Acknowledgements

At the very outset, I owe to almighty Allah who has given me the strength and desire to fulfill my dreams to carry out this thesis work. Without the blessings of the all kind and merciful Allah, this thesis work would not have been possible.

Prior to my joining at IPR as a technical trainee in September 1997, I was involved in basic research work on high temperature superconductivity in Jamia Millia Islamia, New Delhi. I always had a hidden desire to continue and carry out research in high temperature superconductivity. I am extremely delighted with the grace of Allah that I could again begin from where I had left upon the advice from several of my friends to join IPR. The work at IPR in all these years have been extremely rewarding to me professionally. However, I was missing working on my research interest on high temperature superconductivity all these years. Being extremely involved on a spectrum of fusion related tasks at IPR, I was almost losing my desire to resume my research. At the same time, my paternal uncle Mr. Belaluddin Khan, my maternal uncle Mr. Wahid Hossain and my mother-in-law Mrs. Shakera Khatoon have been inspiring me to undertake research at the earliest opportunity. In these toggling uncertain phases of my life, however, my well wishers Dr. Subrata Pradhan (IPR, Gandhinagar), Dr. Sayed Ismail Azad (my brother-in-law) and Dr. Mohd. Sadiq Khan (Sr. Lecturer, Department of Mathematics, Shibli National P.G. College, Azamgarh) have inspired me many a times to carry out research works. I am extremely proud to have such relatives and friends in my life.

I take unending pleasure in expressing my sincere honor and regards to both my research supervisors Dr. Irfan Ahmad and Dr. Subrata Pradhan. They have rendered not only their expert supervisions and technical guidance during the course of this thesis but have been extremely supportive towards my initiatives. I have enjoyed working with them every minute of this thesis work right from formulating the problems, solving the problems, interpreting the results, designing the experiments, conducting the experiments and interpreting the results. I find it very difficult to fathom words expressing my sincere gratitude towards their immense supports all along as well as in boosting my moral. They have been truly my friend, philosophers and guides.
This thesis work of mine owe to a great extent to my wife Mrs. Ummerumman Md. Ali in particular apart from my beloved daughters Miss. Rifat zia and Miss. Juweriya zia and my cousin Mr. Samsad Alam Khan. Mrs. Ummerumman has been standing like a rock behind this effort of mines shouldering a lot of house chores and excusing me for not giving enough times towards my daughters. All of them have extended their supports at my late hour works. At the same time, I would like to thank Mrs. Surekha Pradhan, Mr. Sunruta Pradhan and Miss. Suyashi Pradhan for their direct and indirect helps extended during my research work.

I am thankful to my division colleagues Mr. Dilip C. Raval, Mr. Firozkhan Pathan, Mr. Siju George, Mr. Paravastu Yuvakiran, Mr. Kalpesh Dhanani, Mr. Prashant Thankey, Ms. Pratibha Semwal, Mr. Gattu Ramesh, Mrs. Hima Bindu as well as my friends Mr. M. S. Khan, Mr. Imran Mansuri, Dr. Samir Khirwadkar, Dr. Sandhya Dave, Mr. Manoj Kumar Gupta, Mr. Prashant Singh, Mr. Azadsinh Makwana and Mrs. Priyanka Brahmbhatt for their cordial helps and their constant encouragement through out my works.

I am very much fortunate in receiving the moral supports, constant encouragements and sense of confidence building in me from my uncles Mr. Maksud Alam Khan, Mr. Kamaluddin Khan and Mr. Jalaluddin Khan, my aunts Mrs. Husna Begum, Mrs. Husnara Begum and Mrs. Shamsara Begum, my brother Mr. Asif Ekbal Khan, my sisters Mrs. Shamshara Begum, Mrs. Arzumad Banu and Mrs. Tabassum Begum, my brother-in-laws Mr. Sanawwar Khan, Dr. Ismail Azad, Mr. Kalim Mirza, Mr. Saad Md. Ali, Mr. Suhail Md. Ali, Mr. Suhaib Md. Ali, Mr. Mulla Md. Saquib Ali, Late Mr. Mulla Md. Sabit Ali and Mr. Mulla Md. Sharique Ali, my cousins Mr. Naushad Alam Khan, Mr. Farhad Alam Khan, Mr. Jawed Alam Khan, Mr. Juned Alam Khan, Mrs. Anzuman banu, Mrs. Khurshida Yasmin and Mr. Tajammul khan.

No words and no languages can ever be enough to describe the support and blessings of my parents Mr. Jamaluddin Khan and Mrs. Noorjahan Begum throughout the progress of my academic career. They always believed that I could do this work. They always blessed me and supported me in all these years. They are the tallest pillars behind all my achievements.
Also I would like express my heartily thanks to my partner in carrying out some of the experiments, Mrs. Ananya Kundu. She had helped me on all occasions to complete the experiments without any difficulties. She had made the experiments looking easy with her efforts. I express my sincere thanks to my colleagues Mr. Kalpesh Doshi, Mr. Yohan Khristi, Miss Moni Banaudha, Miss Hiral Joshi and Mr. Dashrat Sonara who had helped me on different occasions in conducting the experimental works.

Finally, I would like to thank to all of those who helped me directly or indirectly in the completion of my research work.

(Ziauddin Khan)