The present thesis entitled "Numerical Techniques in Variational Inequalities" is an outcome of the study made by the author at the Department of Mathematics, Aligarh Muslim University, Aligarh, India. The theory of variational inequalities was introduced by G. Fichera and G. Stampacchia, independently in early sixties to study the problems in potential theory and mechanics respectively. The theory of quasi-variational inequalities was introduced by A. Bensoussan, M. Goursat and J.L. Lions in early seventees to study the problems arising in decision science and impulse control, which is a generalization of the study of the theory of variational inequalities.

This work is an attempt to give new results and to unify and generalize certain results scattered in literature viz. Ansari [6], Chen [24], Chang and Huang [18], Ding [35], Hartman and Stampacchia [45], Kazmi [56], Lee et al. [68,68], Noor [78,84,87,93], Parida and Sen [101], Siddiqi et al. [124,127,130,131,133] and Zeng [145].

The thesis comprises five chapters and each chapter is subdivided into various sections. In Chapter-I, a brief survey of variational and quasi-variational inequalities, vector variational and variational-like inequalities and complementarity problems is presented. All the basic definitions, notations and results which are essential for the presentation of the subsequent chapters have also been reviewed. Chapter-II deals with the existence of solutions of a vector variational inequality with and without convexity assumption in the setting of reflexive Banach space, locally convex Hausdorff topological vector and H-spaces by using the KKM theorem and pseudomonotone operators. In Chapter-III, we have developed a perturbed Ishikawa iterative algorithm to obtain the approximate solution of generalized nonlinear quasi-variational inequality problem and have shown that the approximate solution obtained from iterative algorithm
converges to the exact solution. Further, the existence of solutions of a generalized quasi-variational inequality for fuzzy mappings is established and an application of the main result is also discussed. Chapter-IV, contains a more general form of variational-like inequalities for multivalued maps and the existence of solutions of this class of variational inequalities in the setting of reflexive Banach space has also been proved in this chapter. The existence of solutions of a vector variational-like inequality in H-space is also discussed. We introduce in Chapter-V, a more general form of Wiener-Hopf equation and establish the equivalence of a general variational inequality with a general Wiener-Hopf equation. Furthermore it has been shown that the approximate solution obtained from iterative algorithm converges to the exact solution.

Most of the results of this thesis have been communicated for publication in different journals of repute. One paper has been published in Y.Y.U. Journal of Faculty of Education, 1(2)(1996), 161-168 and another has been accepted for publication in Memoirs Fac. Sci. Kochi University and two more have been submitted in revised form for publication.

Definitions, problems, inequalities, iterative algorithms or results in the text have been specified with double decimal numbering. For example inequality (5.3.1) refers to the first inequality appearing in the third section of the fifth chapter.

In the end a list of references of the literature consulted has been given.