Acknowledgement

वक्रतुण्ड महाकाय सूर्यकोटि समप्रभ। निर्विघ्नं कुरु मे देव सर्वकार्येषु सर्वदा॥

I express my gratitude to the Almighty for His constant encouragement and strength during my academic journey. In moments of challenge and triumph, I have found solace and inspiration in His grace.

I would like to express my utmost gratitude to Dr. B. S. Ratanpal, my devoted and attentive guide, whose constant assistance and specialised expertise have played an essential part in the successful culmination of this thesis. Dr. Ratanpal's guidance has not only shaped the direction of my research but has also been a source of inspiration and motivation throughout this journey. I express my sincere appreciation for the innumerable hours that he devoted to evaluating my work, delivering helpful suggestions, and contributing invaluable perspectives that significantly raised the quality of this thesis.

I would like to sincerely thank Dr. Dishant Pandya for his invaluable advice and assistance, which were crucial to the accomplishment of this thesis.

I appreciate the collaborative spirit of Dr. V.O. Thomas, who brought to our interactions, as well as the unique perspectives and insights that he shared. The seamless coordination of Dr. Thomas and Dr. Ratanpal greatly enhanced the depth and breadth of my research.

I am thankful to Head, Department of Applied Mathematics and Dean, Faculty of Technology and Engineering Prof. (Dr.) Dhanesh Patel. I am grateful to Dr. B. M. Shah, and DRC members Dr. Chetan Limbachiya, Dr. Trupti Shah, and Dr. Jaita Sharma for their valuable suggetions.

In addition, I would like to express my gratitude to Dr. Rajesh sir, Dr. Snehal sir, Dr. Purnima madam, Dr. Nimisha madam, Dr. Nilima madam, Dr. Pooja madam, and Dr. Neetu madam for all of their assistance. All members of the Applied Mathematics department, the office personnel of the Faculty of Technology and Engineering, The Maharaja Sayajirao University of Baroda for a seamless procedure.

In particular, I would like to thank Dr. Vishant Shah, Mr. Bhavesh Suthar, Mr. Shivam Munshi, Dr. Dhwani Sheth, and Ms. Ankita Jangid for their invaluable support during my Ph.D. tenure.

I would like to extend my sincere appreciation to the committed personnel and the esteemed Head of the Department of Applied Mathematics at Parul University, Dr. Nityangini Jhala and staff members. Their steadfast assistance, direction, and dedication to cultivating a dynamic academic environment have molded my academic journey. I am grateful to them for their contributions to my growth and learning.

I am grateful to IUCAA, Pune, India, for providing facilities where part of thesis work was carried out.

How can I forget my family for their sacrifices and for their unwavering support and love throughout the journey of completing this thesis? Their encouragement, understanding, and sacrifices have been the bedrock of my academic pursuits. To my spouse, Shreyas Patel, and daughter, Sanvi Patel, whose patience, understanding, and encouragement sustained me during challenging times. I am deeply grateful to my beloved parents, whose love and support have been my foundation.

Lastly, I wish to express my gratitude to everyone who has assisted me, whether directly or indirectly.

Patel Rinkalben Jitendrabhai