The Himalayan mountain range is one of the most prominent geological features on the surface of the Earth. This mountain range is a result of collision between the Indian and Eurasian continental plates and offers an excellent setup to examine the physical causes and mechanisms of mountain building. Studies of igneous rocks which are the principal units of the Himalaya play an important role in revealing these mechanisms.

Granitoids of large dimensions occur in all the structural zones of the Himalaya except in the Sub Himalaya. These granitoids are exposed in linear belts parallel to the Himalayan trend. They are widely distributed in space and time from Trans Himalaya to Lesser Himalaya and from Early-Precambrian to as young as Late-Tertiary, revealing at least 2000 Ma old history of plutonism and granitization. The present geochronological studies are confined to granitoids exposed in four of the five longitudinal zones.

This thesis describes an attempt to gain insight into a few of the problems related with the correlation of Lesser Himalayan metamorphic nappes and the tectonic significance of granitoids of the Himalaya using the Rb-Sr (isochron) dating method. Specifically, two problems have been addressed:

1. Chronology and significance of the granitoids from different zones of the Himalaya.
2. The correlation of the Kumaun Lesser Himalayan nappes and their associated klippen.

About 100 analyses on whole rocks and about 25 analyses on their constituent minerals have been carried out. A detailed discussion of the present work along with that available in literature is presented. The implications are discussed in the context of the evolution of the Himalaya.

The thesis is divided into seven chapters, a brief summary of each is given below:

Chapter 1: The geology of the Himalaya with emphasis on the classification of the rock sequences provided by Gansser (1964), Valdiya (1980a, 1983) and others, is described.

Geologically, the Himalaya are divided into five longitudinal structural zones which are delineated from one another by boundary thrusts. In a north to south traverse these zones are: (1) Trans Himalaya (2) Tethys Himalaya (3) Great Himalaya (4) Lesser Himalaya and (5) Sub Himalaya.

Chapter 2: A critical and detailed survey of the existing geochronological data on the Himalaya, obtained by different isotopic techniques, is presented to provide the background for the present investigation.

Chapter 3: The outcrops of granites or granitic rocks associated with different tectonic zones that were sampled in the present investigation are described in relation to their appropriate field settings.
Chapter 4: The experimental methods used for sample crushing, mineral separation, sample dissolution, isotope dilution and isotopic measurements by mass spectrometry are described in this chapter. Mass spectrometric analysis based on manual peak jumping and recording with chart recorder have a precision of about 2% for $^{87}\text{Rb}/^{86}\text{Sr}$ and 0.1% for $^{87}\text{Sr}/^{86}\text{Sr}$. Blank analysis run in parallel with samples show negligible contamination at the levels of Rb and Sr normally handled. An automated data acquisition system using an IBM-PC/XT developed by the author during the course of this work has enhanced the precision of analysis.

The data have been plotted on Sr evolution diagrams to calculate the age of isotopic equilibration of a given set of related samples and the Sr isotopic composition at equilibration using a two-error least-squares regression method. Criteria have been developed to distinguished departure from perfect isochronism - other than due to experimental errors. The whole rock ages fall into three age groups at 1800-2000 Ma, 450-550 Ma and 30 Ma, whereas, mineral ages vary from 16-470 Ma.

Chapter 6: The implications of the age data to the geological sequence, emphasizing the agreement or otherwise between the traditional belief and the new findings regarding the Himalayan tectogenesis are presented in this chapter. The data are discussed in terms of a general framework for the chronology of the Himalayan rock units.
The principal findings of this research are:

1. Three prominent phases of magmatism/metamorphism in the Himalaya have been found, one of them related to the Himalayan Orogeny (Tertiary) and the other two being Pre-Himalayan dated at 470-580 Ma and 1800-2000 Ma.

2. Definitive evidence for the wide spread occurrence of 1800 Ma old components in much of the Kumaun Lesser Himalayan material and their possible equivalents in the Peninsular region of India is obtained.

3. The results enable identification of more than half a dozen acidic igneous plutons intruded during Early Palaeozoic time (~500 Ma) in different tectonic settings all along the Himalayan range. It is likely that these granitic activities represent a Pre-Himalayan Orogeny.

4. At least some components of the Ladakh batholith are of Permo-Triassic age i.e. older than Himalayan Orogeny. These are considered to be the probable remnants of older continental material in the area north of the Suture Zone.

Analog recording of mass spectrometer data followed by manual reading of peak heights have limited the precision of isotopic ratio measurements to not better than 1%. The initial Sr ratios therefore, could not be determined to the accuracy required for petrogenetic interpretations. However, the following broad generalizations can be made.
1. Early Precambrian granites and gneisses with \( \left( \frac{^{87}Sr}{^{86}Sr} \right)_{i} = 0.7090-0.7230 \) and Early Palaeozoic granite with \( \left( \frac{^{87}Sr}{^{86}Sr} \right)_{i} = 0.7088-0.7181 \) originated in the upper crust either due to fusion of the pre-existing sedimentary material or regional metamorphism of their igneous precursors.

2. The Tertiary Sela granite with \( \left( \frac{^{87}Sr}{^{86}Sr} \right)_{i} = 0.7950 \) was formed from anatectic magmas generated by partial melting of the crustal material during the Himalayan Orogeny and

3. A Permo-Triassic granite with \( \left( \frac{^{87}Sr}{^{86}Sr} \right)_{i} = 0.7081 \) (Gaik granite which crystallized 230 Ma ago) which is a part of Ladakh batholith in the Trans Himalaya was derived probably from a Rb-poor source. Evolution of the Lesser Himalayan nappes/ tectonostratigraphic units have been a major subject of debate and many models have been proposed. A comprehensive correlation between different tectonic units of Kumaun Lesser Himalaya and a chronological framework for the evolution of the Himalayan region, especially in the respect of processes and time scales for magmatic/metamorphic events, are provided by the studies in this thesis.

The main conclusions of this study along with the suggested lines for future work in the region are presented in the concluding Chapter 7.