI, the concept of Convex fuzzy mapping, Logarithmic Convex fuzzy mapping and Quasi Convex fuzzy mapping are introduced. Some theorems and results are established relating to these functions.

In Chapter VII some non-Convex functionals (which are close to Convex functionals) are defined and the behaviour of such types of functionals when they are Gateaux or Fréchet differentiable are discussed. To be more precise the concepts like Quasi-, Pseudo-, Logarithmic-, and Harmonic Convexities for such functionals have been discussed.

8.2 Scope for future research:

In course of the study, several interesting problems come into existence, which require further investigation.

In Chapters II and III applications of certain generalized Convex functions to symmetric duality in nonlinear programming are discussed. It will be useful to study the applications
of such functions to other duality formulations and to optimality results. It will be worthwhile to study the complementarity formulation to obtain some algorithms and necessary computer programmes to obtain the solutions.

In Chapter IV and V certain generalized Convex functions are defined on subsets of $\mathbb{R}^n$. It will be useful to introduce all such concepts for functionals defined on subsets of a Banach space and for fuzzy mappings.

In Chapter VI and VII certain generalized Convexity concepts for fuzzy mappings and for functionals defined on subsets of Banach space are studied. It can further be extended if one can introduce other concepts and formulate duality and optimality results in those settings.