In the six chapters of this thesis, existence of fixed points, common fixed points, convergence of sequence of iterations to fixed points, structure of the set of fixed points and application of some fixed point theorems to approximation theory are dealt with. The theorems are obtained in several spaces like locally convex spaces with a family of seminorms, Banach spaces, convex metric spaces (convex 2-metric spaces), star-shaped metric spaces (star-shaped 2-metric spaces) and both self and non-self maps are taken into consideration. Two new concepts of uniformly asymptotically regular map and asymptotic 1-set contraction map are introduced in this thesis.

Chapter 1 of this thesis is intended to give references to concepts and results known earlier. In chapter 2, some theorems on the existence of fixed points, the convergence of sequence of iterates to a fixed point for asymptotically nonexpansive self and non-self mappings in locally convex spaces by requiring that the map is uniformly asymptotically regular, and common fixed point theorems for a family of asymptotically nonexpansive self-mappings in a locally convex space and for certain nonlinear mappings in metrizable linear topological spaces have been obtained.

Chapter 3 deals with fixed point theorems for a sum of two mappings in reflexive Banach spaces, general Banach spaces and locally convex spaces. This chapter offers a few theorems on the existence of fixed points and the structure of the set of fixed points for asymptotic 1-set contraction and a sum of two mappings in Banach spaces, for a sum of two mappings and (weakly) asymptotically semicontractive type mappings in locally convex spaces.
In chapter 4 a few theorems on the existence of fixed points for nonexpansive and certain type of asymptotically nonexpansive mappings in product of two locally convex spaces have been obtained.

Chapter 5 deals with fixed points in convex metric spaces (convex 2-metric spaces). Theorems on the existence of fixed points for nonexpansive type mappings in convex metric spaces (convex 2-metric spaces), and for asymptotically nonexpansive mappings in star-shaped metric spaces (star-shaped 2-metric spaces) have been obtained. Further, common fixed point theorems for a pair of mappings in convex metric spaces have been established.

Chapter 6 deals with applications of a few fixed point theorems to approximation theory. Theorems on the existence of fixed points for nonexpansive mappings and Banach operators in locally convex spaces have been obtained. Some fixed point theorems of chapter 2 have been employed to obtain results for best approximation in the setting of locally convex spaces. The concept of a mapping which is asymptotically nonexpansive with respect to another mapping is introduced and theorem on the existence of fixed points and its application for such mappings are obtained. The corresponding results for asymptotically nonexpansive mappings in normed linear spaces to best co-approximation and strong best co-approximation have been established.