

Acknowledgement

Undertaking this PhD has been a truly life-changing experience for me and it would not have been possible to do without the support and guidance that I received from many people.

It is a great pleasure for me to express my deep sense of indebtedness and heartfelt gratitude to my guide Dr. Trupti P. Shah, Associate Professor in Department of Applied Mathematics, Faculty of Technology and Engineering, The M. S. University of Baroda, Vadodara. She has provided her valuable guidance at each and every step of this journey. Her enlightened approach, keen interest and constant encouragement made it possible for me to complete this work. Her persistent advice came a long way in researching and writing of this thesis. She is not just supervisor but also a parental figure for me. Words are not enough to express my gratitude towards her.

Moreover, I would like to express my heartfelt gratitude to the Head of the department of Applied Mathematics, The Maharaja Sayajirao University of Baroda, Dr. B. M. Shah, for his academic support and the facilities provided by him to carry out my research work. I express my gratitude to the Board of Research Committee for their suggestions during the various phases of the program.

I would also like to thank the countless experts who have offered guidance, feedback and suggestions along the way - Prof. Dhanesh Patel, Prof. Pragzna Kantawala, Dr. Purnima Pandit, Dr. Jaita Sharma, Dr. Rajesh Shah, Dr. Nilima Shah, Dr. Nimisha Pathak and Dr. Bharat Ratanpal.

I am thankful to our non-teaching staff members, Pooja ma'am, Madhuri ma'am, Shankarbhai and Ravibhai for their kind support.

Besides my advisor, I would also like to thank Dr. Anjali Jiwani from Computer Science Engineering department for their insightful comments and valuable suggestions.

I thank to Rupalim Burman, Hostel Superintendent, for providing constant support and encouragement throughout the journey. I also thank to hostel mates Chetna, Shivani and Urvi for their good wishes.

I wish to place on record my wholehearted thanks to Shardav Bhatt, Anil Chawada, Devang Pathak, Shivam Suthar for their kind help in my research whenever I required. I also thank my dear friends and colleagues, Bhavesh, Drashti, Prani, Amar sir, Vishant, Bhavyata, Gargi, Kalpna, Gayatri for their moral support and help during this

work. I would also like to thank Dr. Nakul Soni for providing guidance during the thesis writing in *LaTeX* format.

I thankfully acknowledge the university authorities for providing the financial support under ‘DST-PURSE Program Phase-II’ for the year 2018–19.

Words are not enough to express my gratitude for my parents. I would like to convey my heartfelt thanks for helping me understand what I was and am capable of, for giving me the strength I needed to follow my dreams, and for believing that I have the skills and potential to achieve my goals. There were moments when I gave up; it was only you who walked with me to provide me with the support that I needed. Without their blessings, I could not have achieved this academic milestone and reached my ambitions. Their goodwill and inspiration far exceeded what the words of appreciation can express. I would like to special thank Dr. Vijay Desai for always supporting me and giving motivations to achieve my goal. He is not only my uncle but also father figure for me. Words are not enough to express my gratitude towards him. It requires luck to have an elder and younger brother like you. My two beloved siblings - Jaymin and Sapan - greatly appreciate and feeling blessed to have both of you for providing me with the continuous motivation, appreciation, strength, understanding and help. I got so much more from the both of you than what I asked for. I am also thankful to Nirali, Devanshi, Nidhi, Reyansh, Prayag and Vaidehi for their good wishes.

I am also thankful to father-in-law and mother-in-law for supporting me to achieve my goal. Last but not the least, I would like to thank my husband, Dr. Kevil Shah for being my source of strength during this entire journey. By offering me a helping hand in everything from daily household chores to key milestones in the thesis journey. Kevil has shown equal dedication to this work as I have. Without his support and understanding, it would be difficult to complete the work. To all my sisters and family, your encouragement, warmth, and support has been instrumental at every stage of my personal and academic life.

Above all, I bow down to The Almighty God for granting me the wisdom, health and strength to undertake this research work even at the later stage of my academic life and enabling me to its completion.