Acknowledgements

I am grateful to almighty God for giving me an opportunity to work under the noble guidance of my reverend teacher Prof. Awadhesh Kumar Rai under whose kind supervision this thesis has come to success and completion. I am fortunate enough to avail all resources of his genial inspiration and enthusiastic encouragement throughout the course of my work. Any achievement in the life of a human being is subject to the help and support of several well wishers and my D.Phil. thesis is no exception to it.

I am grateful to Prof. Ranjana Prakash, Head, Department of Physics, University of Allahabad for her inspiration and constant motivation.

I am grateful to Board of Research in Fusion Science and Technology (BRFST), Institute for Plasma Research Gandhinagar, Gujarat for providing Fellowship as JRF and SRF and financial assistance for research work under the project “NFP-DIAG/F11/03”.

My special heartfelt thanks is duly acknowledged to Prof. Ajai Kumar, IPR, Gandhinagar, for providing the samples of Aditya Tokamak, his help and suggestions regarding experimental skill and for many pleasant conversation with his unlimited understanding. I am grateful to all my teachers of Physics Department, Prof. G. K. Pandey, Prof. V. Prakash, Prof. H. Prakash, Prof. M. C. Sharma, Prof. A. K. Mittal, Prof. R. Gopal, Prof. R. Kripal, Prof. B. K. Ghosh, Prof. R. R. Yadav, Dr. P. S. Yadav, Dr. K. N. Uttam, Dr. Pratima, Dr. V. K. Tiwari, Dr. L. Kumar, Dr. R. K. Anand and Dr. A. Kumar for constant motivation. I am grateful to Prof. D. K. Chauhan (Botany Department) for providing facility of Microscopy Lab. I am also thankful to Prof. B. Rai, former head, Department of Mathematics, University of Allahabad for reading the thesis and giving the fruitful suggestions. At this stage, I cannot forget to acknowledge all the non teaching staffs of the department, especially Mr. Gulab Singh, Mr. Vigyan Prakash, Mr. Beni Prasad and Mr. Umakant.

I also want to thank to the Ewing Christian College Allahabad, An Autonomous college of University of Allahabad for giving me the basic knowledge of the science during my B.Sc. classes, Indian Institute of Technology Guwahati for elaborating my knowledge in Physics during my M.Sc. and University of Allahabad, especially Department of Physics for providing me all type of facility and their support during the research work.

Special thanks to Dr. Ashok Kumar Pathak, who have taught me during my B.Sc. in Ewing Christian College Allahabad, given me the moral support and suggestions during M.Sc. and also played an important role
during my research work in Laser Spectroscopy Research Laboratory, Department of Physics, University of Allahabad. The whole credit of making me a diamond from a crude stone goes to Pathak sir. He has also been my supervisor in B.Sc. Physics project, where I learned the first step of new thinking other than the book stuff, this inspired me towards the research work.

I am thankful to my lab members Dr. Abhimanyu Kumar Singh, Dr. Neeraj Kumar Giri, Dr. Rahul Agrawal, Dr. Durgesh Kumar Tripathi, Dr. Rohit Kumar, Mrs. Aradhana Jyotsna, Mr. Pravin Kumar Tiwari, Ms. Shikha Awasthi, Mr. Abhishek Kumar Rai, Mrs. Vinti Singh, Mrs. Jyotsna Singh, Ms. Jyoti Yadav and Mr. Himanshu Verma for creating a friendly atmosphere at the work place and extending all possible help during the course of the experiments. I am also indebted to some of my bosom friends.

I shall fail in my duty if I don’t express my deepest sense of obligation and thankfulness to Mrs. Shanti Rai for full support and co-operation whenever I needed.

I express my deepest sense of gratitude to my uncle and aunty, Mr. Mewalal Maurya and Mrs. Indrani Maurya, for their constant blessings and encouragement, support of brothers Er. Ajay Kumar Maurya, Mr. Neelish Maurya, Mr. Vinod Kumar Maurya, Mr. Kuldeep Maurya, Mr. Sandeep Maurya and Mr. Rohit Maurya and sisters Ms. Nomita Maurya & Ms. Komal Maurya during my D. Phil. Programme. I express my heartfelt gratitude to my parents Mrs. Kalawati Maurya and Mr. Bale Prasad Maurya, my elder brothers Mr. Shiv Prasad Singh Maurya & Mr. Vijay Maurya, sister in laws Mrs. Purnima Maurya & Mrs. Umawati Maurya, younger brother Mr. Ram Singh Maurya, younger sister Ms. Ganeshiya Maurya and my niece Ms. Anokhi Maurya.

Finally, I express my sense of thankfulness and obligation to all others, who have directly or indirectly co-operated me.

(Gulab Singh Maurya)
Dedicated to

My

Uncle & Aunty

Mr. Mewalal Maurya
&
Mrs. Indrani Maurya