PREFACE

This thesis entitled "GENERALIZATIONS OF CERTAIN ORDINARY AND BASIC POLYNOMIALS SYSTEMS AND THEIR PROPERTIES" incorporates the investigations carried out by me under the guidance of Dr. B.I. Dave, Reader in the Department of Mathematics, Faculty of Science, The M. S. University of Baroda, Vadodara.

In this thesis, two general classes of polynomials and their q-analogues are constructed and their various ordinary and basic properties such as integral representations, differential equations, inverse series relations, series transformations, summation formulas etc. are derived.

The whole work is divided into seven chapters. Chapter-1 gives a brief introduction of history and development of the generalized hypergeometric function and associated polynomials; followed by inverse series relations of these polynomials together with a short account of existing literature on inverse series relations. Also, the basic hypergeometric functions and polynomials related to it are discussed. Lastly, the basic inverse series relations of certain q-polynomials and other general basic inverse relations are stated.

In Chapter-2 a general class of polynomials is defined and the properties like integral representations, differential equation (θ-form), inverse series relations, series transformations are studied for it. A part of it was presented at the 1st annual conference of the "Society for Special functions and their applications", held at Jodhpur in February 2000.Another part of this chapter was presented at State level Research seminar organized by S.P. University, Vallabh Vidyanagar in February 1999. A few known combinatorial identities are obtained as special cases from the general result.

A q-analogue of this general polynomial is constructed in Chapter-3. The various properties studied in Chapter-2 are extended in Chapter-3. A part of it was presented in the form of a paper at the "National conference on mathematical analysis and differential equations", held at the J. N. Vyas University, Jodhpur in November 1997. A piece of work of this chapter has been accepted for publication in the Journal of Indian Mathematical Society. Certain known q-polynomials are inverted through a general result.

Chapter-4 contains unification of some known polynomials. The integral representations, differential equation, inverse series relations etc. are derived for this unified polynomial form. A part of this chapter was presented at the annual conference of the Indian Mathematical Society held in December 2000 at Ahmadnagar.

In Chapter-5, the q-analogues of the results of Chapter-4 are studied. A part of this chapter was presented at the "International conference on Special Functions" held at the Institute of Mathematical Sciences, Chennai, in September, 2002.

Chapter-6 comprises of certain q-series transformation formulas which are derived using the q-integrals obtained in Chapters 3 and 5.

Some basic differentiation formulas and some q-summation formulas are worked out in Chapter-7.

First and foremost, It is my pleasant duty to express my deep sense of gratitude towards my first guide Prof. J. P. Singhal, then Head of the Department of Mathematics, Faculty of Science, The M.S. University of Baroda, for his invaluable guidance, constant encouragement and help whenever needed. After his retirement from the service, I continued to carry out the research work till the completion, under the guidance of Dr. B. I. Dave, Reader, Department of Mathematics, Faculty of Science, The M. S. University of Baroda. My sincere thanks are also due to him. He was kind enough to spare time for the discussion whenever needed.

My respectful thanks are also due to the Heads of the department of Mathematics, Faculty of Science, namely Prof. J.P.Singhal, Prof. O.P.Goyal, Prof. N.V.Patel, Shri R.R.Joshi and, present Head Prof. J.R. Patadia for providing me all possible facilities during entire period of research work.

I cannot forget the cooperation and encouragement that I have always received from my colleagues including my senior colleagues Shri A.C.Patel, Shri N.F.Patwa, Shri V.M.Kaka and others.

At this moment I have a deep feeling of gratefulness to all my family members, particularly my parents who were a constant source of inspiration and encouragement, during my studies as well as during the entire period of research work.

I also owe my deep gratitude to Dr. K.R. Kachot, Head of the Mathematics Department, Nirma University of Science & Technology, Ahmedabad, Gujarat, wherein I am currently serving. He supported and encouraged me constantly.

I am also indebted to all those researchers whose work (quoted in the bibliography) I have consulted. I am also thankful to all those renowned Professors of Mathematics with whom I had useful deliberations during various national and international conferences; for their guidance and encouragement.

Last and certainly not the least, I thank God, the almighty, for giving me strength and ability to accomplish this work, taken on hand.

Finally, I express my sincere thanks to Mr. Pranav Shukla and Mr. Pratik Pandya for making such a nice word processing in time.

Baroda
JULY, 2004

(M. D. DALBHIDE)