PREFACE

The present thesis embodies the researches carried out by me at the Aligarh Muslim University, Aligarh as a Junior Research Fellow and a Senior Research Fellow of the University Grants Commission.

The thesis comprises of six chapters dealing with different aspects of the study of the theory of basic hyper-geometric functions.

Chapter I gives a brief survey of some of the earlier and recent works connected with the present thesis in the field of generalized q-hypergeometric functions. The chapter also contains some preliminary concepts and important well known results needed in the subsequent text. An attempt has also been made in this chapter to make the present thesis self contained.

Chapter II concerns the study of q-Bessel polynomials given by Abdi (2) and the orthogonal q-Bessel polynomials given by Ismail(41). Some very interesting characterizations have been obtained for these polynomials. A q-analogue of a polynomial due to Karande and Thakare (45) has also been introduced in this chapter. This q-polynomial unifies q-Bernoulli, q-Euler q-Genocchi and q-Eulerian polynomials as well as q-Bernoulli, q-Euler, q-Genocchi and q-Eulerian numbers. Some results in the unified form have also been obtained for this q-polynomial.

Chapter III deals with a study of the topological and algebraic structure of the set of all complex valued functions f(z) = \sum_{n} a_{n} z^{n}, where \[ n \] is bounded. It has been established that such a set R is a commutative Branch Algebra with identity element some interesting properties of certain elements of R have also been pointed
Chapter IV introduces a new kind of hypergeometric series called 'pseudo basic hypergeometric series' that involves parameters which are both ordinary as well as those which are on the base q. Such a series has been denoted by the symbol \( A+B^Y C+D \), where \( A \) and \( C \) denote the number of ordinary parameters and \( B \) and \( D \) denote the number of parameters on the base q. It has been shown in the chapter how naturally such a series occurs when one tries to find q-analogue of certain results involving ordinary hypergeometric series. Some very interesting simple and quadratic transformations involving 'pseudo basic hypergeometric series' have also been established.

Chapter V is divided into two parts. The first part is a study of two 'Bibasic' fractional integral operators. These operators may be regarded as extensions of those due to Upadhyaya(77). A bibasic Mellin transform and bibasic Laplace transformations have also been defined here. A number of theorems involving inter-connection of these operators have been given. Some elementary properties of bibasic Mellin Transform and bibasic Laplace transforms have also been discussed.

The second part contains integral representation of 'bibasic' double hypergeometric series of higher order. Here certain integrals involving basic hypergeometric series have also been evaluated. A number of interesting special cases of the main results have been derived.
Chapter VI begins with deriving bibasic analogue of an unpublished result due to Rainville (64). It has been used to establish a 'Bibasic' analogue of a formula due to Manocha (56). The formula so established gives as a particular case, a q-analogue of a result due to Chaundy (30) and also gives a Saalschützian summation theorem for $\frac{1}{2}$.

'Bibasic' analogues of two formulae of Srivastava (74) have also been derived in this chapter and their applications discussed while studying the particular cases of the formulae established in the chapter.

To meet the requirement of clause VIII, chapter XXV of academic ordinances of Aligarh Muslim University, every chapter and its sections are well equipped with comprehensive introduction, pointing out the important results obtained. In the end a list of references of the relevant literature is given.