Acknowledgements

The writing of this thesis has been one of the most momentous and academic challenges I have ever faced in my life. At the end of this journey I would like to express my gratitude to all those who have magnanimously extended a helping hand in every aspect that I needed during the completion of this thesis.

My prime intellectual debt is to Dr. Pankaj Gupta, Department of Operational Research, University of Delhi, Delhi, my supervisor under whose guidance I worked and enjoyed unfettered academic freedom. At every stage of this work he encouraged me to push the boundaries of my thinking. His constant encouragement during the last four years to write extensively on themes outside the purview of the present research added an assuring confidence in me. I am also thankful for his encouragement during the times when my own faith grew thin. His careful editing contributed enormously to the production of this thesis. I owe to him whatever academic maturity I have gained in my subject. I must mention here that I am thankful to Dr. Mukesh Kumar Mehlawat, Department of Operational Research, University of Delhi, Delhi and my co-scholar who kindly took trouble to exchange ideas with me and Dr. Pankaj Gupta several times. I am deeply indebted to his generosity in giving his valuable time to read through the chapters.

I thank Prof. Chandra K. Jaggi, Head, Department of Operational Research, University of Delhi, Delhi and Dr. Preeti Wanti Srivastava, the former head, for completing all the requirements related to the submission of this thesis in a timely manner.

I fondly recall Prof. Shiv Prasad Yadav, Department of Mathematics, Indian Institute of Technology Roorkee, Roorkee, who appreciated and encouraged me to work in the field of ‘Optimization’ when I was doing M.Sc. from Indian Institute of Technology Roorkee, Roorkee.

I thank Dr. P.C. Jha, Department of Operational Research, University of Delhi, Delhi and Dr. C.S. Lalitha, Department of Mathematics, South Campus, University of Delhi, Delhi, the members of my Ph.D. thesis advisory committee for the fruitful discussions and valuable suggestions.
related to this work.

I thank Dr. S.K. Mishra, Department of Mathematics, Banaras Hindu University, Varanasi for his warm and friendly support. I particularly benefited from Dr. Anand Saxena, Department of Commerce, Deen Dayal Upadhayaya College, University of Delhi, Delhi for his pin-pointed discussions as well as providing valuable suggestions for shaping this topic.

I am also thankful to Prof.(Mrs.) Davinder Bhatia (Retd.), Department of Operational Research, University of Delhi, Delhi and Dr. Manjari Srivastava, Miranda College, University of Delhi, Delhi for their kind encouragement and interest in my work. I would like to express my sincere gratitude to the members of the Mathematical Programming Seminar Group, Delhi for the fruitful discussions on various related fields from time to time.

I also thank Prof.(Dr.) S.C. Gupta, Director, Northern India Engineering College, New Delhi for providing all the possible support required to complete the work.

I express my heartfelt thanks to Prof. M.L. Garg, ITS Engineering College, Greater Noida who encouraged me enough to enter into this field of research. I also thank my colleagues Dr. Alka Pandey and Dr. Sujata Mishra for their warm and friendly support and assistance. The warm support and cordial assistance from my colleagues at the Department of Operational Research has been exemplary. Especially, I thank Mrs. Garima Mittal, my pillar of strength, for her concern and care like an elder sister and Santosh Kumar for his much appreciated support and time when I really needed it.

I express my gratitude to my mother Late(Smt.) Shiksha who always aspired to see me to achieve in higher studies. I also thank my father Sh. Rameshwer Dayal for his timely alarms insisting on the early completion of this work everytime I slipped into other work. I cherish the love, encouragement and care endowed by them.

I have no words to apologize to my mother-in-law Smt. Sarla for not contributing enough during her illness, which otherwise I could have done. I appreciate her endless support, coordination and commitment towards my son inspite of
her poor health. The words of encouragement from my father-in-law Late(Sh.) Veerendra B. Verma are still here with me but my only sorrow is that he is not here to share my happiness. All my accomplishments are due to their blessing, love and support.

Dinker, my life partner fervently pushed me to take up this task five years ago. During this period he struggled along with me in various aspects, whether it is related to family matters or my research work, like taking printouts, receiving delegates or accompanying me for attending conferences and workshops. He has been constantly the driving force for me and have always shown me the way out to the sunlight.

I am deeply grateful to my son, Divyaansh, who learnt to bear with my work and waiting for the day this Ph.D. work will be finished so that we can resume our normal life with big plans to spend time and travel together. Without his cooperation and patience it would have been impossible. I am also thankful to him for providing me the emotional support and relieving me from the stress of the work by his childish, innocent and playful activities.

Also I thank my brothers, sisters, brother-in-law, co-sister, nephew and niece who one day will forgive me for not spending time with them for years.

Above all, I wholeheartedly thank almighty for giving me the vision, power, spirit and endurance to complete this interesting research and a will to stand against all the odds to fulfill my dreams.

I do genuinely appealed to the graciousness to those whom I have failed to name above to magnanimously forgive the oversight and continue to maintain the interaction.

SHILPI VERMA