First of all, I thank ALMIGHTY ALLAH for bestowing me the strength, courage, blessing and favor in finishing this work successfully.

Foremost, I would like to thank my supervisor Prof. Qayyum Husain, Department of Biochemistry, Faculty of Life Sciences, Aligarh Muslim University, Aligarh, not only for sharing with me his experience and knowledge, but also for his guidance, perpetual support and faith in me which helped me to complete this work. It is his hard work, sincerity, dedication, perseverance and passion which have put me in shaping this thesis in the present form.

I also express my genuine thanks to Chairman, Prof. A.N.K. Yusufi, and teachers of Department of Biochemistry, Faculty of Life Sciences, Aligarh Muslim University, Aligarh.

I would like personally to thank all my seniors especially, Dr. Kulshrestha, Dr. Fatimah, Dr. Haider (who as my minor advisor guided my study as well as my personal problems) and Dr. Matto (with whom I explored the ideas, organization, requirements and development of my thesis) for their support. Special thanks go to my co-worker, Rukhsana Satar, who taught me how to write research papers, made me a better programmer, developed confidence in me when I doubted myself and brought out the good ideas in me. She also made our lab a wonderful workplace and home for the past three years. The beautiful weather in my lab has kept me in good spirits. Thanks, Rukhsana!

A huge thanks to my lovely juniors; Shakeel (chatter box), Humaira, Farheen and Zaheer for their unconditional love and support. More importantly, they taught me how to work hard and how to reduce stress. Without their encouragement, I won't have been able to finish this dissertation. They were always there to meet and talk about my ideas, to ask me good questions to help me think through my problems. Thanks you all!

Let me also say ‘thank you’ to Dr. Fahad, Atif, Jeelani, Raees, Husain, Sandesh and Taqi for helping me at any time and solving any unsolvable problem.

Last, but not least, I thank my family; my parents, for giving me life in the first place, for educating me with aspects from both arts and sciences, for unconditional support and encouragement to pursue my interests, even when the interests went beyond boundaries. No words can express my feeling for them; it’s their patience, sacrifice and prayers which are bound in this thesis. Special recognition can’t be escaped to my sister for her proximity in spite of such long distance, for listening to my complaints and frustrations and for believing in me and answer my e-mails unless I have something interesting to say, for reminding me that my research should always be useful and serve good purposes for all humankind. During these years, I missed her a lot. Love you sis!

Zoheb Karim