ACKNOWLEDGEMENT

At the end of this part of my journey towards research, it is the time to acknowledge and express gratitude to all those who have been a force in me to complete my research work.

First of all, I bow my head before the almighty God for showing me the path to knowledge and wisdom and also for enlightening my soul and body in my tough phases during this journey.

I am indebted and ever beholden to my erudite supervisor-teachers Prof. (Dr.) Neeta Sharma and Prof. (Dr.) Meenakshi Goyal, University Institute of Chemical Engineering and Technology Chandigarh, for their consistent guidance, persistent encouragement, constructive criticism and valuable suggestions for pursuing my research and in completing my thesis work. It would have been entirely impossible for me to achieve my goal without their direction and support.

I am grateful to Prof. V K Rattan (former Chairman) and Prof. R K Chhabra, presently Chairman, University Institute of Chemical Engineering and Technology, Panjab University, Chandigarh for providing the essential laboratory and research facilities.

I acknowledge a sense of appreciation for the help of technical staff, store incharge and other staff of this institute who in one way or the other extended their assistance and cooperation during my Ph.D. work. Specially, I thank Mr. Tulsi Ram, VICET, for giving present shape to this thesis.

Special appreciation goes to Center for Instrumentation and Laboratories, Panjab University Chandigarh for timely help in the analysis of samples.

I would also like to thank my friends especially Dr. M.C. Sidhu, Dr. Jagroop Singh Sidhu, Mr. Bhupinder Singh Bedi who were always willing to talk about my work as well as my successes. It is difficult to verbalize the deep sense of my feelings towards each of them for their consistent care, support and encouragement. Special thanks are due towards my cousin brothers Mr. Amandeep Singh and Mr. Jatinder Singh (Assistant Professor) for their unconditional support and inspiration to carry out my research work.
I offer my sincere gratitude to Mr. Gulshan Kumar Jawa, Associate Professor, SLIEET, Longowal for his worthy advice and guidance during my research. His scientific knowledge and ideas inspired and enriched my growth as a researcher. The discussions and interactions with him were invaluable. I am grateful to him for offering his hands for supporting me out always in my critical situations during these years with his intelligence, belongingness, love and care like an elder brother and a real friend.

It is difficult to pen down my deepest feelings of indebtedness towards my parents S. Babu Singh, Smt. Manjeet Kaur who have blessed me to be what I am today. I can never ever measure but always treasure their bounteous support, selfless love and silent sacrifice at various stages of my life. I am grateful to my wonderful family my grandma, Smt. Siam Kaur, Jija Ji Gurwinder Singh, sister Narinder Kaur and nephew Balkirat Singh who have always showered their love and affection towards me and shared my responsibilities during the tough and good times with all possible support.

My acknowledgement will be all meaningless without appreciating the most important person in my life, my better half, Kamaljeet Kaur for her love, great perseverance and emotional support which motivated me all along my journey towards research. I am indebted to her as she sacrificed the moments of togetherness for my research career and also taken up the responsibilities at my home in my absence with full devotion and care. I can not forget to my heartfelt gratitude to my sweet little sons Jasman Singh and Sukhman Singh who could not find the hands of their father for most of the times during my research work.

Finally, I thank Panjab University, Chandigarh for giving me the lap to grow as a researcher and to shape this thesis for my career.

Jatinder Singh