Acknowledgements

First and foremost, I would like to express my profound gratefulness to my supervisor Prof. Vipin Srivastava for his coherent advises, myriad patience and inspiring support throughout this research work and my carrier. I could not have completed this work without my supervisor’s enduring support and constant co-operation. My supervisor’s ebullience towards understanding the fundamental concepts and seeing their implications to the arena of inter-disciplinary areas such as mathematics, physics, biology, computer science and cognitive science etc., has been a continuous source of inspiration to me.

I would like to convey my richest gratefulness to Prof. Anil. K. Bhatnagar, S. Chandrasekhar Chair Professor at the University of Hyderabad, Hyderabad and former Vice-Chancellor of the Pondicherry University for all the help.

I am thankful to my doctoral committee members, Prof. S. N. Kaul, Prof. V. S. S. Sastry and Dr. P. K. Suresh for their valuable suggestions. My special thanks are to Prof. S. Chaturvedi, Prof. A. K. Kapoor, Prof. A. P. Pathak, Prof. C. S. Sumandana, Prof. Bindu A. Bambah, Prof. P. Anantha Lakshmi and all other faculty members at the School of Physics for their valuable words.

I am grateful to Prof. K. P. N. Murthy for his help in accessing the CMSD facility at the University of Hyderabad.

I am thankful to the Dean, School of Physics for providing the necessary facilities at the School of Physics.

I am thankful to Prof. G. Govindaraj, Head, Department of Physics, Pondicherry University for his help to finish my work. My thanks are to my colleagues at the Department of Physics, Pondicherry University for their generous support.
I am indebted to my parents for their enduring efforts to impart education as an asset to me and my sisters, without which this day of mine would have remained a dream. I would like to express my appreciation on to my wife for all the support to complete this work. My thanks are to my sisters and brothers-in-law for their support during my work. I am grateful my uncle and aunt at whose residence I have spent good amount of my time carrying out my research. I am grateful to my father-in-law, mother-in-law and their family members for their ample support.

I am thankful to my friend Dr. R. Seshagiri Rao for his constant help and hospitality at the University of Hyderabad. My thanks are to all the research scholars at the School of Physics for their valuable help.

I would like to thank all the non-teaching staff at the School of Physics, University of Hyderabad and at the Department of Physics, Pondicherry University for their help.