Acknowledgements

This thesis would not have seen the light and publications so well without the Divine Blessings of the Almighty God. Thank you Dear Lord, for answering my prayers and for giving me the strength to plod on despite my continuous wanting to give up.

I do not have words to express my gratitude to my supervisor, Prof. Sukhdev Roy, Department of Physics and Computer Science, who introduced me to this exciting area of Ultrafast Nonlinear Optics and Organic Photonics. I am extremely indebted to him for his excellent supervision, patience, encouragement, inspiration and faith in my ability that I received, throughout. His creative ideas and suggestions enlightened me all through my research work.

I am especially indebted to Prof. P.K. Kalra, Director, DEI and Prof. G.S. Tyagi, Head, Department of Physics and Computer Science, DEI for their kind help and encouragement during my research work.

I would like to express my gratitude to Prof. C.P. Nigam (Emeritus), Department of Physics and Computer Science, DEI, Prof. Kehar Singh (Retd.), IIT Delhi and Prof. D. Narayana Rao, Hyderabad University for their kind encouragement and inspiration during this work.

I would like to thank my teachers Prof. V.R. Satsangi, Prof. C.M. Markan, Dr. Ashok Jangid, Dr. K. Soami Daya, Mr. P.S. Sudhish, Mr. Satish Kumar, Dr. G.M.S. Srivastava, Dr. Preetvanti Singh, Dr. Sanjay Saini and Dr. Sandeep Paul for their selfless moral support and encouragement. I am also thankful to Mr. Vijay Dev, Mr. Agam Srivastava, Mr. Ranjit Singh, Mr. Mukesh, Mr. Yogendra and Mr. Amol for their technical assistance.

I would like to thank many others who have also been very kind in giving me valuable advice, assistance and encouragement during different stages of this study, in particular, Prof. S.P. Singh, Dr. Ranjit Kumar and all staff members of the Faculty of Science, DEI.

My special thanks goes to Dr. Mange Ram (In-charge, Central Library), B.P. Singh Librarian Grade-I and all library staff members for providing access to various research journals, reports and other library facilities. I am also indebted to Smt. Radha, Examination Department, DEI for her invaluable help and support.
I am thankful to my seniors, Dr. Parag Sharma, National Physical Laboratory, New Delhi, Dr. Mohit Prasad, Dr. Ankur Pachauri for their support and discussions during my research work. I would also like to thank my friends and batch mates, Mr. Sunil Pratap Singh, Mr. Aman Tyagi, Mr. V. Gurucharan and Dr. Surendra Gupta for their support and encouragement. I would also like to profusely thank to Mr. Shyam Kumar, IIT Mumbai and Mr. Vishal Yadav, IIT Delhi for taking out time and making research papers available to me.

I am grateful to the University Grants Commission and Department of Science and Technology, Govt. of India for supporting me through the Junior Research Fellowship during this work. At last but not least, my most profound gratitude goes to my family who has been a timeless source of inspiration for me to pursue a doctorate, especially my mother, father and elder sister, Nirmala for staying with me at hard times. Without the personal support of my parents, the years put into my study would not have been possible. Without my parents’ love, support, and guidance I would not be the person I am today. I also acknowledge loving encouragement of Divyanshi, Priyanshi, Preeti and Shalini throughout this work.

*I would thank you from the bottom of my heart, but for you my heart has no bottom.*

September, 2015

Chandresh Yadav